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Emmeline Adu-Beng

Dr. J.Puthoff

Design of Hibiscus Dye-Sensitized Solar Cells (DSSCs) Incorporating Carbon-Black Ink Electrode and Flexible Substrate

Abstract

Dye-sensitized solar cells (DSSCs) are an inexpensive and easily manufactured alternative to traditional semiconductor-based solar cells. They consist of an electron-rich organic dye that is adsorbed onto an anatase Titania substrate, with an electrolyte to replenish .the electrons, and a counter-electrode assembled between two transparent, conductive films. Previous experiments in making DSSCs relied on a graphite-pencil based counter electrode that performed inefficiently due to an issue with layer consistency. An alternative to using graphite as the counter electrode for DSSCs is to use carbon black ink, which is pigmented with fine carbon particles, to improve layer coverage when assembling the cell. The uniform coverage increases cell conductivity, thus improving the performance of the cells. The ink that was used is a common inkjet printer ink. This research study focuses on the advantages of manufacturing DSSCs with the carbon-based ink over graphite-pencil as the counter electrode. Open circuit voltages, Voe, for ink-incorporated cells were compared to cells fabricated using graphite pencil. It was determined that the carbon-black counter electrode that was heat treated (baked) provided a 270 % increase in the open circuit voltage, Voe, in contrast to the graphite counter electrode cells. Methods of ink application were also compared to evaluate which one offered the highest open circuit voltages.

Introduction/Objective

As industrialization and modernization spurs advances in technology and the socioeconomic state of the world today, it has contributed to a decline in environmental safety globally. Powering this new change is the energy, fossil fuel, used to support the machines and infrastructure that allowed for these changes. Keeping on trend, the IEA predicts world energy demand to grow by 65% and CO2 emissions by 70% between 1995 and 2020 (1). After decades of documenting the environmental impact of fossil fuels, it is evident that it is a chief contributor to not only global warming but air pollution, ozone depletion and acid precipitation. With growing concerns about the declining state of the environment, increased interest and efforts have been dedicated to finding sustainable energy sources to stem this trend. One area of interest that has been thoroughly researched is renewable energy sources, namely solar energy. A class of solar energy technology that has shown promise is the dye sensitized solar cell. With its inexpensive assembly process and biodegradable components, current research aims to improve the efficiency of these cells, aiming to create a commercial alternative to traditional solar cells. In this experiment, we aim to improve the efficiency ofDSSCs by using a carbon black ink counter electrode, comparing them to graphite counter electrodes and utilizing three different treatments: The performance of the cells will be evaluated by obtaining the open circuit voltage of the DSSCs.

Background

Solar cells, or photovoltaic cells, convert energy from the electromagnetic waves in sunlight into electrical energy. They directly convert this energy into electrical energy utilizing either a photochemical reaction, unlike solar thermal collectors that convert sunlight into heat energy, which is stored in a fluid then is used to turn a turbine to generate electricity. Dye sensitized solar cell are a third-generation thin film alternative to conventional solar cells, usually constructed with semiconducting material such as gallium arsenide or silicon. They are comprised of at least one transparent film, a wide band gap semi conductive layer, a dye sensitizer, an electrolyte and a counter electrode. The mechanism of DSSCs, depicted in Figure 1, work by absorbing photons from incident light into the photosensitive dye. The dye is then reduced, ejecting an electron into the Titanium (II) oxide layer, which then facilitates charge separation. From there, the electron enters the circuit and flows to the cathode, the charge collector, powering any load attached to the device. From the circuit, the electrons travel through the counter electrode, which reduces the electrolyte. The electrolyte oxidizes, reducing the dye, replenishing the electrons.

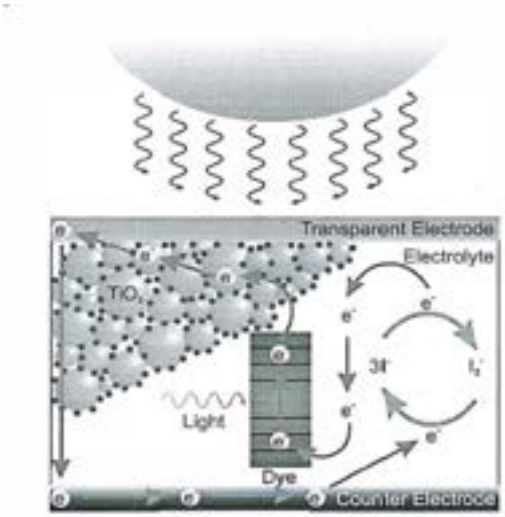

Figure 1. Schematic of the mechanism of Dye-Sensitive Solar Cells.
By *M R. Jones - Original Work, Public Domain*

The design fabricated in the experiment, depicted in **Figure 2**, used a polyethylene terephthalate film coated with a layer of indium doped tin oxide (PET-ITO), titanium oxide as the semi conductive material, hibiscus-derived dye as the dye sensitizer, an iodine/potassium iodide complex suspended in a A.-carrageenan substrate for a semi-solid electrolyte and interchangeably using carbon black ink and graphite as the counter electrode.

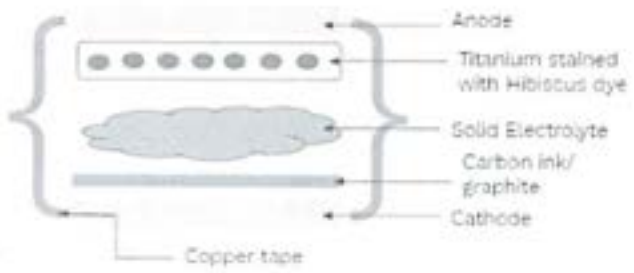

Figure 2. Schematic showing the structure of the dye sensitized solar cells fabricated in this experiment.

A core component in the performance of dye sensitized solar cells is the natural dye sensitizer, which in this experiment is extracted from Hibiscus syriacus. The dye absorbs incident light, particularly photons, causing the reduction of the dye, which then ejects an electron into the conduction band of the semiconductor. This property of the dye can be attributed to compounds known as anthocyanins, whose chemical structure bares an R group (carbonyl and hydroxyl) that forms a bond with the oxide layer (2). The mechanism by which the anthocyanin molecule becomes reduced upon absorbing the incident light is not fully understood. Also, the pigment of the dye plays a central role in the absorptive capabilities of a DSSC cell as the deep hue of the dye enables it to absorb a large spectrum of visible light. High efficiencies may be attributed to rich adsorption of dye molecules onto the TiO2 particle (2).

Titanium (IV) oxide was selected as the semiconductor of choice due to its wide band gap, which aides in effective charge separation in the electric transport of the cell, once the photon is absorbed from incident light into the hibiscus dye.

Carbon black ink and graphite were selected as counter electrodes, due to their conductive properties. The role of the counter electrode in the DSSC is to gather electrons from the external circuit and catalyze the redox reduction in the electrolyte, a mechanism that has great impact on the performance, cost and longevity of the cells (3). Carbon saturated materials prove to be an attractive candidate as counter electrodes due their low cost, high catalytic activity, high electrical conductivity, good corrosion resistance to iodine, high reactivity for triiodide reduction and high thermal stability and have been used with success as counter electrodes (3). Graphite can increase electronic conductivity in cells, while the high surface area of carbon black enhances the catalytic activity with respect to triiodide reduction (3). However, the use of carbon-based counter electrodes in DSSCs showed a 30% decrease in PCE compared to cells constructed with platinum electrodes (3). Due to the high cost of platinum and the versatile properties of carbon, continued research aims to improve on the fabrication and methodology used to fabricating carbon counter electrode as to improve their performance.

The open circuit voltage, V oc, is used as a determining factor in the efficiency of the DSSC cell. The open circuit voltage is the difference of electrical potential between two terminals of a device when disconnected from any circuit. This value represents the full electric potential of a cell, as it does not experience a voltage drop due to a load. To determine the efficiency of the cells, the open circuit voltage, the short circuit current, the fill and the power supplied are determined from current-voltage (I - V) curves (4). This curve is obtained from using a potentiometer of 500 Ohms and obtaining a

point-by-point current and voltage data at each incremental resistance value and plotted. Holding the fill factor, power supplied and short circuit current constant, the open circuit voltage is directly proportional to the efficiency the cell as indicted in **Equation 1** (4). As the open circuit voltage increases, the efficiency of the cell increases.

$$\eta = \frac{Isc \cdot Voc \cdot Ff}{Pin}$$

Eq. (1)

In addition, a reduction in Voe leads to in a smaller theoretical maximum power generated by the cell, to power devices, holding the short circuit current constant, according **Equation 2** (5).

$$P_{max} = V_{OC} * I_{SC}$$

Eq. (2)

Procedure

Polyethylene terephthalate (PET) coated with indium-tin oxide (PET-ITO) film, a thin film transparent substrate, was cut into 1 in x 1.5 in (initially, 1 sq. in) sections. Next, an ohmmeter was used to test for the conductive side of the film to ensure the conductive side of the film is used in constructing the cell. 3.00 g of titanium (IV) oxide was weighed out, along with 5.00 mL of acetic acid and mixed in a mortar and pestle until a creamy paste was created. A template with a 1.5 cm x 1.5 cm square was placed under the PET-ITO film and taped into place. Next, the titanium (IV) oxide paste was spread onto the conductive side of the PET-ITO film. The tape was removed, and the complex was baked in a preheated furnace at 120 °C for 4.5 hours.

After removal from the furnace and cooling to room temperature, hibiscus dye, prepared by boiling hibiscus flowers in a beaker and filtering the resulting solution, was lightly sprayed onto the PET-ITO/ TiO2 complex. Next, the electrolyte solution was created by mixing 1 mL of 0.5M Iodine, 10 rnL ethylene glycol, 5 mL of potassium iodide into a beaker then transferred into a storage container. After, 0.5 g oO .. -carrageenan, 12 mL of industrial water were stirred together until a smooth consistency was reached. 14 drops of acetonitrile and 7 drops of the electrolyte solution were mixed into the carrageenan gel until a uniform consistency was reached. The PET-ITO film with the titanium oxide coating was taped down again with Scotch tape and a small amount of the electrolyte mixture was carefully spread on it with a lab spatula. Next, another PET-ITO film was taped down over a template and the material for the counter electrode was applied. For graphite as the counter electrode, a No.2 pencil was used to fill the template square of the conductive side of the PET-ITO. To apply the ink, a glass stir rod was dipped into the ink container and the ink was spread onto the conductive film. The ink was either allowed to air dry or baked dry at 120 °C for 30 minutes in a furnace. To assemble the cells, the PET-ITO/TiO2 complex, hibiscus dye and electrolyte mix was placed onto the films with the ink, with the electrolyte and counter electrode facing each other. Next, I-inch long strips of copper tape were placed on opposite ends of the cell to hold the cells together and provide a contact point to test the cells. For the initial cells, the 1 sq. in PET-ITO films were placed onto each other, and the tape was attached at the ends, touching the outside of the cells. The final cells were

assembled using the 1 in x 1.5 in PET-ITO film, and they were assembled such that the conductive layer was exposed for each electrode, with the copper tape running from the nonÂconductive side of one film, to the conductive side of the other, on both ends of the cell. All cells were assembled at room temperature (23 C) to eliminate the effect of temperature on the open circuit voltage.

To test the cells, the completed cells were placed under a 120 V AC (60 Hz, 6 Amps) LED lamp, outputting a luminous intensity of 800 lumens at a distance of 15 cm. A multimeter was used to measure millivolts. The multimeter was attached across the two contacts of the cell, giving the open-circuit voltage (Voe) reading for the cell.

Results

Table 1. Counter Electrodes and the maximum Voe obtained based on different treatment conditions.

Electrode	V_{oc} (mV)
Graphite	70.5
Air dried Carbon Black Ink	125.2
Baked Carbon Black Ink	191.5

Discussion

Table 1. shows the open circuit voltages of cells formulated with graphite and carbon black ink, which were tested using a multimeter and LED lamp. The results show the baked ink produced the highest open circuit voltage of 191.5 m V compared to open circuit voltages obtained for the air-dried carbon black ink cell and graphite cell. The open circuit voltage value from the baked carbon black ink imply an increase in performance of DSSC constructed with this material and fabrication method. The improved performance of the baked carbon ink can be attributed to the even coverage of the counter electrode across the surface of the PET-ITO substrate, improving the electron transport throughout the cell. With the assembly of the semisolid gel like electrolyte, the air-dried carbon ink electrode was adsorbed into the electrolyte, breaking down the counter electrode layer and depressing the electron transport mechanism in the cell. The performance of the graphite can be attributed to uneven coverage of the PET-ITO with the electrode material due to the application method. Due to the decreased surface area covered by the graphite and the density of the graphite on the substrate, the electron transport mechanism is theorized to be poor. Further data analysis of the topography of the counter electrode is needed to support these conclusions. In addition, open circuit voltage itself is not enough to sufficiently quantify an increased performance of the cells but gives enough indication that this route needs to be investigated further. To quantify the performance of the cells with this new material, I-V curves should be constructed to characterize the cells, and efficiency analysis should be performed.

Conclusions

This experiment explores inexpensive and effective methods for fabricating dye sensitized solar cells. Based on the two counter electrode, carbon black ink and graphite, and the three different fabrication method, mechanically applying the graphite onto the substrate, air drying and baking the carbon black ink onto the substrate, the carbon black ink proved to be a more effective electrode in improving the electron transport of the cell and the baking of the ink proved to be an improved method of fabricating the cells. Despite the improvement in performance, few recommendations could improve the performance of each variation of the DSSC cells created. The fabrication of the graphite can be improved by ensuring the PET-ITO layers don't not make contact once cell is constructed, as this greatly reduces the open circuit voltage of the cell. Also, fabrication of the cells with a solid electrolyte, instead of the gel-like "Acarrageenan iodine complex, would improve the cell structure as well as performance.

Acknowledgements

We will like to thank the Department of Chemical and Material Engineering at California State Polytechnic University, Pomona for sponsoring our research. We would also like to thank Dr. Jonathan Puthoff for his mentorship and direction during this experiment.

Appendix/References

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Jeyashree Alagarsamy

Dr. Steve Alas
*RSCA

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Biofilm Formation on Human Prosthetic Metal Alloys

Abstract

Solid biomaterials with characteristics such as high biocompatibility or corrosion resistance are now being implanted in the human body more frequently for a wide range of purposes. However, they lack longevity due to prosthetic loosening caused by metal corrosion or chronic bacterial infection. When bacteria adhere to and proliferate on the biomaterial surface, the bacteria produce extracellular polymeric substances, primarily polysaccharides, which mediate cell-to-cell adhesion and formation of biofilm. Therefore, our lab is investigating new biometals with properties that are less ideal for biofilm formation, so that prosthetics in patients have a higher rate of success and increase the longevity of human implants. In this study, using two different biofilmforming bacteria, we report that Titanium-boron metal alloys, compared to traditional metals, may serve as better alternatives for modern prosthetic biometals.

Background

The life span of the world's population continues to increase and statistics predict that there will be a dramatic rise in the number of orthopedic prosthetic implant surgeries required for knee or hip replacement to stabilize and repair bone fractures (1). Prosthesis is an artificial replacement of a part of the body such as a tooth, eye, a facial bone, a hip, a knee, or another joint, the leg and an arm. The most commonly used prosthetic materials in biomedical field are stainless steel (SS), commercially pure titanium (CpTi) and titanium alloy with 6% aluminium and 4% vanadium (Ti64). SS is usually used for temporary implants. Ti64 alloys have an outstanding combination of biocompatibility, moderate specific stiffness, and high specific strength (2) and are broadly used as hard tissue replacements in artificial bones, joints, and dental implants.

Longevity of prosthetics vary depending on several factors such as age, activity level, weight and other health-related complications. One of the major problems associated with these implant materials is aseptic loosening, which is an inflammatory response to the implant material and it's debris produced by corrosion (2). Reasons for prospthetic failure include loosening at the bone-metal interface, periprosthetic fracture, wear, implant malposition, dislocation instability, or materials fatigue (3). Second major problem with an implant is bacterial colonization. Prosthetic joint infection, also known as a periprosthetic infection, is described as an infection involving the joint prosthesis and adjacent tissue (3). Bacterial infection of a joint prosthesis that leads to surface colonization is a major complication that is currently difficult to cure with antibiotic treatment. In most cases, removal of the prosthesis is the only way to address the complication.

Biofilms are bacterial communities held together by a secreted matrix called extracellular polymeric substances (4). Biofilm formation is a tactic used by many bacteria to evade antibiotics and host immune response in natural environment. Biofilminvolved cells are considered 100 to 1000 times more resistant to antibiotics and disinfecting agents than free floating planktonic cells (5). An In vitro study showed that Pseudomonas aeruginosa, Staphylococcus aureus and Staphylococcus epidermidis can easily form biofilms on stainless steel and titanium orthopedic screws (6).

Surface modifications are emerging as a most promising strategy for preventing biofilm formation. The new class of titanium alloys containing boron that we study have been identified for their improved mechanical properties. Even with a low addition of boron (0.5wt% B) to Ti64, a significant increase in yield strength was observed (7). These new metal alloys should meet the complex mechanical and environmental challenges when present in the human body.

Objectives

Our long-term goal is to extend the life of a prosthetic implant by identifying new metal alloys that are less susceptible to bacterial colonization.

Materials and methods

Using two major biofilm-producing bacteria commonly found to colonize surgical implants, Staphylococcus epidermidis and Pseudomonas aeruginosa, we investigated the biocompatibility of novel metal alloys with regard to their susceptibility to biofilm propagation. We examined stainless steel (SS), commercially pure titanium (CPTi), titanium alloy (Ti64), and titanium-boron metal alloys. Ideal experimental conditions were obtained using a biofilm reactor with (continuous culture) or without (batch culture) a constant infusion of growth media during biofilm formation. Biofilm formation was analyzed using crystal violet staining in a spectrophotometer (λ = 540 nm absorbance) and LIVE/DEAD BacLight staining (propidium iodide and SYTO 9) in a fluorescent microscopy to determine the amount of biofilm growth. Non-biofilm forming bacterial strains were used as negative controls.

Results

1. Staphylococcus epidermidis biofilm formation on boron metal alloys

a. Crystal violet staining on boron metal alloys

Amount of biofilm formed on the stainless steel and boron metal alloys by S. epidermidis was quantified by crystal violet staining after incubation period. Optical density (OD) was measured using a Nanodrop spectrophotometer. In the batch method, least amount of biofilm was observed on Ti64 + 0.04% boron as shown in figure 1. Whereas in flow method, both Ti64 + 0.04% boron and Ti64 + 0.1% boron showed least amount of biofilm formation compared to stainless steel as shown in figure 1.

b. Viability staining on boron metal alloys

Furthermore, in order to determine the bacterial viability of the biofilm on the surface of the metal, LIVE/DEAD BacLight staining was performed. This would give a qualitative visualization of both live and dead bacteria on the surface of the metal alloys. Using this method, we found that, similar to crystal violet staining, both Ti64 + 0.04% boron and Ti64 + 0.1% boron showed least amount of biofilm formation compared to stainless steel as shown in figure 2.

2. Pseudomonas aeruginosa biofilm formation on boron metal alloys

a. Crystal violet staining on boron metal alloys

In contrast, batch phase P. aeruginosa formed less biofilms on several boron metal alloys as shown in figure 3. While in flow phase, CpTi + 0.1% boron showed least amount of biofilm formation compared to stainless steel as shown in figure 3.

a. Viability staining on boron metal alloys

To validate our crystal violet staining, P. aeruginosa biofilm formation on boron metal alloys was observed using backlight staining to visualize live and dead bacteria. We observed that CpTi + 0.1% boron showed least amount of biofilm formation compared to stainless steel as shown in figure 4.

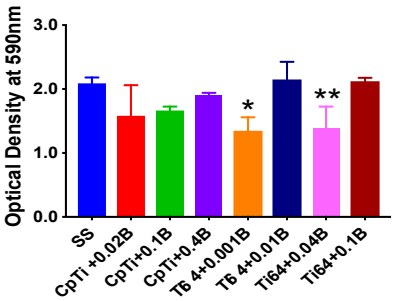
Conclusion

Results indicate that, compared to SS, Titanium-boron metal alloys displayed the least biofilm formation by either bacteria. Specifically, Ti64+0.04%B and Ti64+0.1%B for Staphylococcus epidermidis and CpTi+0.1%B for Pseudomonas aeruginosa. Thus, we show that, compared to traditional metals such as SS and CPTi, Titanium-boron metal alloys may be better alternatives as a modern prosthetic biometals.

Appendix

Figure 1: Crystal violet staining of S. epidermidis biofilm formation on boron alloys

Staphylococcus epidermidis 35984 - 72h Batch



Staphylococcus epidermidis 35984 - 72h Flow

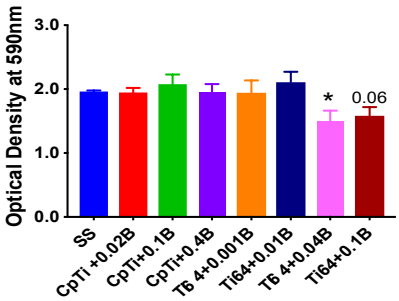
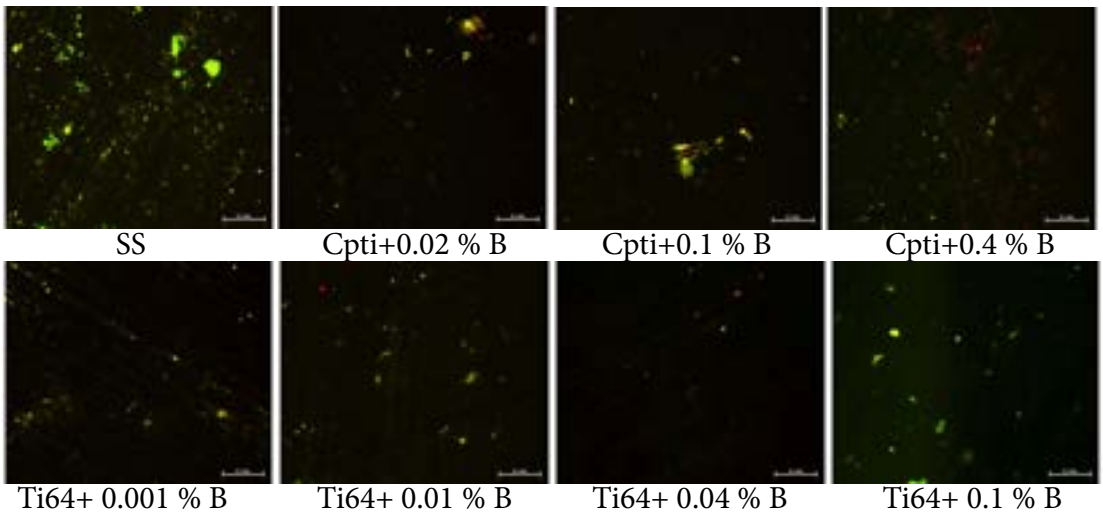


Figure 2: Viability staining of S. epidermidis biofilm formation on boron alloys

Staphylococcus epidermidis 35984 - 72h Batch



Staphylococcus epidermidis 35984 - 72h Flow

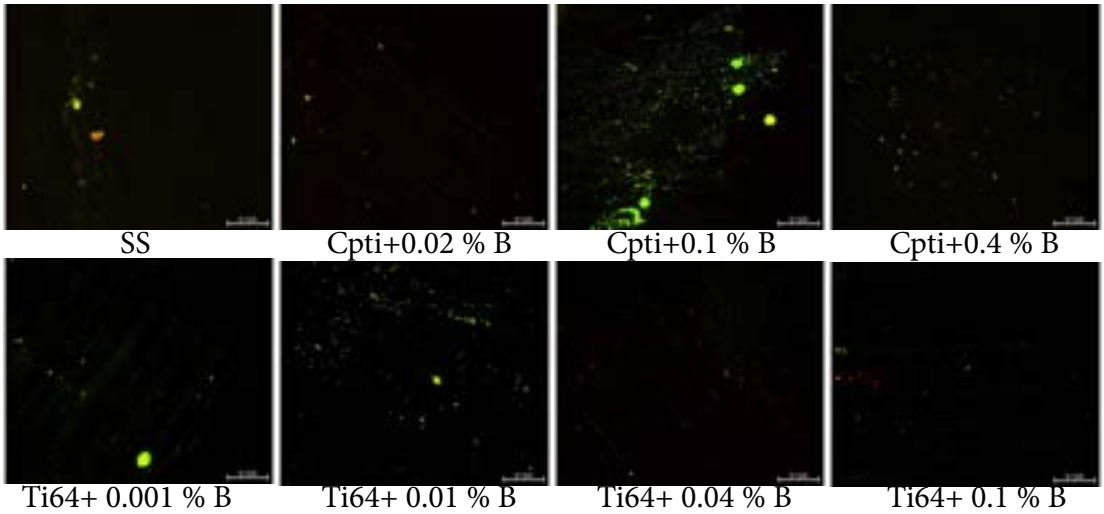
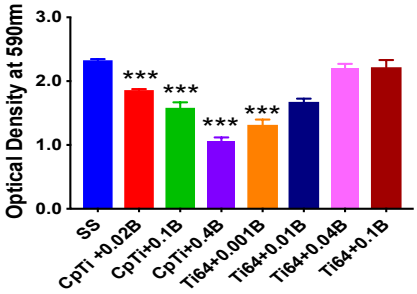


Figure 3: Crystal violet staining of P. aeruginosa biofilm formation on boron alloys

Pseudomonas aeruginosa PAO1 - 72h Batch



Pseudomonas aeruginosa PAO1 - 72h Flow

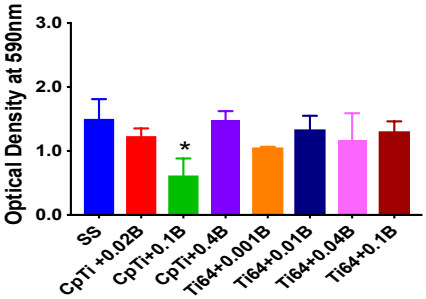
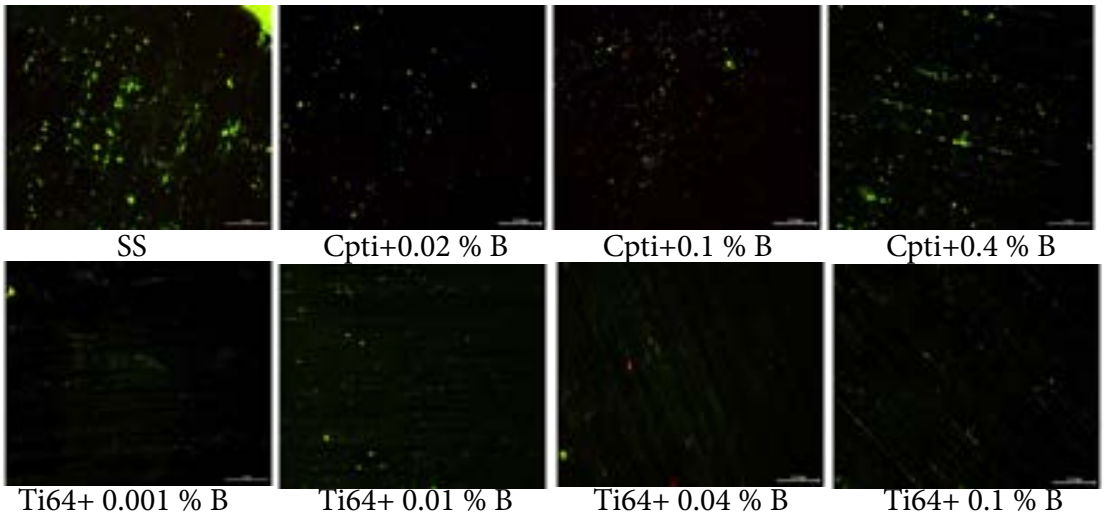
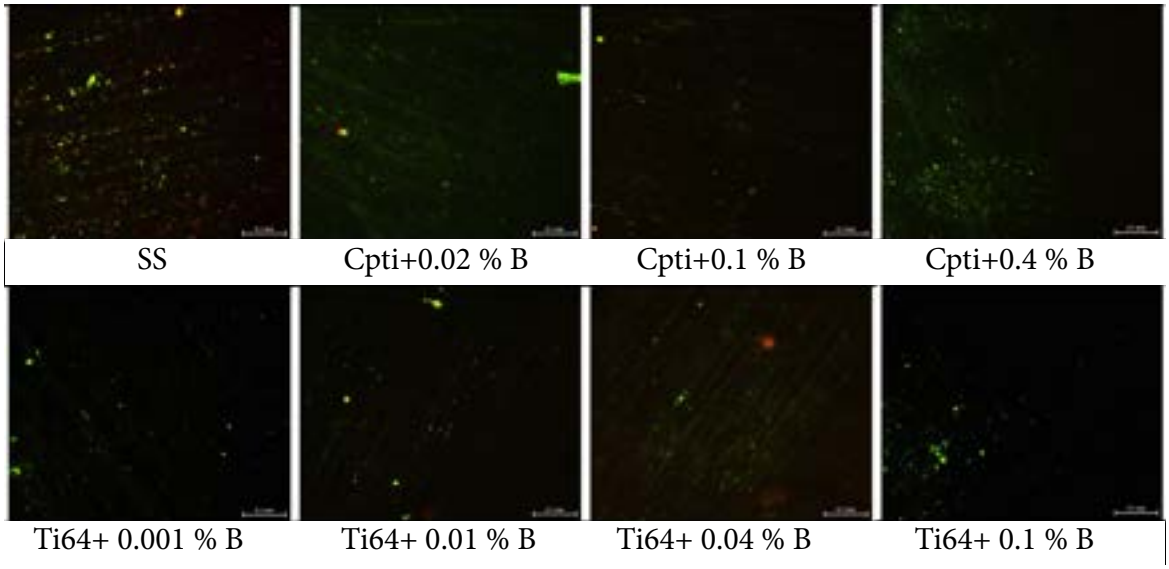


Figure 4: Viability staining of P. aeruginosa biofilm formation on boron alloys

Pseudomonas aeruginosa PAO1 - 72h Batch



Pseudomonas aeruginosa PAO1 - 72h Flow



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Bryan Arciniega
Dr. Adam Summerville

A quantitative comparison between machine learned and analyst predictions on equity prices

Abstract

The object of this paper is to compare the results of stock prediction of a machine learning algorithm and the price targets of buy-side wall street analyst. We begin by gathering price history and analyst price targets for stocks that meet these criteria: $200bln and above market cap, over $1mln average volume, in the technology sector, and on any exchange in the US. We implemented Facebook's Prophet forecasting package to build a model to predict future stock prices based on the price history gathered. We evaluated based on regression and classification regarding price and buy, sell, hold ratings. We were able to conclude that Prophet, a simple-to-use open source forecasting toolkit was universally more accurate in predicting price and buy, sell, hold ratings.

Introduction

Artificial intelligence (AI) is the development of computers systems that perform tasks with similar or improved intelligence of human beings. An AI powered equity prediction algorithm can provide investors with unbiased information and_increase their portfolio ROI. One of the most notable algorithm powered investment funds is known as the Medallion Fund which is the most profitable investment fund in history with an average annualized return of thirty five percent over twenty years. Another example of the potential of AI is the comparison of year to date returns (YTD) between the S&P500 and AIEQ. AIEQ, is a fully autonomous exchangetraded fund that buys and sells stocks of companies. It's YTD return as of December 2018, is 11.08 percent compared to the S&P 500 index's 6.12 percent. (6) Machine learning has made technological advances and implementations such as voice assistants, medical devices, and education but there has not been advances in its implementation of the equities market. This may be because breakthroughs in quantitative analysis are trade secrets and have not been publicly shared. With more public research in machine learning and quantitative analysis, the field of study can be advanced.

The use of Artificial Intelligence has been pioneered by the field of finance for many decades and will continue to be investing in this space. In a survey conducted by Baker and Mackenzie, 33% of correspondents said they plan to implement it in their trading system, 39% portfolio optimization, 45% in financial research, and 49% in risk management and compliance.

There are two types of analysis that investors rely on before making a trade in the stock market. The first is fundamental analysis, this is the study of the intrinsic value of a company based on primary information such as financial reports or reports from stock analysts. The second is technical analysis, this method studies the price action or price history of a security to predict the future price levels. Fundamental analysis begins with the company's financial reporting such as their income statement, balance sheet, and cash flow statement. Technical analysis solely relies on the stock's price history. The reasoning behind this is that all relevant information should already be "priced in" to the stock price.

In the paper, Predicting and Beating the Stock Market with Machine Learning and Technical Analysis, the author uses neural networks and support vector machines to build their machine learning algorithm. (5) Using these two methods is common in the research done by others. A second paper titled, Stock Price Prediction Using Neural Networks with Hybridized Market Indicators also uses artificial neural networks. (1) In an attempt to have similar methodologies as previous researchers, this experiment will also use these two methods. In their experiments, they compare the results from the machine learning algorithm and results from their technical analysis method; however, we are trying to study the possibility of artificial intelligence to surpass humans so our distinction will be comparing the results from our algorithm to the results from the stock analysts' community.

Prophet was built by Facebook's data science research team led by Sean J. Taylor and Ben Letham, to be able to forecast enterprise needs like future server space. Instead of forecasting with ARIMA, it uses a Bayesian curve fitting method to create forecast based on time series data and seasonality changes. The reason we used prophet was because it was the easiest model to implement since prophet automatically finds the seasonal trends beneath the data and it does not require intensive manual fine tuning like other packages. The author's make this clear by stating, "We have found Prophet's default settings to produce forecasts that are often accurate as those produced by skilled forecasters, with much less effort." Stock market quotes are a form of time series data which is why we are using prophet to forecast.

Hypothesis

My hypothesis is that a stock prediction algorithm will be more accurate in the prediction of future stock price than stock analyst's price prediction. There is debate of whether stock analysts could be biased in their published ratings of company. In the paper, Finding Diamonds in the Rough: Analysts' Selective Following of Loss-Reporting Firms, the author concludes that an analyst would find it more difficult to accurately evaluate a loss-operating company than a profit operating company. (2) A machine learning algorithm would not have any incentive to report predictions outside of what the data evaluated will prove. For this reason, I believe that the stock analyst's price targets in the sample will be farther from the price prediction of the AI because of the possible bias of stock analysts.

Methodology

The design of the experiment is to compare the price targets of a sample of stock analysts and the price prediction of the AL The objective of this research is to build a Python class-based tool for stock analysis and prediction. I will be using Will Koehrsen's Stocker toolkit and Facebook's Prophet library that is helpful in analyzing time series data on daily intervals such as stocks. (4) Data on stock analysts price targets and ratings will come from Yahoo Finance API and MarketBeat.com.

Data for the Stocker toolkit will come from the quandl WIKI database which gives us access to years of daily price data. For this project there are two different data sets. One is the price history needed for the prediction model and the second is the data set of analyst ratings. I will be doing my research on all stocks that meet these criteria: $200bln and above market ca, over$ lmln average volume, in technology sector, and on any exchange in the US. I chose these criteria because I wanted companies that were popular enough to have more than a few stock analyst following them since this data was essential to our project. I also chose a large average volume so that the stock prices moved relative to the sentiment of the greater market and could not be manipulated. After running this criteria through the stock screen Finviz, on November 15, 2018, we were left with these companies: CSCO, FB, INTC,

MSFT, T, VZ. For the first data set I will be using the Quandl financial library API to gather price history from the IPO date up to March 27, 2018. For the second data set I will be using MarketBeat.com to gather analyst ratings from March 27, 2017 to September 27, 2017.

1. **Get Data and Plot Data** - Using the Stocker toolkit we will input a stocker ticker to get the data of the daily price. After gathering the data, we will then use a method of the stocker object to plot the price history of a stock similar to what we would see in a Google Finance chart. The plotting method allows us to investigate the price history for any date range of the stock.

   microsoft = Stocker('MSFT')
   MSFT Stocker Initialized. Data covers 1986-03-13 to 2018-01-16.

   # A method (function) requires parentheses
   microsoft. plot_ stock()

   Maximum Adj. Close= 89.58 on 2018-01-12.
   Minimum Adj. Close= 0.06 on 1986-03-24.
   Current Adj. Close = 88.35.

2. **Analyze Data And Create Model** - Once we have the stock price history plotted we will analyze it using the prophet Library. A change in price is a function oftime so we will be using additive modeling and change points as our tools for analyzing and predicting our time series equations. Additive model is a nonparametric regression method which put simply allows us to represent a time series as a graph with different time scales so that we can see common trends. The model can be formed by calling the following method.

3. **Model and Data** - We will then use the prophet model to calculate for uncertainty by reducing the "noise" of the price graph. This "noise" are temporary upticks or down ticks in a stock caused by certain news or events that don't really affect the overall trend. The above code will return the model and some data that we will use to analyze the trend.

   # model and model_data are from previous method call
   model.plot_components(model_data)
   pit.show()

4. **Changepoints** - A second tool that we will use is the changepoint indicator provided by Stocker. Change points are specific point in the price or data where the trend changes from increasing to decreasing or vice versa. As you can imagine these points are significant because we can see when the price is reaching a peak, indicating a supply zone, or a bottom, indicating a demand zone.(3)

5. **Make Prediction:** To make the prediction we call the Prophet method and input how many days into the future we want to make the prediction. As Will Koerheson states model,
   model_data = amazon.create_prophet_model(days=90)
   Predicted Price on 2018-04-18 = $1336.98
   about price prediction, "Any time we make a prediction we must include a confidence interval."(4)

6. **Evaluate Prediction:** It is true that anyone can make a prediction so we must evaluate our model for accuracy. When training a machine learning algorithm we need a test set and a training set for our model to learn. The training set will be three years previous to beginning of our test set. Our test set will be one year of price data from the present. The metrics we will include are the average dollar error, the percentage oftime we predicted the correct price direction, and the percent oftime the correct value was within our confidence interval.

   microsoft.evaluate _prediction()

7. **Get Analyst Data and Clean Data:** The stock analyst's price targets will be gathered from Market beat.com and Yahoo! Finance. We began by using the data gathered from marketbeat.com. This data included the date of ratings release, brokerage/firm, action, rating given, price target (past and present), and impact on shares. We gathered all the ratings releases for all sample companies. To clean the data we discarded info like the action, impact on shares, and previous price target.

8. **Find Time Horizon For Evaluation:** Our experiment needs a time horizon to be evaluate the performance of both parties. To find this we first found the average critical point that made a rating a buy, sell, or hold. However, this critical point varied to much from company to company as seen in the table below.

Stock	Buy if >=	Sell if <=
CSCO	20%	-17%
FB	26%	-22%
INTC	25%	-6%
MSFT	18%	-34%
T	29%	-10%
VZ	12%	NA
TOTAL AVERAGE	22%	-18%

Instead of using this critical point we used the most common time horizon disclosed in the "equities rating system" of the firms. The max time horizons that some of the firms held were 12-18 months for the stock to reach their price targets based on their research. The most common was 6-12 months. We will be evaluating the price targets of the firms on a 12 month horizon. This means we will be gathering stock ratings from 3/28/2017 to 9/28/2017 so that it aligns with the prediction horizon of the algorithm.

Results:

This project was a quantitative comparison of machine learned and analyst price predictions on equity prices. We set out to evaluate the predictions of the model and analyst by using regression and classification metrics. The regression evaluation was the difference between the price predictions and the actual price. We used the Root Mean Square error to evaluate this output. The classification evaluation was the accuracy of the ratings released by the analyst and the model being a buy, sell, or hold. We used a confusion matrix to analyze the accuracy of the output. In this confusion matrix the columns were the buy, sell, hold ratings that were released by the analyst or the Prophet model. The rows were the accurate ratings after we back testea and observed the decrease or increase in price. For example, if the price increased by 10% or more then we assigned a true rating of "buy", we then compared this to what the analyst or model prection was.

Our final results are in two stages. The first result we attained is the model and prediction for each stock. The graphs shown begin on March of 2015 and end on September of 2018. The black line is the plot of the daily closing price of the stock acquired from New York Stock Exchange and ends on March 2018. The dark green line that is overlapped on the closing price is the regression model. After March 2018 and until September 2018 we only see the dark green line, this is the prediction of future price. The light green shade is the confidence interval, we can observe that the confidence interval gets larger the farther away we get from March 29 2018.

Model and Prediction for CSCO

Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	50	19	0	
Hold	0	0	0	
Sell	0	0	0	
				0.72

Prophet Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	69	0	0	
Hold	0	0	0	
Sell	0	0	0	
				1.00

Cisco Systems, Inc. is an American multinational technology conglomerate headquartered in San Jose, California, in the center of Silicon Valley. Cisco develops, manufactures and sells networking hardware, telecommunications equipment and other hightechnology services and products.

The analysis of the confusion matrix shows that the model has a much higher accuracy compared to analyst buy, sell, hold predictions. Analyst advice you to sell the stock when in fact you should 've been buying. If you would have taken their advice you would have missed out on potential capital gains.

Model and Prediction for FB

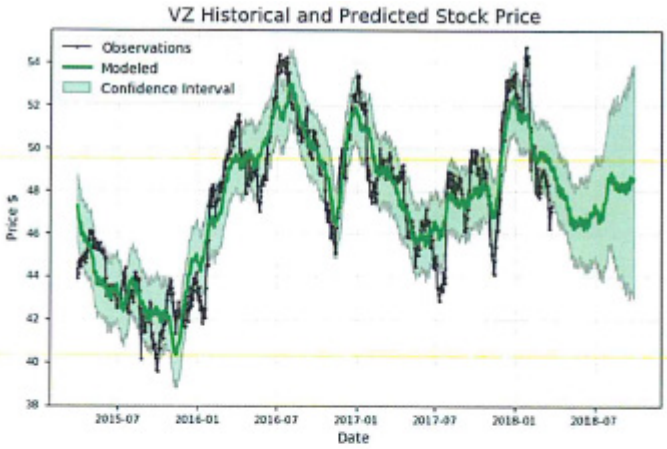
Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	70	5	0	
Hold	44	4	3	
Sell	0	0	0	
				0.59

Prophet Matrix				
	Prediction			
True Rating	Buy	Hold	Sell	
Buy	75	0	0	
Hold	51	0	0	
Sell	0	0	0	
				0.60

Facebook, Inc. is an American online social media and social networking service company based in Menlo Park, California and founded in 2004 by Mark Zuckerberg.

After analyzing the confusion matrix we see that Prophet is slightly more accurate in it's buy, sell, hold prediction. Here we begin to see the possible bias of prophet were it tells you to buy 51 times when you should be holding on the other hand, analyst made this mistake 7 times less. Although the accuracy is similar the analyst confusion matrix tells a very different story. Analyst recommended you to sell 3 times when you should be holding this means you would have sold your position and incurred the transaction cost for no good reason. They also suggested that you hold your positions instead of buying 4 times, which would not have been accurate.

Model and Prediction for VZ

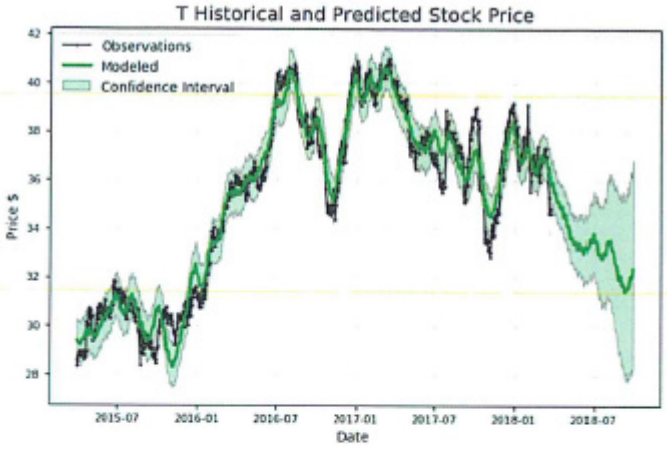


Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	2	12	0	
Hold	1	9	0	
Sell	0	0	0	
				0.46

Prophet Matrix				
	Prediction			
True Rating	Buy	Hold	Sell	
Buy	13	1	0	
Hold	10	0	0	
Sell	0	0	0	
				0.54

Verizon Communications Inc. is an American multinational telecommunications conglomerate. The accuracy of the buy, sell, hold predictions were much lower for both Prophet and analysts. This could be related to the fact that Verizon stock was very volatile. If we look at the price action compare to the other companies, is staying in between the $44 and $54 range compared to the other stocks that are much more bullish. Analysts advise you to hold the stock 12 times when you should be buying which could be detrimental to investors because instead of buying more and compounding their gains, their portfolio stays stagnant. Prophet on the other hand is much more bullish, advising you to buy 10 times when you should be holding. This is negative because you are spending money in a position that is not growing instead of using that capital for upside in other investments.

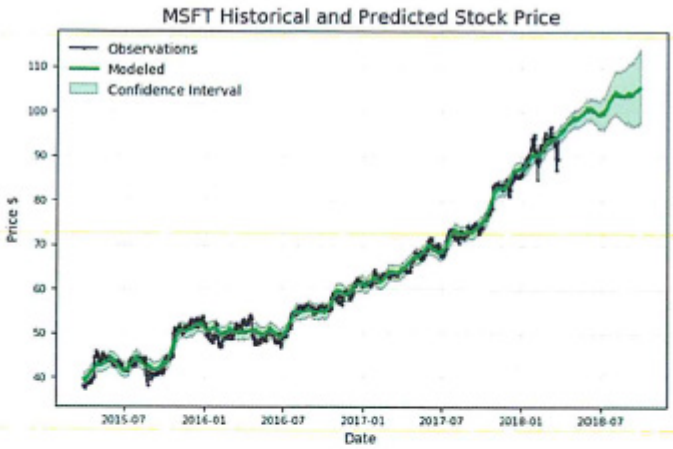
Model and Prediction for T



Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	0	0	0	
Hold	9	13	0	
Sell	0	0	0	
				0.59
	Prediction			
True Rating	Buy	Hold	Sell	
Buy	0	0	0	
Hold	0	22	0	
Sell	0	0	0	
				1.00

AT&T Inc. provides telecommunication, media, and technology services worldwide. Prophet outperformed analyst 100% to 59% respectively. This is the first time we say Prophet not predict a buy rating and instead forecasted only hold ratings which was the correct position. Analyst on the other hand released buy ratings 9 times when the correct answer was a hold.

Model and Prediction for MSFT

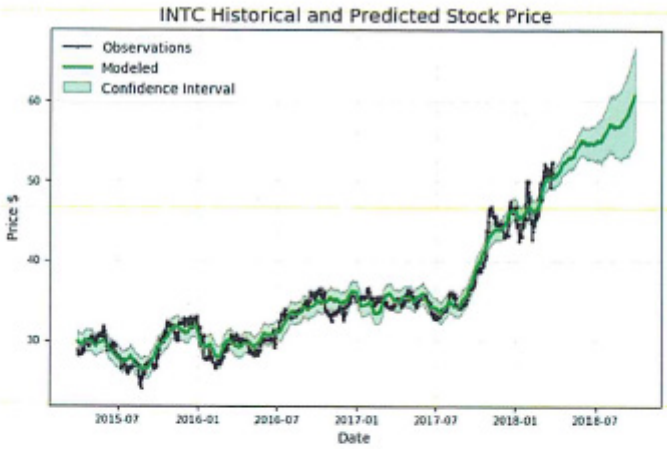


Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	65	13	3	
Hold	0	0	0	
Sell	0	0	0	
				0.80
Prophet Matrix				
	Prediction			
True Rating	Buy	Hold	Sell	
Buy	81	0	0	
Hold	0	0	0	
Sell	0	0	0	
				1.00

Microsoft Corporation is an American multinational technology company with headquarters in Redmond, Washington. It develops, manufactures, licenses, supports and sells computer software, consumer electronics, personal computers, and related services.

In this example we see again that the model outperforms analyst predictions. The story here is that analysts would advise you to sell 3 times and hold 13 times when instead you should be buying. If you were to take their advise you would have incurred transaction cost and would have missed out on the upside.

Model and Prediction for INTC



Analyst Matrix				
	Rating			
True Rating	Buy	Hold	Sell	
Buy	41	23	14	
Hold	0	0	0	
Sell	0	0	0	
Prophet Matrix				0.63
	Prediction			
True Rating	Buy	Hold	Sell	
Buy	78	0	0	
Hold	0	0	0	
Sell	0	0	0	
				1.00

Intel Corporation is an American multinational corporation and technology company headquartered in Santa Clara, California, in the Silicon Valley. They are a semiconductor manufacturer that builds many of the worlds personal computer central processors.

The analysis of the confusion matrix shows that the model has a much higher accuracy compared to analyst buy, sell, hold predictions. Analyst advice you to sell the stock 14 times when in fact you should've been buying. If you would have taken their advice you would have incurred transaction cost and missed out on potential capital gains. They also advised you to hold your positions 23 times when you should have been be buying.

Conclusion:

To explore the data we calculated the RMSE (root mean square error) for the analyst predictions and the model prediction. Since we are using a regression model, we need a performance evaluation technique that is meant for predicted numerical values not classification values and RMSE is the standard for this. To calculate the RMSE we first found the residual which is the predicted minus the actual and squared it. Then we took the square root of the sum of all residuals and divided it by sample amount. Our results are below.

Stock	Analyst (RMSE)	Prophet (RMSE)
Cisco Systems	$8.40	**$3.00**
Facebook	$20.30	**$13.70**
Intel	$11.80	**$6.30**
Microsoft	$24.80	**$3.40**
AT&T	$7.50	**$1.60**
Verizon	$3.00	**$2.50**

We found that in each case the RMSE was lower for the algorithm than for the analyst. This shows that in total the prophet model predicted a price closer to the actual price than analyst. Analyst not only release price targets for the companies they are following but also ratings for the public such as buy, sell, and hold. A buy rating, also known as overweight, outperform or positive, means that the analyst expect the stock increase 10% or more over the next 12 months. Similarly a sell rating indicates the expectation that a company will decrease over the next 12 months by 10% or more. A hold rating simply means that the stock may move within this range but is not expected to break out of the support or resistance levels. To find the accuracy of the ratings for each we took number of times that analyst rating prediction was correct and divided it by the number of ratings in total. The results are below:

Stock	Analyst (Accuracy)	Prophet (Accuracy)
Cisco Systems	.72	**1**
Facebook	.58	**.59**
Intel	.45	**.54**
Microsoft	.80	**1**
AT&T	.59	**1**
Verizon	.46	**.54**

In conclusion Prophet, an easy-to-use open-source AI predictor, performed better than analysts on every analyzed stock. However we do see that Prophet tended to overestimate the performance of the stocks as it never predicted a sell rating. This could be do the fact that the stocks we analyzed were in a bullish rally and so it forecasted that this rally would continue. Prophet was more accurate in real dollars, it prediction was closer to the actual price compared to stock analyst. However, for volatile stocks like Verizon and AT&T its accuracy was barely above a coin toss. Universally, Prophet had better accuracy than stock analyst.

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Stephanie Barrow
Dr. Mario Guerrero

Gender Bias: How It Influences Supreme Court Decisions on Reproductive Rights

Abstract

Women's issues have played a crucial role in the progression of society. The Supreme Court has affected this progression by ruling on reproductive cases, even with no female representation on the bench. The Court ruled on women's issues long before women ever served on the Supreme Court. This paper will study the role that gender plays in the decision-making process of Supreme Court justices by analyzing twenty-seven reproductive cases that the Court has heard at since their formation. Each case will be examined by looking at majority and dissenting opinions and comparing those to the justice's gender. This paper will also examine if justices' decisions changed once women were appointed to the bench. Through these case studies, this thesis will determine if gender bias affects the decision-making of the Court on reproductive rights.

ACKNOWLEDGEMENT

I dedicate this thesis to my mother and father. I want to thank you for showing me that my gender did not need to dictate my place in society. Thank you for supporting me and believing in me throughout my college career.

I would also like to thank my aunt for reminding me how to stay strong during difficult times. Life does not always go the way you planned, but it is how you conduct yourself that defines you as a person. I only hope that one day I can portray just an ounce of your strength.

Thank you to everyone who played a role in my growth. Just know that I could not have written this thesis without your love and support.

INTRODUCTION

The Supreme Court of the United States has a huge influence on those living in the United States, and very few Americans are aware of the power the justices hold. Until relatively recently in American history, the panel of justices has been made up entirely of men. This meant that a court of men made decisions for half of the population that historically had never received representation on the Supreme Court. Once women finally entered the Court, the question remained whether this affected the Courtâ€™s decision-making. Scholarship shows that gender affects decision-making, specifically regarding issues pertaining to women. Thus, it is not only important to examine gender as it occurs in the Supreme Court, but specifically how the justicesâ€™ gender affects their decision-making. The only genders being discussed in this research are men and women, since currently no justice has identified as a different gender.

Ultimately, the question this thesis asks is do the genders of the Supreme Court justices affect their decisions on reproductive rights? This thesis examines Supreme Court justices because the Judiciary is the only branch of federal government over which the people have no electoral power. However, it is still imperative for the Court to be representative of the people. This thesis chooses to highlight Supreme Court cases on contraceptives, because reproductive rights are important. The sheer number of contraceptive cases that have been brought before the Supreme Court underscores the significance of this issue, since the Court looks and chooses the cases that they believe to be the most imperative.

Contraceptives in the United States are a controversial topic, particularly between men and women, so are therefore an ideal topic to discuss in regard to gender. Since contraceptive research is geared toward females, it is important to not only look at the effects on women, but also on men. This is because reproductive rights and contraceptives affect all genders. Besides this, it is important to study how contraceptive research influences those in power.

Justices are expected to be unbiased and nonpartisan. This is because they are meant to view their cases objectively and not let their personal opinions get in the way of their decisions. However, it is impossible for any person to escape their own biases, and this also applies to Supreme Court justices. Since research shows that people's biases affect their decision-making, it leads to the belief that gender would also affect justice's decisions. This is because genders are socialized differently within the United States. It is important to examine the potential bias of these decisions, because if justices are more aware of their biases, it would be easier for them to engage in their discussions objectively. Since their job is to remain objective, it is important for them to not have their gender affect their decisions, especially because the Court makes decisions that affect all genders.

The relative influence of gender is important to consider as well. Some may argue that it is not just the gender composition of the Court that affects their decision-making, but rather other characteristics, like religion or race. It is undoubtedly important to examine all aspects of decision-making and not to assume that gender is the singular influence on people who sit on the Court. However, given the fact that the gender composition of the Court has recently shifted in ways that other demographics have not, gender is an important component of the Court to study. This paper will explore if gender does or does not affect the decision-making of the Supreme Court.

LITERATURE REVIEW

A fair amount of research has been done on the gender of the Supreme Court justices. Scholars have differing opinions on how the gender of the justices affect their decision-making. Some scholars believe that gender has a huge effect on how people behave and react, while others believe that gender rarely affects decision-making.

Research has been done on how and if the gender of the Supreme Court justices affects their decision-making. However, more research needs to be done on this topic to fully understand how gender affects decision-making. Especially because it only takes a simple majority of nine justices to permanently change the path of legislation (Mitchell, 2017). This literature review will discuss the current research that has been done on the Supreme Court justices and their decision-making. This review will begin by looking at the theoretical approaches these scholars use when examining this topic. The review will then move to the research that shows how gender affects the decision-making of the justices. After that, arguments against the idea that gender affects the Court's decision-making will be discussed. Lastly, this literature review will end with the specific research that has been done on the justices' decisions on contraceptives.

This research makes clear that there is no single issue deciding how a justice votes, but rather a wide variety of influences that affect their decisions. Scholars debate on whether gender is the predominant influence on a judge's opinion. This literature review will examine the extent of these scholar's research and will look at both sides of the argument. Recently, case law and legislation have restricted access to abortion (Goldberg, 2015). This literature review will examine why this is, and if

the genders of the Supreme Court justices affect their specific decisions on reproductive rights.

Theoretical Approaches

There have been different approaches to studying the gender composition of the Supreme Court justices. One of these approaches is "feminist legal theory." This is the study of how women's experiences affect their perspectives on the law. The first stage of this theory is that gender is irrelevant, and people are be treated as individuals. The second stage emphasizes the inherent difference between males and females. The last stage developed in the 1990s concentrates on the diversity of women and how they share a common bond with common experiences (Scheurer, 2007). There are different approaches one can take when studying the opinions of the Supreme Court justices. Certain scholars use this approach when looking at gender in the Supreme Court. This means that when scholars look at the women on the bench, they compare these justice's life experiences to the experiences of all women.

Another theory that is used when studying the voting habits of the Supreme Court justices is "legal positivism." This is law established by human authority. Positive law is law that is valid because it is enacted by an existing authority. Justice Breyer believed in this aspect of law. He stated that "the legal positivist maintains that the proper role of the judiciary is not the application of the Constitution's original understanding when adjudicating legal controversies. Rather, it is to study the needs, wants, and desires of a changing society and to reinterpret the Constitution in order to fulfill these societal needs, wants, and desires" (Philips, 2008). This is another way to examine the decision-making of the Supreme Court justices. While some believe it is important to follow the ways of the Constitution, others, like Justice Breyer, believe it is important to interpret the Constitution and mold it to society's needs. This can potentially affect the decision-making of the justices on reproductive rights.

There are two approaches a justice may take when interpreting the Constitution. The first is a "strict constructionist" who interprets the Constitution as the framer's originally intended. The second way is to see the Constitution as a "living document." This means that justices interpret the Constitution in light of recent societal changes. This is how the justices decide the right to privacy in Griswold v. Connecticut in 1965 (Telless, 2008). The decision is that criminalizing contraceptives violate marital privacy. While "the right to privacy" is not clearly stated in the Constitution, the Supreme Court has deemed it a right of the people. Other critics argue that when the Court reaches beyond the text of the Constitution to establish the right to abortion, the Court is not being held accountable and is acting as an "unelected legislature" (Shapiro, 2001). This is where the argument for and against reproductive rights comes from. If reproductive rights fall under the right to privacy or if the Court is acting as a legislative body by making their own laws.

Argument

Prior research on the role of gender on voting behavior has had competing theories about the impact of women judges. Studies have shown that women appear to be more liberal than male justices. Women in politics also approach their decisions differently than men. Davis discusses the results of studies done on women in the judiciary:

> The results from studies of gender differences in the judiciary have been inconsistent in many ways. Some of the earliest analyses of the decision-making of women judges on equality and women's rights issues produced mixed results (Cook, 1980). Allen and Wall (1993) have found that although women judges universally supported the women's position in women's issues, they were bipolar on criminal rights and economic liber- ties. In the federal courts of appeals, women judges cast liberal votes twice as often as men judges in employment discrimination cases, but voted the ame as men in obscenity and criminal search-and-seizure cases (Songer, Davis, and Haire, 1994). Gryski, Main, and Dixon (1986) found that the presence of a woman on the court resulted in a liberal outcome in gender- discrimination case (Davis, 1993).

Davis's findings show that gender can potentially play a role in the decision-making of Supreme Court justices. The fact that women tend to vote more liberally than their male counterparts makes it more likely that gender does affect how these justices vote.

Research shows how a person's gender affects their decision-making. Prior work in sociology has shown that socialization enforces the norms of society. Individuals are socialized differently by gender, affecting their identity. These gender identities have been seen throughout history. Women take on stereotypical "feminine" jobs, while males take on stereotypical "masculine" occupations. However, in the current decade, we have seen more men and women take on occupations that go against these gender roles (Scheurer, 2007). People's gender identity will affect their future experiences and these experiences can potentially affect people's decision-making.

There has been research done to show that women in politics are more likely to have a more feminine perspective on law. For example, in 2002, a study is conducted on congress members and researchers found that female legislatures are more likely to advocate and support legislation that focuses on women's issues (Scheurer, 2007). While this study is done on the legislature, it relates to the judiciary as well by showing that genders of people do affect their decision-making.

Decision-making in regard to the judicial system is also a pressing issue that has been studied. Scheurer argues that if women differ in their views of their role as judge from their male counterparts, then women may "act for women" instead of just "representing women" (2007). She explains that this means women judges are very pro-women and can therefore affect court outcomes in favor of women (Scheurer, 2007). Certain scholars believe that the genders of judges do affect their court decisions. McCall agrees that there is a belief that women will act as representatives of the gender. However, she argues that literature has failed to question the willingness of justices to fulfill this responsibility (McCall, 2003). One side of the argument believes that due to the socialization of gender, women have a different perspective in their role as a justice. In turn, women approach their decisions differently than men.

Disagreements

Not all authors believe that gender is the aspect that affects justices' decision-making. For example, Davis believes the research on gender and Supreme Court voting is not accurate, because the research relies on the belief that justices are "politically willing" to support women's rights. Davis supports this argument by studying Justice O'Connor's voting patterns. Davis found that Justice O'Connor, the first female Supreme Court justice, has a voting pattern that does not indicate a consistence of female jurisprudence (1993). McCall furthers this argument stating that only looking at the gender of the justices, the literature ignores the context in which these decisions are made. McCall argues that female justices are not rationally voting to further the rights of women (1993). Other scholars agree with the assessment that the time period of a decision is what drives the Courts decisions. Coulter makes the argument that it is not the genders of the justices themselves that affect their decision-making, but rather the societal views of gender at the time of the decision. The Court decriminalizes abortion in 1973 with Roe v. Wade. The Court has an opportunity to overturn that decision in 1992 with Planned Parenthood v. Casey. Coulter argues that even though six of the justices are appointed to overturn Roe v. Wade, the Court decides not to. This is because women have a different role in 1973. In the 1970's, women are entering the political and economic world. This means that abortion rights are more important in 1992 than they are in 1973 because women's issues are becoming the forefront of political matters (Coulter, 2018). Some scholars believe that gender does affect the Court's decision-making, but perhaps not the gender of the justices themselves.

Another argument that stands against the idea that gender determines how justices vote in reproductive cases is the simple fact that justices do not make the law, but rather they interpret it. For example, in the case Stenberg v. Carhart, Justice Breyer writes:

> We again consider the right to an abortion. We understand the controversial nature of the problem. . . . Taking account of these virtually irreconcilable points of view, aware that constitutional law must govern a society whose different members sincerely hold directly opposing views, and considering the matter in light of the Constitution's guarantees of fundamental individual liberty, this Court, in the course of a generation, has determined and then redetermined that the Constitution offers basic protection to a woman's right to choose. Roe v. Wade, 410 U.S. 113 (1973); Planned Parenthood of Southeastern PA v. Casey, 505 U.S. 833 (1992). We shall not revisit those legal principles. Rather, we apply them to the circumstances of this case (Stenberg v. Carhart, 2000).

The gender of the Supreme Court justices does not affect their decision-making. The fact that Justice Stephen Breyer bases his opinions on past precedent shows that gender does not affect his decision-making. The fact that Supreme Court justices are meant to interpret the law and not to create it shows that their decision-making on reproductive rights is not based on gender. Placone furthers this argument by stating that, "the Justices typically express agreement with the Court's decision, often reiterate a part of the ruling and occasionally add something that they believe was overlooked in the Court's explanation of the decision" (2009). The justices do not make new decisions on abortion, but rather they "reiterate" what the last Court decided. Gender of the Supreme Court justices does not affect their decisions on abortion, but rather the precedent set by past Courts is what dictates their opinions.

The last dissent in this way of thinking is the idea that ideology, rather than gender, dictates decisions on abortions. Johnson writes, "beginning in 1980, the Republican Party platform has stated: We will work for the appointment of judges at all levels of the judiciary who respect traditional family values and the sanctity of innocent human life" (2017). As of 2014, Republican presidents have appointed twelve of the last sixteen justices to the U.S. Supreme Court. The current Roberts Court is sharply divided, "with the five Republican appointees supportive of abortion restrictions that the Court previously held unconstitutional" (2010). The fact that the Republican Party is adamant about their views against abortion shows how political ideology affects the decision-making of the Court. Devins believes that justices are aware of opposition groups and are worried about "politically unpopular rulings" (2010). Ideology and pressure from political groups may play a larger role in decision-making than gender. Not all scholars believe that gender is what dictates a justice's decision-making. Other factors including precedent and ideology can affect a justice's decision.

Contraceptives

The contraceptive conversation has always created a divide in America. The debate over contraceptives comes down to two sides: either contraceptive laws are a "war on religion" or they are a "war on women" (Lipton-Lubet, 2014). Contraceptives are either a religious issue or a gender issue. This is an important distinction when looking at the rulings of the Supreme Court justices on reproductive rights. Those that make their decision on a gender issue show that gender is an aspect that affects the Court. If all the decisions made by the justices on abortion have to do with religion, then gender may not play a role in their decision-making.

Since Roe v. Wade, contraceptives have been an important question for the Supreme Court. There have been multiple cases since this landmark decision on reproductive rights. There have been studies on how the political ideologies of the Supreme Court justices affect their views on abortion. The justices' liberal or conservative stances define their views on abortion. Placone states, "the debate over Roe v. Wade has "reshaped the nation's political parties" and "for more than two decades consumed Supreme Court nominations and confirmation proceedings" (2009). The abortion debate has drastically changed in recent years. Research has been done on how the ideologies of the Supreme Court justices affect their decision-making on abortion rights. This means that more research needs to be done on how the gender of the justices affect their decision-making on reproductive rights.

Some academics find that other traits determine a justice's stance on abortion decisions. In a study conducted in 2004, Orthodox Jews are questioned on their abortion beliefs. None believed that abortions should always be illegal. Sixteen percent believed that it should be legal in a few circumstances, twenty-four percent believed it should be legal in most circumstances, and sixty percent believed it should be legal and left up to the women (Philips, 2008). Gender is not the only aspect that can affect the Courtâ€™s decision-making. There has been research done to show that religious beliefs can also affect decision-making.

The contraceptive debate has created a division within the Court. If gender is the leading reason for why a justice votes for or against abortion, it shows that gender does influence the Court's decision-making. If the justices vote for or against abortion because of their ideology or religion, it shows that gender does not affect their decision-making. More research needs to be done on how the Court reaches its decisions.

Justice's Opinions on Contraceptive

Supreme Court justices have differing opinions on reproductive rights. For example, Justice Kennedy's decision in Planned Parenthood of Southeastern Pennsylvania v. Casey is "these matters, involving the most intimate and personal choices a person may make in a lifetime, choices central to personal dignity and autonomy, are central to the liberty protected by the Fourteenth Amendment" (Sigel, 2013). Siegel goes on to explain that Kennedy's decision is not one that is made based on gender roles. Rather, his decision invokes the idea of "sex equality," which is the idea of having freedom from traditional gender roles (2013). This plays a role in the decision-making of the justices, since gender does not have to be the sole reasoning behind a decision. It opens a path where a justice, like Kennedy, is making his decisions solely on the rights protected by the Fourteenth Amendment. This means that there is a possibility that gender does not dictate the decisions of the Supreme Court.

Other Court decisions verify this point. In Stormans v. Wiesman, Justice Alito's decision is based on the fact that he does not believe that Washington's regulations are adopted for a legitimate purpose. These laws are legislation that require stores to stock the "morning after pill." Rather, Justice Alito believes they are adopted to combat pharmacies whose religious beliefs are different from the states (Ray, 2018). Not all decisions made on abortion may have anything to do with gender. Instead, some may be about politics, as Justice Alito believes is the case in Washington. Comparato adds to this argument by stating that Supreme Court justices are motivated by wanting to see the law reflect their preferred policy positions (Comparato, xiv). However, sometimes these cases may have an underlying gender bias, and justices are coming up with other reasons to hide that bias.

Hess discusses the gender bias that effects Ruth Bader Ginsburg and how that bias affects her decision-making once she enters the Court. Before becoming a prominent justice, Ginsburg struggles as a female attorney. The sexism that she faces affects her decision-making on women's rights issues (2016). The influence of gender can affect the decisions of people in the future. The fact that Justice Ginsburg struggles with sexism as a female attorney shows that gender can potentially affect the Court's decision-making. On top of that, the more women that enter the Court, the more decision-making seems to change (Hughes, 2016). This shows the importance of gender and how it can affect the decision-making of other Supreme Court justices.

All the justices come from different backgrounds that influence their decision-making. This means that the justices have different opinions on contraceptives. Some of these opinions may be dictated by gender, however some might not. It is important to look at the specific justicesâ€™ backgrounds and opinions to understand their decisions.

Conclusion

Research has been done on if gender affects the decision-making of people. Different scholars have different answers to this question. This means that more research needs to be done on this topic. This thesis will add to the conversation by determining if the genders of the Supreme Court justices affect their decision-making on contraceptives.

RESEARCH METHODOLOGY

This thesis uses a quantitative research design and case studies to determine whether gender influences Supreme Court justicesâ€™ decision-making in regard to reproductive rights. Specifically, this research uses analysis to interpret text material. This analysis is the process of evaluating texts, and coding results into quantitative data. This research begins with the qualitative data of Supreme Court decisions and converts this evidence into quantitative data. This methodology assesses how gender affects decision-making. In order to conduct this analysis, certain descriptive variables need to be accounted for. These variables are the gender of those serving on the Court, other types of decision-making including precedent and ideology, and how the Court takes gender into account when making their decision.

This study examines twenty-seven reproductive cases that the Court has looked at since the Court's formation. Cases are chosen based on their ability to fall under the "reproductive" spectrum, meaning any case that relates to reproduction or reproductive health. This includes, but is not limited to, cases on abortion, birth control, sterilization and access to education. These twenty-seven cases take place between the years of 1925 and 2014. This list of cases is comprised from "SCOTUSblog" and "ACLU." These are every major reproductive Supreme Court case that has been decided on in the last eighty-nine years. It is important to look at reproductive cases that are decided prior to women serving on the Court, and if decisions change once women are placed on the Court. This would clearly show how the gender composition of the Court influences the Court's decision-making. Twelve of the cases that are examined are decided without a woman on the bench, while the last fifteen cases do have women on the Court.

These twenty-seven cases are then coded on a variety of different variables. The first variable looks at the composition of the Court during each case. These are coded as: WomenYES (the number of women that vote in favor reproductive rights), WomenNO (the number of women that vote against reproductive rights) and WomenTOTAL (the total number of women on the bench during the decision). This analysis also codes the number of males on the Court in a similar fashion: MenYES, MenNO and MenTOTAL. This is important because it shows how certain genders vote in certain ways. This serves as a basis for the analysis, and the following variables are compared to the results of this gender variable.

Another variable that is examined is the ideology of the Supreme Court justices. By studying their ideology, one can determine what affects their decision-making more; ideology or gender. The coding for this variable is; LiberalYES (the number of liberals that vote for reproduction rights), LiberalNO (the number of liberals that vote against reproduction rights) and LiberalTOTAL (the total number of liberals on the Court at the time of the decision). The same is used for the conservatives on the Court: ConservativeYES, ConservativeNO and ConservativeTOTAL. By looking at ideology data, one can determine if a certain gender tends to vote more in line with their ideology.

Over the past eighty-nine years there have been one hundred and ten Supreme Court justices, four of which have been female. Part of this analysis is to look at how these forty-two justices vote on reproductive rights prior to women serving on the bench, and if decisions change once women enter the Court. On top of this, this research is meant to determine if women vote for reproductive rights more often than men. To do this, I looked at "Oyez", Cornellâ€™s Legal Information Institute, and Justia's database, for Supreme Court justices and decisions. Using this database, I was able to

examine how certain justices vote in the aforementioned reproductive cases. A systematic approach is used to keep track of how each individual justice votes in reproductive cases. This is then compared to the genders of the justices to determine if a certain gender votes more often in favor of reproductive health. This could potentially show how the genders of the justices affect their decision-making.

After analyzing data, the next step is to conduct case studies. This is done by exploring how often the justices look at how their decisions affect women. This discloses how gender can potentially affect the way the justices make their decision. This is done by pulling quotes from the decisions whenever a justice discusses how they came to their conclusion. These quotes are then compared to the gender of the justice who wrote them to see if justices make their decisions because they are trying to further the rights of reproductive rights, or if they base their decision solely on precedent. By looking at quotes from the opinions and dissent, it would show how the justices came to their conclusions, and if a certain gender votes consistently in favor of reproductive rights.

After all the analysis is conducted a comparison is conducted on the results. This comparison is meant to determine two things. First, if one gender tends to vote more for reproductive rights and second, how certain genders make their decisions. For example, if one gender tends to make their decision based on precedents or ideologies. If any similarities are found, it would show that gender does in fact influence the decision-making of the Supreme Court justices.

DATA ANALYSIS

The first part of this research design is to look at who votes in favor of reproductive rights. This means that the first step is to list all twenty-seven reproductive cases since 1925. After that, "Oyez" is used to determine who vote for and against reproductive rights. As previously mentioned in the section "Research Methodology," the justices are categorized under "gender" and "ideologies." This is done to compare gender and ideology to see if gender actually plays a role in the decision-making of the Court, or if it is due to another factor. Each case is listed, and a number calculation is used to determine how many women and men vote in favor of or against reproductive rights, and how many conservatives and liberals vote for and against reproductive rights. The chart below shows how data was entered.

(Insert Appendix I.)

After listing how every justice votes in these twenty-seven reproductive cases, data analysis software is used to compare the results. The first descriptive statistics creates a pie graph of the distribution of women and men votes in these cases. See the below graph to see how the different genders vote in these cases.

(Insert Appendix II.)

As demonstrated from this graph, women vote in favor of reproductive rights seventy-one percent of the time, while men vote in favor of reproductive rights sixty-two percent of time. Women do vote in favor of reproductive rights more often than men. However, there have only been four women justices on the bench, compared to the one hundred and ten men. Since there is more data to analyze for the men, it can explain why he percentages are smaller than the women. This means that currently women vote in favor of reproductive rights more often than men, however women have not been on the Court long enough for substantial research to have been conducted on them.

The last statistics examined are the ideology of each justice of the Court when they make their decisions. To determine the ideology of the justices, the Martin-Quinn analysis is used. This is a case study conducted to determine the ideology of every Supreme Court justice (Martin, 2002). After determining the justices' ideology, I can view how they vote. See the below table and graph to see how research is tabulated and the results.

(Insert Appendix III and IV.)

From this bar graph, one can see how the justices vote in terms of their ideological views. While only forty-one percent of conservatives vote in favor of reproductive rights, eighty-two percent of liberals vote in favor of reproductive rights. This clearly shows how ideology affects the decision-making of the Supreme Court. Liberal justices are two times more likely to vote in favor of reproductive rights than conservatives. Ideology affects the Court's decision more than gender, since there is a huge variation between these numbers than between the genders. This data analysis shows that ideology affects the Courts decision-making more than gender.

CASE STUDIES

After analyzing how the justices' backgrounds influences their decision-making, it is important to look at the specific decisions justices make surrounding reproductive rights. This is done by looking at the opinions, concurring opinions, and dissents of the justices. By studying their written decisions, one can determine their reasoning for voting a certain way. However, the following research is limited in scope. Academics have shown that multiple factors influence a justices' decision-making including religion, past experiences, ideology, race, and gender (Coulter, 2018). The succeeding research tries to separate these biases, however, the entanglement of all these factors is what shapes individuals' opinions. This next section will look at the written opinions of four landmark Supreme Court cases on reproductive rights to determine what shapes justices' opinions.

The first case that is examined is United States v. Vuitch (1971). This case is chosen because it is a 5-4 decision made by an all-male Court. 5-4 decisions are very important because they show how split the Court is on controversial issues. Even though almost half the Court dissents, these decisions hold the same standing as 9-0 decisions. The second case that is looked at is City of Akron v. Akron for Reproductive Health (1983). This is the first Supreme Court decision made about reproductive rights with a woman on the bench. This is studied to see if the decisions of the justices change when Sandra Day O'Conner is appointed. Ruth Bader Ginsburg is appointed to the Court in 1993 ("Ruth Bader Ginsburg", n.d). She and Sandra Day O'Conner decide on four reproductive cases while on the bench together. Out of these four, Stenberg v. Carhart (2000) will be closely examined because it is the only 5-4 decision. It is important to look at how these two women make their opinion in a controversial case. The last case that will be examined is Burwell v. Hobby Lobby (2014). This is the most recent Supreme Court case on reproductive rights with three women on the bench.

Decisions of the bench when there are no women justices are compared to when additional female justices are added. If the justices' decisions change significantly when more women are appointed to the bench, it means that there is a gender bias in the Supreme Court. However, if there is no significant difference it means that there is no gender bias within the Court.

United States v. Vuitch (1971).

Long before women ever serve on the Court, the male justices are making decisions about reproductive rights. *United States v. Vuitch* is one of the early reproductive cases decided by the Supreme Court. This bench is made up of nine male justices: Douglas, Brennan, Marshall, Black, White, Stewart, Harlon, Blackmun and Burger. In a 5-4 decision the Court holds that the Supreme Court has jurisdiction to determine if the District of Columbia's abortion statute is vague. They decide that this abortion law is not vague, and that the Court has jurisdiction to decide on an abortion law created in D.C. (United States v. Vuitch, 1971).

The first half of Justice Black's opinion deals with who has authority in this case. This means that during the first half of the opinion, the Court discusses the law and how it affects this case. The second question the Court needs to answer is what is being looked at in this case study. In this case, the Court needs to decide if the word "health" is ambivalent. Under the law, the only abortion allowed is one that "preserves the mother's life" (United States v. Vuitch, 1971). The Court decides that the word "health" is not vague, because it applies to psychological and physical well-being. In this case, a physician is indicted for conducting abortions in the District of Columbia. The law at the time states that:

> "Whoever, by means of any instrument, medicine, drug or other means whatever, procures or produces, or attempts to procure or produce an abortion or [402 U.S. 62, 68] miscarriage on any woman, unless the same were done as necessary for the preservation of the mother's life or health and under the direction of a competent licensed practitioner of medicine, shall be imprisoned in the penitentiary not less than one year or not more than ten years . . . ." (United States v. Vuitch, 1971).

The District Court dismisses the charges because the abortion statute is vague. The Supreme Court, however, rules that after an abortion is performed, "a physician is presumed guilty and remains so unless a jury can be persuaded that his acts were necessary for the preservation of the woman's life or health (United States v. Vuitch, 1971). Justice Black delivers the opinion of the Court and addresses the District Court's position. The Court believes that this is the wrong interpretation of the law, and instead believes that the burden of proof lies with the prosecution to prove a doctor is guilty. Furthermore, Justice Black discusses the definition of the term "health." He explains that the modern interpretation of that word includes psychological as well as physical well-being. This is why the Court reverses the district court's ruling.

Throughout the entirety of the opinion, the Court never once discuss how their ruling affects women. Instead, the Court bases their opinion on how conducting an abortion affects a doctor. At the time, the Court is not looking at if abortions are legal. The only time an abortion is legal is if it is necessary to protect a women's health. The Court does not make their decision based on how it affects women's health, but rather what the definition of "health" is. In fact, throughout the entire opinion, concurring opinion and dissent, the word "women" is only mentioned two times. The Court does not make their decision based on women's rights.

While the Court does not mean to further the rights of women, they do so slightly in this case. After this decision, a woman can have an abortion if it affects their "psychological well-being." This gives women more opportunity to have an abortion, since it expands the definition of "health." Even though women are not on the bench, the Court furthers the rights of women's reproductive health. The dissenters of this opinion also promote women's rights. Justice Stewart dissents because he believes that a physician who performs an abortion should be "wholly immune from being charged with the commission of a criminal offense under this law" (United States v. Vutich, 1971). This means that Justice Stewart believes that any doctor who performs an abortion should not be prosecuted. This opinion is one that aligns with broadening reproductive rights. If this is the opinion of the Court, it could possibly make it much easier for women to receive an abortion. Justice Stewart is a registered Republican; however, he becomes a centrist voter in the Court. He is also raised by a wealthy and powerful Republican family ("Potter Stewart," n.d). Stewart's background goes to prove two things. First, that someone's background does not necessarily influence their decision-making later in life. Although Stewart is a Republican, he becomes a centrist voter during the Burger Court and his dissent in this case is fairly liberal. Second, his dissent shows that one does not have to be a woman to want to further reproductive rights. His dissent shows that gender may not affect the decision-making of the Court. His decision also has nothing to do with the rights of women. His dissent does not mention women or their health, but rather the rights of doctors. It is these small decisions that finally led to *Roe v. Wade.*

Before Sandra Day O'Conner is appointed to the Court, the Court hears numerous cases on reproductive rights. These cases cover sterilization, health education, contraceptives and abortion. Before a woman sits on the bench, the Court votes in favor of reproductive rights. *Griswold v. Connecticut* rules that bans on contraceptives violate the right to privacy, and *Roe v. Wade* gives women the right to abortions under the Fourteenth Amendment. These are two of the most influential reproductive cases, and they are both decided without women on the bench. Gender does not affect the decision-making of the justices, since men vote in favor of reproductive rights on an all-male Court.

City of Akron v. Akron for Reproductive Health (1983)

Even though the Supreme Court expands reproductive rights without women on the bench, it is important to look at if their decision-making changes once a woman is appointed. The first women appointed to the Supreme Court is Sandra Day O'Conner. She is appointed in 1981 by Ronald Reagan, and is unanimously sworn in (â€œSandra Day O'Conner, n.d). Within her first two years on the bench Sandra Day O'Conner sees her first reproductive case as a Supreme Court justice. The case is City of Akron v. Akron for Reproductive Health. Within this case, Akron City Council creates a law that limits the ability of someone to get an abortion. Under this law there are seventeen provisions including; parental consent for minors, a twenty-four-hour waiting period, and that the fetuses need to be properly disposed of. In a 6-3 decision the Court upholds Roe v. Wade and finds that Akron's ordinance is unconstitutional, because it steers women away from getting an abortion (City of Akron v. Akron for Reproductive Health, 1983).

In Justice Powell's opinion, he explains that Akron's regulations do not further the state's interest in health regulation, but rather "imposed a heavy and unnecessary burden on women's access to a relatively inexpensive and otherwise accessible, and safe abortion procedure" (City of Akron v. Akron for Reproductive Health, 1983). In comparison to the two above case studies, this is the first case that makes reference to a woman's right to reproductive health. This could either be because of the changing of the times, or because there is now a woman on the bench. If the opinion is written with even a small variation because of a sitting woman justice, it means that gender does affect the decision-making of the Supreme Court justices.

Justice Sandra Day O'Conner is the justice who writes the dissent in this case. She argues that the government can restrain pregnancy if it is not an undue burden (City of Akron v. Akron for Reproductive Health, 1983). As the first sitting woman justice of the Supreme Court, she makes an opinion against reproductive rights. Justice O'Conner writes:

> In my view, this "unduly burdensome" standard should be applied to the challenged regulations throughout the entire pregnancy without reference to the particular "stage" of pregnancy involved. If the particular regulation does not "unduly burde[n]" the fundamental right, Maher, supra, at 473, then our evaluation of that regulation is limited to our determination that the regulation rationally relates to a legitimate state purpose. Irrespective of what we may believe is wise or prudent policy in this difficult area, the Constitution does not constitute us as "Platonic Guardians," nor does it vest in this Court the authority to strike down laws because they do not meet our standards of desirable social policy, "wisdom," or "common sense."

Sandra Day O'Conner explains that during any stage of a pregnancy, the "unduly burdensome" standard should apply. She further explains that even though society has certain social views on abortions, it does not mean that the Court has the ability to strike down certain laws. This is the first reproductive decision written by a female Supreme Court justice. In this decision, Justice O'Conner votes against reproductive rights, showing that gender may not influence a justice's decisions. While it may be assumed that a female justice has an interest in advancing reproductive rights, Justice O'Conner proves that this is not the case. Instead, she shows that her gender does not influence her decisions on the Court. She is not going to vote in favor of womenâ€™s rights just because she is a woman.

Sandra Day O'Conner's decision goes to show that rather than gender influencing Supreme Court decisions, ideology does. In this case, Sandra Day O'Conner is nominated by a Republican and considered to be conservative ("Sandra Day O'Conner, n.d). During this decision, there are five liberals on the bench, three conservatives and one moderate. Justice Marshall, Brennan, Stevens, White, and Blackmun are liberal while Justice Powell, Burger and Rehnquist are conservative. At the time of this case Justice O'Conner leans conservative, however, overall she is considered a moderate and the swing vote in many cases (Martin, 2002). Four out of five of the liberal justices vote against the city of Akron in this case. Out of the four conservative justices, two of them vote against the city of Akron (City of Akron v. Akron for Reproductive Health, 1983). Justices vote more along party lines than gender lines. Almost all the liberal justices vote in favor of reproductive rights, while only half of the conservative justices do the same. Rather than gender influencing the justices, their ideologies do.

Men decide on women's rights long before women are on the bench. The first reproductive case that came before a bench with at least one woman is *City of Akron v. Akron for Reproductive Health* (1983). In this decision, the Court decides to protect women's reproductive rights. However, the sole female justice on the bench dissents. This case goes to show that while a woman's influence may affect the decision-making of the entire Court, it is society's views and the ideologies of the Court that actually drives a single justice's decision.

Stenberg v. Carhart (2000)

After Ruth Bader Ginsburg is appointed to the Court in 1993, there are two women on the bench ("Ruth Bader Ginsburg", n.d). There are only four Supreme Court cases on reproduction rights while these two women serve together. Stenberg v. Carhart is the only 5-4 decision during this time period on reproductive rights. Nebraska has a law that makes "partial birth abortions" illegal unless it is necessary to save the mother's life. The state defines partial birth abortions as a procedure where a doctor partially delivers a child vaginally before killing the child. Doctor Carhart finds that this stature places an undue burden on abortionists. The Court closely holds that this law criminalizes abortions and places an undue burden on women's right to abortion (Stenberg v. Carhart, 2000). Justice O'Conner and Ginsburg both write a concurring opinion.

Justice O'Conner concurs with the Court because she believes Nebraska's law is not compatible with the decision made in Planned Parenthood of Southeastern Pennsylvania v. Casey (1992). Her decision is made solely on the basis of precedent and the undue burden this law places on women. She does not discuss the rights of women in this concurring opinion. In fact, she begins her opinion by writing "the issue of abortion is one of the most contentious and controversial in contemporary American society. It presents extraordinarily difficult questions that, as the Court recognizes, involve "virtually irreconcilable points of view" (Stenberg v. Carhart, 2000). Before she even writes the reasoning behind her decision, she wants to make it clear that abortion is a very controversial topic. So instead of explaining why she agrees or disagrees with the topic of abortion, she limits her opinion to the courts previous decisions.

Justice Ginsburg also sides with the majority and writes a concurring opinion. She begins the concurrence the same way as O'Conner, writing "amidst all the emotional uproar caused by an abortion case, we should not lose sight of the character of Nebraska's "partial birth abortion law." It is important to note that the male dissenters, Rehnquist, Scalia, Kennedy, and Thomas, did not begin their dissents this way. Instead, they begin by arguing their opinion. Genders of the justices do affect their written decisions. As females, it is important for the two women to begin by identifying how controversial this issue is and not take sides in their opinion. They understand that because they are women their decisions will be more closely examined. They need to show that their gender does not affect their decision in this case.

Justice Scalia is not held to this same standard. Instead he begins his dissent by writing "I am optimistic enough to believe that, one day, Stenberg v. Carhart will be assigned its rightful place in the history of this Court's jurisprudence beside *Korematsu and Dred Scott*. The method of killing a human child–one cannot even accurately say an entirely unborn human child–proscribed by this statute is so horrible that the most clinical description of it evokes a shudder of revulsion" (Stenberg v. Carhart, 2000). Scalia begins by immediately explaining his stance on abortion. He believes that abortions are atrocious, and he makes that very clear in his dissent. There is a difference between the decision-

making of females and males. Scalia has a different view on abortion than O'Conner and Ginsburg, part of which stems from how he was raised as a male. Furthermore, he is able to write how he truly feels in his dissent. Ginsburg and Oâ€™Conner do not have the same luxury afforded to them, because of how their opinions would be perceived. Instead, they write their opinions politely and discuss how they came to their conclusions. The writing style of the justices show how gender can affect their decision-making.

While this case points to how gender does affect the decision-making of the Court, it also shows the role ideology plays. This is a 5-4 decision that is decided entirely on ideological lines. The liberal justices, Stevens, Ginsburg, Souter, and Breyer, all decide in favor of Carhart. The four conservative justices vote in favor of Stenberg, Kennedy, Rehnquist, Scalia, and Thomas (Stenberg v. Carhart, 2000). This leaves the decision up to the swing vote: Justice Oâ€™Conner. This shows how ideology affects the Court, since conservatives vote against abortion, while liberals vote in favor of it. This also shows the important role that a female plays on the bench. Justice O'Conner's decision could have been affected by her ideology or her gender, or both of these could have factored into her decision.

Overall, this case shows how bias does influence Supreme Court decisions. Justices' beliefs form at a very young age. These beliefs are either affirmed or challenged as they grow. Ideology and gender play an enormous role in society, making it impossible for even Supreme Court justices to abandon these biases.

Burwell v. Hobby Lobby (2014)

Justice Alito delivers the opinion for the Court in Burwell v. Hobby Lobby. In this 5-4 decision, the Court decides that Hobby Lobby does not need to provide contraceptives to their employees under the Affordable Care Act. This is because for-profit businesses have the same religious rights as non-profit businesses. Justice Alito delivers a fifty-five page opinion. Within that opinion, he mentions the word "women" thirteen times. Justice Ginsburg, who writes the dissent, writes the word "women" forty-one times in thirty-four pages (Burwell v. Hobby Lobby, 2014). Ginsburg identifies women three times more often than Alito, in twenty-one less pages. This is because Ginsburg spends more time discussing the burdens women face when obtaining care. She discusses how certain woman advocates, like Senator Mikulski, fight for women's health (2014). Gender can affect Supreme Court decisions. Prior to women serving on the bench, the Court barely mentioned the word "women" in their decisions. It is not until women are serving on the Court that the justices began to address their rights.

Justice Ginsburg directly addresses how decisions affect the rights of women in *Burwell v. Hobby Lobby*. For example, in the dissent she writes "It bears note in this regard that the cost of an IUD is nearly equivalent to a month's full-time pay for workers earning the minimum wage" (2014). Justice Ginsburg makes key comparisons on the negative impact on women's health. These are the types of comparisons that did not come out in Alito's decision. Instead of looking at how women are affected, Alito looks at how Hobby Lobby is affected. He writes in the opinion, "If the companies continue to offer group health plans that do not cover the contraceptives at issue, they will be taxed $100 per day for each affected individual. 26 U. S. C. §4980D. For Hobby Lobby, the bill could amount to $1.3 million per day or about $475 million per year (2014). One reasoning as to why the justices focus on different aspects of this case is their gender. As a woman, Justice Ginsburg is better able to identify with the ways laws affect women, so she is able to write about it.

The writing style of the justices also changes between the opinion and the dissent. The male who writes the opinion for the Court has a drastically different tone then the woman who writes the dissent. Alito speaks about the genders in a detached voice, in the sense that women and men both have certain characterizes that the country needs to address. When Ginsburg writes, she writes more passionately. For example, when she begins her dissent she writes:

> In a decision of startling breadth, the Court holds that commercial enterprises, including corporations, along with partnerships and sole proprietorships, can opt out of any law (saving only tax laws) they judge incompatible with their sincerely held religious beliefs. See ante, at 16-49. Compelling governmental interests in uniform compliance with the law, and disadvantages that religion-based opt-outs impose on others, hold no sway, the Court decides, at least when there is a "less restrictive alternative." And such an alternative, the Court suggests, there always will be whenever, in lieu of tolling an enterprise claiming a religion-based exemption, the government, i.e., the general public, can pick up the tab. See ante, at 41–43.1 The Court does not pretend that the First Amendment's Free Exercise Clause demands religion-based accommodations so extreme, for our decisions leave no doubt on that scoreâ€¦.â€"in these cases, thousands of women employed by Hobby Lobby and Conestoga or dependents of persons those corporations employ. Persuaded that Congress enacted RFRA to serve a far less radical purpose, and mindful of the havoc the Court's judgment can introduce, I dissent (1).

Justice Ginsburg's passionate dissent has become well-known in society. Just from her opening dialogue, one can see where she is heading in her decision. Her opening line, "in a decision of startling breadth," shows her disturbance in this decision. She continues to show her disproval by saying that the "public will pick up the tab" and the "Free Exercise Clause demands religion-based accommodations so extreme, for our decisions leave no doubt on that score." By using this colorful language, Ginsburg clearly shows her feelings towards the case. Her language choice is completely different to the way Alito speaks. Her descriptive words of "havoc," "extreme," and "extraordinary" are much different than the Court's usual, flat tone. However, this could be singular to Justice Ginsburg. This is a justice who is known for making memorable decisions. Nevertheless, the comparison between the dissent and opinion on this case demonstrates how gender can affect the justice's opinions. The genders of the justices writing these dissents and opinions also shows the importance of gender on their decision-making.

While there is evidence that gender does affect the decision-making of justices, it is important to note that not all the evidence points that way. Both justices make references to precedent, meaning that precedent may have more influence on justices than their genders. This allows for less bias to influence their decisions. In *Burwell v. Hobby Lobby* (2014), Justice Ginsburg references Planned Parenthood v. Casey when she says, â€œThe ability of women to participate equally in the economic and social life of the Nation has been facilitated by their ability to control their reproductive lives. (Planned Parenthood of Southeastern Pa. v. Casey, 505 U. S. 833, 856 (1992)" (2014))". The Supreme Court has been tackling gender issues regarding reproductive rights for a very long time. However, Ginsburg uses this precedent to prove her point that the current law is meant to protect women and that women need their reproductive rights to be protected so that they can participate in society. Ginsburg is arguing that if Hobby Lobby wins, the Court will create a lasting precedent that will affect the abilities of women.

People make decisions based on their background and history. Ginsburg's life experiences are what influences her votes on the Court. Part of her life experiences comes from her gender. Ginsburg has different experiences growing up than Alito does, in part because of their gender differences. Even though Ginsburg could have made her final decision on Burwell based on the precedent of Planned Parenthood, her understanding of this case is also partly influenced by her gender experience. This illustrates that gender does affect the decision-making of the Supreme Court.

The 5-4 decision of Burwell v. Hobby Lobby reveals how the Supreme Court makes their decisions. In this controversial case, the justices decide to allow for-profit businesses to not provide contraceptives to their employees. The opinion and dissent of the justices are drastically different. While Justice Alito beats around the bush when discussing the effects this case have on women, Justice Ginsburg is quick to draw those parallels. Both justices have different reasonings for their decisions, but they also write their decisions in completely different ways. This is because gender plays a role in how they grew up, which in turn influences how they perceive this case. Since individuals of different genders are socialized differently, it would make sense that this socialization would affect people's decision-making (Scheurer 4). Although justices are supposed to make unbiased decisions, it is impossible for people to completely rid themselves of their biases.

CONCLUSION

This paper analyzes if gender affects the Supreme Court's decision-making on reproductive rights. By using data analysis and case studies, this study determined that while gender does play a slight role in the Court's decisions, ideology plays a bigger role.

By comparing the data analysis of how the different genders and ideologies of the justices affect their decisions on reproductive rights, it is clear that ideology has a bigger impact on their decisions. While the percentages of the males and females that vote in favor of reproductive rights are fairly similar, liberal justices are twice as likely than conservatives to vote in favor of reproductive rights. Furthermore, in *Burwell v. Hobby Lobby* and *Stenberg v. Carhart* the justices vote entirely on ideological lines. Ideology plays a bigger role in the Court's decision than gender. However, after reviewing the opinions and dissents of the Court, it becomes clearer where gender bias can play a role since justices of different genders write their decisions much differently than others.

It is hard to disentangle the roles that gender and ideology play on the Supreme Court justices. One reasoning is because gender can play a role in a person's ideology. As mentioned under the "Literature Review", women judges tend to vote more liberally for women's issues. Furthermore, if you look at the four women that have served on the Supreme Court, three of them are liberal. The last, Sandra Day O'Conner, is considered a moderate justice. Gender can play a role on the ideology of the Court, which in turn affects the decision-making of the Court.

Supreme Court justices are supposed to be nonpartisan and not be influenced by their biases. Nevertheless, Supreme Court justices are partisan and can be biased. These biases can be seen by reading the Courtâ€™s opinions and dissents on different cases. While it is impossible to truly have a nonpartisan court system, itâ€™s crucial that the justices be aware of their biases and do their best to uphold the law.

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This article describes the early life of Justice Potter Stewart. It explains his education and family, the criticism of the bench during the time and the cases he made decisions on.

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(n.d). Ruth Bader Ginsburg. Oyez, Justia Supreme Court Center.
This article describes the early life of Justice Ruth Bader Ginsburg. It explains her education, when she was appointed to the court and the cases she has made decisions on.

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This article describes the early life of Sandra Day Oâ€™Conner. It explains her early life and her accomplishments in law school. It further describes her decisions on the bench and how she sought to further women's rights.

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This article discusses the most important factors that determine a judge's decision; one of these factors in gender. The author cites numerous academics as well as court decisions. He also does his own research and compares it to the Model Code of Judicial Conduct. Shapiro has his JD and is a professor of law at the University of Baltimore College of Law.

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This is the Supreme Court decision for Stenberg v. Carhart. The Court sites multiple precedents and arguments to reach their decision. The authors of this decision are the justices of the Supreme Court. Justice Breyer wrote the opinions while Justice Rehnquist wrote a dissent.

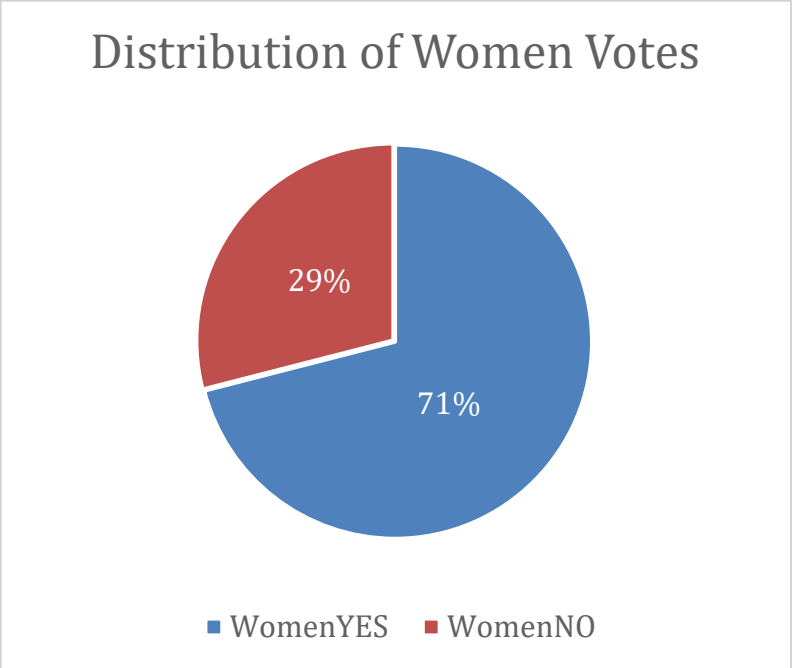
Telless, S. (2008). A Jurisprudence of Doubt: The Roberts Court and the Future of Abortion in the United States. Order No. 1453818.
Within this paper, the author explains the current Court's stance on abortion. He explains how past precedents of the Court shape their current views on Roe v. Wade. He also explains that Roe v. Wade would not be overturned by this current Court.

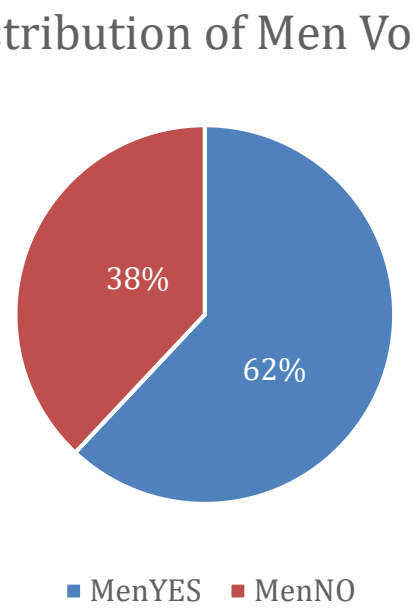
United States v. Vuitch, 402 U.S. 62 (1971). Supreme Court of the United States. Supreme Court Collection. Legal Information Inst., Cornell U. Law School, n.d. This is the Su preme Court decision for United States v. Vuitch. The Court sites multiple precedents and ar guments to reach their decision. The authors of this decision are the justices of the Supreme Court. The Court held that the District of Columbia's abortion statute was not unconstitutionally vague.

Appendix I.

		Data Anaylsis of Supreme Court Cases					
Decision	Supreme Court Case	WomenYES	WomenNO	WomenTOTAL	MenYES	MenNO	MenTOTAL
unanimous	*Pierce v. Society of Sisters (1925)*	0	0	0	9	0	9
unanimous	*Skinner v. Oklahoma (1942)*	0	0	0	7	2	9
7-2 decision	*Griswold v. Connecticut (1965)*	0	0	0	7	2	9
5-4 decision	*United States v. Vuitch (1971)*	0	0	0	4	5	9
6-1 decision	*Eisenstadt v. Baird (1972)*	0	0	0	6	1	7
7-2 decision	*Roe v. Wade (1973)*	0	0	0	7	2	9
7-2 decision	*Doe v. Bolton (1973)*	0	0	0	7	2	9
7-2 decision	*Bigelow v. Virginia (1975)*	0	0	0	7	2	9
7-2 decision	*Carey v. Population Services International (1977)*	0	0	0	7	2	9
8-1 decision	*Bellotti v. Baird (1979)*	0	0	0	8	1	9
5-4 decision	*Harris v. McRae (1980)*	0	0	0	4	5	9
6-3 decision	*City of Akron v. Akron for Reproductive Health (1983)*	0	1	1	6	2	8
unanimous	*Bolger v. Young Drugs Products Corporation (1983)*	1	0	1	7	1	8
5-4 decision	*Thornburgh v. American College of Obstetricians and Gynecologists (198*	0	1	1	5	3	8
5-4 decision	*Bowen v. Kendrick (1988)*	0	1	1	4	4	8
5-4 decision	*Webster v. Reproductive Health Services (1989)*	0	1	1	4	4	8
5-4 decision	*Hodgson v. Minnesota (1990)*	1	0	1	4	4	8
5-4 decision	*Rust v. Sullivan (1991)*	1	0	1	3	5	8
5-4 decision	*Planned Parenthood of Southeastern Pennsylvania v. Casey (1992)*	1	0	1	4	4	8
6-3 decision	*Schenck v. Pro-Choice Network of Western New York (1997)*	2	0	2	4	3	7
5-4 decision	*Stenberg v. Carhart (2000)*	2	0	2	3	4	7
6-3 decision	*Ferguson v. City of Charleston (2001)*	2	0	2	4	3	7
9-1 decision	*Ayotte v. Planned Parenthood of Northern New England (2006)*	2	0	2	7	0	7
5-4 decision	*Gonzales v. Carhart (2007)*	1	0	1	3	5	8
5-4 decision	*Gonzales v. Planned Parenthood (2007)*	1	0	1	3	5	8
unanimous	*McCullen v. Coakley (2014)*	0	3	3	0	6	6
5-4 decision	*Burwell v. Hobby Lobby (2014)*	3	0	3	1	5	6

Appendix II.



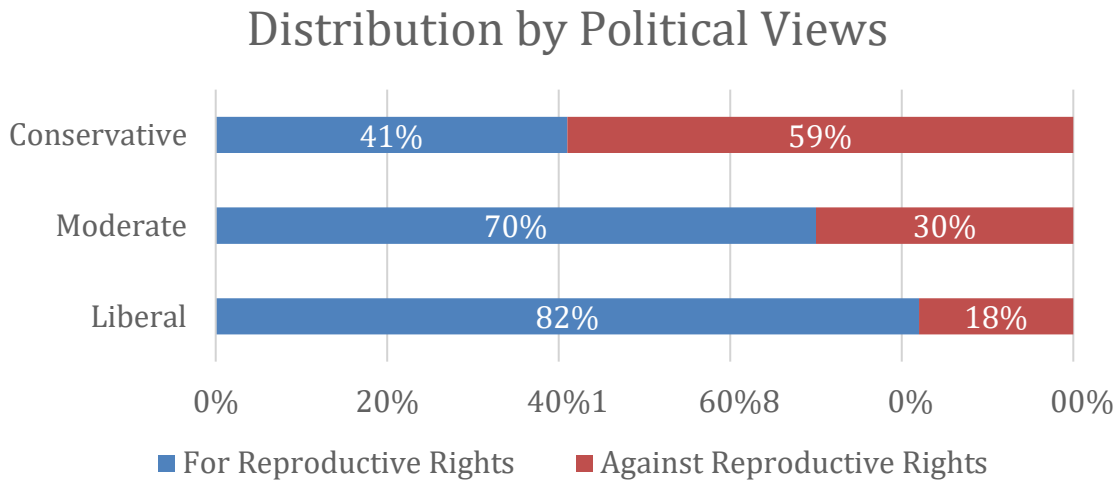


Appendix III.

Data Anaylsis of Supreme Court Cases

Decision	Supreme Court Case	LiberalYES	LiberalNO	LiberalTOTAL	ConservativeYES	ConservativeNO	ConservativeTOTAL	ModerateYES	ModerateNO	ModerateTOTAL
unanimous	*Pierce v. Society of Sisters* (1925)	2	0	2	7	0	7	0	0	0
unanimous	*Skinner v. Oklahoma* (1942)	4	0	4	3	2	5	0	0	0
7-2 decision	*Griswold v. Connecticut* (1965)	5	1	6	1	0	1	1	1	1
5-4 decision	*Eisenstadt v. Baird* (1972)	3	2	6	1	1	2	0	1	1
6-1 decision	*Roe v. Wade* (1973)	5	0	5	0	1	1	1	0	1
7-2 decision	*Doe v. Bolton* (1973)	4	1	5	2	1	3	1	0	1
7-2 decision	*Bigelow v. Virginia* (1975)	4	1	5	2	1	3	0	1	1
7-2 decision	*Carey v. Population Services International* (1977)	5	0	5	1	2	3	1	0	1
6-1 decision	*Bellotti v. Baird* (1979)	4	1	5	3	0	3	1	0	1
5-4 decision	*Akron v. Akron for Reproductive Health* (1983)	4	1	5	0	3	3	0	1	1
6-3 decision	*City of Akron v. Akron for Reproductive Health* (1983)	4	1	5	2	1	3	0	1	1
unanimous	*Bolger v. Young Drugs Products Corporation* (1983)	4	1	5	3	0	3	1	0	0
5-4 decision	*Thornburgh v. American College of Obstetricians and Gynecologists* (1986)	4	1	5	1	2	3	0	1	1
5-4 decision	*Bowen v. Kendrick* (1988)	4	1	5	0	3	3	0	1	1
5-4 decision	*Webster v. Reproductive Health Services* (1989)	4	1	5	0	3	3	0	1	1
5-4 decision	*Hodgson v. Minnesota* (1990)	4	1	5	0	3	3	1	0	1
5-4 decision	*Rust v. Sullivan* (1991)	3	1	4	0	3	3	1	1	1
5-4 decision	*Planned Parenthood of Southeastern Pennsylvania v. Casey* (1992)	2	1	3	1	3	4	2	0	1
6-3 decision	*Schenck v. Pro-Choice Network of Western New York* (1997)	3	0	3	1	3	4	2	0	1
5-4 decision	*Stenberg v. Carhart* (2000)	3	0	3	4	0	4	2	0	1
6-3 decision	*Ferguson v. City of Charleston* (2001)	3	0	3	1	3	4	2	0	1
7-2 decision	*Ayotte v. Planned Parenthood of Northern New England* (2006)	3	0	3	4	0	4	2	0	1
5-4 decision	*Gonzales v. Carhart* (2007)	3	0	3	0	3	3	1	0	1
5-4 decision	*Gonzales v. Planned Parenthood* (2007)	3	0	3	0	3	3	1	0	1
unanimous	*McCullen v. Coakley* (2014)	0	4	4	0	3	3	0	0	0
5-4 decision	*Burwell v. Hobby Lobby* (2014)	4	0	4	0	3	3	0	0	0

Appendix IV.



Community Perception on Air Pollution

Jose Becerra
Dr. Claudia Garcia-Des Lauriers

Abstract

The focus of this study is to better understand how local communities perceive the health risks of air pollution in San Bernardino County, CA1 • Globalization is affecting local communities through processes of distribution in the United States. More specifically distribution centers are creating high health risks due to air pollution affecting the surrounding communities. It has led to air quality in areas of San Bernardino being unhealthy on a daily basis: affecting the health of the local communities at risk for asthma, cardiovascular disease, and cancer. I employ participant observation and online ethnography to gather data on local attitudes and perceptions on the issue.

Introduction

As a resident of the Inland Empire's lower socioeconomic communities, it was a shock to me learning that I had to worry about air pollution. On top of financial instability, crime, and political change threatening my family's security I had to worry about a hazard that I had never really noticed. It was not until I did secondary source research that I realized I had grown to live with air pollution. In fact, through participant observation I learned that many residents in the communities did not see the alarming rates of lung disease, cancer, and asthma as unordinary.

Air pollution in the Inland Empire is significant threat to its residents. It has been reported that due to the high levels of emissions such as ozone and Particulate matter (PM2.5) pollution the county has led in most days ranked as "hazardous" to all populations. Such emissions are damaging to the health of the residents, local ecology, and contribute to climate change.

For the purpose of my research I further investigate the connections of air pollution on health risks in marginalized communities. Air pollution in the Inland Empire is intensified to an extent that it dramatically creates higher risks of cancer, asthma, cardiovascular disease and many other health related issues (Newman, 2012). My overarching theoretical research question focuses on better understanding agency and structure of communities experiencing health risks due to air pollution.

In order to do so I make connections between two issues. First, I look at what social factors contribute to health and safety risk perceptions. I go in depth with the residents on what they consider unhealthy or a risk. I attempt to apply context to all of their answers to better understand how their built environment, identity, and political climate influence those responses. Then, I investigate the perception residents have on air pollution itself. For instance, identifying if residents are aware of the hazardous air quality in the city they live in, where that pollution comes from, and what health risks are associated with air pollution.

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[1] For the ethnography I use San Bernardino County and the Inland Empire interchangeably. The Inland Empire is made up of mostly San Bernardino County but also includes Riverside county and small parts of the bordering Los Angeles County. I focus on only cities in San Bernardino County in order to incorporate certain dynamics particular to cities. For instance, Ontario's large amount of warehouses (distritubion ceters), and the very apparent poverty and crime in San Bernardino.

Moreover, I approach the research through two different but overlapping themes to better inform the project. First, as a global problem resulting in local issues. Second, as a local issue informed by local circumstances. It is important for my question to have the background to understand the problem at a global scale when relating it to environmental impacts. Then, taking a local approach for humanistic, and socially relative understanding of the health risk perception.

Air pollution as an injustice to marginalized communities has been an issue which researchers and environmental justice groups have engaged with. In fact, it was through various presentations from environmental justice leader Allen Hernandez (CCAEJ), and senior attorney David Pettit (NRDC) that I found the gap in the literature which I wanted to engage with. Although the environmental justice groups do a great job in advocacy and publishing great information, the area I did not see was "average residents".

My aim is to report how the "average" resident perceives health risk due to air pollution. I argue that people are not simply complacent or do not worry about the issue. Instead, many social factors exist which limit the information, and resources available. Social circumstances exist which minimize air pollution as a threat in context with other problems.

Literature review

Globalization and the processes of supply and demand have a long range of negative impacts. One way to understand the processes is looking at the issue as a result of capitalist economies search and success of maximizing profits. Many of the issues surrounding capitalism are the exploitation of natural resources and labor across the globe. In fact, anthropological research often investigates the relations between Western countries outsourcing production and the effects it has on the countries of production or resource extraction.

The issues created from consumer's demand of goods are not limited to the effects of outsourcing production (Colombijn, 1998). In fact, some of the communities that receive the goods have become victims. In particular, due to the stimulation of goods into the United States we observed an alarming amount of air pollution affecting local communities through the increase of diesel trucks travelling back and forth from ports.

The Nations demand for exported goods has transformed areas in the pacific coast into delivery ports. More specifically, there are huge ports in Long Beach, and Los Angeles California which transport around 70% of all goods delivered east into the valley (Newman, 2012) (see figure.I). In many instances, the Inland Empire has been looked at as a cheap, and convenient area to build distribution centers. When driving through cities you are able to see signs coming up promoting jobs, accessibility and overall "development", which is already problematic through anthropological analyses.

Communities in the Inland Empire have become victims of the global processes. What that looks like in a local scale is a political history transforming the Inland Empire into a distribution center through power and class dynamics (Patterson, 2016). Distribution centers are locations where goods are delivered, sorted, and disbursed inward to the surrounding counties and outwards into the nation. The Inland Empire has become a majorly convenient location for corporations such as Target, Walmart, Staples, Pepsi, Amazon along with many others.

The.significance to the Inland Empire as a distribution center is that the transport of goods has increased air pollution drastically through diesel truck trafficking emission. In addition, the Inland Empire has transformed into a commuter community due largely to two reasons. First, the increase of warehouses makes the Inland Empire into a job destination, second, affordable housing becomes a large incentive for people to move into the area who lost their homes due to gentrification in surrounding counties. Both which contribute to car emissions through traffic idling (Figure.2).

The problem of air pollution is intensified in pockets of the county due to geographic factors. For instance, the Inland Empire is surrounded by mountains which trap pollution in cities. Moreover, the climate in the area is hot and dry especially during the summer which dramatically intensifies the days we see "hazardous" levels of pollution.

Unfortunately, air pollution seems to be impacting marginalized communities of minority identity with low socioeconomic status. It is clear that in some societies low socioeconomic status and exposure is correlated (Stem, 2003). Air pollution is a great threat to the residents', studies have linked a number of health risks such as cardiovascular disease, asthma, cancer, mental illness to air pollution: putting children, elderly, and asthmatics most at risk (ALA, 2018). This becomes a huge problem especially damaging the quality of life of those residents.

An issue I had when addressing the problem•at a local scale is that the concentration of air pollution exists in patches in the Inland Empire. For instance, the west side of a city could face lower quality of air pollution, while east of the city is a lot healthier. Luckily there has been a rise of efficient ways to investigate a community by connecting them through examining symptoms due to a common hazard instead of simply talking about a community as a region (Wylie, 2018).

Moreover, low visibility environmental hazards with prolonged health effects becomes problematic for two reasons. First, resident risk perceptions prioritization is skewed which I go into further detail in my findings. Second, when trying to hold states or companies accountable for heightened health risks the fact that the symptoms could also be from other sources is used in favor of the company (Cepek, 2018). But the problem can not be dismissed so easily when instances such as the west side of San Bernardino having rates in cancer cases of 2,500 per million while the regional rates are 1,000 per million (Newman, 2012).

Similar environmental hazards are observed around the world but "localised" differently (Bickerstaff, 2001). In other words, air pollution risks are understood and dealt with in different ways. This became of specific interest to me. I wanted to apply context in order to develop on the ideas that risks are informed by the lived reality and local environments (Douglas, 1988). It was important to understand what people perceived as risk since the concept of risk is socially prescribed (Lupton, 1999). In other words, the risk that people identify outside of environmental hazards was informative to think about context including social factors, identity, and political climates impact on environmental health risk perception.

Methods:

As part of gathering and understanding, I employed participant observation, and reflections of my own experience as a resident, I visited a number of different locations, attended presentations and visited parks. I also did a version of "online ethnography" where I searched through a number of

different forums, websites, and social medias to read about the general attitudes about certain pockets in cities.

The reason I did participant observation at various sites in the county is that I wanted to get an understanding of how different cities engaged with the issue. Some of the presentations I attended were by environmental justice groups such as the Center for Community Action and Environmental justice, and Natural Resource Defense Council. Attending those presentations allowed me to understand the perspective of a group trying to work towards a solution and how they viewed the people affected. I was also able to ask questions that allowed me to better understand why and how they employ their strategies to try and create change. Moreover, being part of the communities that are affected made it easy to casually engage with residents. I was able to bring up the issue and let groups lead the discussion any way they wanted.

The online ethnography allowed me to see unfiltered opinions on the communities I was researching. It was a valuable tool to use because people do not hold back, and you get a good general sense for the attitudes and worries people have. It is also interesting to learn about the dynamics provided by outside groups and residents.

Data:

Through my preliminary observations I recognized three patterns. First, living in the area was described as undesirable but convenient. Second, air pollution is not at the forefronts of what residents consider most important regarding health and safety. Third, both health risk associated with air pollution and source of pollution is not always known.

During my participant-observation and online ethnography I noticed that people would express their dislike with the cities in various ways. Residents talked about the city as convenient and non-permanent. For example, when looking thr0ugh online forums about housing in the area which included various opinions from residents, surrounding communities, and online pitch: the comments seemed to talk about the inconveniences of the built environment, the lack of transportation, heat, and other issues but always expressed there was convenience in affordability.

In summary, the research indicates that some of the residents did not live in the areas of low-quality air as a first choice. They did not pick the city for the scenery, opportunities or networks available. Instead they described it as economically convenient. Although some did use their family network as a reason to live in the city, based on what they said I would argue that it is more related to the economic convenience provided by the family as child caregivers. This is not to say that they do not consider their family relations as important, just that it seems that their family was also undesirably in the city. In fact, one of my interviewees explained that his family had to move into the area for financial reasons. It might be fair to say that the residents would value living in a different area along their family.

When looking at the cities of high air pollution, we must recognize the clear correlation with low socioeconomic status and minority communities in San Bernardino County. When navigating OEHHA's data base2 we can clearly see the pattern by hovering around cities and reading the demographics. The issues related to the low socioeconomic status and minority nexus can not be avoided. A number of symptoms associated with lack of financial stability and other resources is evident in anthropological and sociological literature. Issues relating to poverty, criminality, lack of education and health issues.

The online ethnography was very insightful in providing general outlooks of certain areas in the Inland Empire. One very interesting title published on reddit under r/Inland Empire is, "Is it taboo to talk about the smog?". One of the replies ·wrote:

> "I grew up in Montclair. Played baseball at Montclair high. From the baseball field we had a lovely view of the mountains when they weren't covered by the smog. We noticed that on clear days our lungs burned more during conditioning at the end of practice. Yeah we were so used to that dirty dirty air that our throats hmt running on clear days. As soon as we got to the field and started wanning up it was Fuck I can see the mountains or hooray smog. So so sad"

On other google searches, I was able to find comments on specific cities and areas, most seemed to follow the patterns of observing problems with the built environment. Interestingly I did come by a few comments that talked about development such as a rating on Niche.com, which talked about it as a good thing.

Discussion

For the first pattern I recognized, people expressing a financial necessity or convenience keeping them in high pollution areas clearly comments on structure and agency. In this case, class separation due to socioeconomic status limits mobility. In other words, this addresses an answer to the suggestion of people simply moving out of the city to avoid air pollution. Residents become restricted as a result of structure. Even though most reported wanting to move out the area for many reasons, they are limited through financial or other obstacles.

The people restricted to the area became unsuspecting victims of air pollution and simply faced a limited mobility. This is also directly connected to the facts of gentrification in the surrounding cities. People have little options; the Inland Empire has large populations of minorities who have had to move out their communities due to rises in mortgage and rent.

Although marginalized communities are not directly targeted due to race, it is clear that the race and socioeconomic nexus is experiencing another symptom of environmental risks. Therefore, the problem is an issue of environmental justice. The problem is not that air pollution is purposely being intensified in marginalized communities. The problem is that systemic constructs of structure prevent those communities from having mobility, or access to power of prevention.

The issues of environmental injustice are intensified by the fact that the communities being affected simply do not have the resources to push back on potential projects that pose a risk (Hernandez, 2018). This can be clearly observed when comparing such communities to those with higher socioeconomic status. The higher socio-economic status communities have been able to push back and do not face the same risks (Pettit, 2018).

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[2] https :/ / oehha.ca. gov/ calenviroscreen/report/ calenviroscreen-3 0

Unfortunately, there is a very complicated intersectionality of how personal, social, environmental, economic and other stressors impact each other (see figure. 3). The marginalized communities in the Inland Empire face all of the before mentioned dynamics but are also further dispossessed by the fact that there is a lack of primary care physicians in the area (CHCF, 2017). A complication that further impacts the quality in health of the residents.

The 3-4-50 framework is a framework designed for San Diego which suggest the following. Three behaviors lead to four diseases which make up 50% of deaths in San Diego. The reason I bring the framework up is to further discuss the very practical complications of living in a disadvantaged community in the Inland Empire. Although the framework is not designed particular to the Inland Empire, it provides a framework on general leading causes of death nationwide.

To be more detailed the three behaviors are no physical activity, poor diet, and smoking. Leading to four diseases cancer, cardio vascular, type two diabetes, and lung disease. If we apply the framework to an area of high air pollution, we can see how burdensome and difficult it is to maintain healthy. The first problem is poor diet, driving through San Bernardino you will quickly notice how the birthplace of McDonalds, is now filled with fast food in every main street. The problem with fast food is that it becomes extremely convenient for families that are preoccupied with work and inexpensive enough for them to afford. It is not a lack of good decision-making skills, instead fast-food is about convenience. Because of the underlying issues of poverty, people already struggle with making ends meet. Second, when thinking about physical activity it would seem that it is simple, you either exercise or do not. But, if we think about children and teenagers in sports, it becomes complicated when living in polluted areas. As mentioned before air pollution impacts cardiovascular disease, asthma, and other health problems which means that if kids participate in sports, they become more vulnerable to health risks. The Environmental Protection Agency lists avoiding outdoor physical activates as a recommendation to avoid health risks of air pollution, which seems to only make risky tradeoffs available.

Another important aspect of the problem, as mentioned before is minority populations have other things to worry about. This concept was first made clear to me through participant observation and even mainstream media. The attitude towards environmentalism tend to be summarized in the response "that is white people stuff'. Why is it limited to white people? I think that this very interesting statement which I heard multiple times. In my research I believe it comments on how the lived experiences of low socioeconomic communities tend to be focused on issues regarding making it through the week or month.

Worries related to health and safety are typically problems that are immediate and of high visibility, issues that demand instant effort or pose immediate threat. By looking at the built environments that have overlapping issues of enviro.nmental health, poverty, and unemployment that has been shaped by poverty. The difference between the two is that one could threatened life while the other threatened quality of life. Although this might seem as evidence enough as to why people worry about those types of risks, I was not convinced due to the high frequency of informants listing fast food as a worry. Instead, I argue that the reason people identify fast food as a risk is because of awareness through various sources. Although the risks are of relatively prolonged health effects, many media and warnings are made visible documenting fast food as unhealthy.

Instead, I believe that the threats are relative to the two factors. First, low visibility in that it is not apparent when they experience low air quality. Second, prolonged health effects due to the fact that a lot of the symptoms are subtle. When comparing it to risk of fast food the difference is that people are generally aware of fast food being unhealthy, while it is not the case for simply being outside or playing a sport.

The fact that residents face social risks of poverty informed my discussion by highlighting social context. The residents in high risk areas should not be thought of as irresponsible for not actively pushing towards clean air policy. Instead, their circumstances threatening other risks they identified should be taken into account. For instance, it makes sense that a resident with financial insecurity prioritize getting rent paid rather than health risks of air pollution.· Again, this comments on a structural issue that should be changed through policy rather than agent.

A driving statement for my research was one made by Mary Douglas regarding voluntary risks; "People do live in Los Angeles, for example, not for the privilege of breathing in smog but in order to take advantage of its natural beauty, warm climate, job opportunities and so on."
(Douglas, 1988; 18). This lead my research in that residents in the Inland Empire did not report the risk taken as voluntary nor does it come with the exchange of benefit. Although this is not a critic on Mary Douglas' statement, it is a commentary on how acceleration in demand for imported goods has pushed the boundaries on risk behavior and trade thinking.

Therefore, the beneficiaries of the risk created and taken by unsuspecting residents are the consumers. Due to the convenience of getting exported goods through amazon, and other companies the risk of air pollution victimizes unsuspecting residents. I think this is an important factor when addressing social responsibilities in health justice. I argue that people should all be entitled to a good quality of life; therefore, clean air policy is a social responsibility.

As I reflect, I learned that the residents such as myself and families have grown to live with the symptoms of air pollution and sources. Things like seeing diesel trucks in their neighborhoods, or warehouses next to schools was not out of the ordinary. Although it has been observed that warehouse areas have an increase of health risks due to the idling of diesel trucks it rarely raised suspicion in the community. The only times that residents seemed to worry about sources such as traffic was in connection to being stuck behind a line of diesel trucks.

It made it very clear to me that marginalized communities simply did not-not care about environment and health risks due to air pollution. Instead the lack of information is more of a reason why residents did not list air pollution as one of the things that made them unhealthy. Knowing that there is a lack of information is an important part of advocating for clean air policy. The fact that the risk of air pollution is not knowingly taken makes it clear that awareness needs to be raised. There should be a push towards informing both current residents and incoming residents.

Conclusion

Understanding the structural limitations makes it clear that in some cases getting up and moving is not an option for the residents. There is economic and social ties preventing the easy move.

Lastly, the ethical question of social responsibility is important. I argue that due to the nation's consumer culture and capitalist efforts it is not restricted as a local issue. The beneficiaries of goods being delivered hold some responsibility. This is not to promote guilt, instead to raise awareness through bounded solidarity of responsibility. Although it has been easy to "other" communities outside of the nation it might help change perspectives when the demand of good is damaging to neighboring towns.

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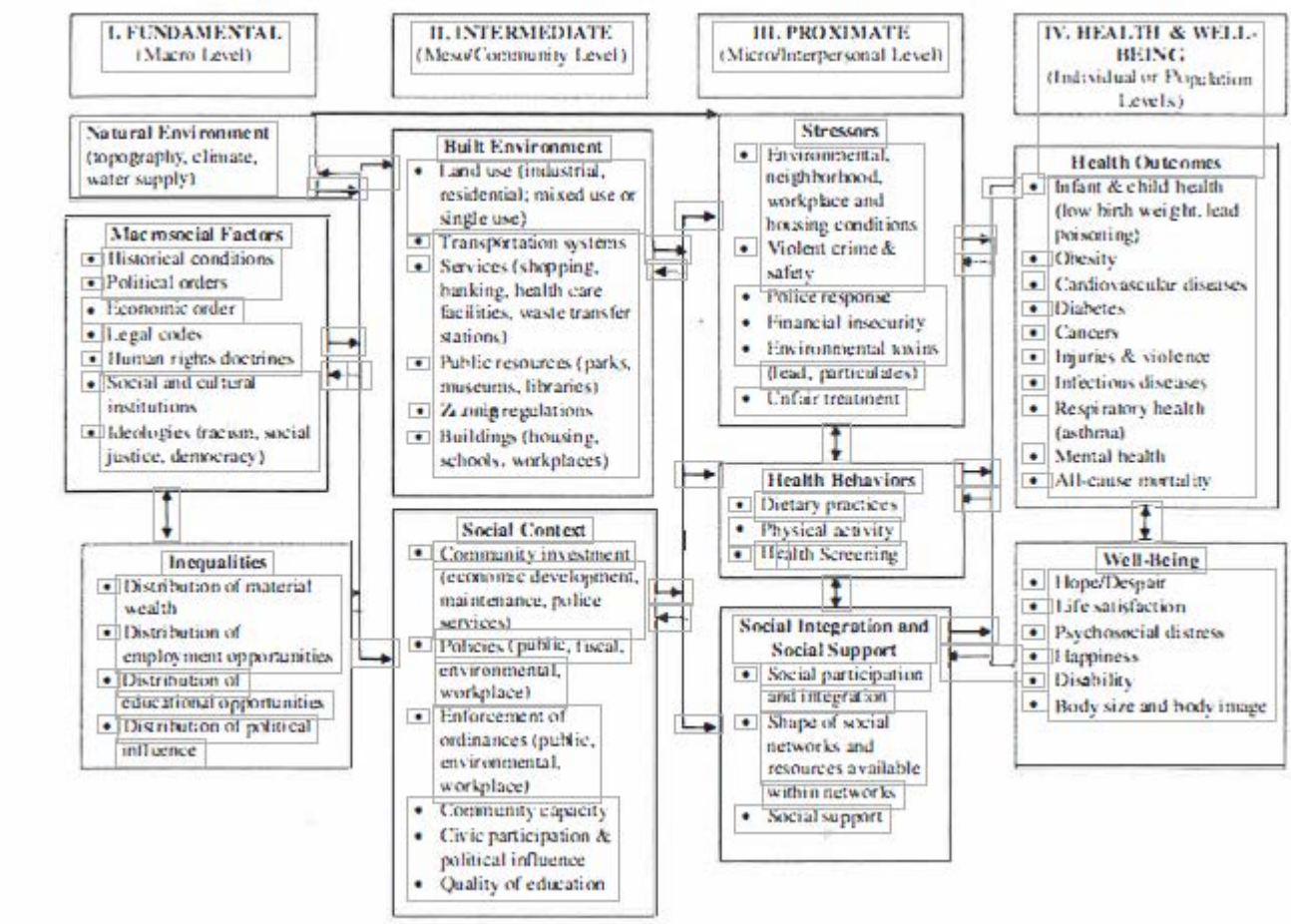
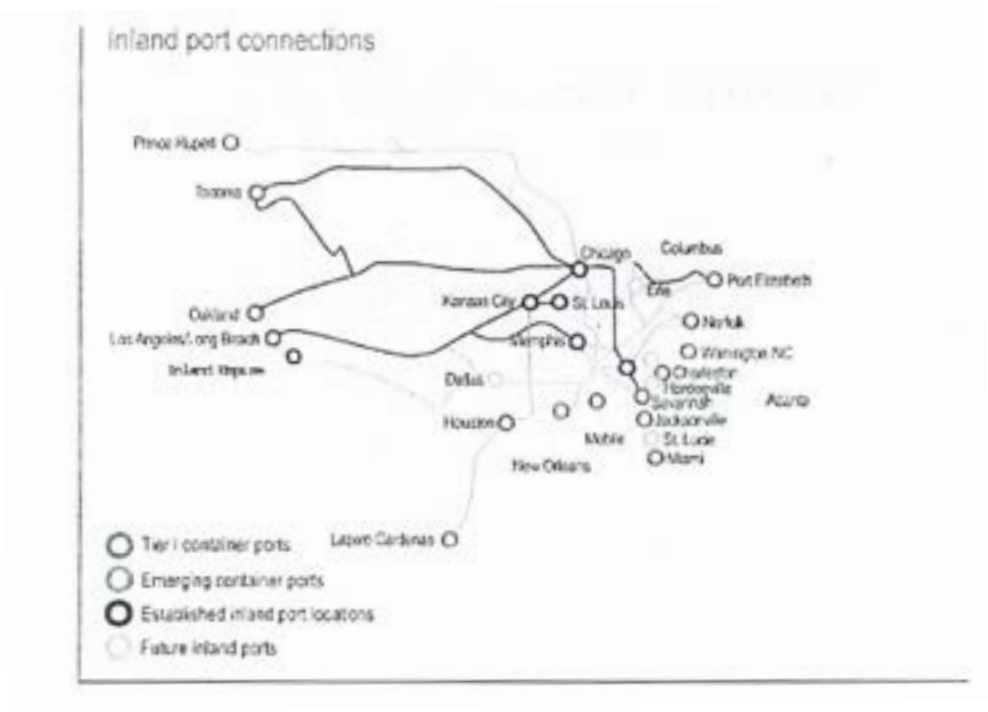
Appendices

(Figure.I)



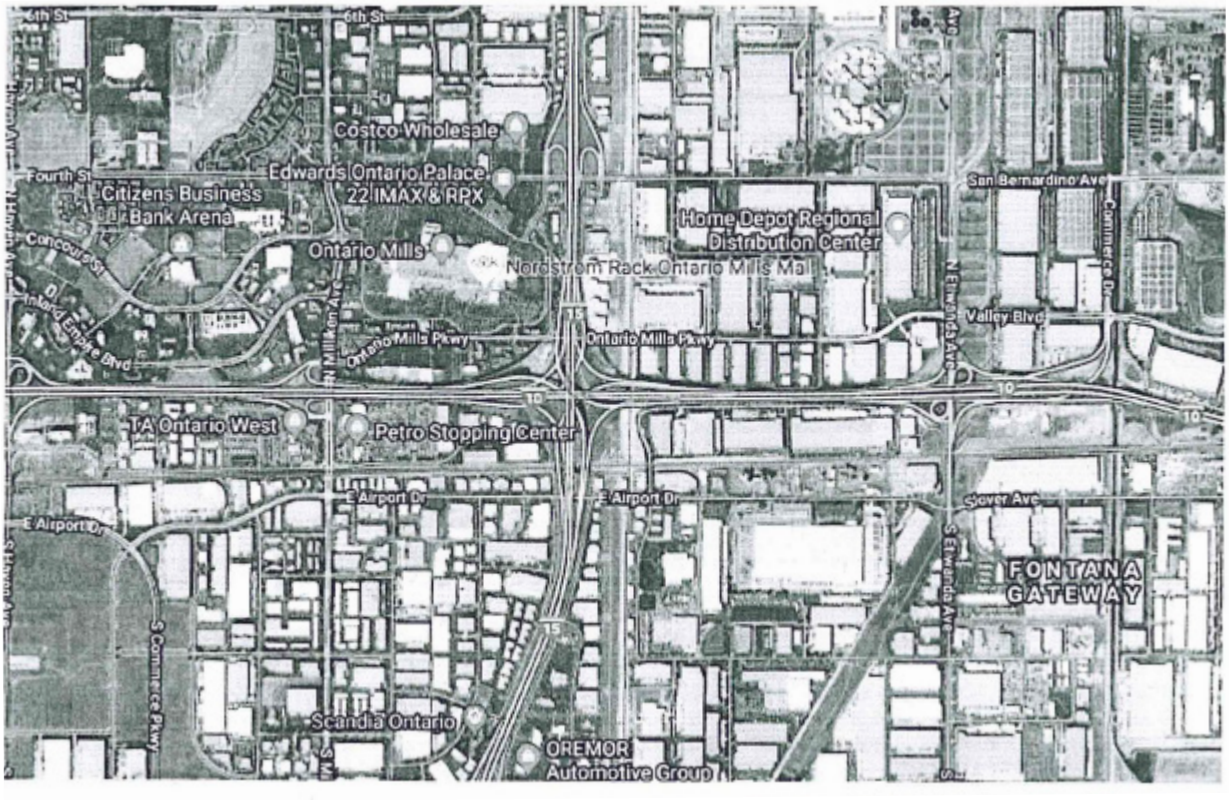
(Figure.2)



(Inland Ports of Southern California-Warehouses, Distribution Centers, lntermodal Facilities Impacts, Costs and Trends: Newman, 2012)
(figure.3)

(Cal trans, State of California: Department of transportation)

Inland Empire 10fwy/15fwy intersection and distribution centers



(https://www.google.com/maps/search/10+and+l5+freeway+intersection)

General Map

(geology.com/county-map/California)

Benjamin Hunter

Dr. Mario Guerrero

The Shaping of Views on Free Speech

ABSTRACT

Free speech has been a big issue in America for numerous decades. In more recent years the two parties seem to have become more polarized on this issue than in decades past. This thesis explores how partisan affiliation shapes views on free speech. Preliminary research suggests that liberalism as of the last decade or so is more closely affiliated with people who choose to identify as Democrats whereas conservatism is more closely affiliated with people who choose to identify as Republicans. That said, Conservatives were indicated to be just as intolerant as liberals and less protective, but more consistent in their tolerance judgments than liberals according to 2009 and 2012 studies. This study uses various target groups to assess political tolerance and discusses political tolerance regarding the flag as well. An online survey was conducted at Cal Poly Pomona that assesses party ID, political tolerance, and various types of demographic information. This study controlled for other variables besides party affiliation and determined that partisan affiliation is not the strongest predictor of views on free speech for target groups but is for the flag. Free speech tolerance judgments were indicated to be greater for Democrats than Republicans overall. However, regarding least-liked groups the tolerance levels were lower for each party affiliation. The flag aligns with these findings with tolerance levels, for the most part, being higher for Democrats than Republicans given the strong ties Republicans are perceived to have with the flag which has been shown to, in turn, have strong connections with nationalism as well. This thesis indicates nothing has really changed since 2009 and 2012.

1. Introduction

This thesis focuses on party affiliation and how it influences tolerance judgments on free speech/expression. Freedom of speech/expression is a fundamental constitutional right guaranteed by the First Amendment. Free speech is defined as "the legal right to express one's opinions freely" (www.merriam-webster.com). Freedom of expression is defined as "the unrestrained right to voice ideas, opinions, etc." (www.collinsdictionary.com). For the purpose of this thesis these are one in the same. Free speech in general has seemingly become a far more polarized issue in recent years than it was in past decades. The Democratic Party and the Republican Party typically are in direct opposition to each other on this issue. Free speech and the flag specifically are a hot topic in light of recent anthem protests around the NFL the first being Colin Kaepernick taking a knee to protest police brutality in African American community. By assessing how party affiliation influences views on free speech political scientists can assess partisan trends regarding this issue. Through examining these trends and correlated variables they can explore ways to possibly influence the populous to become more moderate on this issue. Finding common ground can help prevent stigmatization and polarization on this issue.

This thesis examines Cal Poly Pomona and the views held on this issue here on campus compares them to previous studies on political tolerance. The first question is how does party affiliation shape views on free speech/expression? Conventional knowledge suggests Democrats are less tolerant of free speech/expression than Republicans. Republicans have a greater desire for openness regarding free speech/expression than Democrats do nowadays. However, a very prominent issue today that violates this conventional knowledge is the flag. This leads to the next question: *Are Republicans less tolerant of free speech/expression regarding the flag than Democrats?* Republicans are less tolerant on this matter than Democrats because past studies such

as that conducted by Carter, Ferguson, and Hassin (1012) indicate they are closely affiliated with the flag. Furthermore, the flag is often usually affiliated with patriotism by many Americans. However, Kemmelmeier, and Winter (874) have determined that the flag is more closely associated with nationalism than patriotism. In fact, the flag had no actual impact on patriotism whatsoever (Kemmelmeier & Winter 874). Nationalism being defined as "a sense of superiority over others" and patriotism is defined as "love and commitment to one's country" (Kemmelmeier and Winter 859). Another issue is that many Americans do not know the difference between nationalism and patriotism (Kemmelmeier and Winter 874). This confusion produces an antagonistic attitude amongst Republicans towards those who do not look favorably on the flag, whereas Democrats are less likely to do so because they are not as strongly affiliated with the flag and, thus, nationalism as well. Understanding how views on patriotism affect the views the two parties have on this issue could go a long way towards bringing more unity on this matter. Regarding views on free speech/expression in general, since personality traits can have a significant impact on partisan affiliation (Alan S. Gerber, Gregory A. Huber, David Doherty and Conor M. Dowling 675), it can be helpful for political scientists to know what factors shape these personality traits. By determining these factors future research can help provide political scientists with the tools needed to potentially help people nationwide see eye-to-eye on this issue more than they do now. Other variables can shape tolerance judgments: situational context, gender, religion, strong group identity (I.e. race), age/generation, and level of education. Party affiliation is a stronger predictor of free speech tolerance judgments than these other variables.

This study conducts a campus wide survey. It first checks party affiliation, second political ideology (degrees of liberalism/conservatism), third personality, and fourth group-targeted tolerance. This research tests the prediction strength of party affiliation regarding views on free speech/expression. For the second part of this study it assesses party affiliation and how it shapes tolerance judgments of acts of free speech concerning the flag (I.e. flag burning, protesting the national anthem, abstaining from the pledge of allegiance, flippant speech regarding the flag, etc.). This assesses the prediction strength of party affiliation on this issue and can help with drawing the connection between party affiliation and the flag.

2. Literautre Review

2.1 Introduction

This literature review goes over preliminary research regarding the connections several variables have with political tolerance and the connection party affiliation has with the flag. It first addresses the connection political ideology has with political tolerance, as well as other factors connected to either variable. The second segment addresses the connections demographics have with political tolerance. The third and final segment examines political attitudes and party affiliation. This last portion establishes the connections those variables have with the flag. Some of the preliminary research helped formulate the survey questions for this thesis.

2.2 Concerning the Connections between Political Ideology, Party Affiliation, Political behavior, Political Attitudes, Personality, and Political Tolerance

This research focused on "whether and how the public is sensitive to the specificities of actual political debate?" (Petersen et al.). This study addressed the topic of political tolerance. Political tolerance has to do with one's willingness to put up with all viewpoints especially those one disagrees with (Petersen et al.). Petersen argued that how democratic the target group (group in question) is and whether they are characterized by violence will influence levels of political tolerance (aka tolerance

judgments). Furthermore, he argued tolerance judgments would be greater for non-extremist groups than extremist groups. A telephone survey was conducted to test the argument. All the arguments held with the level of persuasion of the target groups being dependent on all the aforementioned factors, with an exception being that non-extremism was not always a guarantee of increased political tolerance. One such noteworthy exception in this study was Muslims (Petersen et al. 596). Sympathy for non-extremist groups played no role in determining tolerance judgments (Petersen et al. 595). Previous studies only used the "least-liked" approach to determine tolerance judgments. The "least-liked" approach analyzes a given issue area by gearing questions for the respondents in relations to groups they distance themselves from the most (Petersen et al.). This study differed from preliminary research by accounting for favorable groups as well as unfavorable groups. The effects democracy and nonviolence have on political tolerance are still ambiguous though. Tolerance judgments can tell a person a great deal regarding willingness to allow certain target groups to speak. This ties into the thesis by assessing this willingness and connecting it to partisan affiliation.

Linder and Nosek measured tolerance judgments regarding free speech for the given political groups: liberal, moderate, and conservative. They argued "liberals are more willing to protect any speech, regardless of its content" (Linder & Nosek 70-71). They assessed the target of the speech's criticism and the political orientation of the observer to test this argument (Linder & Nosek 90). In general, the respondents demonstrated a willingness to protect unfavorable speech. However, Liberals were more protective of free speech than Conservatives, but were not as consistent as Conservatives. Liberalism equated to stronger political tolerance, but Conservatives were more resolute in their protection of ideological content of the speech while Liberals were more flexible in this regard (Linder & Nosek 88). In other words, whether content aligned with their own caused greater discrepancies in protection for Liberals than for Conservatives. The strength of the political tolerance of liberalism in general was not absolute and ideological consistency was still somewhat ambiguous leaving room for further research in these areas (Linder & Nosek 88-89). That said, this thesis argues that Republicans, typically associated with Conservatism, are more tolerant of free speech than Democrats, typically associated with Liberalism. Liberals have greater tolerance levels than Conservatives. This does not necessarily line up with this argument. However, the fact that the content of the speech does not throw off the consistency for Conservatives but does for Liberals could indicate that the argument this thesis is making is not entirely unreasonable. Lastly, Unlike Petersen, Linder and Nosek focus on ethnic preferences instead of out-groups.

Golebiowska stated that "Important questions remain, however, about the extent to which the distinction between group-targeted and individual-targeted tolerance applies to political out-groups (controversial or questionable groups) more generally and the conditions under which group-and individual-targeted tolerance diverge." This study posed the question: does political tolerance for an out group determine political tolerance for an individual group member? Individual-targeted political tolerance is 'willingness to allow individual members of political out-groups to exercise rights and freedoms protected by the First Amendment' and group-targeted tolerance is 'willingness to allow political out-groups to exercise First Amendment freedoms' (Golebiowska 1017). The argument is "individual group members will be more tolerated than the group(s) because they will be liked more and/or judged unrepresentative." (Golebiowska 1022). This research builds off prior research of Marcus et al. The argument Golebiowska made held. Honesty, along with individuation, led to greater tolerance of the individual. This differs from the Petersen study in that it made a distinction between out-groups and individual out group members. Linder and Nosek differ from Petersen and Golebiowska by focusing on ethnic preferences. Like Petersen, Golebiowska does examine tolerance judgments for out-groups.

The connection to this research is the connection between political tolerance and out-groups. This thesis explores political tolerance for out-groups as well.

Traditional models are hardly enough to determine the distinction in attitudes towards an out group and individual group member (Golebiowska 444). The goal of this research was to determine the sources of such attitudes towards individual group members. Theoretical and empirical methods were used to assess the relationship between stereotypic consistency and tolerance. The argument goes as follows: "For moderately disliked groups (e.g. gays), I expect and find stereotypic beliefs are linked with tolerance more strongly when group membership is learned before other information about the individual group member. For intensely disliked groups (e.g. racists) stereotypic beliefs are linked with tolerance more strongly when group membership is learned after other information about the individual group member." (Golebiowska 444-445). Two studies were conducted with gays and racists being the target groups. The general argument that the impact of stereotypic beliefs on tolerance of an out group member is dependent on the timing of group membership revelation was confirmed by the two studies. Stereotypic consistency depended on the intensity at which the group was disliked. Marcus et al. (1995) on stereotypic consistency also had an impact on this research. These findings do deepen one's understanding of political tolerance. Golebiowska differs from the previous study in that she used group membership revelation to determine political tolerance as opposed to group-and individual-targeted tolerance. The Petersen, Linder, and both Golbiowska studies all used out-groups. Once again using this least-liked model connects to the intent of this research: to determine free speech tolerance judgments for out-groups and particularly political opponents.

Mondak et al. established their hypotheses with a 2006 U.S. survey and drew on data from Uruguay and Venezuela. They investigated three pillars of behavior which are environment, individual traits and the interplay between them (Mondak et. al. 85). Research has typically only been concerned with environmental variables or character traits, but not both. This study focused on disposition, situation, and their interactions (Mondak et. al. 85). Biological influences of personality were also considered in this research. This body of research sought to compare behavioral antecedents with personality and their connections to situational expression. Because prior research did not seek to investigate the relationship between personality and environment Mondak et. al. found it necessary to be innovative in this manner. Continuing to investigate political behavior in this manner can enhance our understanding of it in future research (Mondak et. al. 104). The holistic approach is rather complex and requires further investigation. Ultimately neither personality, nor environment alone is enough to provide an adequate understanding of political behavior, but examining both variables enhanced understanding in a way that each variable as a standalone could not. This differs from all the other previous articles by providing a psychological viewpoint of political behavior. However, in this case there is a connection to the previous articles in that it could be used to assess the behavior of the respondents from the prior articles. This research could be used as the basis for an in-depth psychological analysis of this thesis in future research.

Crawford and Pilanski (841) asked a commonly held question: 'Is political intolerance more strongly predicted by political conservatism than by liberalism?' Several tolerance judgments were utilized to assess the claim that political conservatism is a stronger predictor of political intolerance than liberalism. In conclusion, equal intolerance was indicated towards the opposing side for both conservatives and liberals (Crawford & Pilanski 841). In fact, both sides were intolerant of the opposing side more than they were of differing views on their own side. This research built upon Linder and Nosek's (2009) research on political tolerance and ideology. This study took up their challenge to assess

political tolerance using people of directly opposing ideological positions as the target group. Since prior research demonstrated that rigidity and dogmatism are connected to political intolerance, future research should investigate the potential moderating effect of trait-based rigidity (Crawford & Pilanski 849). This thesis argues Democrats, generally affiliated with Liberalism, are less tolerant of free speech than republicans, generally affiliated with Conservatism. In this manner, this thesis is essentially arguing the opposite of Crawford and Pilanski.

This research investigated the connection between personality traits and partisan identification. "The relationship between party affiliation and Big Five personality traits— extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience— should mirror those between the Big Five and Ideology." (Gerber et. al. 653). This was confirmed, but there was a correlation amongst the Big Five, ideology, and party affiliation, whereas there was a more direct causal relationship between personality traits and party affiliation. Extraversion, Agreeableness, and Openness were especially strong predictors of party affiliation even when ideology was unaccounted for (Gerber et. al. 653). This thesis will utilize the Big Five personality traits as well to access the current connection between personality and party affiliation.

Slothuus and de Vreese (630) asked "How do people respond to issue frames from political parties and which individuals and situational factors determine the kind and strength of effects that party frames might have on opinion formation?" They argue that "Citizens should be more likely to follow a frame if it is promoted by "their" party and such biases should be made more pronounced, on issues at the center of party conflicts and among the politically aware." (Slothuus & de Vreese 630). They use Denmark as a case study because even though it has a multiparty system, it is strongly dominated by two parties: the social democrats and the liberals. The experiments performed confirmed these arguments. Framing relates to how issues are communicated and, therefore, could be the basis for future research regarding why Democrats and Republicans differ on political tolerance in the manner they do in this thesis.

2.3 Conclusion

Petersen and Golebiowska both focused on tolerance judgments for out-groups. Petersen decided to diverge from the "least-liked method" while Golebiowska focused on group-targeted tolerance vs. Individual-targeted tolerance. Linder and Nosek used ethnic preferences to assess political tolerance of Conservatives and Liberals particularly. Mondak gave a psychological perspective on political behavior. Crawford and Pilanski connected political ideology and tolerance together. Gerber connected personality and ideology with party affiliation. Slothuus and de Vreese connected issue framing with partisan affiliation.

2.3 2.4 Alternative Influences on Political Tolerance

This study investigated the claim that greater levels of education produce greater levels of support for civil liberties. Previous studies indicated that cognitive skills increase political tolerance in education, exposure to intellectual and social diversity produces increased tolerance, and so does augmentation of knowledge (Green et. al. 463). In a survey that involved 1,000 students in 59 high schools the study randomly assigned enhanced civics classes designed to improve knowledge of civil liberties in half the sample. While this study did confirm the relationships between education and those three aforementioned factors, it also mentioned there is no direct connection between education and increased political tolerance despite those byproducts (Green et. al. 463). A correlation between those byproducts was found, but no evidence determining causation. Further research needs to investigate the focus of education on civil liberties and the alternative explanation that education and political tolerance for

civil liberties are merely correlated (Green et. al. 475). This research demonstrates a need to broaden research of the causal relationship between education and political tolerance of civil liberties and this is only a first step in that direction. This thesis looks at alternative influences beside party affiliation in order to show how they aren't as influential of free speech tolerance judgments. This addresses education.

Few studies examine the relationship between religion and political tolerance. This study concluded that religion has an insignificant impact on tolerance and psychological determinants of political tolerance. Previous research had not investigated the connection to religion, failed to use rigorous measurements of religion, or lacked sophistication in the methodology, and did not account for psychological and political predictors (Eisenstein 328). This study utilized a random sample of 601 individuals in Lake County, Indiana (Eisenstein 333). Three arguments were made regarding this: Religious commitment produces increased intolerance; doctrinal orthodoxy may produce increased intolerance. And it is highly unlikely there is a causal relationship between religion and political tolerance. The first two arguments were disproven while the last argument held true, but there was a caveat. The caveat is the previous two factors are correlated to an increased negative influence on tolerance. Education was accounted for and was found to increase religious commitment contrary to expectations (Eisenstein 342). These conclusions were formed by building upon Sullivan's earlier work. Further research should examine the increased tolerance with increased religious commitment, the reason for this surprising relationship between education and religion, as well as self-esteem and dogmatism regarding religion. This research drew a connection to religion and education so there is an indirect connection between Einstein's research and Green's. This also shows why education is not as influential on free speech tolerance judgments as party affiliation. This thesis also seeks to show that religion is not as significant a predictor of tolerance judgments as partisan affiliation.

The gender gap is noticeable when it comes to civil liberties (Golebiowska 43). Preliminary research suggests women are more intolerant of political out-groups than men. The 1987 Freedom and Tolerance National Survey and the General Social Survey were used to examine claims that explanations from prior research (e.g. women's greater religiosity), feminist theory ideals, and factors that do not fit in either category well drive this. Different target groups were utilized in the study and it was determined that both genders have pluralistically distributed and parallel intolerance towards target groups, but sometimes preferences differed (Golebiowska 43). Commitment to democratic norms, political expertise, and moral traditionalism were found to contribute to women's heightened political intolerance. This research confirms the gender gap assumption made by prior research and expands the etiology of it. Further research should seek to find ways to manipulate these factors which are most controllable regarding the political intolerance of women (Golebiowska 58). Furthermore, these findings indicate a need for greater understanding of women's apathy towards political expertise. This establishes a connection between gender and political tolerance.

The General Social Survey indicates Americans have become increasingly tolerant of social out-groups such as racists, communists, anti-religious groups, militarists, and homosexuals, especially regarding adults in the 2010s as opposed to the 1970s and 1980s (Twenge, Carter, & Campbell 379). Twenge, Carter, and Campbell (379) asked, "Were people more tolerant in 2012 than they were in the 1970s and of what groups?" According to this study tolerance for homosexuals experienced the greatest increase while that for racists, experienced the least increase over this 50-year time span. There was a positive correlation with higher levels of education and individualistic attitudes, but also a negative correlation with changes in empathy (Twenge, Carter, & Campbell 379). This research made

a connection between the passage of time and political tolerance. There also was a correlation to education. For college students, years with greater levels of tolerance equated to lower levels of empathy (Twenge, Carter, & Campbell 393). This thesis looks at age and generation as one of many alternative influences on increased tolerance.

Schwadel and Garneau (421) asked the question, “Is the increase in political tolerance over the last few decades because of more liberal birth cohorts replacing more conservative cohorts (i.e. cohort effects) or changes among the population as a whole (i.e. period effects)?" Prior research indicates the following: 'Social change is often motivated by differences across generations or birth-cohorts.' Other preliminary research state, 'Some social and religious viewpoints change across time periods, regardless of when people are born.' (Schwadel & Garneau 421). For homosexuals, communists, racists, and anti-religionist the increase in tolerance was both period-based and cohort-based, but for racists it was only cohort-based. The findings made a clear distinction between period effects and cohort effects and the findings show period effects have a much stronger impact on political tolerance than cohort effects. By showing this Schwadel and Garneau’s research implies that the relationship between age and political tolerance is insignificant. This thesis also intends to show that alternative factors to party affiliation such as age and generation are not as influential on free speech tolerance judgments.

Mondak and Sanders (493) asked, "Have levels of intolerance changed over time?" According to Mondak and Sanders (492), "The GSS scale captures two aspects of tolerance: whether respondents are tolerant or intolerant; and among the intolerant, the breadth and depth of their intolerance. Also, that the first of these dimensions can be measured validly using the GSS data." The General Social Survey (GSS) data utilized 15 dichotomous tolerance items. "The GSS data is not very useful for diagnosing the breadth and depth of intolerance. But the data is useful for identifying the proportions of Americans who are tolerant and intolerant so long as all or nearly all respondents dislike one or more of the five GSS groups, those respondents can express tolerance. Consequently, a dichotomous indicator that divides the tolerant from the intolerant is easily obtained." (Mondak & Sanders 501). Tolerance did not significantly increase over this time span. This goes along with the connection between time/age and political tolerance and once again shows that generation and age do not significantly impact political tolerance.

Masuoka (253) investigates multiracial Americans, their political attitudes, and the impact their racial identity has on their individual public opinions. Three competing theoretical models were used in this assessment: classical assimilation, minority Trumping, and new Identity formation (Masuoka 253). Masuoka (253) defines each of those. The classical assimilation model states “Multiracial individuals will exhibit diminishing racial or ethnic attachment and will not use race-based cues in their political choices.” The minority trumping model says, “Multiracial individuals will integrate into one of their racial minority ancestry groups continuing the race paradigm seen today.” The new identity formation model suggests “Multiracial individuals will construct their own racial identity as specifically multiracial. This alternative multiracial identity may encourage the formation of distinctive political interests on behalf of a separate multiracial identity group.” Masuoka (253) asked "What are the political attitudes of multiracial individuals and how do they compare with those of their monoracial counterparts?" Multiracial political positions tend to parallel those of their minority counterparts. The classical assimilation model did not hold as race still influenced political decision making. The minority trumping models held, while the new identity formation model also held, but with mixed evidence. Masuoka (265) suggested an alternative model called flexible identities that argues multiracial individuals tend to identify as the race that gives them the most leverage at any given time.

This research also established a connection between race and political attitudes and could be used to create a connection between race and political tolerance. This thesis also connects race with political tolerance.

Gibson asked, "Do strong group identities fuel intolerance?" According to Gibson (665), "In the case of South Africa, group identities are not useful predictors of South African Intolerance." South Africa was used for a case study because it is an example of a country with strong group identities. This study was conducted by using a face-to-face survey of the South Africa mass public conducted in 2000/2001 which involved a random sample of 3,727 South Africans (18+) across every area of South Africa. The findings confirmed the argument, but the confusion lies in the fact that South Africa has a long history of intergroup conflict. This case study serves the intent of this thesis by having indicated that group identities such as race are not especially useful for predicting political tolerance.

Oskarsson and Widmalm (236) asked, "Why are some individuals willing to grant political rights to others whereas others are not?" Both personality traits and situational and contextual factors influence political tolerance. Case studies were performed in Bhopal, India and Lahore, Pakistan in order to determine the influence of personality traits in these countries and to see how situational contexts outside of the stereotypical western studies influence political tolerance. The Big Five Approach was used to find the connection between personality traits and political tolerance. Personality traits have a strong connection to political tolerance; however, they had a stronger connection in Lahore than Bhopal. "These findings support the notion that situational factors activate the influence of personality traits on political tolerance instead of suppressing them." (Oskarsson & Widmalm 248-249). This thesis seeks to show social context on its own do not impact political tolerance and this body of research indicate this to be the case. If social context is not a useful standalone influence of political tolerance, then it is it not a significant predictor of political tolerance alone.

2.5 Conclusion

Green et al stated education is not a significant predictor of political tolerance. Eisenstein mentioned religion is also not a significant predictor of political tolerance. Golebiowska showed a connection between gender and political tolerance stating women are more intolerant than men. Twenge, Carter, and Campbell made a connection between both age and generation and political tolerance. Schwadel and Garneau had shown in their 2014 study that this connection is insignificant. Masuoka connected race with political attitudes. Gibson had shown that race alone is not a significant predictor of political tolerance. Oskarsson and Widmalm stated that social context on its own is not a significant predictor of political tolerance.

2.6 The Connections between Political Attitudes, the Flag, and Party affiliation

Wolak and Dawkins asked, "Why do some Americans feel more patriotic than others?". According to Wolak and Dawkins (391) "feelings of national pride are reinforced by cues from people's political and social environments.". The social climate of areas where people reside: values, traits, civic orientations can cause a rise in patriotism if they fit with a respondent's preferences. Racial and ethnic diversity of an area of residency tends to cause minorities and other supporters of political equality to become more patriotic. For partisans, political competition can drive up patriotism (Wolak & Dawkins 391). This argument was evaluated using 2012 American National Election Study (ANES) data. This research investigated the relationship between social context and patriotism. This thesis examines the connection the flag, political attitudes, and partisan affiliation all have with each other and how these relate to free speech.

This research examined the impact flag observance has on patriotism. Kemmelmeier and Winter (863) asked, "Does the American flag enhance patriotism and/or nationalism? Of interest are actions surrounding the flag and the connection they have with American national identity (Kemmelmeier & Winter 861). "The flag increases patriotism, defined as love and commitment to one's country, and nationalism defined as a sense of superiority over others." Two experimental studies confirmed the argument regarding nationalism, but not regarding patriotism. The respondents associated the flag with patriotism, but nationalism was the actual result (Kemmelmeier & Winter 874). According to Kemmelmeier and Winter (872) the connection a national flag has with either patriotism or nationalism depends on the reference frame of a given nation-state. As mentioned in the previous paragraph this thesis looks at the connection between the flag and party affiliation.

Sparse evidence has suggested incidental cues in the environment can drastically impact political judgment and behavior (Carter, Ferguson, & Hassin 1011). That leads to the question what effect does the flag have on political partisanship? The flag is an incidental cue so political partisanship is influenced by the flag in this manner as flag exposure pushes people towards Republicanism in the U.S. Experiment 1 was conducted during the 2008 presidential election, while experiment 2 was conducted more than a year deep into Barrack Obama's term and in both cases flag displays pushed respondents towards republicanism for as many as 8 months later (Carter, Ferguson, & Hassin 1011). This provides evidence for nonconscious priming effects of the flag regarding influencing political partisanship. Though this research is not conclusive it gives a strong connection between the flag and party affiliation. This thesis seeks to draw a connection between the flag and partisan affiliation.

2.7 Conclusion

Wolak and Dawkins made a connection between social context and patriotism thus providing an avenue for assessing political attitudes. Kemmelmeier and Winter made a connection between the flag and political attitudes by relating the flag to patriotism and nationalism. Carter, Ferguson, and Hassin made a connection between the flag and partisan affiliation. This thesis looks to see how the connections between the flag, partisan affiliation, and political attitudes affect free speech tolerance judgments regarding the flag. These studies may provide different ways to assess these in order to prove or disprove the argument that Republicans are less tolerant on this matter than Democrats.

2.8 Conclusion

This literature review assessed the connections between political ideology and political tolerance, as well as other factors connected to either of those variables. The first portion managed to make a connection between ideology and partisan affiliation as this thesis also does. The second portion addressed the connections demographics have with political tolerance as does this thesis. The third and final portion established a connection between the flag and both patriotism and nationalism. Furthermore, it made a connection between the flag and partisan affiliation as does this thesis. The prior research neither confirms, nor nullifies the argument regarding free speech in general, however, the connection between the flag and both nationalism and Republicanism is favorable towards the argument this thesis makes regarding the flag.

3. Research Methodology

This thesis looks to prove that party affiliation is a very strong predictor of political tolerance, especially free speech tolerance judgments. Democrats are less tolerant of free speech/expression than Republicans. A survey of Cal Poly Pomona is being used to prove these arguments in this study.

Cal Poly Pomona is a public university belonging to the California State University System.

According to the Public Policy Institute of California (PPIC) California has 19 million registered voters constituting 75.7% of eligible adults. 44.4% are registered Democrats, while 21.5% are registered Republican and 25.5% identify as Independent. Independent is defined as "decline to state" or "no party preference". 43% of Independents lean democrat, while only 29% lean Republican and 28% lean towards neither party. According to the University of Virginia Center for Politics there are 31 states, along with the District of Columbia, with party registration. The District of Columbia along with 19 states has more registered Democrats than Republicans. 12 states have more registered Republicans than Democrats. In the aggregate 40% of registered voters are Democrat, 28% are Republicans, and 28% are independent. In this thesis roughly 25.5% of the respondents are registered Republicans, 41.5% are Democrats, 4.3% are Third-party members, and 27.7% are Independents. For party leaning roughly 26.6% of respondents lean Republican, 36.2% lean democrat, and 14.9% lean neither way.

Preliminary research discovered personality is a stronger predictor of partisan affiliation than political ideology (Gerber, Huber, Doherty and Dowling). Conservatives are as equally intolerant as liberals (Crawford and Pilanski 841) and are less protective, but more consistent regarding political tolerance (Lindner and Nosek). These trends are not far from this thesis's argument that Republicans are more tolerant than Democrats. There is also a strong connection between the flag and partisan affiliation (Carter, Fergusen, and Hassin).

3.1 Participants, dates, and Locations

Participants in this study included all students who are registered to vote on campus, so anyone 18 years or older who fits this description and was willing to participate was used as a respondent. The survey was anonymous for confidentiality purposes. This survey was administered as a convenience sample. Approximately 94 students partook in the questionnaire. Qualtrics Survey Software was used to conduct this study. The questionnaire was first assembled on Tuesday, January 22nd and completed on Saturday, January 26th. On Saturday, January 26th the survey was announced and distributed to my Christian club Pomona Valley Cru at 8:49pm. At 11:03am on Monday, January 28th the survey was distributed to all my classmates in my California Government class and at 3:30pm it was distributed to my classmates in my Government and Politics of the Russian Federation class both via student email. At 9:32am on January 29th the link for the online survey was emailed to my senior thesis advisor. At noon that same day I distributed the survey to my classmates in my Media, Politics, Sex, and Violence class. At 9:55am the next day my senior thesis advisor emailed my classmates and me the online survey. At 10:21 on February 4th I asked an E-board member of CPP college republicans to distribute my survey to the regular attenders from that club and encourage them to share with their classmates also. At 11:38am he confirmed that he would do that. At 10:07am on February 5th I notified the president of my Young Americans for Liberty (YAL) club about my survey asking him to distribute it to his classmates and encouraging them to distribute it to theirs. At 10:21 he responded saying he would do that for me. At 10:37am that same day I shared my survey on the Political Science Club Facebook page encouraging the students to once again share with their classmates. At 5:08pm on February 16th I posted the survey to the CPP Reddit page, at 5:13pm I distributed this survey on the CPP Facebook page, and at 5:32pm I messaged friends with the survey using text messaging and Facebook messenger. The Survey was biased towards the College of Engineering and the College of Liberal Arts and Social Sciences (C.L.A.S.S). The survey questionnaire addressed the following three areas: party affiliation, political tolerance, and demographics.

3.2 Party Affiliation

The questionnaire gave participants the options of the following party registrations: Republican, Democrat, Third Party, or Independent. Independent, once again, is defined as "decline to state" or "no party preference". For those who were registered Independent or Third Party it gave them the option to state whether they lean Republican, Democratic, or in neither direction. After asking those questions, the questionnaire then asked how Liberal/Conservative each respondent is on a scale from 1 to 7 with 1=extremely Liberal, 4=Moderate, and 7=extremely Conservative. Personality was assessed as well using the Big Five Traits of "(1) Extraversion (associated with gregariousness and self-confidence); (2) Agreeableness (associated with harmonious relations with others); (3) Conscientiousness (associated with dutifulness and adherence to social norms); (4) Emotional Stability (associated with low levels of negative emotions, e.g. low anxiety); and (5) Openness to Experience (associated with intellectual curiosity and aesthetic appreciation)" (Gerber, Huber, Doherty and Dowling 656). The level of identification with each trait was measured on a scale of 1 to 5 with 1=Highly Identify and 5= Don't Identify.

3.3 Political Tolerance

This study combined the "least liked" approach of using controversial groups as the target group (group in question) and also acknowledged groups with possible political similarities to some of the respondents. Tolerance judgments were given for these target groups: Muslims, LGBT people, Fundamentalist Christians (e.g. Westboro Baptist), Islamic extremists, racists, communists, whites, as well as those on both the far left and the far right. For each of those groups disagreement/agreement with the willingness to let them speak was indicated by 1=Strongly Disagree, 4=Neutral, and 7=Strongly Agree. The tolerance judgments were assessed for three different scenarios: in private, in public demonstrations (e.g. protests, speeches, etc.), and in public positions (e.g. k-12, college, or university professors, public office, etc.). Regarding the flag an unwillingness/willingness number scale from 1 to 7 was used to permit speech acts, but this time 1=Highly Unwilling, 4=Neutral, and 7=Highly Willing. The speech acts included flag burning, protesting the anthem, abstaining from the pledge of allegiance, flippant speech regarding the flag, wearing the flag as a clothing article, and other acts of physical desecration to the flag.

3.4 Demographics

The last portion of the survey assessed demographics. Age was assessed based on generation: Gen Z or people ages 18-23 for this study; Gen Y (aka Millennials) or people ages 2438; Gen X or those ages 39-53, Baby Boomers or those ages 54-72; The Silent Generation or those ages 73-93; the Greatest Generation or those ages 94-102; and the interbellum generation and the lost generation or those ages 103-128 altogether. Due to the declining nature of generations preceding baby boomers this study mainly focused on Baby Boomers and subsequent generations. For race/ethnicity it asked the respondents if they are white, black/African American, Hispanic/Latino, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, and Other. Gender was determined with the options male, female, or transgender based on the self-identification of the respondent. Education was also assessed: 1st year, 2nd year, 3rd year, 4th year, and 5th year or higher. The college each student belongs to was accounted for, while also offering the option undeclared. Religion was accounted for with Christianity including Evangelical Protestant, Mainline Protestant, Historically Black Protestant, Catholic, Orthodox Christian, Mormon, Jehovah's Witness, and Other Christian. Non-Christians included Jews, Muslims, Buddhists, and Hindus. Other world religions, other faiths, unaffiliated (religious "nones"), atheists, agnostics, nothing in particular, and don't know were also options as well.

4. Results

4.1 Political Ideology and Party Affiliation

Previous research from Gerber et. al. Indicates correlation between party affiliation and both personality and political ideology. Gerber et. al. mentioned that personality is a stronger predictor of party affiliation than political ideology. This thesis examines such a relationship to determine whether this holds for Cal Poly Pomona students. In order to investigate this claim and this thesis's arguments regarding political tolerance further an online survey with 94 respondents was utilized. This survey indicates that there is a significant relationship between party registration and political ideology. A scale that measures extent of liberalism/conservatism from 1 to 7 was used in this study. Cross tabulations with the percentage from each party registration were used in determining the predictive strength. Being extremely conservative is the strongest predictor of a Republican Party ID. The weakest predictor of a Republican Party ID is being somewhat liberal. The strongest predictor of a Democrat Party ID is being somewhat Liberal and the weakest predictor is the entire conservative spectrum For Third Party registered voters being somewhat conservative is the strongest predictor and the weakest predictors are the entire liberal spectrum and being slightly conservative. For Independent voters the strongest predictor is being slightly liberal and the weakest predictor is being extremely conservative.

Just like with party ID there is a significant relationship between party leaning and political ideology. In the case of party leaners this survey once again used the same number scale as the portion for political ideology and party registration to measure the extent of liberalism/conservatism. The strongest predictor of Republican Party leaning is being extremely Conservative and the weakest predictor is the entire liberal spectrum. The strongest predictors of Democrat Party leaning are being extremely and somewhat liberal. The weakest predictor of Democrat Party leaning is the entire conservative spectrum. The strongest predictors of leaning in neither a Republican nor Democratic direction are being slightly liberal and moderate. For leaning neither way the weakest predictor is being extremely conservative. Regarding both Party ID and party leanings there is some overlap. In both cases being extremely conservative was the strongest predictor of affiliating with the Republican Party to any sort of degree and being somewhat liberal is the strongest of affiliating with the Democrat Party to some extent or another. In the case of leaning neither way and being independent the strongest predictor is being slightly liberal. For a Democrat Party ID and a Democrat Party leaning the weakest predictor is being extremely conservative. Based on this assessment, this seems to align with conventional wisdom for the most part with those affiliating with the Republican Party to any degree being closer to the conservative end of the spectrum and those affiliating with the Democrat Party being more towards the liberal end of the spectrum. Third-party and Independent voters are harder to predict according to conventional wisdom, but the data indicates that they seem to avoid ideological extremes concerning liberalism and conservatism as do those leaning neither way.

4.2 The Big-Five Traits and Both Party Registration and Party Leaning

The Big-5 personality traits (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience) do not have a significant relationship at all with party registration in this thesis. Concerning party leaning the only significant relationship is the one it has with emotional stability. A number scale from 1 to 5 was utilized in the survey with 1=highly identify and 5=don't identify and a crosstab was used to assess prediction strength again. For a Republican Party leaning the strongest predictor is highly identifying with emotional stability. The weakest predictor of a Republican Party leaning is not identifying with this personality trait. The strongest predictor of a Democrat Party leaning is somewhat identifying with this personality trait. The weakest predictor of a Democrat Party leaning is not identifying with this personality trait. Concerning those leaning in neither a Republican

or Democratic direction, the strongest predictor of leaning neither way is slightly identifying with emotional stability. Once again, for those leaning neither way, just like with Republican and Democratic Leaners, the weakest predictor is not identifying with emotional stability. That said, Republican Leaners identify with this personality trait more so than Democratic Leaners and both groups identify with it more than those leaning neither way. However, it is abundantly clear that all three groups identify with emotional stability.

4.3 Party Registration and Political Tolerance for Various Target Groups

Political tolerance was assessed in terms of willingness to allow certain groups to speak. The groups included the following: Muslims, LGBT people, fundamentalist Christians (e.g. Westboro Baptist), Islamic extremists, racists, communists, whites, and those on both the far left and the far right. This thesis examines the relationship between the willingness to allow those groups to speak in private, in public demonstrations (e.g. protests, speeches, etc.), and in public positions (e.g. k-12, college, or university professors, public office, etc.) and party registration while controlling for—taking account of—other variables such as age, race/ethnicity, gender, level of education, college, and religion. Regarding letting certain groups speak in private party registration, gender, level of education, and religion all have a connection with political tolerance. There is a significant relationship between willingness and party registration for two groups: racists and fundamentalist Christians. There is a significant relationship between willingness and gender for two groups: racists and communists. Level of education has a positive relationship with willingness meaning willingness increases as the level of education increases. There is a significant relationship between willingness and level of education regarding racists. Lastly, there is a significant relationship between willingness and religion regarding the far right. Overall gender has the most significance in this category because it effects two groups in this category as does party registration, but also the sum of the significance values (sig.) is .028 for gender whereas sig.=.075 for party registration and the smaller the significance value the more significant the relationship is.

For letting certain groups speak in public demonstrations party registration, gender, level of education, and religion all have a connection with political tolerance once again. There is a significant relationship between willingness and party registration for two groups: Muslims and communists. There is a significant relationship between willingness and gender for two groups: racists and communists. Level of education has a positive relationship with willingness once again. There is a significant relationship between willingness and level of education for racists. There is a significant relationship between willingness and religion for two groups: Whites and the far right. Since party registration, gender, and religion all effect two groups in this category gender has the most significant relationship with willingness because it has the lowest overall significance value with sig.=.021 compared to that of religion (sig.=.052) and party registration (sig.=.061).

For letting certain groups speak in public positions race/ethnicity, gender, and religion all have connections with political tolerance. For Muslims there is a significant relationship between willingness and race/ethnicity. There is a significant relationship between willingness and religion for three groups: LGBT people, Whites, and the far left. Concerning communists there is a significant relationship between willingness and gender. Religion plays the most significant role in this category because it affects the most groups in this category.

Of these three dominant variables, the most significant connection overall with willingness is the one it has with gender and with party registration and religion following subsequently. The summation of all the significance values for those variables comes out to sig.=.058 for gender, sig.=.136 for party registration, and sig.=.190 for religion leading to the conclusion that gender, not party registration or religion, has the most significant relationship with willingness to let these groups speak in general. The fact that religion plays such a significant role in political tolerance runs contrary to Eisenstein's findings.

4.4 Most Significant Relationships Examined

The strength and magnitude of willingness was measured on an agreement/disagreement scale from 1 to 7 with 1=strongly disagree and 7=strongly agree and cross tabulations were used throughout this portion of the thesis. Gender and political tolerance is the most significant relationship of three. There were three options for gender: male, female, and trans. Males have a stronger and greater level of political tolerance than females. This applies to letting racists and communists speak in private and letting both groups speak in public demonstrations. Females largely have a stronger and greater level of intolerance. This applies to letting racists and communists speak in private and letting communists speak in public demonstrations. Being trans does not say much about strength or magnitude of political tolerance.

Party registration has four categories: Republican, Democrat, Third Party, and Independent. Republicans have the strongest willingness to let communists speak in public demonstrations while Independents have the greatest and the other way around for letting racists speak in public. Republicans have the strongest and greatest unwillingness to let fundamentalist Christians speak in private and to let Muslims speak in public demonstrations. A Democratic Party ID is a stronger predictor of tolerance and intolerance than being Republican or Independent. Tolerance applies to letting fundamentalist Christians speak in private and letting Muslims speak in public demonstrations. Intolerance applies to letting fundamentalist Christians speak in private, letting racists speak in private, and letting communists speak in public demonstrations. Being a Third-party member is a poor predictor of tolerance judgments. Thus, being a registered Democrat is the strongest predictor of tolerance judgments while being a Third-party member says practically nothing about it. Democrats are more intolerant than Republicans based on how many groups they tolerate speaking, but they are also more tolerant overall based on strength and magnitude of willingness.

The connection between religion and willingness is the last of the most significant relationships. There were nine different religious groups that responded: Evangelical Protestant, Mainline Protestant, Catholics, Orthodox Christians, other Christians, Muslim, Unaffiliated (religious "nones"), Atheists, and Nothing in particular. Catholics are disproportionately the most intolerant group. This applies to letting the far right speak in private and in public demonstrations as well as letting the far left speak in public positions. Atheists have the strongest tolerance levels, but other Christians have the greatest. This applies to letting the far right speak in privates as well as whites speak in public demonstrations and in public positions. Orthodox Christianity is the weakest predictor of tolerance judgments.

4.5 Conclusion

This thesis revealed that regarding gender being male is the strongest predictor of political tolerance. Being female is the strongest predictor of intolerance. Being trans is the weakest predictor of tolerance judgments. For party ID being a registered Democrat is the strongest predictor of tolerance judgments in general. Democrats are more intolerant than republicans while simultaneously being more tolerant.

For religion Catholicism is the strongest predictor of intolerance. Atheists have the strongest levels of tolerance while other Christians have the greatest.

4.6 Party Leaning and Political Tolerance for Various Target Groups

Political tolerance was assessed in terms of willingness to allow certain groups to speak for this portion of the study as well. The same nine target groups as before were used for this portion. This thesis examines the relationship between the willingness to allow these groups to speak in private, in public demonstrations, and in public positions and party leaning while controlling for other variables: age, race/ethnicity, gender, level of education, college, and religion.

For letting certain groups speak in private the significant relationships are between willingness and religion, party leaning, gender, and college. The most significant relationship is between religion and willingness because it affects three groups: Muslims, the far left, and the Far Right. Party leaning effects tolerance judgments for Fundamentalist Christians, gender affects those for racists, and college affects those for whites.

For letting certain groups speak in public demonstrations the significant relationships are between willingness and gender, college, and religion. The most significant relationship is the one between willingness, and religion because it affects two groups: whites and the far right. Gender affects tolerance judgments for communists and college affects those for Whites.

For letting certain groups speak in public positions there are significant relationships between willingness and race/ethnicity, religion, and gender. The most significant relationship, once again, is between willingness and religion because it affects two groups: LGBT people and the far left. Race/ethnicity affects tolerance judgments for Muslims and gender effects those for communists once again.

The most significant variable is religion followed by gender and college based on the number of groups they affect overall. The least significant variable is party leaning regarding its effects on willingness based on the number of groups it affects and its significance value. Sig.=.017 for race/ethnicity whereas sig.=.042 for party leaning. That said, the relationship between party leaning and willingness will help determine the conclusion of this research.

4.7 Most Significant Relationships Examined

Tolerance judgments were measured on the same number scale from 1 to 7 as for party registration and assessed using crosstabs as well. For religion the same nine groups as before were used in this thesis: Evangelical Protestant, Mainline Protestant, Catholics, Orthodox Christians, other Christians, Muslim, Unaffiliated (religious "Nones"), Atheists, and Nothing in particular. Catholics have the strongest and greatest unwillingness overall as they indicate the highest levels of intolerance strength and magnitude wise towards the far left and the far right speaking in private, the far right in public demonstrations, and the far left in public positions. Every other group except other Christians indicate the weakest and least intolerance levels. This applies to letting the far right speak in general as well as LGBT people. Atheists have the strongest willingness, while other Christians have the greatest willingness. This applies to letting the far left and the far right speak in private and letting whites speak in public demonstrations. Orthodox Christians have the weakest and least willingness to let every group speak in all three situations. This shows that Catholic have the highest levels of intolerance overall, while Atheists have the strongest tolerance levels and other Christians have the greatest. Orthodox Christianity is the weakest predictor of tolerance judgments throughout.

Gender, once again, had the same three options as before: male, female, and transgender. Females disproportionately have stronger intolerance levels than males, but not greater. This applies to letting racists speak in private and communists speak in public positions. Males disproportionately have higher tolerance levels than females with the only exception being letting communists speak in public positions as females have the greatest tolerance levels. Identifying as transgender is the weakest predictor of tolerance judgments.

College, referring to which college within Cal Poly Pomona each student belongs to, had seven groups respond: Don B. Huntley College of Agriculture, College of Business Administration, College of Engineering, College of Environmental Design, College of Letters, Arts & Social Sciences (C.L.A.S.S.), College of Science, and undeclared. Belonging to the College of Business Administration is the strongest predictor of political intolerance overall. This applies to letting Whites speak in private. Belonging to any other group serves as the weakest predictor of intolerance throughout. Those belonging to C.L.A.S.S. have the strongest tolerance levels throughout, but those belonging to the College of Business Administration and the College of Engineering have the greatest. This applies to letting whites speak in private and in public demonstrations respectively. Being undeclared is the weakest predictor of tolerance levels.

4.8 Party Leaning and Political Tolerance

Party leaning included three groups: Republicans, Democrats, and Neither referring to those who do not have a party leaning. Leaning in a Republican direction is the strongest predictor of intolerance and leaning in a Democratic direction is the strongest predictor of tolerance. Leaning neither way is the weakest predictor of tolerance judgments. All this applies to letting fundamentalist Christians speak in private. Thus, Democrat Party Leaners are more tolerant than Republican Party Leaners while Republican Party Leaners are also more intolerant.

4.9 Conclusion

Regarding religion Catholics are the most intolerant. Atheists have the strongest tolerance levels while other Christians have the greatest tolerance levels. Males are more intolerant than females. Females have stronger intolerance levels, but Males have greater intolerance levels. Belonging to the College of Business Administration is the strongest predictor of intolerance. Those belonging to C.L.A.S.S. have the strongest tolerance overall while those belonging to the College of Business Administration and the College of Engineering have the greatest. Republican Party Leaners are less tolerant than Democrat Party Leaners and are more intolerant.

4.10 Overall Conclusion for Political Tolerance for Various Target Groups

For gender females are disproportionately more intolerant than males and males are more tolerant than females. For religion Catholics are the most intolerant while Atheists have the strongest tolerance levels and other Christians have the greatest. Democrat Party affiliates, whether registered voters or leaners are just as intolerant of out-groups as Republican Party affiliates, but are also more tolerant which certainly relates to Crawford and Pilanski's argument that conservatives are more intolerant than liberals since a Democrat Party affiliation is strongly connected to liberalism and a Republican Party affiliation is strongly connected to conservatism. They also conclude that liberals and conservatives are equally intolerant of the opposing side. Democrat Party affiliates were intolerant towards fundamentalist Christians, racists, and communists while Republican Party affiliates were intolerant towards fundamentalist Christians speaking in private for both party registration and party leaning and Muslims showing that the significant connection between ideology and party affiliation may be playing a role in political tolerance.

4.11 The Flag and Party Registration

For this portion of the research political tolerance was assessed in terms of willingness to permit certain speech acts. These speech acts include flag burning, anthem protests, abstaining from the pledge of allegiance, flippant speech regarding the flag, wearing the flag as a clothing article and other acts of physical desecration to the flag. This thesis examines the relationship between willingness to permit those speech acts and party registration while controlling for other variables: age, race/ethnicity, gender, level of education, college, and religion.

There is a significant relationship between willingness and party registration, level of education, college, and religion. The most significant relationships are between willingness and party registration and then willingness and level of education based on the number of categories they affect: five and four respectively. The five include willingness to permit flag burning, anthem protests, abstaining from the pledge of allegiance, flippant speech regarding the flag, and other acts of physical desecration to the flag. The four includes all of those except willingness to permit flippant speech regarding the flag. The least significant relationships are between willingness and college followed by willingness and religion based on the number of categories they effect, which is one for both, and then significance value: sig.=.011 and sig.=.043 respectively.

4.12 Most Significant relationships examined

Political tolerance was assessed using an unwillingness/willingness number scale from 1 to 7 throughout this portion of the study with 1=highly unwilling and 7=highly willing. There are four groups of registered voters: Republican, Democrat, Third-party, and Independent. Republicans have the strongest and greatest intolerance levels overall. This applies to permitting anthem protests, abstaining from the pledge of allegiance, and flippant speech regarding the flag. A Third-party ID is the weakest predictor of intolerance overall. A Democrat ID is the strongest predictor of tolerance overall. This applies to permitting anthem protests and abstaining from the pledge of allegiance. A Third-party voting registration is the weakest predictor of tolerance overall. Thus, Republicans are more intolerant than Democrats and Democrats are more tolerant than Republicans which makes sense in light of Carter, Ferguson, and Hassin's research given there appears to be a strong connection between the flag and the Republican party. A Third-party voting ID is the weakest predictor of tolerance judgments overall.

For level of education there are five groups: first years, second years, third years, fourth years, and fifth years or higher. Being a third year is the strongest predictor of intolerance overall. This applies to permitting flag burning and other acts of physical desecration to the flag. Second years have the weakest intolerance levels, but first years have the least. Fifth years or higher have the strongest tolerance levels while third years have the greatest. This applies to permitting, anthem protests, and abstaining from the pledge of allegiance. Being a first year is the weakest predictor of tolerance. This suggests that the lower the levels of education the harder it is to predict tolerance judgments, but also higher levels of education do not necessarily guarantee greater tolerance levels though they serve as a stronger predictor of tolerance judgments. This is consistent with the findings of Green et. al.

4.13 Conclusion

This portion of the thesis indicates that Republicans are more intolerant than Democrats and Democrats are more tolerant than Republicans. Lower levels of education are a poor predictor of tolerance judgments. Higher levels of education act as a stronger predictor of tolerance judgments, but do not guarantee higher levels of tolerance.

4.14 The Flag and Party Leaning

For this last portion of the research political tolerance was assessed in terms of willingness to permit certain speech acts. The same speech acts from the previous portion of the study were used in this portion of the study. This thesis examines the relationship between willingness to permit these speech acts and party leaning while controlling for other variables: age, race/ethnicity, gender, level of education, college, and religion.

There is a significant relationship between willingness and religion as well as level of education. The most significant relationship is between willingness and religion and the least significant is between willingness and level of education. This is based on the number of categories they affect. Religion affects three which are willingness to permit anthem protests, willingness to permit abstaining from the pledge of allegiance, and willingness to permit flippant speech regarding the flag. Level of education only effects one: willingness to permit anthem protests.

4.15 Most Significant Relationship Examined

For religion nine groups participated as respondents: Evangelical Protestant, Mainline Protestant, Catholics, Orthodox Christians, other Christians, Muslim, Unaffiliated (religious "nones"), Atheists, and Nothing in particular. Evangelical Protestants, Catholics, and Orthodox Christians have the strongest intolerance levels overall, while other Christians have the greatest levels. This applies to permitting anthem protests and flippant speech regarding the flag. Every other besides those mentioned prior regarding strength have the weakest intolerance levels while Mainline Protestants, Muslims, Nones, and Atheists have the least intolerance levels. Atheists have the strongest tolerance levels while Catholics have the greatest. This applies to permitting abstaining from the pledge of allegiance and flippant speech regarding the flag. Orthodox Christianity is the weakest predictor of tolerance. This indicates that almost all types of Christians are more intolerant than non-Christians with the only notable exception being Mainline Protestants. Being non-Christian indicates lower intolerance levels. On the flip side, Atheists have stronger tolerance levels overall while Catholics have greater tolerance levels.

4.16 Overall Conclusion for Political Tolerance and the Flag

Based on both portions of this thesis regarding the flag party affiliation, level of education, and religion have the most significant effect on tolerance judgments even though party leaning is insignificant. Registered Republicans are more intolerant than registered Democrats and vice versa. Lower levels of education are a weak predictor of tolerance judgments. Higher levels of education are a strong predictor of tolerance judgments, but alone are not enough to cause higher tolerance levels. Christians are disproportionately more intolerant than non-Christians minus Mainline Protestants. On the flip side, Atheists have stronger tolerance levels overall and Catholics have greater tolerance levels.

5. Conclusion

This thesis looked to examine how party affiliation shapes views on free speech in general by determining group targeted tolerance for each affiliation. This study achieved this by assessing willingness to let nine target groups speak in private, in public demonstrations, and in public positions. This thesis argued Democrats are less tolerant than Republicans. It then proceeded to evaluate whether there is a significant relationship between party affiliation and free speech tolerance judgments concerning the flag. This thesis asked if Republicans are less tolerant of free speech regarding the flag and argued that they are less tolerant. Regarding free speech in general the study concluded that Democrats and Republican are equally intolerant of groups they dislike, but Democrats are more tolerant overall.

This makes sense given Crawford and Pilanski determined that conservatives and liberals are equally intolerant of the opposing side. The thesis examined the connection between party affiliation and both ideology and personality. Republican Party affiliates are strongly associated with conservatism, Democrat Party affiliates with liberalism, and those affiliated with neither party tended to be more centrist avoiding both liberal and conservative extremes. Personality did not have much significance except in regard to the connection between emotional stability and party leaning. Republican Leaners identified with emotional stability the most and those leaning neither way identified with it the least. The highly significant connection between party affiliation and ideology builds upon the research by Crawford and Pilanski by first establishing this connection and then examining the potential connections between party affiliation and group-targeted tolerance. Concerning the flag Republicans are more intolerant of disrespecting the flag than Democrats, while Democrats are the more tolerant ones. This is reasonable because Carter, Ferguson, and Hassin determined that there is a strong connection between the flag and Republicanism. Furthermore, Kemelmeier and Winter concluded the flag evokes nationalism, not really patriotism. Nationalism is "a sense of superiority over others" and patriotism is "love and commitment to one's country".

The fact that this thesis utilized a convenience sample of 94 respondents means it is not representative of the roughly 25,000 or so people on campus which includes students and faculty, let alone the state of California and the country. The duration of the project was another limitation. The eight months spent working on the project altogether and the roughly two months of independent research are hardly enough for obtaining a truly representative sample size. It would most likely take years to obtain such a sample size. The lack of collaboration also limited the effectiveness of the work. Not only was time a potential limitation, but when undergoing significant research as this two or more people partaking in the research could help improve the scope of the research.

Regarding personality and party affiliation it would be worth investigating how the role of personality in shaping party affiliation also affects political tolerance. It is unclear if there is a connection between personality and political tolerance, but it wouldn't be too surprising if there is a connection and that connection significantly impacts views on political tolerance. Given there is a strong connection between the flag and Republicanism as well as the flag and nationalism it is worth investigating how nationalism affects tolerance judgments regarding the flag. By doing so, political scientists may be able to find ways to mitigate the polarization surrounding this issue. Gender had greater significance regarding group targeted tolerance than party affiliation. Future research should investigate if this holds at the state and national level and if so why. As stated before, the greater the understanding of factors that shape free speech tolerance judgments the more effectively political scientists can address polarization regarding free speech in general. Lastly, it is worth examining if the conclusions made in this thesis do hold at the statewide and national levels concerning group-targeted tolerance and if so, why for the same reason: to help political scientists bring Americans together on the issue of free speech.

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Appendix

Political Ideology and Party Affiliation

Table 1.1: Chi-Square Test for Party Registration and Extent of Liberalism/Conservatism

Chi Square value	67.498
Significance value	.000

If the significance value (sig.) is below .050 then the relationship is significant

Table 1.2: Crosstabulation for Relationship between Party Registration and Extent of Liberalism/Conservatism

Extent of liberalism/conservatism	Republican	Democrat T	hird Party I	ndependent
Extremely liberal	4.2%	28.2%	0%	11.5%
Somewhat liberal	0%	43.6%	0%	19.2%
Slightly liberal	8.3%	10.3%	0%	26.9%
Moderate	16.7%	17.9%	25%	15.4%
Slightly conservative	16.7%	0%	0%	19.2%
Somewhat Conservative	20.8%	0%	50%	7.7%
Extremely Conservative	20.8%	0%	25%	0%
Total	24	39	4	26

Crosstab used to measure predictive strength for each party registration in connection to ideology. Total is the number of respondents for each party ID.

Table 2.1: Chi-Square Test for Party Leaning and Extent of Liberalism/Conservatism

Chi-Square Value	55.032
Sig. .	000

Table 1.2: Crosstabulation for Relationship between Party Registration and Extent of Liberalism/Conservatism

Extent of liberalism/conservatism	Republican	Democrat N	either
Extremely liberal	0%	32.4%	14.3%
Somewhat liberal	0%	32.4%	14.3%
Slightly liberal	0%	17.6%	21.4%
Moderate	16%	17.6%	21.4%
Slightly conservative	20%	0%	14.3%
Somewhat conservative	28%	0%	14.3%
Extremely conservative	36%	0%	0%
Total	25	34	14

Table 3.1: Chi-Square Test for Party Leaning and Emotional Stability

Chi-Square Value	18.400
Sig. .	018

The Big-Five Traits and Both Party Registration and Party Leaning

Table 3.2: Crosstab for Relationship between Party Leaning and Emotional Stability

Emotional Stability	Republican	Democrat	Neither
Highly identify	50%	19.4%	25%
Somewhat identify	31.8%	25.8%	8.3%
Slightly identify	9.1%	19.4%	50%
Neutral	9.1%	19.4%	16.7%
Don't identify	0%	16.1%	0%
Total	22	31	12

Party Registration and Political Tolerance for Various Target Groups

Table 4.1: Linear Regression Test for Relationship between Willingness to Let Fundamentalist Christians (e.g. Westboro Baptist) Speak in Private and Party Registration

Factors	Categories	Beta Coefficient	P value (significance)
Party registration	nominal	.362	.047*
Age	ordinal	-.258	.603
Race/ethnicity	nominal	.085	.455
Gender	nominal	.087	.832
Level of education	ordinal	.110	.481
College	nominal	-.073	.316
Religion	nominal	-.056	.085

Linear regression tests were used to determine the significance of party registration while controlling for other variables. Categories refer to the type of variable each independent variable is. Nominal means that the variable is categorical, but cannot be ranked in any particular order. Ordinal means that the variable is categorical and is ranked in a given order. A negative coefficient value for an ordinal independent variable means that as it increases willingness decreases and vice versa for a positive value. The closer a beta coefficient is to 0 the less significant it is in the data analysis. An asterisk means that the significance value is significant because sig is less than .050.

Table 4.2: Linear Regression Test for Relationship between Willingness to Let Racists Speak in Private and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.609	.028*
Age	-.690	.359
Race/ethnicity	-.133	.442
Gender	-1.725	.007*
Level of education	.599	.014*
College	-.023	.833
Religion	.054	.266

Table 4.3: Linear Regression Test for Relationship between Willingness to Let Communists Speak in Private and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.453	.053
Age	-.354	.579
Race/ethnicity	-.026	.858
Gender	-1.246	.021*
Level of education	.287	.156
College	.017	.860
Religion	.000	.993

Table 4.4: Linear Regression Test for Relationship between Willingness to Let The Far Right Speak in Private and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.057	.760
Age	-.246	.636
Race/ethnicity	.008	.947
Gender	-.352	.415
Level of education	.136	.407
College	-.053	.486
Religion	.067	.049*

Table 5.1: Linear Regression Test for Relationship between Willingness to Let Muslims Speak in Public Demonstrations and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.319	.048*
Age	-.180	.683
Race/ethnicity	-.154	.132
Gender	.355	.332
Level of education	-.042	.764
College	.021	743
Religion	.036	.203

Table 5.2: Linear Regression Test for Relationship between Willingness to Let Communists Speak in Public Demonstrations and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.615	.013*
Age	-.156	.815
Race/ethnicity	-.183	.237
Gender	-1.719	.003*
Level of education	.364	.088
College	.027	.788
Religion	-.009	.837

Table 5.3: Linear Regression Test for Relationship between Willingness to Let Racists Speak in Public Demonstrations and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.183	.555
Age	-.428	.619
Race/ethnicity	-.104	.600
Gender	-1.728	.018*
Level of education	.644	.021*
College	.018	.890
Religion	.012	.829

Table 5.4: Linear Regression Test for Relationship between Willingness to Let Whites Speak in Public Demonstrations and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	-.075	.530
Age	-.256	.441
Race/ethnicity	-.024	.749
Gender	.356	.197
Level of education	.080	.443
College	-.071	.151
Religion	.043	.049*

Table 5.5: Linear Regression Test for Relationship between Willingness to Let the Far Right Speak in Public Demonstrations and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	-.329	.119
Age	.243	.675
Race/ethnicity	-.003	.981
Gender	.119	.804
Level of education	.060	.742
College	-.051	.547
Religion	.117	.003*

Table 6.1: Linear Regression Test for Relationship between Willingness to Let Muslims Speak in Public Positions and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.206	.263
Age	-.887	.086
Race/ethnicity	-.282	.019*
Gender	.530	.210
Level of education	-.146	.361
College	.052	.486
Religion	.041	.215

Table 6.2: Linear Regression Test for Relationship between Willingness to Let LGBT People Speak in Public Positions and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.218	.301
Age	-.752	.202
Race/ethnicity	.037	.785
Gender	.438	.366
Level of education	.193	.296
College	-.035	.683
Religion	.080	.037*

Table 6.3: Linear Regression Test for Relationship between Willingness to Let Whites Speak in Public Positions and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	-.143	.296
Age	-.754	.051
Race/ethnicity	-.133	.129
Gender	.449	.154
Level of education	.069	.560
College	-.067	.228
Religion	.053	.034*

Table 6.4: Linear Regression Test for Relationship between Willingness to Let the Far Left Speak in Public Positions and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	-.049	.820
Age	-.383	.523
Race/ethnicity	-.177	.201
Gender	-.214	.665
Level of education	.217	.250
College	-.042	.629
Religion	.093	.018*

Table 6.5: Linear Regression Test for Relationship between Willingness to Let Communists Speak in Public Positions and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.131	.659
Age	-.505	.541
Race/ethnicity	-.090	.634
Gender	-1.853	.009*
Level of education	.505	.056
College	-.005	.956
Religion	-.005	.824

Most Significant Relationships Examined

Table 7.1: Crosstab for Relationship between Willingness to Let Racists Speak in Private and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	28.6%	50%	100%	57.1%	80%	71.4%	75.9%
Female	71.4%	50%	0%	35.7%	20%	28.6%	24.1%
Transgender	0%	0%	0%	7.1%	0%	0%	0%
Total	7	2	3	14	5	7	29

Crosstabs were used to assess the strength and magnitude of unwillingness/willingness. Strength was determined based on the percentage that strongly disagrees and strongly agrees. Magnitude was determined by the percent advantage across the unwillingness/willingness spectrum. Total refers to the number of respondents for each column.

Table 7.2: Crosstab for Relationship between Willingness to Let Communists Speak in Private and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	0%	50%	75%	54.5%	66.7%	66.7%	75%
Female	100%	50%	25%	36.4%	33.3%	33.3%	25%
Transgender	0%	0%	0%	9.1%	0%	0%	0%
Total	2	2	4	11	6	6	36

Table 7.3: Crosstab for Relationship between Willingness to Let Racists Speak in Public Demonstrations and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	43.8%	66.7%	66.7%	60%	100%	50%	85%
Female	50%	33.3%	33.3%	40%	0%	50%	15%
Transgender	6.3%	0%	0%	0%	0%	0%	0%
Total	16	6	9	5	5	6	20

Table 7.4: Crosstab for Relationship between Willingness to Let Communists Speak in Public Demonstrations and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	0%	50%	50%	71.4%	80%	57.1%	79.3%
Female	100%	50%	50%	14.3%	20%	42.9%	20.7%
Transgender	0%	0%	0%	14.3%	0%	0%	0%
Total	4	4	7	9	12	7	30

Table 8.1: Crosstab for Relationship between Willingness to Let Communists Speak in Public Demonstrations and Party Registration

Party registration	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Republican	25%	25%	14.3%	44.4%	16.7%	14.3%	30%
Democrat	75%	50%	71.4%	33.3%	58.3%	14.3%	30%
Third party	0%	0%	0%	0%	0%	0%	10%
Independent	0%	25%	14.3%	22.2%	25%	71.4%	30%
Total	4	4	7	9	12	7	30

Table 8.2: Crosstab for Relationship between Willingness to Let Racists Speak in Private and Party Registration

Party registration	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Republican	0%	50%	25%	17.6%	33.3%	37.5%	31%
Democrat	85.7%	50%	75%	47.1%	33.3%	37.5%	24.1%
Third party	0%	0%	0%	0%	0%	0%	10.3%
Independent	14.3%	0%	0%	35.3%	33.3%	25%	34.5%
Total	7	2	4	17	6	8	29

Table 8.3: Crosstab for Relationship between Willingness to Let Fundamentalist Christians Speak in Private and Party Registration

Party registration	Strongly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Republican	50%	20%	50%	25%	25.5%
Democrat	50%	60%	50%	37.5%	40%
Third party	0%	0%	0%	0%	3.6%
Independent	0%	20%	0%	37.5%	30.9%
Total	2	5	2	8	55

Table 8.4: Crosstab for Relationship between Willingness to Let Muslims Speak in Public Demonstrations and Party Registration

Party registration	Strongly disagree	Slightly disagree	Slightly agree	Somewhat agree	Strongly agree
Republican	100%	100%	50%	42.9%	18.3%
Democrat	0%	0%	0%	28.6%	46.7%
Third party	0%	0%	0%	0%	5%
Independent	0%	0%	50%	28.6%	30%
Total	1	3	2	7	60

Table 9.1: Crosstab for Relationship between Willingness to Let the Far Right Speak in Private and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	0%	40%	40%	0%	8.3%
Mainline Protestant	0%	0%	0%	0%	0%	2.8%
Catholics	100%	50%	20%	20%	28.6%	16.7%
Orthodox Christians	0%	0%	20%	0%	0%	0%
Other Christians	0%	0%	0%	40%	14.3%	16.7%
Muslim	0%	0%	0%	0%	14.3%	5.6%
Unaffiliated(religious "nones")	0%	0%	0%	0%	14.3%	11.1%
Atheists	0%	50%	20%	0%	14.3%	22.2%
Nothing in particular	0%	0%	0%	0%	14.3%	16.7%
Total	1	2	5	5	7	36

Table 9.2: Crosstab for Relationship between Willingness to Let the Far Right Speak in Public Demonstrations and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	28%	16.7%	28.6%	0%	10.3%
Mainline Protestant	0%	0%	0%	0%	0%	3.4%
Catholics	100%	25%	16.7%	28.6%	25%	13.8%
Orthodox Christians	0%	0%	16.7%	0%	0%	0%
Other Christians	0%	25%	16.7%	28.6%	12.5%	13.8%
Muslim	0%	25%	16.7%	0%	12.5%	0%
Unaffiliated(religious "nones")	0%	0%	16.7%	0%	12.5%	10.3%
Atheists	0%	0%	0%	14.3%	25%	27.6%
Nothing in particular	0%	0%	0%	0%	12.5%	20.7%
Total	2	4	6	7	8	29

Table 9.3: Crosstab for Relationship between Willingness to Let Whites Speak in Public Demonstrations and Religion

Religion	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	25%	0%	0%	13.6%
Mainline Protestant	0%	0%	0%	2.3%
Catholics	50%	0%	20%	20.5%
Orthodox Christians	25%	0%	0%	0%
Other Christians	0%	100%	0%	13.6%
Muslim	0%	0%	40%	2.3%
Unaffiliated(religious "nones")	0%	0%	0%	11.4%
Atheists	0%	0%	20%	22.7%
Nothing in particular	0%	0%	20%	13.6%
Total	4	3	5	44

Table 9.4: Crosstab for Relationship between Willingness to Let Whites Speak in Public Positions and Religion

Religion	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	12.5%	0%	0%	14%
Mainline Protestant	0%	0%	0%	2.3%
Catholics	25%	0%	25%	20.9%
Orthodox Christians	12.5%	0%	0%	0%
Other Christians	37.5%	100%	0%	11.6%
Muslim	0%	0%	50%	2.3%
Unaffiliated(religious "nones")	12.5%	0%	0%	9.3%
Atheists	0%	0%	25%	23.3%
Nothing in particular	0%	0%	0%	16.3%
Total	8	1	4	43

Party Leaning and Political Tolerance for Various Target Groups

Table 10.1: Linear Regression Test for Relationship between Willingness to Let Muslims Speak in Private and Party Leaning

Factors	Categories	Beta Coefficient	P value (significance)
Party leaning	nominal	.206	.268
Age	ordinal	-.194	.544
Race/ethnicity	nominal	.063	.388
Gender	nominal	-.032	.903
Level of education	ordinal	.042	.648
College	nominal	-.097	.052
Religion	nominal	.043	.033*

Table 10.2: Linear Regression Test for Relationship between Willingness to Let the Far Left Speak in Private and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.344	.264
Age	.268	.612
Race/ethnicity	.030	.800
Gender	.025	.954
Level of education	.074	.626
College	-.111	.171
Religion	.088	.010*

Table 10.3: Linear Regression Test for Relationship between Willingness to Let the Far Right Speak in Private and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.339	.323
Age	.453	.442
Race/ethnicity	.006	.963
Gender	-.239	.623
Level of education	.075	.656
College	-.119	.190
Religion	.090	.017*

Table 10.4: Linear Regression Test for Relationship between Willingness to Let Fundamentalist Christians Speak in Private and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.511	.042*
Age	.277	.512
Race/ethnicity	.127	.191
Gender	.391	.266
Level of education	-.020	.872
College	-.111	.089
Religion	-.016	.534

Table 10.5: Linear Regression Test for Relationship between Willingness to Let Racists Speak in Private and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	-.015	.977
Age	.070	.937
Race/ethnicity	.061	.763
Gender	-1.598	.035*
Level of education	.356	.168
College	-.125	.357
Religion	.001	.988

Table 10.6: Linear Regression Test for Relationship between Willingness to Let Whites Speak in Private and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.124	.554
Age	-.261	.472
Race/ethnicity	.016	.845
Gender	-.086	.773
Level of education	.182	.087
College	-.119	.037*
Religion	.044	.055

Table 11.1: Linear Regression Test for Relationship between Willingness to Let Whites Speak in Public Demonstrations and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.091	.633
Age	.168	.662
Race/ethnicity	-.041	.640
Gender	.495	.124
Level of education	.085	.441
College	-.134	.027*
Religion	.051	.036*

Table 11.2: Linear Regression Test for Relationship between Willingness to Let the Far Right Speak in Public Demonstrations and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.059	.883
Age	.687	.321
Race/ethnicity	-.003	.987
Gender	.087	.878
Level of education	.090	.649
College	-.152	.151
Religion	.128	.004*

Table 11.3: Linear Regression Test for Relationship between Willingness to Let Communists Speak in Public Demonstrations and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	-.161	.722
Age	.960	.225
Race/ethnicity	.012	.948
Gender	-1.448	.030*
Level of education	-.003	.989
College	.004	.976
Religion	.053	.276

Table 12.1: Linear Regression Test for Relationship between Willingness to Let LGBT People Speak in Public Positions and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.625	.124
Age	-.568	.412
Race/ethnicity	.073	.646
Gender	.622	.279
Level of education	.123	.538
College	-.015	.887
Religion	.100	.023*

Table 12.2: Linear Regression Test for Relationship between Willingness to Let the Far Left Speak in Public Positions and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.050	.902
Age	-.168	.811
Race/ethnicity	-.174	.282
Gender	-.263	.653
Level of education	.240	.241
College	-.071	.508
Religion	.105	.020*

Table 12.3: Linear Regression Test for Relationship between Willingness to Let Muslims Speak in Public Positions and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.440	.212
Age	-.719	.237
Race/ethnicity	-.343	.017*
Gender	.771	.127
Level of education	-.230	.189
College	.106	.250
Religion	.055	.146

Table 12.4: Linear Regression Test for Relationship between Willingness to Let Communists Speak in Public Positions and Party Leaning

Factors	Beta Coefficients	
Party leaning	.314	
Age	.037	
Race/ethnicity	.057	
Gender	-1.924	
Level of education	.348	
College	-.067	
Religion	.035	

Most Significant Relationships Examined

Table 13.1: Crosstab for Relationship between Willingness to Let the Far Left Speak in Private and Religion

Religion	Strongly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	28.6%	33.3%	14.3%	79%
Mainline Protestant	0%	0%	0%	0%	2.6%
Catholics	100%	28.6%	0%	14.3%	21.1%
Orthodox Christians	0%	14.3%	0%	0%	0%
Other Christians	0%	0%	66.7%	14.3%	15.8%
Muslim	0%	0%	0%	14.3%	5.3%
Unaffiliated(religious "nones")	0%	0%	0%	14.3%	10.5%
Atheists	0%	0%	0%	14.3%	21.1%
Nothing in particular	0%	28.6%	0%	14.3%	21.1%
Total	1	7	3	7	38

Table 13.2: Crosstab for Relationship between Willingness to Let the Far Right Speak in Private and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	0%	40%	40%	0%	8.3%
Mainline Protestant	0%	0%	0%	0%	0%	2.8%
Catholics	100%	50%	20%	20%	28.6%	16.7%
Orthodox Christians	0%	0%	20%	0%	0%	0%
Other Christians	0%	0%	0%	40%	14.3%	16.7%
Muslim	0%	0%	0%	0%	14.3%	5.6%
Unaffiliated(religious "nones")	0%	0%	0%	0%	14.3%	11.1%
Atheists	0%	50%	20%	0%	14.3%	22.2%
Nothing in particular	0%	0%	0%	0%	14.3%	16.7%
Total	1	2	5	5	7	36

Table 13.3: Crosstab for Relationship between Willingness to Let the Far Right Speak in Public Demonstrations and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	25%	16.7%	28.6%	0%	10.3%
Mainline Protestant	0%	0%	0%	0%	0%	3.4%
Catholics	100%	25%	16.7%	28.6%	25%	13.8%
Orthodox Christians	0%	0%	16.7%	0%	0%	0%
Other Christians	0%	25%	16.7%	28.6%	12.5%	13.8%
Muslim	0%	25%	16.7%	0%	12.5%	0%
Unaffiliated(religious "nones")	0%	0%	16.7%	0%	12.5%	10.3%
Atheists	0%	0%	0%	14.3%	25%	27.6%
Nothing in particular	0%	0%	0%	0%	12.5%	20.7%
Total	2	4	6	7	8	29

Table 13.4: Crosstab for Relationship between Willingness to Let the Far Left Speak in Public Positions and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	0%	16.7%	25%	33.3%	0%	7.7%
Mainline Protestant	0%	0%	0%	0%	0%	3.8%
Catholics	50%	33.3%	25%	11.1%	33.3%	15.4%
Orthodox Christians	0%	0%	25%	0%	0%	0%
Other Christians	50%	16.7%	0%	33.3%	11.1%	11.5%
Muslim	0%	16.7%	0%	0%	22.2%	0%
Unaffiliated(religious "nones")	0%	0%	25%	11.1%	11.1%	7.7%
Atheists	0%	16.7%	0%	11.1%	11.1%	30.8%
Nothing in particular	0%	0%	0%	0%	11.1%	23.1%
Total	2	6	4	9	9	26

Table 13.5: Crosstab for Relationship between Willingness to Let LGBT People Speak in Public Positions and Religion

Religion	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	66.7%	0%	0%	25%	33.3%	5.3%
Mainline Protestant	0%	0%	0%	0%	0%	2.6%
Catholics	0%	0%	0%	25%	16.7%	26.3%
Orthodox Christians	0%	0%	25%	0%	0%	0%
Other Christians	33.3%	0%	75%	25%	16.7%	7.9%
Muslim	0%	100%	0%	25%	0%	2.6%
Unaffiliated(religious "nones")	0%	0%	0%	0%	0%	13.2%
Atheists	0%	0%	0%	0%	33.3%	23.7%
Nothing in particular	0%	0%	0%	0%	0%	18.4%
Total	3	1	4	4	6	38

Table 13.6: Crosstab for Relationship between Willingness to Let Whites Speak in Public Demonstrations and Religion

Religion	Neutral	Slightly agree	Somewhat agree	Strongly agree
Evangelical Protestant	25%	0%	0%	13.6%
Mainline Protestant	0%	0%	0%	2.3%
Catholics	50%	0%	20%	20.5%
Orthodox Christians	25%	0%	0%	0%
Other Christians	0%	100%	0%	13.6%
Muslim	0%	0%	40%	2.3%
Unaffiliated(religious "nones")	0%	0%	0%	11.4%
Atheists	0%	0%	20%	22.7%
Nothing in particular	0%	0%	20%	13.6%
Total	4	3	5	44

Table 14.1: Crosstab for Relationship between Willingness to Let Racists Speak in Private and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	28.6%	50%	100%	57.1%	80%	71.4%	75.9%
Female	71.4%	50%	0%	35.7%	20%	28.6%	24.1%
Transgender	0%	0%	0%	7.1%	0%	0%	0%
Total	7	2	3	14	5	7	29

Table 14.2: Crosstab for Relationship between Willingness to Let Communists Speak in Public Positions and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	44.4%	42.9%	80%	50%	71.4%	100%	77.3%
Female	55.6%	57.1%	20%	40%	28.6%	0%	22.7%
Transgender	0%	0%	0%	10%	0%	0%	0%
Total	9	7	5	10	7	7	22

Table 14.3: Crosstab for Relationship between Willingness to Let Communists Speak in Public Demonstrations and Gender

Gender	Strongly disagree	Somewhat disagree	Slightly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Male	0%	50%	50%	71.4%	80%	57.1%	79.8%
Female	100%	50%	50%	14.3%	20%	42.9%	20.7%
Transgender	0%	0%	0%	14.3%	0%	0%	0%
Total	4	4	6	7	10	7	29

Table 15.1: Crosstab for Relationship between Willingness to Let Whites Speak in Private and College

College	Strongly disagree	Neutral	Slightly agree	Somewhat agree	Strongly agree
Don B. Huntley College of Agriculture	0%	0%	0%	0%	5.5%
College of Business Administration	100%	0%	100%	50%	7.3%
College of Engineering	0%	25%	0%	0%	32.7%
College of Environmental Design	0%	0%	0%	0%	5.5%
College of Letters, Arts & Social Sciences	0%	62.5%	0%	50%	34.5%
College of Science	0%	12.5%	0%	0%	12.7%
Undeclared	0%	0%	0%	0%	1.8%
Total	1	8	1	2	55

Table 15.2: Crosstab for Relationship between Willingness to Let Whites Speak in Public Demonstrations and College

College	Neutral	Slightly agree	Somewhat agree	Strongly agree
Don B. Huntley College of Agriculture	0%	0%	0%	5.7%
College of Business Administration	16.7%	33.3%	0%	9.4%
College of Engineering	0%	33.3%	60%	30.2%
College of Environmental Design	0%	0%	0%	5.7%
College of Letters, Arts & Social Sciences	66.7%	33.3%	20%	35.8%
College of Science	16.7%	0%	20%	11.3%
Undeclared	0%	0%	0%	1.9%
Total	6	3	5	53

Party Leaning and Political Tolerance

Table 16.1: Crosstab for Relationship between Willingness to Let Fundamentalist Christians Speak in Private and Party Leaning

Party leaning	Strongly disagree	Neutral	Somewhat agree	Strongly agree
Republican	100%	33.3%	42.9%	28.9%
Democrat	0%	33.3%	57.1%	51.1%
Neither	0%	33.3%	0%	20%
Total	1	3	7	45

The Flag and Party Registration

Table 17.1: Linear Regression Test for Relationship between Willingness to Permit Flag Burning and Party Registration

Factors	Categories	Beta Coefficient	P value (significance)
Party registration	nominal	.644	.045*
Age	ordinal	.209	.811
Race/ethnicity	nominal	-.090	.653
Gender	nominal	-1.034	.157
Level of education	ordinal	.607	.031*
College	nominal	-.146	.261
Religion	nominal	.018	.751

Table 17.2: Linear Regression Test for Relationship between Willingness to Permit Anthem Protests and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.484	.025*
Age	-.591	.314
Race/ethnicity	-.102	.450
Gender	-.227	.639
Level of education	.667	.001*
College	-.227	.011*
Religion	.064	.092

Table 17.3: Linear Regression Test for Relationship between Willingness to Permit Abstaining from the Pledge of Allegiance and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.773	.001*
Age	-1.220	.050
Race/ethnicity	-.176	.213
Gender	.149	.767
Level of education	.489	.014*
College	-.146	.108
Religion	.081	.043*

Table 17.4: Linear Regression Test for Relationship between Willingness to Permit Flippant Speech regarding the Flag and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.593	.012*
Age	-.133	.833
Race/ethnicity	-.061	.673
Gender	-.124	.812
Level of education	.350	.082
College	-.066	.477
Religion	.066	.107

Table 17.5: Linear Regression Test for Relationship between Willingness to Permit Other Acts of Physical Desecration to the Flag and Party Registration

Factors	Beta Coefficients	P value (Sig.)
Party registration	.716	.017*
Age	.044	.957
Race/ethnicity	-.061	.742
Gender	-.602	.369
Level of education	.617	.018*
College	-.028	.811
Religion	.041	.433

Most Significant relationships examined

Table 18.1: Crosstab for Relationship between Willingness to Permit Anthem Protests and Party Registration

Party registration	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Republican	66.7%	100%	33.3%	22.2%	50%	22.2%	21.6%
Democrat	33.3%	0%	0%	22.2%	25%	55.6%	46.9%
Third party	0%	0%	0%	0%	25%	0%	5.4%
Independent	0%	0%	66.7%	55.6%	0%	22.2%	27%
Total	3	2	3	9	4	9	37

Table 18.2: Crosstab for Relationship between Willingness to Permit Abstaining from the Pledge of Allegiance and Party Registration

Party registration	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Republican	100%	100%	100%	30%	0%	25%	17.1%
Democrat	0%	0%	0%	20%	50%	75%	46.3%
Third party	0%	0%	0%	0%	25%	0%	4.9%
Independent	0%	0%	0%	50%	25%	0%	31.7%
Total	3	3	2	10	4	4	41

Table 18.3: Crosstab for Relationship between Willingness to Permit Flippant Speech regarding the Flag and Party Registration

Party registration	Highly unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Republican	75%	66.7%	29.4%	0%	20%	20%
Democrat	0%	33.3%	47.1%	40%	40%	40%1
Third party	0%	0%	0%	0%	0%	10%
Independent	25%	0%	23.5%	60%	40%	30%
Total	4	6	17	5	5	30

Table 19.1: Crosstab for Relationship between Willingness to Permit Flag Burning and Level of Education

Level of education	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
1st year	15.4%	25%	14.3%	30.8%	0%	0%	4.3%
2nd year	7.7%	25%	28.6%	15.4%	50%	0%	8.7%
3rd year	30.8%	25%	28.6%	30.8%	50%	40%	26.1%
4th year	23.1%	0%	14.3%	15.4%	0%	40%	26.1%
5th year or higher	23.1%	25%	14.3%	7.7%	0%	20%	34.8%
Total	13	4	7	13	2	5	23

Table 19.2: Crosstab for Relationship between Willingness to Permit Other Acts of Physical Desecration to the Flag and Level of Education

Level of education	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
1st year	15.4%	0%	27.3%	27.3%	0%	0%	5.6%
2nd year	7.7%	42.9%	18.2%	9.1%	0%	0%	11.1%
3rd year	30.8%	14.3%	36.4%	45.5%	0%	25%	27.8%
4th year	30.8%	14.3%	18.2%	0%	66.7%	50%	38.9%
5th year or higher	15.4%	28.6%	0%	18.2%	33.3%	25%	38.9%
Total	13	7	11	11	3	4	18

Table 19.3: Crosstab for Relationship between Willingness to Permit Anthem Protests and Level of Education

Level of education	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
1st year	33.3%	0%	0%	33.3%	0%	22.2%	8.1%
2nd year	0%	100%	33.3%	11.1%	25%	22.2%	5.4%
3rd year	0%	0%	66.7%	33.3%	75%	44.4%	21.6%
4th year	33.3%	0%	0%	11.1%	0%	0%	32.4%
5th year or higher	33.3%	0%	0%	11.1%	0%	11.1%	32.4%
Total	3	2	3	9	4	9	37

Table 19.4: Crosstab for Relationship between Willingness to Permit Abstaining from the Pledge of Allegiance and Level of Education

Level of education	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
1st year	0%	33.3%	0%	20%	0%	25%	12.2%
2nd year	0%	33.3%	50%	20%	0%	0%	12.2%
3rd year	0%	33.3%	0%	40%	100%	75%	19.5%
4th year	66.7%	0%	50%	0%	0%	0%	26.8%
5th year or higher	33.3%	0%	0%	20%	0%	0%	29.3%
Total	3	3	2	10	4	4	41

The Flag and Party Leaning

Table 20.1: Linear Regression Test for Relationship between Willingness to Permit Anthem Protests and Party Leaning

Factors	Categories	Beta Coefficient	P value (significance)
Party leaning	nominal	.506	.232
Age	ordinal	-.166	.818
Race/ethnicity	nominal	-.034	.837
Gender	nominal	-.178	.766
Level of education	ordinal	.517	.017*
College	nominal	-.186	.097
Religion	nominal	.092	.044*

Table 20.2: Linear Regression Test for Relationship between Willingness to Permit Abstaining from the Pledge of Allegiance and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.534	.261
Age	-.652	.424
Race/ethnicity	-.083	.655
Gender	.410	.542
Level of education	.209	.374
College -	.047	.704
Religion	.125	.017*

Table 20.3: Linear Regression Test for Relationship between Willingness to Permit Flippant Speech regarding the Flag and Party Leaning

Factors	Beta Coefficients	P value (Sig.)
Party leaning	.557	.206
Age	.381	.613
Race/ethnicity .	-.031	857
Gender .	208	.738
Level of education	.193	.374
College .	.025	828
Religion	.103	.032*

Most Significant Relationship Examined

Table 21.1: Crosstab for Relationship between Willingness to Permit Anthem Protests and Religion

Religion	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Evangelical Protestant	33.3%	50%	0%	16.7%	25%	11.1%	6.7%
Mainline Protestant	0%	0%	0%	0%	25%	0%	0%
Catholics	33.3%	0%	0%	33.3%	0%	22.2%	23.3%
Orthodox Christians	33.3%	0%	0%	0%	0%	0%	0%
Other Christians	0%	50%	50%	33.3%	25%	0%	13.3%
Muslim	0%	0%	0%	0%	0%	22.2%	13.3%
Unaffiliated(religious “nones”)	0%	0%	0%	0%	0%	11.1%	13.3%
Atheists	0%	0%	0%	0%	0%	33.3%	26.7%
Nothing in particular	0%	0%	50%	16.7%	25%	0%	13.3%

Table 21.2: Crosstab for Relationship between Willingness to Permit Flippant Speech Regarding the Flag and Religion

Religion	Highly unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Evangelical Protestant	33.3%	50%	9.1%	20%	0%	3.8%
Mainline Protestant	0%	0%	0%	0%	0%	3.8%
Catholics	33.3%	16.7%	27.3%	0%	60%	15.4%
Orthodox Christians	33.3%	0%	0%	0%	0%	0%
Other Christians	0%	16.7%	36.4%	0%	0%	15.4%
Muslim	0%	0%	0%	0%	40%	3.8%
Unaffiliated(religious "nones")	0%	16.7%	0%	0%	0%	15.4%
Atheists	0%	0%	18.2%	20%	0%	30.8%
Nothing in particular	0%	0%	9.1%	60%	0%	11.5%
Total	3	6	11	5	5	26

Table 21.3: Crosstab for Relationship between Willingness to Permit Abstaining from the Pledge of Allegiance and Religion

Religion	Highly unwilling	Somewhat unwilling	Slightly unwilling	Neutral	Slightly willing	Somewhat willing	Highly willing
Evangelical Protestant	0%	33.3%	50%	25%	0%	0%	9.1%
Mainline Protestant	0%	0%	0%	12.5%	0%	0%	0%
Catholics	33.3%	0%	0%	37.5%	0%	75%	15.2%
Orthodox Christians	33.3%	0%	0%	0%	0%	0%	0%
Other Christians	33.3%	66.7%	0%	25%	33.3%	0%	9.1%
Muslim	0%	0%	0%	0%	0%	0%	9.1%
Unaffiliated(religious "nones")	0%	0%	0%	0%	0%	25%	12.1%
Atheists	0%	0%	0%	0%	0%	0%	30.3%
Nothing in particular	0%	0%	50%	0%	33.3%	0%	15.2%
Total	3	3	2	8	3	4	33

Nathaniel Chun

Dr. Marc Scarcelli

What is the Best Policy the United States can Implement to Transition to Clean Energy?

Abstract

This paper examines the different approaches to solve climate change that were implemented by different countries, and what the United States should implement into their own system. Scholars have different perspectives and recommendations on what should be done. For example, implementing a form of carbon tax, or just investing more money into research and development of renewable energy were the most common recommendations. Scholars have brought up the perspective that perhaps government alone is not enough to transition to clean energy. There needs to be government and private sector cooperation. My result is a pro and con evaluation of the different approaches to see if what has been done can be implemented to the United States. This paper concludes with a policy recommendation that I think the United States should take to transition to clean energy.

Intro

Climate change is the biggest threat to humans in this current generation that most people tend to ignore because they think the effects of climate change will not affect them in their lifetime. The extreme weather patterns around the world or the effects on the agriculture system to provide food affect each and every one of us. Climate change is a natural process of the earth, in the past we had ice ages, but now we have an exponential trend of global warming. This process has been sped up due to us burning coal and fossil fuels at an unchecked rate. The topic of environmental politics was more talked about in the 60's and 70's during the environmental movement and the presidency of Richard Nixon. President Nixon was the person who created the Environmental Protection Agency (EPA) and was a huge advocate for the environment. The environmental movement was a huge movement in the United States that people advocated for and debated on environmental policies. This was a time period of awareness and people actually wanted to change things. The last major environmental policy to pass in the United States was the Endangered Species Act of 1973. But since then, any environmental movement has been minimal, and the subject of climate change is barely talked about within the United States government. Other environmental policies passed in the United States during the 70's are the Clean Air Act of 1970 and the Clean Water Act of 1972. Today, most people brush off the idea of climate change because people cannot believe it is happening since the process is so slow. If the topic was about something instant, something that people could see right away, like a shooting or a bombing, people would talk about that and how terrible it is. We are slowly killing our planet and people just want to ignore that because they cannot see the damage in front of them like they would if for example they saw dead people on the street from a terrorist attack. Climate change is a real important threat that needs to be addressed otherwise we will slowly kill ourselves from rising sea levels, severe weather patterns, running out of resources, etc. The question I want to answer is, what is the best policy the United States can implement into their own system to help transition to clean energy? The way I want to answer this question is to look at what scholars have to say about different environmental policies and I want to also look at what other countries have implemented. By looking at what other countries have done already, we can determine if it is even possible to implement to the United States and I won't have to write up hypothetical theories. By evaluating if these policies were successful or not and conducting a pro-con evaluation of the policy, it will allow me to discern what is the best policy that can be implemented in the United States.

Lit Review

Scholars have proposed two different types of solutions that are needed to help with the transition to clean energy and they are government solutions and non-government solutions. Government solutions are some form of tax reform, change in policies/increase in government support, and global cooperation/intervention. While non-government solutions are consumer behavior and the private sector.

The first set of solutions I will be going over are all the government solutions. The first type of government solution I will be looking at are authors who discussed anything about a tax reform from the government. Some say taxes are good some say they are bad, but it depends on the type of tax. I have a total of five authors that did research on this: Ball, Garciano, Manzi, Metcalf, and Sharma. Garciano, Metcalf, and Sharma, say taxes are good, Ball and Manzi, say taxes are bad. Garciano's main argument is on state and federal tax incentives for renewable energy and energy efficiency. Garciano says "tax incentives can achieve the goals of increasing clean energy production and decreasing energy used. State tax incentives play the important role of shaping energy policies at the local level. State incentives vary tremendously in form and policy objectives, but wind, solar, geothermal, and biomass continue to be clear favorites. At the federal level, the IRC § 451 tax credit for renewable electricity production and IRC § 482 tax credit for investments in energy property have been the main programs leading the way in this arena for many years. At the federal level, the income-tax deduction for energy efficient commercial buildings and the income-tax credit for energy efficient appliances promote reductions in the use of energy." (Garciano). What I believe Garciano overlooks is getting these tax incentives to pass as a proposition or a law. The public will most likely vote no on anything tax unless it is a tax reduction. Also tax incentives target specific beneficiaries like owners of energy property and not the average everyday person. However, towards the end of his research, he does acknowledge that "it is hard to utilize renewable energy and energy efficiency tax incentives in the current economic climate" (Garciano). The next author I will looking at is Metcalf. Metcalf also discusses and analyzes tax incentives and says, "Tax incentives are a major part of the federal government's energy tax policy and increasingly so with the passage of the Energy Policy Act of 2005." (Metcalf). Some summarized main points from his analysis include, "tax incentives make the renewable energy sources competitive with non-renewable sources, it sets the basis of economic efficiency or distributional goals, energy efficiency incentives enacted by EPACT should increase conservation investment activity." (Metcalf). This literature from Metcalf can be connected to increased government support since in order to make any tax incentive work, we need policies written and increased research projects on energy efficiency.

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[1] IRC § 45 provides an income tax credit in the amount of $0.021 (in 2009) per kilowatt hour of electricity produced from qualifying energy resources during a ten year period. taxpayer must produce electricity from qualifying renewable resources and sell the electricity produced to an unrelated person. (Garciano)

[2] IRC § 48 provides an income tax credit in the amount of 10 percent or 30 percent with the basis of qualifying energy property investments in fuel cell property, solar energy property, small wind energy property, geothermal property, geothermal heat pump systems property, microturbine property, and combined heat and power system property. (Garciano)

Moving on, Sharma's research was on India's "clean energy tax" on coal and he quotes a research analyst. "Chandra Bhushan, a research analyst at the Centre for Science and Environment (New Delhi), believes that "taxes and duty reductions for solar energy technologies and use of LEDs [light-emitting diodes] will provide the necessary impetus for the growth of renewable energy technology in the country" (Sharma). This is an example of a carbon tax on coal that has already been implemented into India's system. However, the only issue is that there are no results as to if this tax has worked or not since it's still in progress. Next up, the type of taxes Ball is talking about are tax breaks. He is saying tax breaks are bad because "the tax break is not only paying for the construction of the turbines, but it also gives money to the bankers. The financial institutions investing in wind farms in exchange for a tax break are making a profit. About 30% of the value of renewable energy post-power tax credits ends up benefiting financiers rather than the production of renewable energy." (Ball). I agree with Ball's assessment and don't think there is an argument against what he is saying. Perhaps we should change how tax breaks work, but other than that, tax breaks seem to be a bad choice as a solution. Manzi is against tax reforms and he listed six reasons why and what he thinks we should do instead of putting a carbon tax. "First, plainly put, a carbon tax would not be politically feasible. Second, if the United States were to go it alone and enact a carbon tax without the world's other major economies, it would not only severely damage the U.S. economy but would also fail to appreciably reduce global emissions. Third, you don't have to be Henry Kissinger to be skeptical of the geopolitical reality of the prospect of a planet-wide carbon tax. Fourth, even if we got to an agreement de jure, we would then actually have to enforce a set of global laws for many decades that would run directly contrary to the narrow self-interest of most people currently alive on the planet. Fifth, a carbon tax would be, most likely, a one-way door: Once we introduce it we're stuck with it for a long time. Therefore, keeping our options open has great value. Sixth, and most importantly, the economics of a carbon tax just don't make sense: A carbon tax designed for the expected case can safely be put off for decades, while a carbon tax high enough to ameliorate a low-odds disaster scenario would be insanely expensive. We are not going to transform our economy with such a tax; major changes would really start in the latter half of the upcoming century. A sensible, science-based approach to climate change would be one that hedges by providing support for prediction, mitigation, and adaptation technologies." (Manzi). The one criticism I have for Manzi is that his whole paper is about why taxes would never work, he doesn't look at hypotheticals if taxes to work. Even though I do agree with his reasoning as to why it wouldn't work, I still think trying to find ways to get it to work is better than saying all the negatives about why it wouldn't work because I think a part of government solution to transition to clean energy has to include a form of tax reform. The second type of solution I will be looking at is change in policies/increase government support. What I mean by increase in government support is an increase in government research and development into clean technology. Also, most of these examples in this section are real life examples of what countries have tried or are doing rather than scholarly research journals. There are many authors proposing different policies and government support, but mostly a change in policy, like signing legislation for change. For example, the governor for the state of California, Jerry Brown, has done talks and signed legislation for California to switch to 100% clean energy. A BBC news article says, "Mr Brown vowed to meet the terms of the Paris agreement and to "continue down that path to transition our economy to zero carbon emissions". Under the terms of the legislation, all utility companies must get 60% of their energy from renewable sources by 2030. By 2045, all Californian electricity must come from carbon-free or renewable energy." (BBC). Even though this is not a scholarly article, I wanted to showcase that some politicians do believe there needs to be something done and they are willing to take the first step. Politicians are viewed as leaders in the United States and they hold the power to begin the transition to clean energy by convincing the people. Moving on to a different example, China, China has become the leader in the

production of clean energy since the United States left the Paris Agreement. "China pledged to peak emissions "by around the year 2030," with best efforts to peak significantly earlier, and to increase the share of non-fossil fuels in its energy mix to 20 percent also by the year 2030. China also announced 2 additional targets: to reduce carbon intensity (the amount of carbon used per unit GDP produced) by 60-65% and to restore about 4.5B cubic meters of forested land. China is ready to fill the international climate leadership role ceded by the Trump administration." (ClimateNexus). This proposal by China sounds solid, however what the article didn't mention was how China was going to accomplish this goal. A problem with this type of solution is that a change in policy is what a country proposes, but hasn't actually implemented yet, therefore it is difficult to see if it will be effective. However, this is a good starting point that shows a country that is at least trying to slow down climate change. A research on policies the United States has passed conducted by David Hunter shows interesting results. He mentions the United States, during the Bush Administration, was actively investing into clean energy research and projects and even "promoted bilateral and multilateral cooperative agreements to encourage research into clean energy technologies and to climate-related science. The first U.S. legislation promoting research relating to climate change was enacted as early as 1978. The legislation created a National Climate Program, located in the Department of Commerce, to coordinate research regarding 'natural and man-induced climate processes and their implications" (Hunter). However even with all the effort the United States put into it Hunter's results were, "despite the high profile of Climate VISION and the central role that it plays in implementing U.S. climate change policy, a recent Government Accounting Office (GAO) report found that it was not effective in meeting its goals. In particular, the GAO reported that the government did not track implementation of the promised commitments by industry and thus had no way of either encouraging implementation or measuring the program's actual effectiveness." (Hunter). This research done by Hunter shows that proposing policy can be a failure. Another example of a failed policy is East Germany's water policies. Their policies were a failure because "most of this ecological ruin is due to the ousted communist government's policies, which favored economic self-sufficiency over everything else, regarded waste-water treatment as a luxury, and prompted East Germany to burn mountains of the brown coal dug out of the ground around Leipzig." (Cherfas). East Germany has acknowledged the problem and is still trying to figure out what to do. This demonstrates, despite being real old policies, that policies enacted from the past had consequences. The policies were for coal, however it doesn't change the fact that they were energy policies. The last type of government solution is global cooperation/intervention between governments. East Germany and the United States case examples show that perhaps writing new policy is not enough of a solution and therefore a gap within other studies saying, writing policies can fix climate change. Writing policies is a good start, but there needs to be more intervention and participation. This last government solution is mostly theory and has no real evidence that it will work since complete global cooperation has no happened yet. However, an argument one can make is that global governments need to fully cooperate because one country advancing to clean energy will then change the trade agreements. For example, a country exporting oil will lose a trading partner and that can be detrimental to their economy. I only have one author for this section and she says, "global cooperation requires two things, institutional and organizational development, along with a hefty helping of political leadership." (Florini). The reason I only have one author is because I haven't found any good literature on global cooperation besides this one. Florini's main point is that the world is so interconnected on energy already, importation of oil or other resources, that the world doesn't have a choice and we need to cooperate. Florini also says we need to â€œredefine the energy problem to focus not on particular sources of energy (such as oil) but rather on energy services. Most of the world has a mutual interest in developing effective energy markets, coordinating policies on taxes and subsidies, responding effectively to climate change, and making a serious investment in alternative energy

technologies for developing countries in order to put them on a sustainable path." (Florini). In order for complete global cooperation, we need to use tax reforms and signing of legislation on the global level. All of these solutions are interconnected and can be applied to each other. However Florini criticizes her own ideas and says "What has been lacking to date is a concerted effort to develop better habits of collaboration, to learn from experience, and to develop the organizational infrastructure needed for progress. The world will not be able to shift to energy systems that satisfy the demands for reliable access to energy services for all the world's people at an environmentally acceptable cost unless the international community develops far more effective institutional mechanisms." (Florini). I agree with her criticism and I do believe that the world can do a better job on fixing the energy markets so that we can transition to clean energy. Global cooperation is the biggest factor for a solution to the transition. Governor Jerry Brown has also acknowledged that climate change is a global issue and it cannot be solved unless everyone contributes. He says "Unfortunately, no one's in charge — everyone is creating the problem, and unless everyone contributes to the solution, then the job won't get done. We don't know the exact timing or the magnitude of the global warming threat. We know it's a problem… wake up the whole world to realize that we have a common destiny and what's at stake. Let's lead the whole world to realize this is not your normal political challenge. This is much bigger. This is life itself." (Kirschbaum). One thing I would like to address for all types of government aided solutions is that they all overlook the fact that it is consumer behavior and private businesses that caused most of the damage of climate change. We have uneducated consumers buying products that private businesses create for profit that could have been created while damaging the environment. I'm not saying a government solution is bad, but I'm saying that in the current political and economic climate, it will be difficult to achieve. Also, with the current set of literature, there seems to be lacking examples showing global cooperation. Where the literature does

Looking at non-government solutions. This type of solution is interconnected, and one will not exist without the other. Consumer behavior is directly correlated to private corporations. "Since pollution is a direct consequence of consumption, we must also limit the amount of resources we use. Any viable solution to climate change will therefore require a global agreement to drastically inhibit the extraction, production, and consumption of natural resources." (Park). I agree with Parks argument that a viable solution will need global agreement with a mix of reduction of resources by consumers. In Szasz book, he mentions that "the United States has 4.5 percent of the world's population but consumes about 25 percent of the world's resources" and, "If everyone on Earth lived like Americans, that would require four Earths' worth of natural resources." Consuming the right stuff promises to make one "happy." One consumes to construct, lay claim to, and display a desirable social identity. Consumption is no longer just the satisfaction of basic needs; consumption is driven by powerful societal/cultural motives. Not many persons are so deeply committed to the environment that they are willing to forgo all that and voluntarily choose less attractive green alternatives." (Szasz). Consumption patterns is a huge problem that needs to be fixed however, I do agree with Szasz research in that he says â€œsociological analysis suggests, however, that a politics that focuses on consumption will not, by itself, be a solution to our environmental crisis unless we also address, at the same time, inequality/poverty, population, the whole cycle of extraction, production, distribution, and waste disposal."(Szasz). The private sector is directly connected with consumer behavior. Private companies will make products and will cut corners to make a profit, ignoring all environmental consequences. Therefore, by fixing private corporations methods of creating and selling their product could help change consumer behavior or vice versa, changing consumer behavior will change the private sector. However, where these solutions connect back to government solutions is in the global cooperation. Where there is a problem is that global cooperation is a public-sector problem, whereas non-government is the private sector problem.

Getting the private sector to care about inequality in other countries and getting full cooperation between countries is the least of their concerns. I'm not saying all private companies are like that, but the big oil and gas companies will lose a lot of money if we switch to clean energy. Some things I would like to address for non-government solutions is that all of this is mostly theory and hypothetical because you can only do hypothetical tests on consumer behavior. We can only guess and maybe predict what consumers do and perhaps predict what that means for the environment. But until consumers fix their habits, we won't have any solid evidence as to how changing consumer behavior is a fix. I also agree with Szasz that fixing consumer behavior is only part of it, we also need to fix how corporations create and sell their products. A solution could be a combined effort from private corporations and government intervention to get regulations on how to create and sell products. The only problem with that is that by creating regulations like that we are kind of destroying our capitalist mentality. The whole point of capitalism was all about private ownership and the ability to create and sell products for profit. One thing I would say that non-government solutions overlook is the fact that all of our current energy grids and sources were created by the government before private companies took over and started selling their product due to capitalism. Therefore, it is not the responsibility of consumers or private corporations, but it is the government's responsibility to fix.

Overall, the literature is of both types of solutions are quite broad. I agree with Manzi that a carbon tax would never work and his six reasons why it won't are what I believe as well. The literature on global cooperation was quite lacking in examples, but I do agree with Florini's solution on how to get global cooperation to work. For my research design I will try to find case examples, but in the current political and economic climate, that might be difficult. The solution of consumer behavior was also quite lacking, and it will be difficult to prove. Consumer behavior is all about trends and patterns and can't be predicted. Where I think the literature was good and applicable were the legislations/policies being signed by California and China, and the proposed tax reforms by Metcalf and Garciano. Even though I agree with Manzi that taxes will never work, I think there can be a way to implement it. Finding data on countries that have implemented a tax reform would be a way to see if a carbon tax will be beneficial or not. Where my research fits into all of this is I want to look at case studies that have implemented these theoretical/proposals and see what worked or hasn't worked. Or look at case studies that have implemented something similar and analyze it. I will then state what I think the best solution is for the transition to clean energy.

Methodology

I will be looking at other countries policies and looking at what policies they have passed. The countries under examination are France, Germany, China, and Chile. An additional policy I will be looking at is the Montreal Protocol. What I want to be looking for in these policies is if they were successful or not and why. How I am measuring success has different variables to it. First and foremost, the biggest factor of success is if the policy even passed. If the policy passed, variables to look at are if they are still in effect or did they ultimately fail. The second variable is if the policy was publicly popular and accepted. The last variable is if the policy was able to phase out fossil fuels and phase in clean energy. The first goal of looking at these examples and their success rate is to determine which policies have the highest chance of being implemented into the United States. The second goal is to determine the best hypothetical policy and the most realistic policy. Looking at both options can help determine the best policy option there is for the United States moving forward.

Case Example 1 France

The first example is the French carbon tax "often referred to in the French public debate as the contribution-energie-climat (energy-climate contribution)". (Laurent). An interesting fact about this case is that France has the "lowest carbon-intensive economic growth in the developed world. However, the French economy suffers, ecologically speaking, from "nuclear fatigue" or "complacency": sins in diffuse pollution from housing and transportation have over time offset energy virtue. (Road transportation alone now accounts for a third of total emissions, as its share increased by an astonishing 490 percent since 1960.) Hence, if French C02 emissions went down 30 percent from 1980 to 2007, they only decreased by 10 percent from 1990 to 2007)" (Laurent). So even though France had the lowest carbon use in industries, they still had a lot of carbon emissions from vehicles and the cost to maintain nuclear was too much for the French economy. What President Sarkozy did was try to implement a carbon tax policy, but before officially writing one and advocating for it, she called for a study to be conducted for scientific evidence to hopefully convince the public that this was a necessary tax. "To confirm scientifically the necessity of a carbon tax and design its practical modalities (tax base, rate, exemptions, etc.), President Sarkozy convened a commission of experts chaired by former Prime Minister Michel Rocard in the spring of 2009. The experts concluded that the tax was to be set at 32 euros per ton of C02, most members actually favoring a launching level of 45 euros but resorting to a lower launching level in the face of political acceptability considerations. Still, President Sarkozy set the price tag even lower, at 17 euros per ton of C02 for 2010. The argument put forward by the government to justify this level was that French households should not pay more than firms engaged in the EU ETS (the European cap-and-trade market). At this level, 17 euros per ton of C02, the environmental economics of the tax was clear: the overall impact was to be very weak at least initially, with revenues amounting to a mere 4.6 billion euros, close to 0.23 percent of France's GDP and 0.47 percent of its total tax revenues. Yet, the hardest part was ahead: once the economic form of the tax was determined, it had to be "sold" to the French public, a difficult sell indeed" (Laurent). The way France followed other successes of environmental taxation in the EU was to compensate households. "The socially regressive effect of the tax was obvious, as the poorest French households pay out a higher share of their income on energy (2.5 times more for the bottom 20 per- cent compared with the top 20 percent). The government chose to compensate households financially directly depending on their income and residential situation" (Laurent). This strategy worked for a while until the numbers didn't add up correctly and the majority of people opposed the carbon tax. "The project was abandoned in March 2010…after an Ipsos poll showed that 69 percent of French citizens thought it was the right thing to do" (Laurent). The people living in poorer neighborhoods would be using less efficient energy but would still have to pay the carbon tax which they do not completely benefit from. In total, the poorer people are paying the most since their energy systems don't benefit from the carbon tax because lack the infrastructure of the more efficient and renewable energy infrastructure that the tax is supporting. "The "contribution climat-energie" is an incentive instrument meant to modify individual behaviours and to disappear once those behaviours have been corrected. Therefore, this tax does not primarily aim at generating a revenue. It does not influence households' purchase power for it is fully compensated by a reduction of income tax or a "green check" for those who do not pay this tax (the poorer). The amount of the compensation depends on the family size, the living area (urban, rural) and the presence or absence of public transports. So introducing the French carbon tax would boil down to create also a new public expense, and in combination with a tax reduction, this could even bring about a new cause of public deficit" (Sene). Evaluating the policy, I see more cons than pros. The most obvious con of this whole policy is that it failed, and it was ultimately abandoned by the French government. Some more cons I see is that the government failed to properly budget their money and ended up losing money by over-compensating people and keeping the tax very low.

Perhaps if the government decided to tax people at the rate scientists proposed, there wouldn't be such a deficit in money, but at the same time, perhaps if they did that the policy would have never been passed. However, even though the policy failed, that doesn't mean there weren't good things about the policy. First of all, to get a tax policy to pass is a success. Politically passing a tax policy is extremely difficult not only because it is highly unpopular, but depending on the topic, it would be almost taboo to talk about. In this case, because the topic was on the environment, I would say this is a taboo topic to talk about only because a lot of politicians avoid this topic and work on other things more short-term.

Case Example 2 Germany

My second example is Germany's solar subsidy policy. A subsidy is a grant or gift of money: such as a grant by a government to a private person or company to assist an enterprise deemed advantageous to the public.3 In this case, the German government granted money for the production of solar technology and solar energy. Subsidies is an important policy to look at for renewable energy because in the United States we already heavily subsidize coal and oil. Not saying we don't already subsidize the production of renewable energy, but we can make a policy to fully support it and transition the subsidies for non-renewables to renewables. This is why Germany is an interesting case because they heavily subsidized their solar energy, and this will be a good comparison to make for the United States as an option. Some background of Germany, "Germany has virtually no oil reserves and only small proven natural gas reserves, but it does have considerable reserves of coal, with 4.7 percent of global proven reserves. In 2011, Germany had net imports of 76.2 billion cubic meters of natural gas, making it a major gas importer. Germany's high dependence on foreign gas resources has certainly motivated policy-makers to support renewable energy for electricity." (Gallagher). Despite the fact we see that Germany has coal deposits, dependence on foreign aid is a huge economic motive to invest into renewable energy that can be exported for profit. The policy I will be looking at is Germany's solar market subsidies. Germany has made a huge investment into solar energy or photovoltaic (PV). According to a NY Times article written in 2017, "Germany has spent an estimated 189 billion euros, or about $222 billion, since 2000 on renewable energy subsidies. But emissions have been stuck at roughly 2009 levels, and rose last year, as coal-fired plants fill a void left by Germany's decision to abandon nuclear power. That has raised questions — and anger — over a program meant to make the country's power sector greener." (Reed). "Germans already pay the second highest energy prices in Europe. Next year, a three-person family will likely have to pay up to an additional €175 ($220) to finance the construction of renewable energy infrastructure. The biggest culprit behind this increase is the German government's misguided subsidy policy. To the delight of the solar industry, Altmaier has decided to divert the largest share of renewable energy subsidies to photovoltaics, the most expensive renewable energy technology. As a result, the solar industry is expecting continued record growth, despite the fact that photovoltaics are also the renewable energy least suited to the German climate." (Neubacher). I found a source saying Germany PV energy is not subsidized because it is not publicly funded. "Is PV power subsidized? No. The support is provided through a surcharge, which applies also to self-produced and self-consumed PV electricity. The investment incentives for PV power are not supported by public funds. While fragmentary reports often quote figures relating to past and future PV power feed-in tariff payments in the hundreds of billions and call these «subsidies", a true subsidy is supported by public funds." (Wirth). For the purposes of this paper, we will just classify Germany has subsidizing their solar energy, since a majority of news outlets call them subsidies. The pros of Germany's subsidy policy are (1) it provides funding and (2) it successfully created a solar market in Germany. The cons of Germany's subsidy policy are (1) it proved to be not beneficial since pollution levels has not changed since it was implemented, (2) pollution levels rose because of coal burning which means the policy unsuccessfully phased out fossil fuels, (3) the money was spent on PV cells which is the most expensive

solar energy technology which does not complement Germany's location, and (4) these subsides are a burden on the people of Germany who have to pay more for energy.

Case Example 3 China

China being one of the top three most powerful nations in the world and having an extremely high population density compared to the United States, have great renewable energy policies. The policies enacted by China were more like goals that have been set and the policies were shaped around those goals. I would even suggest and say these policies have the highest chance of implementation in the United States since these policies are about investing and development to improve the economy. "China is full of energy contradictions. It is the largest coal producer, the largest emitter of carbon dioxide, and also one of the largest clean energy investors in the world. In 2010, China invested $51 billion (USD) in clean energy. Most of China's environmental policies are implemented to achieve targets set by the central government in its five-year plan. China's support for renewable energy was greatly enhanced in 2005 with passage of "The Renewable Energy Law of the People's Republic of China." The law created four mechanisms to promote renewable energy: (1) a national renewable energy target; (2) a mandatory connection and purchase policy; (3) a feed-in tariff system; and (4) a cost-sharing mechanism, including a fund for renewable energy development" (Gallagher). "Apart from large hydropower, solar PV and wind energy play the biggest role in China. The growth of the wind energy industry was amazingly swift: in 2010, China became the largest wind power market in terms of annual capacity increase and total cumulative installed capacity" (Gallagher). "In an April 2012 speech, China's Premier Wen Jiabao said, "Greening of the economy is not a burden on growth; rather, it is an engine that drives growth and an effective means to achieve sustainable development". China's wind power industry (power generation and turbine manufacturing) generated an average of 40,000 direct jobs annually between 2006 and 2010 and is expected to generate 34,000 jobs annually between 2011 and 2020."(Gallagher).

Some pros of China's policy are (1) it created four ways to promote renewable energy throughout the country, (2) it will create jobs for the people, and (3) the investments into renewable technology can be exported for money. Some cons of this policy are (1) it is expensive to invest into clean energy, (2) even though jobs are being created, we would have to re-train people to fit the jobs of creating renewable tech, (3) Since China is not a democratic country, it was easier to force people to assimilate to their new policy; this would be a challenge for the United States, and (4) this policy did phase in clean energy, but there is no evidence or knowledge on the fact of phasing out fossil fuels or the old infrastructure of burning coal.

Case Example 4 Chile

Chile is a prime example where government regulations and policies meet with the private sector to form a functioning relationship. A little background on the energy policies in Chile, "Chile imports around 70 percent of its primary energy supply, due to having limited domestic energy resources.1 However, since 2010, growth in Chile has had high annual rates of 5 to 6 percent, and the demand for electricity to feed this growth continues to rise at an annual rate of 6 to 7 percent.2 With a relatively high energy intensity concerning electricity (Chile is at 0.42 compared to the OECD average of 0.27), Chile requires high levels of electricity input to produce an increase in its GDP, revealing a low energy efficiency of its economy." (Hatzfeldt). Government working with the private sector was one of the solutions brought up in the lit review. In Chile, the government allowed private companies to sell energy into the market to produce GDP for the overall health of the economy. "The Chilean government has introduced several reforms into the regulatory framework that have driven renewable energy project development and the participation of renewable energy in the electricity market.

The first reform was introduced in 2004 through the enactment of Law 19.940, which enabled any generating company—regardless of its size—to sell energy in the electricity market. Moreover, the law introduced a partial or full exemption for those renewable energy plants supplying the system with a surplus power of less than 20 MW from paying tariffs for the transmission of their electricity through the main distribution networks. The opening of the market to small power generators facilitated the viability of small renewable energy plants." (Hatzfeldt). "With the privatization and liberalization of the electricity market in 1982, Chile became a global pioneer in the comprehensive liberalization of the electricity sector, functioning as a role model for many other countries in Latin America and beyond, with even Great Britain following Chile's model in the early 1990's. The new governance structure was based on free market competition, with only minimal regulation where necessary.16 The electric system has been widely celebrated for its successes in privatization and deregulation: installed capacity has rapidly increased as private investment has dramatically grown and access to electricity in rural areas has spread to 94.5 percent.17 Costs and prices have decreased due to improved productivity of labor and capital, and energy losses in the distribution system have sunk." (Hatzfeldt). "While studies show the feasibility of renewable energy in terms of its potential and the competitiveness of its electricity prices, the actual level of renewables in the electricity matrix is lagging heavily behind aspired goals. While the law demanded 5 percent of electricity to come from renewable energy sources in 2010, in that same year only 2 percent had been reached. It is projected that if the country continues on its current trajectory, by 2030 only 8.5 percent of electricity will be generated from renewable sources.9 It is therefore doubtful that the proposed national target of 20/20 is possible under the current electricity sector governance structures, since both the prevailing market forces and the regulatory system that govern the energy sector seem to hinder the development of renewable energy" (Hatzfeldt). Some pros that we can take from this example is (1) the cost and prices have decreased due to improved productivity of labor and capital, and (2) energy losses in the distribution system have sunk. However, the cons here are (1) The policy failed. "While the law demanded 5 percent of electricity to come from renewable energy sources in 2010, in that same year only 2 percent had been reached" (Hatzfelt), and (2) We can't implement this exact policy into the US since we already have privatization through capitalism. We would have to look at a different type of private sector cooperation policy.

Case Study 5 Montreal Protocol

The Montreal Protocol is an important example to look at because this is one of the only cases to exist where full global cooperation occurred. "The Montreal Protocol formally Montreal Protocol on Substances That Deplete the Ozone Layer, international treaty, adopted in Montreal on Sept. 16, 1987, that aimed to regulate the production and use of chemicals that contribute to the depletion of Earth's ozone layer. In the early 1970s, American chemists F. Sherwood Rowland and Mario Molina theorized that chlorofluorocarbon (CFC) compounds combine with solar radiation and decompose in the stratosphere, releasing atoms of chlorine and chlorine monoxide that are individually able to destroy large numbers of ozone molecules. The initial agreement was designed to reduce the production and consumption of several types of CFCs and halons to 80 percent of 1986 levels by 1994 and 50 percent of 1986 levels by 1999. The protocol went into effect on Jan. 1, 1989. Since then the agreement has been amended to further reduce and completely phase out CFCs and halons, as well as the manufacture and use of carbon tetrachloride, trichloroethane, hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), methyl bromide, and other ODCs." (Britannica) In my lit review, there were authors who suggested at the thought of global cooperation as a solution to transition to clean energy. The thought was if we all work together, we will all motivate each other to transition and progress.

The reason the Montreal Protocol is important in my paper is because the United States took the leading role during crisis of the ozone layer. "The Montreal Protocol has proven to be innovative and successful, and is the first treaty to achieve universal ratification by all countries in the world. Leveraging worldwide participation, the Montreal Protocol has sent clear signals to the global market and placed the ozone layer, which was in peril, on a path to repair." (state gov). In summary, the Montreal Protocol was an international treaty, however, there were policies set to ban and replace harmful chemicals. The main chemical to replace was CFC's and the replacement were different carbon chemicals. Some pros of the Montreal Protocol are, (1) it was the first successful global treaty, (2) it successfully achieved its goals, and (3) the United States took a leadership role. Some cons of the Montreal Protocol are, (1) even though they successfully banned CFC's, this created a black market for the chemicals, (2) the chemicals now are contributing to our current problem of climate change, and (3) even though harmful chemicals were phased out, poorer countries were left behind because they could not afford the new and expensive chemicals. What I want to take from this is, is it possible to set a policy to ban carbon use and essentially replace it with renewable energy? Similarly, to the Montreal protocol banning CFC's for a 'better' option.

Analysis

At the beginning of my paper I stated that my question aimed at two things; the phasing in of clean energy and the phasing out of fossil fuels. Now looking at my five examples, can these things apply to my goal and fit with the United States?

Looking first at carbon tax, can a carbon tax achieve this goal? First, I want to clarify and clearly define carbon tax. "The objective of a carbon tax is to provide an incentive for reducing activities that produce the most GHG emissions by making them more expensive. The carbon tax is one of various fiscal instruments used alongside other tools for fighting climate change, including emissions trading systems such as the European Union scheme for industries that produce large amounts of CO2. Putting a price on carbon is to encourage businesses, institutions and consumers to lower their greenhouse gas (GHG) emissions." (Laurent). So now looking specifically at my example of France's carbon tax, "the carbon tax implemented by France was an incentive instrument meant to modify individual behaviours and to disappear once those behaviours have been corrected. Therefore, this tax does not primarily aim at generating a revenue." (Laurent). I think that a carbon tax can theoretically achieve my definition of success. I think that a tax on carbon can incentivize a switch as long as if we don't do what France did. France's policy failed, so we would have to modify it. When there is a tax on the excess burned CO2, this can incentivize producers to switch to cleaner energy. Can a carbon tax help phase in clean energy and phase out fossil fuels? Yes, it can, on the condition the bill gets passed. The only problem with a carbon tax is that any form of tax bill is generally highly unpopular and taboo to most, if not all politicians. So, if a carbon tax were to pass in the United States I think it could prove beneficial for the financial aspect of transitioning from fossil fuels to renewable energy.

Looking now at my second example on subsides. Can a subsidy policy help with transitioning to clean energy? The short answer is yes, it was proven in the German solar subsidies example that subsidies can help transition to cleaner energy. In more recent news, Germany wants to get rid of their solar subsidies and they are going to build their first solar park without subsides.4 However, a more detailed and specific answer to a subsidy policy working in the United States is no. Like I said earlier, the United States already heavily subsidize a lot of things like fossil fuels and agriculture, so why not do more heavy subsidizing for renewable energy? There is an article that disproves more subsidies for renewable energy actually works because the subsidies for renewable energy are different to fossil fuels.

"According to the Energy Information Administration (EIA) and the University of Texas, from 2010 through 2013, federal renewable energy subsidies increased by 54%, from $8.6 billion to $13.2 billion, despite the fact that total federal energy subsidies declined by 23%, from $38 billion to $29 billion. Subsidies then decreased dramatically from 2013 to 2016, because: tax incentives expired for biofuels, the American Recovery and Reinvestment Act (ARRA) stimulus funds were used up, energy assistance funds decreased, there was a 15% decrease in fossil fuel subsidies from $4.0 billion to $3.4 billion, and a 12% decrease in nuclear subsidies from $1.9 billion to $1.7 billion. But the subsidies for nuclear and fossil fuels are indirect subsidies like decommissioning and insurance assistance, leasing of federal lands, and other externalities, unlike the subsidies for renewables which are directly for the production of electricity and directly affect cost and pricing. Between 2010 and 2016, subsidies for solar were between 10¢ and 88¢ per kWh and subsidies for wind were between 1.3¢ and 5.7¢ per kWh. Subsidies for coal, natural gas and nuclear are all between 0.05¢ and 0.2¢ per kWh over all years." (Conca). Has subsides shown that they can phase out fossil fuels and phase in clean energy? Yes, specifically to Germany only; in the United States we still use both and even though we subsidize our renewable energy, our fossil fuel plants and energy has not been phased out. In comparison to the United States, Germany does not really have as much fossil fuel plants as the United States does. It's not a fair comparison since the United States is one of the top three polluters on the planet, but because Germany has less to phase out, it was easier for them to subsidize their solar and not lose money like the United States. I think in theory subsides could prove marvelous in transitioning energy sources, but with how things currently are, I would say that a subsidy policy would be very difficult to get people on board with, especially if citizens have to end up paying more for energy than if we never switched at all.

Looking at how China implemented a policy based on environmental goals they wanted to reach is admirable. China is doing what the United States should be doing; progressing forward with cleaner energy instead of going backwards for coal jobs. The current political rhetoric on energy from President Trump is getting people out in the Mid-West and Eastern Us their coal jobs back. Trump campaigned on promising those people that he would get them their jobs back. Looking at Chinas plan of investing and creating a job market for the renewable energy technology, this is something that the United States can do. This type of policy can create competition between the United States and China in the market of renewable energy technology. Problems with implementing this type of policy is that it costs a lot of money to invest into more renewable energy than we already have and this policy does not generate funds. Theoretically this type of policy should also be able to phase in clean energy and phase out fossil fuels as time progresses because if we do this long enough there should be a market for these new technologies from developing countries. Overlooking these negatives of this policy, it is important to realize that this type of policy is the most realistic policy that the United States can implement because it is currently being done in China, one of the top three superpowers of the world as well as the largest polluter.

Looking at government and private government cooperation, as I said earlier, the privatization of Chileâ€™s electricity market is not applicable to the United States. We already have privatization through our capitalistic society, so we would need a different policy that involves both the government and private companies. So, a policy that involves both government and the private sector is a cap and trade system. "A cap and trade system is a system designed to reduce pollution in our atmosphere. The cap on greenhouse gas emissions that drive global warming is a firm limit on pollution. The cap gets stricter over time. The trade part is a market for companies to buy and sell allowances that let them emit only a certain amount, as supply and demand set the price. Trading gives companies a strong incentive to save money by cutting emissions in the most cost-effective ways. "(Keohane).

A cap and trade system has proved successful in the EU and CA. In the European Union's Emissions Trading System, capped emissions were 26 percent lower in 2016 than when the program started in 2005. California's emissions from sources subject to the cap declined 8.8 percent between the program's launch in 2013 and 2016.5 We cannot ignore the fact that private companies are directly responsible for GHG emissions. Therefore, a cap and trade system would work by having the government set a cap of carbon emissions on private companies (so there is a firm standard unlike the Paris agreement) and companies can then trade excess carbon credit they don't burn, however if they burn over the cap they have to pay a fine or buy carbon credit from a different company. In this way, we incentivize companies to profit off selling carbon credit, and we can start phasing in clean energy as we keep lowering the cap to make fossil fuels less appealing to burn. However, the downsides of a cap and trade system is that it is extremely easy to exploit and highly corruptible.

Looking now at my 5th example of Global cooperation, the Montreal Protocol is not really an example of a climate change policy. This example was strictly to demonstrate a successful global cooperation treaty, and perhaps there can be a global cooperation treaty on climate change. Fortunately, we have a modern Montreal protocol, and that is the Paris Climate Agreement, which the United States unfortunately the US wants to withdraw from. It's good we have a global agreement, but a major flaw in this agreement is that there, is no leader, there is no standard, and there is no incentive to phase in clean energy b/c everyone is focused on short-term gains like profit if they produce and export more products. Within the treaty, it states that nations get to independently choose the standard they want to decrease emissions. The only rule is that they have to continually decrease emissions every 5 years. Because the US is not leading the Paris Climate Agreement like the Montreal Protocol, I would say a policy surrounding global cooperation is going to be close to impossible if no-one wants to take charge and set a standard. More selfish reasons as to why global cooperation would be difficult to implement is because countries who are less developed than the Western world have a lot more to lose than these richer nations. Developing countries who need to deforest for money and fuel would lose more than the United States who have a lot of money already. Another example, Saudi Arabia exports a lot of oil, if everyone were to go green their natural resource will be worthless. Global cooperation in terms of climate agreements is a perfect example of the Tragedy of the Commons phenomenon, which just basically means everyone will do things that will benefit themselves in the short-run, but in the long-run no one will benefit anymore. A policy surrounding global cooperation would have to override that selfish and greedy outlook of countries and make incentives to go green. However, with such high levels of inequality, I think any global policy is a bust and cannot be fully implemented for long-term results.

Results

My results in Table 1 below is just a list of how many pros and cons each policy that I had previously went over. In Table 2, I use my definition of success and check to see if the policies I went over fit my criteria. I will also add the additional policies I brought up in my analysis. For clarification Table 2 is going over the policy under evaluation and not the entire broad definition of the policy, ie: Carbon tax is specifically to France, and not an evaluation of a carbon tax policy in general. Excluding cap and trade and the Paris Climate Agreement because these two policies were not part of the original five examples under evaluation.

Table 1: Number of Pros and Cons Each Policy Had

	Pros	Cons
France Carbon Tax	2	4
German Subsidies	2	4
China Investment and Exports	3	4
Chile Private and Government Partnership	2	2
Montreal Protocol	3	3

Table 2: Evaluations of Policies under my Criteria

	Policy Passed	Policy Failed	Accepted and popular with the people	Phase in Clean Energy	Phase Out Fossil Fuels
French Carbon Tax	0	0	1	1	0
German Subsidies	0	0	0	0	0
China Investment and Exports	0	1	0	0	2
Chile Private and Government Partnership	0	1	0	0	1
Montreal Protocol	0	1	0	1	1
Cap and Trade	1	1	2	0	0
Paris Climate Agreement	0	1	1	2	2

0=Yes, 1=No, 2=Unsure

Conclusion

In this paper, we went over, (1) reasons why this topic is important, (2) literature surrounding this topic, (3) case examples of policies that were implemented in other countries, and (4) examined those policies that have been implemented to see if they could work in the United States. To quickly recap, climate change is the biggest threat to humans in this current generation that most people tend to ignore because they think the effects of climate change will not affect them in their lifetime. There has been little to no major environmental policy since the 60's and 70's and because of this, we are going at an exponential rate of global warming. Scholars on this topic have proposed two different categories of policies (1) government policies and (2) non-government policies. Non-government policies does not mean anti-government, but it means these authors believe that government is not enough.

Examples of government policies are carbon tax, tax incentives, subsidies, global government cooperation, and research and development + investment. Some examples of non-government policies are to change private sector policies on production, change consumer behavior, and a private sector and government cooperation. My goal for this paper was to provide a policy recommendation, both a hypothetical and a more realistic option. Before I get into that, I will list out the policies that have basically a zero percent chance of implementation, the runner up policies, and then my two recommendations. The policies that have almost zero percent chance of implementation and working are global cooperation and subsides. As a I stated before, a global policy would be too difficult to implement because it is almost impossible to override nations selfish gains as well as poorer countries that export fossil fuels lose out on a deal like this. There is no point in trying to get a global policy implemented if the terms and agreements are unfair and unequal to all. Renewable energy subsidies on the other hand were proven to be not beneficial to the United States. The study from the Forbes article showed us that even though the United States increased renewable energy subsides, the trade-off was not as beneficial as subsidies to fossil fuels. We ended up paying more for renewable energy sources than fossil fuels because of the type of subsidies they were. In Germany, subsides only failed because of poor spending choices. They decided to invest into PV technology which does not do well in German climate. Subsidies are also a burden to the people because they end up having to pay more money for energy that may or may not be reliable. The German people pay one of the highest energy costs throughout the EU and to no effect because the technology they invested in was a bust. The runner up policies are carbon tax and cap and trade. A carbon tax done correctly and no like France could prove beneficial if we want to generate funds specific for environmental use. The reason carbon tax is a runner up and no one of my recommendations is because a carbon tax can only theoretically fix the financial aspect of switching to energy sources. A carbon tax is strictly for generating funds, but fails to provide any other type of standard. Perhaps a carbon tax policy mixed with a standard policy could work out for the best, but a carbon tax policy on its own just does not quite cut it for a policy that needs to be able to transition energy sources. A cap and trade system seems like the best option because there is a standard and it incentivizes companies to profit off from carbon credit. However, every system is exploitable, and cap and trade is no different. There are loopholes in cap and trade that make it easily corruptible. For example, within a cap and trade system there is no true monitor of how much a company emits and even if there was that number can always be changed. Also buying the carbon credit is much cheaper than actually switching to renewable energy.
6 Therefore, this type of policy as good as it sounds, is just that, a good sounding policy that wouldn't work if implemented because companies will always go for the quick profit than invest into new products and wait for a profit. My hypothetical policy recommendation is a form of government and private sector cooperation. I know I just said that cap and trade is a runner up and it is a form of private sector and government cooperation, however, my reasons for putting this broader policy as my hypothetical and not cap and trade is because it is more flexible in definition. I'm not entirely sure what kind of policy we could implement here, but I think that a policy needs to involve both government and the private sector. Both parties are at fault here for the negative effects of climate change and both need to take responsibility. In comparison to the other policies, this type of policy can both generate funds and create a standard, which are both needed to transition to clean energy. However, this is my hypothetical because I'm not sure what type of policy can be written that fit this criteria and I think that this fits more with hypothetical than my actual realistic recommendation. Finally, my policy recommendation from my list is going to be a policy following China's steps in investing and exporting. This is the most realistic out of all my policies because it is something the United States can do now. China created environmental goals it wanted to reach and wrote a policy to fit those goals. China invested into renewable energy as well as created a job market for the new technology, which

allows them to export this technology for profit. This is the main reason China can surpass the United States in the next few years. The United States wants to go back to coal jobs which will sustain us for the next few years, but eventually we would have to switch which means we would have to import from China, or start later in the investment plan than China. This policy does not generate funds which makes it difficult to start the investment, however since the United States is the richest country in the world, I do not see why we cannot start investing more into better technology like China has and export that technology for a profit. A policy like this can get us in competition with China and create a market for renewable energy, which is the goal of transitioning.

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Briana Dearman

Dr. Katherine Gasdaglis

Love

1.1 Introduction

Can love be taught? For many this question is confusing, for others it is absurd and for others still it is completely legitimate. The reason for this has everything to do with how we conceptualize love. Love may be thought of as a feeling or as a set of actions we take in relationship to another. Much of the obscurity regarding the concept emanates from the common thought that both the feelings and the actions that constitute love are unique for each individual. The things which I expect from a loving partner will differ immensely from what even a close friend or family member may expect from a significant other. We need not investigate very far in order to observe a myriad of relationships ranging from polyamorous or monogamous, heterosexual or homosexual, complementary or parallel, etc. What is desired out of these relationships, what makes them loving, will depend on the individuals involved. To this end, it is not uncommon to witness individuals claim to be in love while acting in ways that contradict our intuitions regarding what it means to love. Take for example, a woman who has verbally expressed her love for her partner, behaves in many ways we assume substantiate her claim, but also has a pattern of cheating. As her behavior is undoubtedly emotionally damaging for her partner, this case forces a reexamination of our existing notion of love.

In All About Love by bell hooks, the author argues for a shared definition of love on the basis that the common view of it leads to untenable results. More specifically, the common view does not provide a sufficient basis for challenging (or substantiating) claims of love (3-14). If we allow love to take as many forms as there are individuals experiencing it, this leaves us in a compromising position for excluding the various forms of abuse that are often intermingled with certain attachments. To resolve this issue, hooks offers something resembling what Sally Haslanger calls the ameliorative project, in which she explains

Ameliorative projects….begin by asking: What is the point of having the concept in question, e.g., why do we have a concept of knowledge or a concept of belief? What concept (if any) would do the work best? In the limit case a theoretical concept is introduced by stipulating the meaning of a new term, and its content is determined entirely by the role it plays in the theory (4).

More specifically, Haslanger proposes that "When we are asking what social kinds… are, we should (at least in part) be asking what we want them to be" (Barnes 39). Using a similar methodology, hooks proposes that we turn our focus away from the subjective feeling to a universal account that focuses on the practice of love as "the will to nurture our own and another's spiritual growth" (6). Another way to think of this, (that may be especially helpful for those that are not spiritual) is assisting another to become self-actualized. In this paper, I will make the case for hooks account of love. In order to do this I will first outline the argument that love cannot be narrowed down to a single concept then go back and enumerate hooks' view. I will be considering possible counterexamples throughout the paper and refute them to show why hooks account ultimately succeeds as an ameliorative account.

1.2 The Common View of Love

In order to defend hooks' view, it is first necessary to dissect the popular heterogeneous account of love. This account, which I call the "common view," is based on various beliefs which all support the notion that no essentialist view of love, that is, a view that purports to capture the universal "essence" or "nature" of love, can be provided with any real success. Such reasoning is extremely common in discourse on love, making it difficult to recognize its various components. The argument follows this general form:

1. Love is a response to the subjective valuation of a person.

2. Individuals differ in how they express their love.

C: No universal account of love can be given.

The first claim points to the fact that love is commonly understood as an emotion directed at persons who possess characteristics we deem valuable. In his discussion on Love, Justin Clardy explains that he recognizes love solely as an affinity for another person, excluding it from the realm of things which can be improved through instruction. He reasons that the kind of appraisal of qualities involved in love is almost instinctive, stating "you can't teach a person how to value" (The Unmute Podcast, Episode 002, 8:30). Clardy's account maps onto what may be the most popular view of romantic love which has been called "property-based" and refers to love which results from an agent perceiving various attractive properties in another (Soble, 4). This view's prevalence can be seen in just about any romantic film or literature on the topic of love. Love is seen as something impulsive and often times even as something unavoidable. In the same way that one loves ice cream and cannot control that its taste is pleasing to them, I have no say in the qualities that I will enjoy most in a person. Even Philosopher René Descartes mirrors this claim, describing love as "an emotion of the soul caused by a movement of the spirits, which impels the soul to join itself willingly to objects that appear agreeable to it" (Soble, 1). Our word for this emotion is given great latitude in what objects it may be directed at so it can recognize the countless experiences of different persons. A single definition would be an assault on this kind of impartiality. Similarly, the assertion that we differ in how we "act on" our love appears to disallow for any isolated account.

1.3 Why Are We Drawn to This View?

On its face, this view is alluring for many reasons. First, any moral analysis of love could not explain the special treatment we give to our romantic partners without calling upon the feeling of love in response to value as its motivation. This may help explain why rejecting any particular account of love is commonly favored. For, what we feel as human beings is so strongly influenced by a complex mix of our personal histories and cultural values that placing restrictions on what counts as love would seem to discredit our own identity in some way. A similar explanation can be offered for the claim regarding how we love. This claim regarding the behaviors we look for and give to express our love highlights the fact that the practice of love looks different depending upon the individual. Anyone familiar with the idea of "Love Languages" or who has ever been offered the adage "men are from Mars, women are from Venus" as an explanation for communication breaks in a heterosexual romantic relationship understands that love does not always take one exclusive form. It would seem that both our intuitions and experiences lead us to accept that love should remain an ambiguous term.

Other reasons this view may have gained so much traction are much more complex. For instance, it is very possible that we are scared of the emotional implications that follow from a shared definition of love. Specifically, a single account of love which places emphasis on loving actions might evoke painful feelings when we recognize that many of our defining relationships were unloving. This idea is brought up by hooks in All About Love, where she states that we are "more comfortable with the notion that love can mean anything to anybody precisely because when we define it with precision and clarity it brings us face to face with our lacks" (hooks, 11).

Another reason a more indeterminate concept might be preferred is that an explicit definition could take on an elitist air. Although the account of love I will be defending in this paper is much more prudential than scientific, it faces the same problems as any science which theorizes about primary bonds. This problem concerns the fact that much of what we take to be objective knowledge is almost always influenced by various background values. Bearing this in mind, a single account of love is much easier to reject when it will likely be the result of certain values that everyone does not subscribe to.

1.4 Problems With The Common View

For many, the vagueness of the term "love" seems to be of little importance. Our conceptual approach is at least objective enough; we know that when an agent claims to love someone else, they do not want to keep as much distance from them as possible or hope that misfortunes befall them. But maybe this is assuming too much, too quickly. In a study conducted by Rebecca L. Babcock and Anne DePrince, they highlight the strong link between experiencing various types of caregiver abuse in childhood (physical, sexual, emotional/psychological) and ongoing victimization in adult romantic relationships. The study begins by employing the ideas of Betrayal Trauma Theory, which asserts that children of abusive caregivers adapt to various forms of mistreatment in order to maintain the connections that are needed for their subsistence. Such adaptations, may look like "dissociation, amnesia, or altered emotional processing" and while helpful for surviving in dysfunctional environments, were ultimately proven to predispose children to various harms in later romantic relationships (1386-1387). Alternatively, growing up in such a harmful context can lead a child to perpetuate the same mistreatment they were exposed to early on. For instance, Ashley Montagu highlights the fact that frustrated love often manifest as a quest for power. She explains that "the idea seems to be that by acquiring power one will have all that love can give, or else by using power one may acquire love" (The Meaning of Love, 6).

In All About Love, bell hooks takes up the task of repudiating the traditional view on similar grounds. The piece problematizes the existing concept on the basis that it "can mean almost nothing or absolutely everything" (4). Hooks demonstrates why this ambiguity has detrimental consequences, explaining that it allows for various abuses to take place while the notion of love goes unchallenged. Unsurprisingly, this account does little to increase our comprehension of love, and less still to master it when our starting point is complete ignorance. The inability to recognize when we are not being given love also disallows for us to know when we are providing it, and thus leads to more lovelessness. Hooks goes on to draw a sharp distinction between love and cathexis, which she explains as "the process of investment wherein a loved one becomes important to us"(5). Such a demarcation is beneficial, because it provides a term for what is commonly mistaken for "love" while preserving loves' integrity. Further, the piece emphasizes the fallibility of the common view in light of the many individuals who have been brought up in dysfunctional homes. As these individuals grow up in environments in which some aspects of love are fulfilled while others are neglected, they come to accept and provide the same treatment in their adult lives. To this end, hooks concludes that we must arrive at a shared definition of love which provides a more concrete understanding of it. Borrowing from M. Scott

Peck, hooks promotes an account of love that is "the will to nurture our own and another's spiritual growth" and provides seven criteria for its identification: " care, affection, recognition, respect, commitment, and trust, as well as open and honest communication" (4,5). In the remainder of this paper, I will show why each of these criteria is a necessary condition for love and make the case for Peck/hooks' ameliorative concept.

1.5 Care As A Starting Point

Care, or the provision of help, protection, or supervision to another is perhaps the most obvious criteria for identifying a loving relationship. It would be incredibly difficult to believe in the veracity of someone's claim to love if they consistently served their own interests, allowed their partner to be exposed to various harms or neglected to provide assistance when desired or needed.

Many feminists philosophers have been critical of this aspect of love, however, as they recognize care giving to masks various forms of exploitation and general inequality. For instance, Iris Marion Young unravels many of the problems with traditional gender roles in a marriage, explaining that women's labor (emotional care to men and children, sexual satisfaction to men) is given in oppressive contexts in which they are dependent on men for their livelihood (("Five Faces of Oppression", 7). Similarly, Marilyn Frye criticizes the care that men are often quick to provide in place of more substantial assistance stating "…numerous acts of unneeded or even noisome "'help'" occur in counter point to a pattern of men not being helpful in many practical ways in which women might welcome help" ("Oppression", 86). Although such contentions are forceful, they do not cancel out the need for care in an account of love. Care may be a low, and insufficient, bar for identifying and acting upon love;, however, it is a necessary condition all the same.

1.6 Affection

Lucy: There must be some way to get that $500 back. Fred, you know about real estate and things. Isn't there some way that we can make Mr. Spaulding give, um, give that deposit back?

Fred: Well, I don't know. Unless you could fix it some way to make him think you're undesir able, and he didn't want you to have the house.

Lucy: Hey, that's a good idea.Yeah. Now, let's think. How can we do that?

Ethel: We? How did we get in on this?

Lucy: Well, for heaven's sake, Ethel, You and Fred are the reason that I don't want to move. The least you can do is help me out of this fix.

Ethel: Oh, you're right. Let's see now…How can we be undesirable?

Fred: That shouldn't be hard for you, Ethel.

In the incredibly popular 1950's sitcom I Love Lucy, the audience was exposed to an extremely hostile and comical romantic couple: Fred and Ethel Mertz. In the episode cited above, Lucy changes her mind about buying a house her husband has already put a down payment on after her friends guilt her out of moving. The exchange alluded to between the couple is a common theme throughout the show. All too frequently, the two would criticize one another for being too cheap, too fat, too bald, too ugly, or for just being around too much. A likely explanation for why the couple was so hilarious was that their behavior toward one another was so antithetical to what is viewed as appropriate within the context of a marriage or loving relationship. While audience members might laugh at couples that seem to resent each other, by no means do they aspire to be them. Flipping the switch to a more serious example in which one or both partners are constantly critical, negative, and insensitive to the others needs for affirmation, it is easier to see why this would serve as an impediment to spiritual growth. This problem elucidates why affection, or fondness and warmth felt toward a romantic partner is so crucial. For, while it may be possible to engage in benevolent acts toward another due to feelings of obligation or some other non-emotive basis, this does not fit into hooks/pecks account.

1.6 Recognition

In The Structure of Love by Alan Soble, he provides many reasons to think that romantic partners lack the kind of unique individuality that is so often ascribed to them. Soble points out that in defense of heterogeneity, "Most of us draw on the same stock supply of merits and defects, good traits and bad traits" but goes on to highlight that such idiosyncrasies become less and less rare the more people we meet. He goes on to note that "our mannerisms, physiognomy, ways of walking, sense of humor, and linguistic habits are close copies of the traits of our parents, siblings, peers and other models" (52). Recognition of a romantic partner, however, seems to entail both perceiving and validating their irreplaceability. If we take hooks' account to advocate recognition in this sense while acknowledging the validity of Soble's position, it may be difficult to act on.

Instead, it seems that what recognition refers to is something much less complicated. Rather than requiring perceiving another as significantly distinguishable, it is most helpful to think of recognition as merely being attuned to the particular needs and desires of a partner. For instance, in the field of psychology, recognition is defined as " a form of remembering characterized by a feeling of familiarity when something previously experienced is again encountered; in such situations a correct response can be identified…" (Encyclopedia of Britanica, 2018). Recognition, then, is both an awareness and appreciation of the idiosyncrasies of another person that are critical for determining how best to interact with them.

I want to clarify that this notion of recognition does not advocate an entirely individualized expression of love similar to the common view. Instead, with respect to hooks account, I suggest that an Aristotelian intermediate approach be taken toward each of the criteria. To elaborate, Aristotle's view reasons that a flourishing life is achieved through an intermediate course, as opposed to an excess or deficiency in an agent's passions and actions. For instance, he offers the examples of courage existing as a mean between the extremes of rashness and cowardliness, and temperance as the mean between the easily-angered person and the overly-passive. Aristotle acknowledges that the intermediate course may take different shape depending on specific circumstances, but qualifies this by explaining that feelings and actions are virtuous only when applied "at the right times, with reference to the right objects…with the right motive, and in the right way" (30, 1106b20). In adopting this framework and applying it to hooks account, I will be rejecting the many cases in which individuals fail to meet the criteria properly by adopting one extreme or another. Due to the fact that hooks account is an ameliorative one, it is more

advantageous to reject "bad" cases of loving as instantiations of love. For, by allowing them it would promote the same confusion and abuses hooks account attempts to resolve.

Admittedly, I began this paper struggling to see the same value in this criteria as the others which hooks proposes. This was likely due to confusion over what exactly the concept involved. After arriving at a workable definition, however, it became obvious that the standard is paramount for nurturing another's spiritual growth. The task of promoting another to achieve self-actualization cannot be executed without first understanding a partner's unique emotional, physical and mental needs and responding to them properly.

1.7The Importance of Respect

To illustrate the importance of respect, consider the following example. Celeste Wright and Perry Wright appear to have a paradigmatic marriage. Celeste is a beautiful, retired lawyer with two twin six year old boys and Perry is a business man and a great father. To the public, the two have it all; wealth, beauty, love. In private, however, things get much more complicated. Perry provides for the couple's lavish beach front property and all of their living expenses with his income exclusively. He displays his affection for his wife every chance he gets and is hardly able to keep his hands or his eyes off of her. At any given moment, Celeste is bombarded with compliments on any of her desirable qualities and Perry will even go so far as to acknowledge how many other men would love to take his place. Perry Wright emphasizes how much he loves his wife and looks to be extremely committed to their marriage. In fact, Perry is so committed to his wife that he lives in dread of their union ending. In spite of these seemingly positive attributes of the marriage, however, Perry is physically abusing his wife. While Celeste is granted some latitude in what she is able to do (she has friends in her neighborhood which she often goes out with and has over the house) her husband has pushed her to quit her job, give up her family and move. Still, according to Celeste, she is in love. Her husband, Perry Wright will insist that he is too (Hall, 2017).

This case shows how certain kinds of abuses can be especially pernicious because it is not clear that there is a lack of love—if love is merely defined as a feeling, or, as Descartes claimed, an attraction impelling one soul toward another. Perry Wright cares for his wife by providing for her, he recognizes her positive qualities, is mostly affectionate toward her, and very committed to the marriage. It might seem easy for anyone to write off the couple's union given the physical abuse, but understanding the implications of growing up in toxic homes helps to delay an immediate determination. While most can see that this is not an example of genuine love, such a recognition may be very difficult to come to for Celeste. After all, her husband is meeting some of the criteria for even hooks' account of love, (care and commitment) as well as displaying the other principles a good portion of the time (affection, trust, recognition, and honest communication). It seems highly possible if not very likely that Celeste can chalk up Perry's abuse to him loving badly, rather than him not loving her at all. This is especially true if the only concept of love that is available admits of so much imprecision.

So how can this problem be resolved? This case necessitates the respect element that hooks proposes for identifying love. Importantly, the respect standard forces this example to be rejected as an instantiation of love on the grounds that Perry Wright's behavior runs completely contradictory with the actions we would expect in relationship to a person one regards as being worthy of high esteem. In his piece entitled "Love in Healthy People" A.H. Maslow provides a description of respect stating: v

Respect for another person acknowledges him as an independent entity and as a separate and autonomous individual. The self-actualizing person will not casually use another or control him or disregard his wishes. He will allow the respected person a fundamental irreducible dignity, and will not unnecessarily humiliate him (81).

To be sure, knowingly harming an individual is irreconcilable with respecting them.

1.8 Commitment

In discussing hooks' standard of commitment, it is very important to specify what exactly is being proposed. There is a strong tendency to connect the term commitment with monogamous relationships which is not productive for the purposes of this account. I will not be challenging the legitimacy of polyamorous relationships as romantic commitments, but rather what characteristics must be present in a bond to promote the spiritual development of another. Commitment involves both effort and constancy in order to achieve and maintain love. What this ends up looking like in practice will be the aggregate of each element hooks proposes with sufficient intention and consistency to make it stick. Without such a condition, each criteria can be acted upon sporadically or neglected entirely.

In The Nicomachean Ethics, Aristotle provides another useful explication of commitment. The piece distinguishes between three types of friendships: those persons pursue because of utility for themselves, those persons pursue because of pleasure to themselves, and friendships which are not incidentally good, but good in their own right. The piece asserts that friendships of both the first two kinds are always short-lived, being that utility and pleasure are impermanent ends. Alternatively, however, Aristotle commends the last type stating

Perfect friendship is the friendship of men who are good, and alike in virtue; for these wish well alike to each other [as being] good, and they are good in themselves. Now those who wish well to their friends for their sake are most truly friends; for they do this by reason of their own nature and not incidentally; therefore their friendship lasts as long as they are good-and goodness is an enduring thing.

What Aristotle seems to be referencing here is a commitment to the good that is achieved through love. In discourse on love, it has often been viewed as the devoting of oneself to another based off of the traits they embody. Martha Nussbaum mirrors these beliefs and explains that "the choice between one potential love and another can feel, and be, like a choice of a way of life, a decision to dedicate oneself to these values rather than to these" (Stanford Encyclopedia of Philosophy). If such accounts are plausible, then commitment to a romantic partner can be viewed as acting in accordance with one's own beliefs and principles. As such personal qualities are self-defining and much less mutable, commitment in this sense appears much more achievable.

1.9 Honest Communication and Trust

On the topic of open and honest communication, bell hooks brings up how pervasive lying has become in male and female interactions. For instance, hooks elucidates the fact that male domination ineluctably entails deceiving for its preservation. The piece explains that many men have had to begin employing subtler methods to subordinate women in response to their growing economic independence. Hooks goes onto explain that these subtler methods usually take the form of psychological terrorism or gas lighting. These tactics are a highly manipulative and pernicious form of deception which undoubtedly erode trust and intimacy. In a similar vein, hooks repudiates the adoption of patriarchal femininity by women. Unlike their male counterparts, however, this act or mask that women take up involves making themselves appear more fragile, unintelligent and incompetent.

The purpose of this kind of masquerade, hooks explains, is to bolster men's self-esteem and access things from them that women feel entitled to. Although these women's manipulative behavior occurs in a context in which they have been subjugated by men, their actions too inhibit their ability to give and receive love under this account.

Aside from the false identities men and women adopt for their personal benefit in romantic relationships, however, there is also the more complex phenomena of lying to protect the other person's feelings. Here I want to clarify that I am not referring to white lies such as telling a partner you like their new haircut when you actually dislike it, or giving them a compliment on a meal you didn't enjoy. Instead, I have in mind the communication of needs, desires, and disappointments that are often avoided in the name of love. Although not entirely misguided, this practice ultimately diminishes the connection between partners and stagnates, rather than nurtures, the others spiritual growth. In most cases, when individuals resort to dishonesty to "protect" someone else, it is because they have come to believe that kindness and honesty must be in direct conflict, but this is a misconception. For instance, Eric Fromm defines love as a "productive form of relatedness to others and to oneself" (79). In viewing love in this way and as an intermediate between two extremes, it becomes more clear why this type of deception or withholding must be abandoned. For, part of what it entails to facilitate another's spiritual growth is a high level of honest communication that can be used to correct our actions, hold ourselves accountable, and ultimately learn to navigate the world better.

Trust and honest communication are so intertwined that a requirement of one automatically suggests a requirement of the other. For, the masks and dishonesty that seep into relationships either serve to create distrust, or arise from an individual's existing worries that their authentic self will not be well-received. This is especially true when a person's true-self runs contrary to the standards set by society-as in the cases of women failing to meet certain popularized beauty standards or men possessing traits that have been deemed feminine by society. In researching love in self-actualized persons, Theodore Riek draws the conclusion that these relationships are centered around trusting the other person enough to let one's guard down. Comfort in this sense means "allowing one's faults, weaknesses, and physical and psychological shortcomings to be freely seen by the partner" (62). Individuals who expose themselves in this way have an increased satisfaction in their relationships, as they can act natural around their partner without fear of rejection.

2.1 Conclusion

In all, Hooks ameliorative account is very successful due to the fact that it places an individual in a better position to identify and act in ways that are loving. Although the common view of love has a strong pull for numerous reasons, it is incredibly problematic for the many people that have not been brought up in loving environments. These individuals adjust to environments where love is lacking and have no concrete standard for beginning to learn the proper way of loving another person. Hooks account is not only effective for resolving this issue, but also has the advantage of nullifying claims of love in abusive contexts. Although this paper focused on showing how hooks account mapped onto love in romantic relationships, perhaps one of its greatest benefits is its applicability to other aspects of life. For, in taking up the idea that love is "the will to nurture our own and another's spiritual growth" or promoting another's flourishing, and relating it to other loving relationships, the ameliorative account proves to be equally valuable. For instance, in healthy parent-children relationships, we often see instances in which an attentive parent will recognize the needs of their different children and tailor their approaches to each one accordingly. Or in expanding love from even a familial context to a general love for society, it can be seen why open and honest communication is so important.

In "Letters From Birmingham Jail", Martin Luther King provides a great example of what loving and truthful communication looks like with members of the Christian church during the civil rights movement. King challenges their indifference to the injustices suffered by African Americans but attenuates his reproaches against the church by stating " There can be no deep disappointment where there is not deep love" (8). Hooks ameliorative account elucidates the fact that the common view of love is insufficient. It acts as both a call to action and a resolution. As A. H. Maslow states "…our duty is clear. We must understand love; we must be able to teach it, to create it, to predict it, or else the world is lost to hostility and suspicion" (58).

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Jacob Diaz

Dr. Katherine Gasdaglis

A Critique of the Philosophical Discourse on Immortality

Abstract

In this paper, I analyze two prominent objections against the desirability of immortality the boredom problem and the personality problem. I argue against both objections, as well as the desirability debate as a whole. These are my claims 1) Both problems hold fixed certain a priori, speculative assumptions in order to make claims about the desirability of immortality 2) Empirics may speak to the desirability of immortality like the boredom problem and personality problem. I use the hedonic treadmill and the future self-continuity observations as my empirical data. 3) However, even empirics are highly limited in answering the many concerns we have about immortality. 4) Therefore, our epistemic position with the respect to immortality is so impoverished, we are, ultimately, unable to make definite claims about the desirability of immortality.

1.0 Intro

"Would you want to live forever?" According to one survey, at least 1 in 5 people in the UK do (New Scientist, 2018 poll). Questions involving the desirability of immortality are asked frequently but are rarely analyzed in-depth. In particular, I remember being asked a similar question when I took my first class at Cal Poly, Pomona. I remember initially thinking "Sure, I don't want to die. I enjoy life and want it to last forever." Little did I know, part of being an undergraduate in philosophy is the all too important act of justifying your responses. After contemplating the question, I realized that I had a difficult time substantiating my answer. This lead me to inquire about the philosophical discussions of immortality. I heard reasons for and against the desirability of immortality. What I didn't realize then, as I do now, is that philosophical methodology being used in the debate about immortality is often speculatory. As a result, I focus my attention in this paper on two prominent objections to the desirability of immortality -the boredom problem and personality problem. In my critique of both objections, I illustrate that when answering if immortality would be desirable, we are in no position to make definite claims if it would or wouldn't be.

1.1 Roadmap

This paper will be an examination of two common objections to the desirability of immortality – the boredom problem and personality problem. First, the boredom problem, as presented by Bernard Williams, argues that if you have an infinite amount of time, life will get boring. I will also be using Shelly Kagan's examples on boredom to expand Williams's claim. Second, the personality problem, states that an immortal life would be undesirable because a person's personality, in the form of interests and desires, would radically change over time. This would result in the individual insufficiently resembling themselves in the future and, therefore, make immortality undesirable because of the personality changes. I will give an exposition of both objections and then write expositions in response to both claims. This will be followed by my own analysis: 1) Both problems hold fixed certain a priori, speculative assumptions in order to make claims about the desirability of immortality 2) Empirics may speak to the desirability of immortality like the boredom problem and personality problem. 3) However, even empirics are limited in answering the many concerns we have about immortality.2 4) Therefore, our epistemic position with the respect to immortality is so impoverished, we are, ultimately, unable to make definite claims about the desirability of immortality.

[1]Special thanks to Dr. Gasdaglis, Dr. Cholbi, Marmar Tavasol, and Bernard Granados for helping me on this thesis.

2.0 The Boredom and Personality Problems

This section of my essay will focus on the philosophical expositions of two arguments against the desirability of immortality. The first exposition will be the boredom problem and the second will be the personality problem. This will be followed by responses to both objections by Fischer, Mitchell-Yellin, and Greene.

2.1 Boredom

In 1973, Bernard Williams wrote The Makropulos case: reflections on the tedium of immortality. Williams's paper argues that an immortal life would be undesirable because of the inevitability of boredom. Using a play called "The Makropulos Affair," the main character, Elina Makropulos, is given a life extending elixir (Williams, 1973 82). By the age of 342, she becomes disenchanted with her extended life and finds her existence joyless and boring (Ibid.). Eventually, she refuses to take the elixir to prolong her life and accepts her death (Ibid.). Williams concludes that Elina's problem was ultimately boredom: "Her trouble was, it seems, boredom: a boredom connected with the fact that everything that could happen and make sense to one particular human being of 42 had already happened to her," (Williams, 1973 90). Using what he calls "categorical desires" Williams makes a case for boredom as an inevitability. To briefly explain, a categorical desire is a type of desire or goal that motivates individuals to look forward to the future (Fischer & Mitchell-Yellin, 2014 355). Such desires or goals are motivations that drive us to continue living e.g. having a family, graduating from college, learning new subjects, etc. According to Williams, there are a finite number of categorical desires in immortality that can be explored before we inevitably succumb to boredom (Williams, 1973 90). Moreover, this boredom occurs as a result of living through repeated cycles of the same or similar experiences over and over again (Williams, 1973 90-91). Although Williams isn't specific about said experiences, I interpret his repeated cycles argument to mean that there are a limited number of new or fresh categorical experiences one can have. If life was analogous to watching our favorite film, there is only a finite number of times we can replay our favorite movie before we lose the desire to keep replaying. Eventually, we become bored and don't want to re-watch it anymore. In Elina's case, she is left with a sense of detachment from her lack of categorical desires. Williams describes her circumstances as a type of "frozen" life (Williams, 1973 91). He ultimately concludes "EM's case, her boredom and distance from life both kill desire and consist in the death of it;" (Ibid.).

Expanding on the boredom problem, Shelly Kagan advocates for Williams's position by appealing to examples of interests that would lose their meaning over time. Kagan thinks that the desirability of living forever isn't so much about being immortal; but rather the option of living as long as one wants to (Kagan, 2012 246). Regardless of what a person's interests are, there will come a time where interests are so similar and repetitive that one will lose their desire to continue living. Kagan, like Williams, assumes there is only a finite number of interesting desires one would have in an immortal life. Kagan imagines an immortal existence in which you're allowed to explore any interests you may have. Using the example of having an interest in math, Kagan imagines dedicating himself to solving math problems for a very long time. After x number of years, he is likely to become proficient and able to solve complex problems in math briefly explain, a categorical desire is a type of desire or goal that

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[2] Although empirics are limited, the purpose of this essay is to suggest that the desirability of immortality may be answered through empirical reasons. I am not suggesting that empirics will definitively answer the desirablity question nor am I arguing that empirics will be unable too answer either. My essay is arguing if, and I stress if, empirics were to answer the desirability question this is how it might go about it.

motivates individuals to look forward to the future (Fischer & Mitchell-Yellin, 2014 355). Such desires or goals are motivations that drive us to continue living e.g. having a family, graduating from college, learning new subjects, etc. According to Williams, there are a finite number of categorical desires in immortality that can be explored before we inevitably succumb to boredom (Williams, 1973 90). Moreover, this boredom occurs as a result of living through repeated cycles of the same or similar experiences over and over again (Williams, 1973 90-91). Although Williams isn't specific about said experiences, I interpret his repeated cycles argument to mean that there are a limited number of new or fresh categorical experiences one can have. If life was analogous to watching our favorite film, there is only a finite number of times we can replay our favorite movie before we lose the desire to keep replaying. Eventually, we become bored and don't want to re-watch it anymore. In Elina's case, she is left with a sense of detachment from her lack of categorical desires. Williams describes her circumstances as a type of "frozen" life (Williams, 1973 91). He ultimately concludes "EM's case, her boredom and distance from life both kill desire and consist in the death of it;" (Ibid.).

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2.2 Personality

The second objection against the desirability of immortality is the personality problem. Building on Bernard William's boredom argument, Kagan argues that an immortal existence wouldn't be desirable because an individual's personality will drastically change over time. Assuming that there is gradual memory loss from an immortal individual, a person's interest will change over time and new interests will develop. [3] Kagan imagines himself having interest in math for the first 10,000 yrs. but will move on to molecular biology for the next thousand years; followed by a new interest or hobby after that. This new development of interests continues for infinity. different interests and personality traits. Furthermore, Kagan imagines these incremental changes to be drastic changes when compounding the timeline of immortality. These personality changes are so drastic that Kagan is left contemplating whether or not he cares for a future version of himself. His conclusion is that immortality is undesirable because he wouldn't care about a future version of himself that isn't sufficiently like him. He writes,

> You tell me: 'There's going to be somebody alive. He'll be you, but he will be completely unlike you. He will have different tastes, no memories of having taught philosophy-no interest in philosophy, or politics, or folk music, no concern for your family, and so forth and so on.' I say: 'That's all rather interesting from a metaphysical point of view, but speaking personally, I don't really care…What I want isn't merely for somebody to be me. I want them to be sufficiently like me' (Kagan, 2012 245).

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2.3 Objections agai nst Boredom and Personality Problems

2.3.1Repeatable Pleasures & Fixed Categories

According to John Fischer, Bernard Williams's boredom objection doesn't account for desires for pleasures that are repeatable (Fischer, 2008 263). Acts like sex, enjoying music, having great food, art, etc. are all pleasurable experiences that are consistent and cannot be exhausted to the point where life is boring (Ibid.). Fischer notes that this claim is assuming repeated pleasures are not "distributed too closely" e.g. having cake every day at every moment would not be a repeated pleasurable. Yet, enjoying repeatable pleasures are not necessarily boring (Fischer, 2008 264). Continuing the rebuttal against Williams, Fischer and Mitchell-Yellin use a metaphor of a library to illustrate their criticism (Fischer and Mitchell-Yellin, 2014 358). If an immortal person was to be locked in a library, proponents of the boredom objection would think there are only a finite number of books one could read. After the immortal individual was done reading all the books, their life would result in boredom as in the case of an immortal that has experienced all their categorical desires. Yet, Fischer and Mitchell-Yellin argue that books, like immortality, are constantly evolving. Sure, some books will be finished and categorical desires will end but there will be authors who write responses to old books

3 It's possible that memory loss won't occur in an immortal existence. Assuming technology advances to a point where we are able to recollect all lived experiences, our personalities may be radically different if we remember everything in our past.

and authors who write new books. The analogy is that categorical desires will continue to evolve into new and exciting deviations. Also, Fischer and Mitchell-Yellin challenge Kagan's math example by questioning Kagan's assumption that math would lose its appeal. They compare the interest of losing math to being disinterested in sex, love, or friendship:

> But why exactly suppose that math would lose its appeal? Of course, as Kagan recognizes, one would need to spread out one's activities in an immortal life (just as it is sensible to do in a finite life). Under these circumstances, why think that the joy of doing math would disappear, any more than (say) the pleasures of eating fine food, listening to beautiful music, or having sex? For example, it would be very odd to say, "I've tried all of the positions in the Kama Sutra, and even more, and I've gotten what there is to get out of them. Isn't there anything new?" This is jarring for many reasons, not least of which is that sex is not all about different positions or partners: there is something compelling and rich and deeply engaging about the experience itself (Fischer and Mitchell-Yellin, 2014 359).

Both Fischer and Mitchell-Yellin claim that Kagan and Williams are assuming that categorical desires are fixed. However, using the metaphor of the library, neither books nor sex, love nor friendship are fixed states of enjoyment. Categories evolve and bring about repeatable pleasure. Therefore, Williams's boredom objection is using fixed a priori assumptions about how an immortal life would be like.

2.3.2Imagination

Continuing the rebuttal against Williams and Kagan, Preston Greene argues that the boredom problem and personality problems are predicated on the imagination of future events. Greene notes that "If very long life is unimaginable, then we should not expect appeals to imagination to result in accurate affective forecasting," (Greene, 2017 5). Moreover, Williams' and Kagan's theories are open to criticism based on their fixed assumptions of what a future life might be. Greene cites Thomas Nagel's response to Williams's boredom argument: "Can it be that [Williams] is more easily bored than I?" (Ibid.). According to Greene, Nagel's response highlights some serious flaws with imagination. Instead of relying on experience to justify what an immortal life would be like, Williams and Kagan are using imagination of an infinite future to make fixed assumptions about the future. This poses a serious problem for philosophers because claims about the desirability of immortal are difficult to justify and are speculative at best.

3.0 – The problems with certain fixed a priori, speculative assumptions

Although Williams' and Kagan's boredom and personality arguments are potential problems for an immortal life, both of their methodologies are using a certain kind of fixed a priori reasoning to make speculative assumptions about the future. In imagining a world so vast and unpredictable, as in the case of anything infinite, one is limited to how they can critique a future world composed of infinite possibilities. Since there is infinite time in an immortal life, there is as much possibility of being bored as there is of being entertained. Perhaps Williams and Kagan are correct in that an infinite life would run its course and we are left with an Elina Makropulos situation. Yet, Fischer and Mitchell-Yellin can be equally correct in their prediction that an immortal life is similar to a library that never stops developing. Perhaps sex, love, and friendship are enough to motivate us to keep on living, perhaps not. So far, the only conclusions we can make about immortality is that there are many unknown variables to an immortal life. Holding fixed certain a priori assumptions about the desirability of immortality e.g.

boredom and personality problems, relies on imaginative speculation. As argued by Greene, this is problematic because imagination alone makes it difficult to justify our claims about immortality. Without the proper justification of our imagination, we are left with different hypothetical accounts of what an infinite life would be like. This dilemma applies to both proponents and opponents of immortality and perhaps we are stuck without any justifiable claims. Larry Temkin summarizes this point best: "Unfortunately, like everyone else, my views on this topic are based not on experience, but on mere speculation and imagination. Clearly, then, anything I, or anyone else, writes on this topic should be taken with a large grain of salt," (Temkin, 2008 193).[4]

3.1 – Empirics

In spite of what Greene calls Temkin's "disarmingly honest reflections," I suggest that the concerns Williams has about immortality are questions that empirics may help answer (Greene, 2017 5). Admittedly, it is important to note that empirics are still highly limited in answering questions about infinity and perhaps, in many cases, if not all, they may not help whatsoever. Yet, if empirics can provide answers to the desirability of immortality, these are the methods that may be adopted. Moreover, empirics is still a better alternative than engaging in certain fixed a priori speculative assumptions. The following will be arguments against Williams's and Kagan's objections.

3.1.1. Boredom

First, Williams' boredom objection stipulates that all individuals will inevitably succumb to boredom due to a lack of categorical desires. However, Fischer and Mitchell-Yellin note that this universal claim shouldn't apply to all individuals (Fischer and Mitchell-Yellin 2014 356). Certainly, some people would be able to imagine an immortal life where they would be entertained for eternity. Nagel's question to Williams's boredom argument hints at the difference in imagination between himself and Williams. To extrapolate, Williams and proponents of the boredom objection may be accepting that all categorical desires are fixed and see no justifiable reason as to why categorical desires bring repeatable pleasure. To be charitable, this may not be the case for Kagan and other proponents who are speaking for themselves and not for others' imaginations. In the case of Williams, there is a universal claim that people will no longer be happy because of boredom in an immortal life. (Williams, 1973 94-95)

Empirically, we can look to psychology and the observed tendency, called the hedonic treadmill, in response to the boredom objection. The hedonic treadmill, also called hedonic adaptation, "refers to the process by which individuals return to baseline levels of happiness following a change in life circumstances," (Lucas, 2007 75). The changes in life circumstances can be drastic changes in either positive or negative ways. Negatively, changes can involve the death of a spouse, unemployment, paralysis, and divorce. Positively, change can come in the form of a windfall or winning the lottery. A study conducted on 22 lottery winners indicated that there were no significant changes in long-term pleasure after the initial peak of winning the lottery (Brickman Et al. 1978). However, set baselines of happiness vary from individual to individual i.e. some people may have lower baselines than others. Empirical data on hedonic adaptation and baseline happiness are still in development. Yet, psychologists conclude that genetics, situational circumstances, and environment all play an important role in determining baseline happiness (Diener Et. al 2009 103-118). Moreover, long-term negative events, in the case of disability, death, etc. have long-lasting negative changes in baseline happiness. Yet,

[4]This quote was originally referenced by Preston Greene. I decided to use it here because it illustrates the difficulty of talking about immortality without proper justification.

hedonistic adaptation restores the baseline happiness in individuals who are more receptive to positive outcomes (Lucas, 2007 76-77).5

Applying this concept to Williams' boredom objection, assuming the range of the infinite number of activities we endure throughout infinity, the observed effects in hedonic adaptation tell us that there is a baseline for happiness. If Williams is correct that our categorical desires are finite, we still may have a baseline of happiness that keeps us motivated to keep living. There might be periods where we are bored with the activities of an immortal future but hedonistic adaptation might restore our levels of happiness after a certain time. This is not to universalize that everyone will avoid boredom. There are individuals who have lower levels of baseline happiness and may be likely to succumb to the boredom problem. Perhaps this was the case for poor Elina Makropulos. However, this doesn't mean everyone is like Elina Makropulos. This leaves open the possibility, that perhaps, some people are genetically or environmentally better suited for an immortal life than others.

3.1.2. Personality

Concerning the personality problem, empiricism offers two responses to Kagan's concern of our future self not being sufficiently like us. The first is that our personality is changing all the time throughout life, and, typically, for the better (Roberts and Mroczek, 2008 31-35). To illustrate this point, consider my life. I am a 'different' person now, at age 26, then I was at age 21. I'm 'different' in terms of personality, interests, hobbies, goals, etc. At age 21, I was a business major who was interested in entrepreneurship and financial markets. 5 years later, I am interested in philosophy and ethics. My personality and interests have changed but I still feel sufficiently like myself, but perhaps Kagan is talking about a longer period than 5 years. Let's imagine 5 yr-old me (21 yrs. ago): My interests at the time were Sesame Street, especially Big Bird, and my personality was that of a hyper kid who was very social. Although my personality has changed over those 21 yrs., I still love Sesame Street and Big Bird, in a different way, and I still like to socialize. Likewise, I assume my personality and interests will continue to change when I become 40, 60, and 80. Yet, that doesn't cause me to say "who cares?" I have completely different interests from when I was 20 and don't care to see a future version of myself." Empirically, I have cared about myself throughout my life. Why would this change my outlook if my life extended to millions, billions, ad infinitum years? I personally find myself disagreeing with Kagan; I think the future version of myself is sufficiently me. At least in the 26 yrs. of my existence, I don't feel a disconnect with my younger self.

I can imagine proponents of this claim arguing that my view is limited to incremental changes of personality rather than cumulative changes in personality. I may not care from year to year about incremental changes but I would care about an aggregation of incremental changes that would lead to culmulative changes in my personality. I think Kagan points to this claim when referring to his interest in philosophy switching to math and poetry (2.2). However, consider individuals who may welcome large cumulative changes in their life. They may see a future version of themselves and say "Wow! How did I get there?" I enjoyed philosophy, I enjoyed math, but what I truly enjoy is living life itself. Even if they experience cumulative changes in their lives, this isn't necessarily a bad outcome; it's just a part of life's journey. This may or may not be justifiable for Kagan or Williams but the argument is that individuals have different motivations in imagining their own immortality.

[5] It is important to note that because immortality involves infinity, a person's environment could be drastically different than what it is today. It could be the case that a person's happiness baseline is exceptionally low or high. The problem with empirical data is that it's limited in determining where a person's happiness point will be.

Secondly, empirical research conducted at Stanford University concluded that some individuals are committed to their future-self continuity i.e. caring about a prospective version of themselves (Ersner-Hershfield Et al. 2009 280-286).6 Participating undergraduates were evaluated on three different measuring methods. In the first measure entitled: Future Self-Continuity Measure, students were given a questionnaire followed by a self-reported point[6] ranking evaluation. The rankings involved "how similar and how connected they felt to a future self ten years from now. They also rated how much they cared about and liked their future self ten years from now on 7-point Likert scales" (ibid). The second study had the students evaluate themselves in the form of personality traits. Participants would select either a 'me' or 'not me' response to positive, negative, or neutral traits about themselves and a future, 10-year-old, version of themselves. Researchers concluded that individuals who cared more about a future version of themselves had a higher probability of delaying immediate rewards for greater future rewards. In the case of the students who had a higher future-self continuity, they were able to save more money than the students who didn't care as much for their future selves. Likewise, a similar study used VR (virtual-reality software) to show students an older version of themselves and were asked how they felt about their future well-being. Students reported that they were more likely to save for retirement and were concerned about their future selves (Hershfield Et al. 2011 37-38).[7]

In summary, based on the observed research, empirics provide a response to Kagan's personality objection. Some individuals, in the present, have particular desires about prospective versions of themselves. However, a 10-year future projection is minuscule compared to infinity. Yet, current research indicates that on small timelines, individuals have an interest in future-self continuity.

3.2 Candidates for immortality

Considering that some individuals are more prone to future-self continuity than others and that people have different baselines for happiness (3.1.1), perhaps certain individuals are better suited for an immortal life than others. In my response to Kagan and Williams, I am able to speak about my childhood and how I am able to identify with my past-self. Furthermore, empirical research shows that certain individuals desire and care about future-self continuity. Although there is no clear correlation, perhaps individuals who have higher baselines for happiness and have higher future-self continuity are the best candidates to avoid boredom and personality problems. Yet, this observation is too early in its infancy to make definitive claims about immortality. What can be said is that there seems to be no universal claim that immortality would or would not be desirable.

4.0 Our limited understanding

As mentioned earlier, the methodology used by Williams and Kagan is a fixed form of certain a priori assumption about the desirability of immortality. This form of reasoning is problematic because philosophers aren't able to justify any of their fixed claims about an infinite future. Due to several variables, Williams and Kagan are, at best, relying on imagination to determine what wouldn't be desirable. Likewise, empirical studies are severely limited in answering a lot of questions and concerns we have about an immortal life. This poses a problem to philosophers on both sides of the immortality debate, for desirability and against it, because the assumptions that we make about immortality could be completely inaccurate.

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[6] Special thanks to Marmar Tavasol for finding this

[7]Results of the Stanford study indicated that age is a high factor in future-self continuity; this could be due to maturity or other variables.

To illustrate this point, consider the 1989 film, Back to the Future Part II.[8] The premise of the film involves Marty McFly traveling into the future with, friend and scientist, Dr. Brown in the year 2015. Since the timeline is set in the future, there are considerable advances in technology from 1989 to 2015. There are flying cars, hoverboards, holographic advertisements, automatic dog walkers, etc. After having lived in 2015, the movie was inaccurate about a lot of predictions about the future. In some instances, they were right in crude ways, flat-screen televisions, drones, e-payments. However, the futuristic world that was envisioned in 1989 was not an accurate prediction of 2015. Only a minority of people could have imagined a future where everyone had handheld computers in his or her pockets. Nor did any of the movies capture the birth of the internet. Using Back to the Future Part II as an analogy, philosophers have a difficult, if not impossible, task of predicting how an ad infinitum life will be like via fixed a priori speculation.

There are infinite possibilities of events that can happen in an immortal life. Perhaps we learn to travel to new galaxies and discover aliens. What would humanity be like when the sun runs out of energy? What is the role of AI in the future? Do we upload ourselves into a virtual world where we can't distinguish virtual reality from actual reality? If we are to live ad infinitum, what does it mean to be human? Contemplating these questions can derive infinite webs of possibilities. Williams and Kagan could be correct in the way Back to the Future Part II was correct, albeit crudely, in predicting how 2015 would be like. However, the problem with having certain fixed a priori reasoning of immortality is that there is no way of knowing how the future will be like, not in 40 yrs., 1,000 yrs., or 1,000,000 yrs. In this regard, our understanding is very limited by our capacity to imagine how the future will be like.

To use a metaphor, as a child, I imagined myself one day becoming a police officer or a cowboy.[9] I was infatuated with guns and action movies where the hero fought off bad guys and earned the respect of the community. I envisioned myself becoming a hero for my own community and fighting crime for the rest of my life. Unfortunately, police officers and cowboys aren't as glamorous as Hollywood made them out to be. Reflecting back on my adolescent self, I realize that I had an impoverished understanding of how life worked. My knowledge of the world was so limited that imagining a realistic future was out of my depth. In many ways, our understanding of immortality mirrors that of a child. Our understanding of infinity is so impoverished, we are in little, if no position, to make definite claims about the desirability of immortality in the same way a child can predict the outcome of their future.

5.0 Objection: Simulation of all possible outcomes

If having certain fixed a priori assumptions won't help us figure out the future, perhaps we can double down on our empirics effort and create a simulation of all possible scenarios in an immortal life. In the event AI progresses enough, potentially, we can develop supercomputers that can run numerous variables in an immortal life. Alternatively, we could run a sophisticated simulation of the world and predict how we would fare in an immortal existence. We would then be able to conclusively know if we get bored, if hedonic adaptation works, future-self continuity, etc.

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[8] Thanks to Dr. Gasdaglis for this movie reference

[9] Special thanks to Dr. Gasdaglis for helping me with this metaphor

There are two problems with this theory. First, is that we are speculating that this is possible. Second, even if it is possible, a simulation or AI wouldn't be able to accurately convey the experience of being immortal. Considering we don't know what the future will be like, there isn't certainty that an AI or supercomputer will have the capacity to predict the future. Using Fischer and Mitchell-Yellin's library metaphor, if books represented variables in an immortal life, perhaps the computer could predict every book title and genre in the library. However, it would be extremely difficult, if not impossible, for the computer to predict books, or variables, that will develop in the future. Authors will continue to write new books, others will respond to original works, some will create entirely new genres, there will be some in English, some in Spanish, etc. Also, would an AI even be around past 1,000,000 years? or will we have discovered something more intelligent and more sophisticated for our simulation? will humanity even be around for that long? These are difficult questions for us to comprehend and relying on a supercomputer to convey this information might be impossible.

Finally, even if a supercomputer could provide us with a definite answer to the desirability of immortality, understanding the experience of being immortal is unequivocally incomprehensible. To use a metaphor by L.A. Paul, imagine if someone offered you the chance to become a vampire. You would be able to live forever, you could feast on animal blood, and you'd be granted superpowers. Assuming your friends were vampires before you, you ask them about their experience and how they enjoy it. Your friends tell you they "love it" and it's the best thing to ever happen to them (Paul 2014 1). However, there is a huge difference in having your friends tell you how great it is to be a vampire and actually being a vampire. Paul's argument is that when confronted with major life choices we often can't rationally compare our lived experiences with prospective desired experiences. Even if science, friends, and relatives can provide information on how a particular experience will be, we must acknowledge that we can't fully understand the scope of our decision. She concludes that the best way to to make life-changing decisions is to decide based on "whether we want to discover who we'll become," (Paul, 2014 4). So, in the event a computer can tell us all the variables of immortality, we can't understand what immortality would be like without first experiencing it.

7.0 Conclusion

To briefly recap my argument, I examined two prominent objections against the desirability of immortality -the boredom problem and the personality problem. I critiqued both by arguing each problem has certain fixed a priori assumptions. I then used empirical data as a suggestion on how empirics could potentially address the boredom and personality problems. They included hedonic adaptation and future self-continuity. This was followed by own analysis on why having certain fixed a priori speculations are bad and that empirics may or may not have the necessary data to answer the desiriblity of immortality. Ultimately, I concluded that our understanding of immortality is incomprehensible in order for us to make a rational choice.

Lastly, some final thoughts, because our understanding of immortality is incomprehensible through certain fixed a priori assumptions and current empirical data, we must be cautious in our philosophical approach in discussing immortality. At times, I am sympathetic to Temkin's claim (3.0) that all our discussions should be taken with a grain of salt. However, I still think a priori reasoning can serve an important purpose in the discussion immortality, as long as the claims aren't holding fixed certain a priori assumptions about whether or not immortality would or would not be desirable. Allowing such speculation oversimplifies the desirability of immortality. Instead, we must endorse a type of humility in acknowledging that we know close to nothing about an infinite life.

Accordingly, the question if immortality would be desirable or not seems like an unanswerable question at this point. To quote Wittgenstein "Whereof one cannot speak, thereof one must be silent," (Wittgenstein, 1889). Well, not completely silent, just in matters of certain fixed a priori assumptions.

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Esteban Escobar

Dr Jennifer Switkes
*RSCA

This paper was presented at the Annual Student RSCA Conference at Cal Poly Pomona

Modeling the Effect on Tumor Growth Using Combination of Chemotherapy and Immunotherapy

Abstract

Analyzing a mathematical model from the article Mixed Immunotherapy and Chemotherapy of tumors: Modeling, Application and Biological Interpretations by Dr. de Pillis, Gu, and Radunskya, we are able to conduct different treatment plans to see the affects on tumor cells. Using a system of ordinary differential equations and human parameters extracted from a patient who was treated for melanoma we can conduct theoretical treatment plans that can help eradicate tumor cells and consider the quality of life. With treatment plan of chemotherapy, immunotherapy, or combination of both it can be shown that the number of tumor cells can be successfully decreased whereas without treatment it will otherwise grow. We will illustrate how the differences in the timing of the drug deliveries plays an important part in the effect on the number of tumor cells in the body. These results can be useful in gaining a broad understanding of combination therapies and the specific system dynamics.

Introduction

Mathematical Model is a description of the behaviors of the real world in mathematical terms. Mathematical models are often used in the natural science, for example physics, biology, and chemistry. Many mathematicians have created models that simulate traffic flow, two mass springs, and even cell growth.

In an article Mixed Immunotherapy and Chemotherapy of tumors: Modeling, Application and Biological Interpretations by Dr. de Pillis, Gu, and Radunskaya, they were able to create a model that simulates the growth and decay of tumor growth in the form of a system of ordinary equations (ODE'S) using data from patients who were diagnosed with melanoma [l] . Melanoma is a type of skin cancer that arises when pigment producing cells mutate and become cancerous. It is estimated that in 2014, 76,100 new cases of melanoma was diagnosed in the United State.

Dr. De Pillis, Gu, and Radunskaya used theoretical treatment plans to see how it will affect the population of tumor cells. The two types of treatment plans that they used are chemotherapy and immunotherapy. The goal of this paper is to create multiple simulations with a variety of different theoretical treatment plans but keeping in mind the quality of life, which means trying to decrease the "amount" of doses but receiving a "successful" results[4].

Model Assumptions

With any model there are always assumptions that have to be made. It should be noted that there is no universal agreement for the dynamics in the immune response process, thus these assumptions were based on published statements that Dr. De Pillias, Gu and Radunskaya have gathers.

1. Tumor grows logistically in the absence of an immune response.
2. Both N K and C D8+T cells are capable of killing tumor cells.
3. Both N K and C Ds+T cells respond to tumor cells by expanding and increasing cytolytic activity.
4. N K cells are normally present in the body, even when no tumor cells are present, since they are part of the innate immune response.

5. As part of the specific immune response, active tumor-specific CD8+T cells are only present in large numbers when tumors cells are present.
6. NK and CD8+T cells become inactive after some number of encounters with tumor cells.

N K and C D8+T Cells are types of white blood cells that help kill cancer cells. For assumption 1 when a tumor grow logistically it means that there is a carrying capacity, in other words the tumor does not grow exponentially big, there is an amount that it levels off. In assumption 3, it means that Nk and CD8+T are able to kill tumor cells by making them expand and explode[3].

ODE Model: General Form of Equations

The model describes the kinetics of four populations and two drug concentrations in the bloodstream. The populations at time t are denoted by:

1. T(t), tumor cell population
2. N(t), total NK cell population
3. L(t), total CD8+T cell population
4. C(t), number of circulation lymphocytes (or white blood cells)
5. M(t), chemotherapy drug concentration in the bloodsream
6. I(t), immunotherapy drug concentration in the bloodstream

Now that we know about our assumptions and our 6 populations, we will now look how our system of ordinary differential equations will look like.

$$\frac{dT}{dt} = aT(1-bT) - cNT - DT - K_T(1-e^{-M})T$$

$$\frac{dN}{dt} = eC - fN + \frac{gT^2N}{h+T^2} - pNT + K_N(1-e^{-M})N$$

$$\frac{dL}{dt} = -mL + \frac{jD^2T^2L}{k+D^2T^2} - qLT + (r_1N + r_2C)T - uNL^2 - K_L(1-e^{-M})L + \frac{p_ILI}{g_I+I} + v_L(t)$$

$$\frac{dC}{dt} = \alpha - \beta C - K_C(1-e^{-M})C$$

$$\frac{dM}{dt} = -\gamma M + v_M(t)$$

$$\frac{dI}{dt} = \mu_I I + v_I(t)$$

$$\text{where } D = \frac{s(\frac{L}{T})^i}{s+(\frac{L}{T})^i}$$

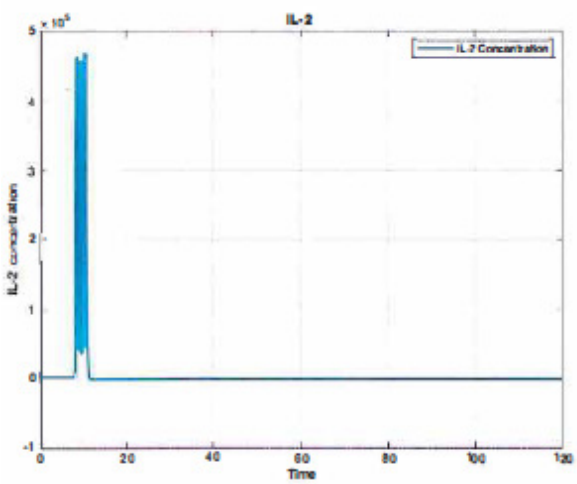
Here vm(t), and v1(t) are chemotherapy treatment plan, and immunotherapy treatment plan respectively, and both are functions of time. vL(t) is the tumor infiltration lymphocyte (TIL) drug intervention term in which the immune cell levels are boosted by the addition of antigen specific cytolytic immune cells, which is also a function of time. Parameters are represented by lower case letters and state variables are represented by upper case letters[2].

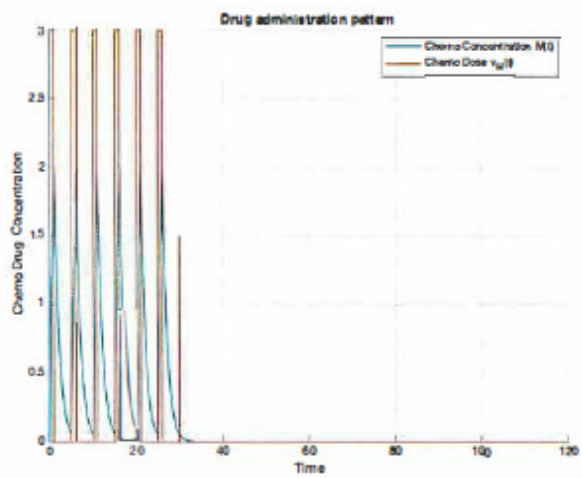
The parameters that are used in the model have meaning, they have units and were extracted using data from real patients who were treated for melanoma[l]. Below is a chart of some of the parameters that are used in the model and what they represent:

Model's Parameters and their meanings		
Parameters	Units	Description
a	day^{-1}	Tumor growth rate
b	$cell^{-1}$	$\frac{1}{b}$ is tumor carrying capacity
f	day^{-1}	Death rate of NK cells
p	$cell^{-1}day^{-1}$	NK cell inactivation rate by tumor cells
m	day^{-1}	Death rate of $CD8^{+}T$ cells
γ	day^{-1}	Rate of Chemotherapy drug decay

Treatment Functions

Our theoretical treatment functions are called square wave functions, an example of how our treatment function looked like can be seen below.





(Left) Immunotherapy square function (G pulses from day 8 to day 11 at concenÂtration v1(t) = 5 x 105 per pulse) and (right) the chemotherapy square function. (6 pulses from day Oto day 30 once every 5 days with concentration vM(t) = 3)

In the figure above to the right is our theoretical chemotherapy treatment function and to the left is our theoretical immunotherapy treatment functions. The height of our square wave represent the dosage that is injected to the patient and the number of square waves represents how often it is injected. So we are able to input these in our ODE and graph our results to see how it will affect the model.

5 Model Output

Let's examine how our model output will look like with different variation of immunotherapy and chemotherapy treatment plans.

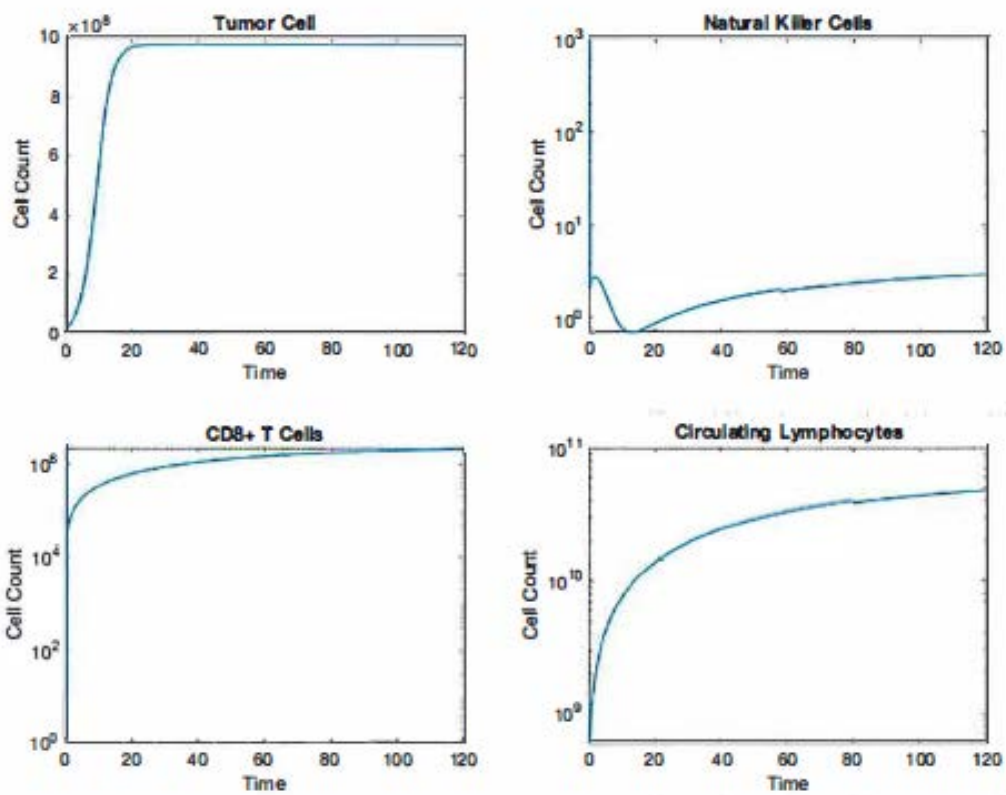
5.1 No Treatment Plans

First we will see how our model will be affected if we input neither chemotherapy nor immuno-thereapy treatment plans. First we will consider some initial condi-tions:
Initial Conditions:

$$T(0) = 2 \times 10^7,\ N(0) = 1 \times 10^3,\ L(0) = 6 \times 10^8,\ C(0) = 6 \times 10^8,\ M(0) = 0$$

$$I(0) = 0.$$

Output



Notice that the tumor population grows at a logistic rate, which was expected because one of our assumptions was that tumor grows logistically in the absence of an immune response. We will mark this as a "unsuccessful" result since the population of tumor cells grows at a dangerous level.

5.2 lmmunotherapy Treatment Plan

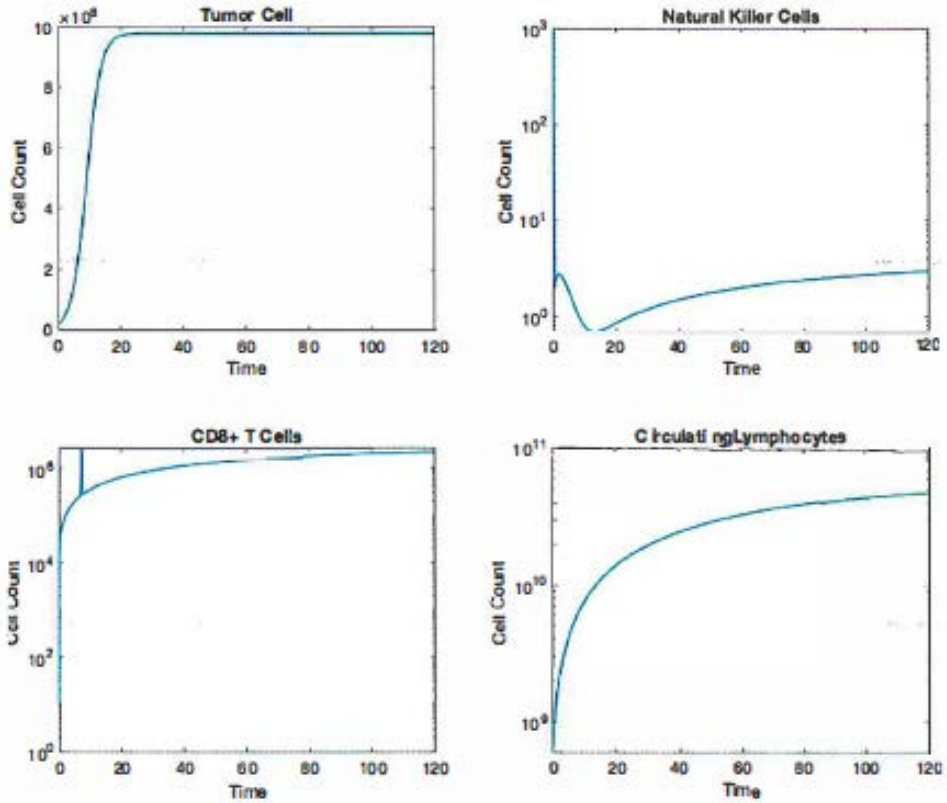
We will now see how our model will be affected if we only input our theoretical immunotherapy treatment plan. We will consider the same initial conditions:

Initial Conditions:

$T(0) = 2 \times 10^7$, $N(0) = 1 \times 10^3$, $L(0) = 6 \times 10^8$, $C(0) = 6 \times 10^8$, $M(0) = 0$

$I(0) = 0.$

Output



Notice that we have similar results where our tumor population grows at a dangerous level and thus will mark this as an "unsuccessful" result.

5.3 Chemotherapy Treatment Plan

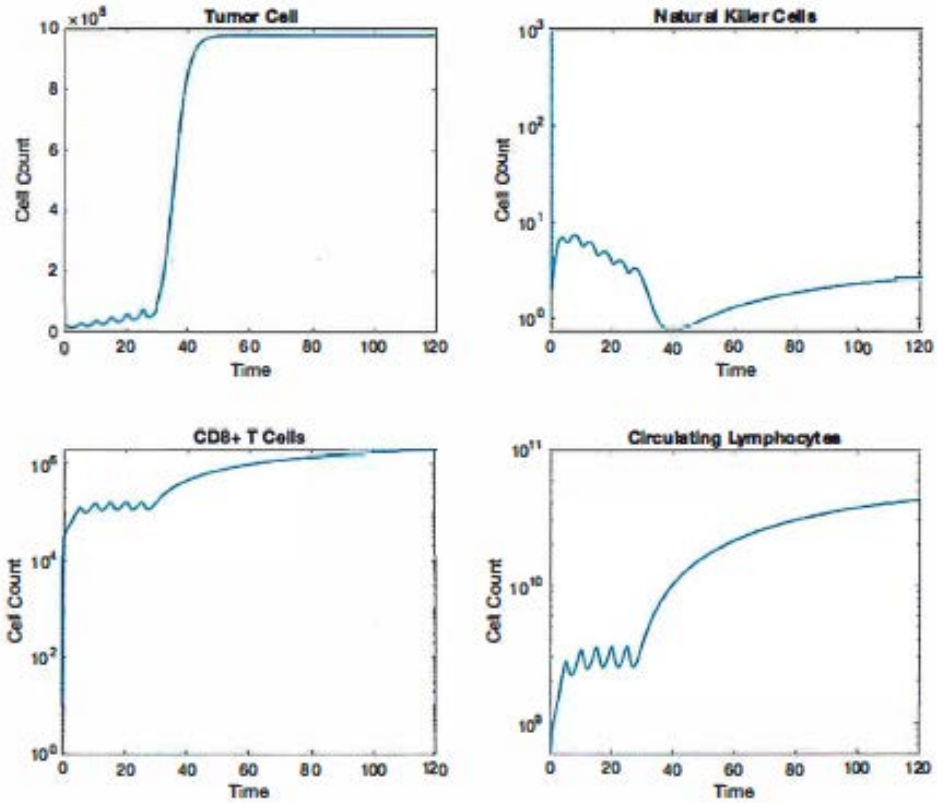
We will now see how our model will be affected if we only input our theoretical chemotherapy treatment plan. We will consider the same initial conditions:

Initial Conditions:

$T(0) = 2 \times 10^7$, $N(0) = 1 \times 10^3$, $L(0) = 6 \times 10^8$, $C(0) = 6 \times 10^8$, $M(0) = 0$

$I(0) = 0.$

Output



Notice that we have some resistance in the amount of tumor population in the start of our simulation, but as time goes forward we see the amount of tumor population grows at a dangerous level. We will also mark this as an unsuccessful result.

5.4 Combination of Immunotherapy and Chemotherapy Plans

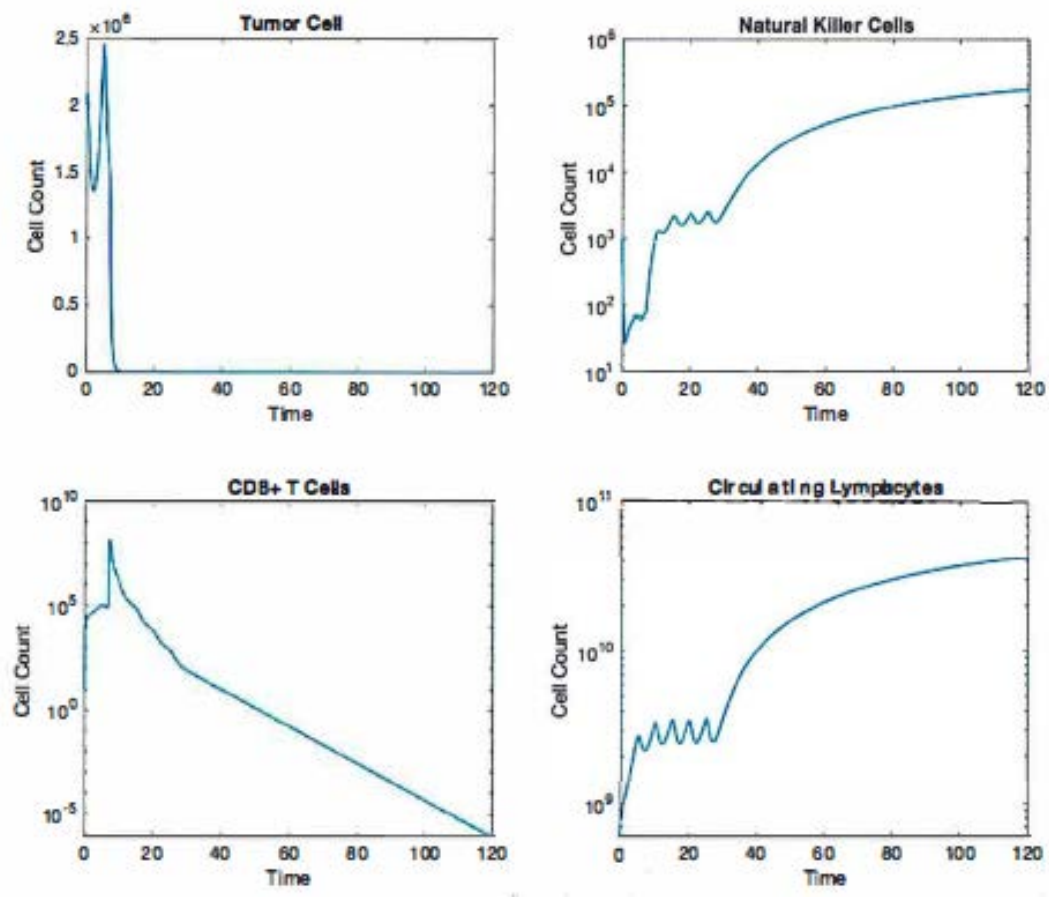
We will now see how our model will be affected if we use the combination of both treatment plans. We will consider the same initial conditions:

Initial Conditions:

$T(0) = 2 \times 10^7$, $N(0) = 1 \times 10^3$, $L(0) = 6 \times 10^8$, $C(0) = 6 \times 10^8$, $M(0) = 0$

$I(0) = 0.$

Output



population decreases as time goes forward, and it should be noted that the height of our chemotherapy square wave is 3, while in the article they used 5 or above.

5.5 Other Results

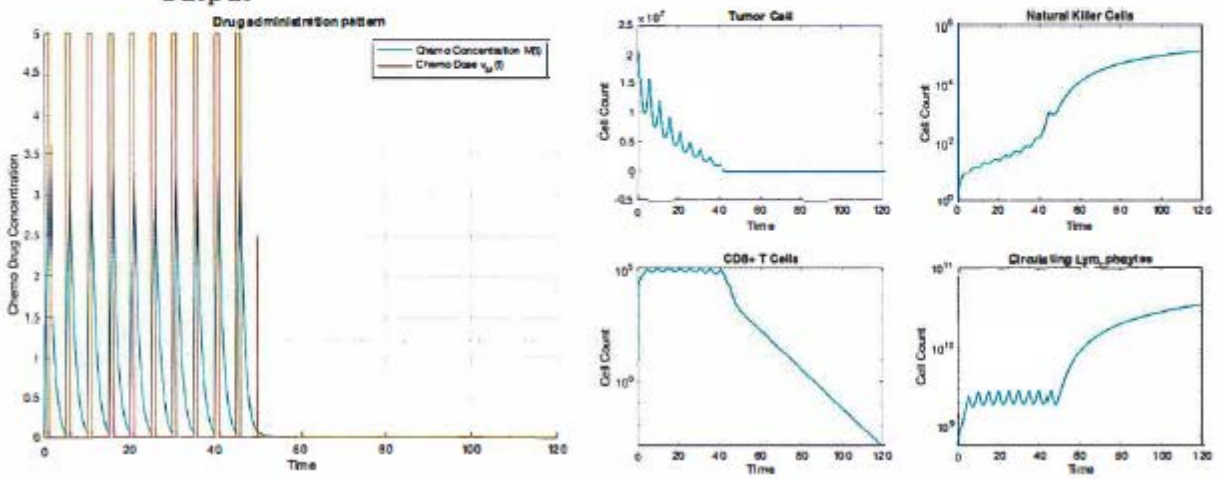
We will also consider other interesting results with different theoretical treatment plans. Consider the same initial conditions

Initial Conditions:

$T(0) = 2 \times 10^7$, $N(0) = 1 \times 10^3$, $L(0) = 6 \times 10^8$, $C(0) = 6 \times 10^8$, $M(0) = 0$

$I(0) = 0.$

Output



(Left) Chemotherapy square function (10 pulses from day Oto day 50 once every 5 days with concentration v111(t) = 5), (right) outputs from our model.

There is a situation where using only theoretical chemotherapy treatment plan shows a "successful" result which can be shown from the figure above. However, notice that the chemotherapy square wave function has a higher dosage and it is more frequent. The model does not put in account that taking this high amount of doses in such a short period of time might hurt the patient rather then help. This shows that the model does not account for what amount of chemotherapy is too dangerous.

6 Conclusion

In conclusion, after multiple simulation there are many situations where using only chemotherapy or immunotherapy treatment plans is not enough to have a "successful" result, however the combination of both treatment plans will has a "successful" result. Also, there are situations where using chemotherapy is enough to have a" successful" result, however there are two conditions that has to be satisfies. Either the amount of dosage is high and more frequent or the initial conditions for tumor cells are very low, to the point it is not considered dangerous.

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[3] Depillis, L. and Radunskaya, A. (2014). Modeling Immune-Mediated Tumor Growth and Treatment, pages 199-235.

[4] Depillis, L., Radunskaya, A., and Wiseman, C. (2005). A validated math- ematical model of cell-mediated immune response to tumor growth. Cancer research, 65:7950-8.

Albert Fattal

Dr. Anne Bresnock

Electric Vehicles in the Global Industry

Abstract

This Paper will examine the historical, scientific, technological, and economics development of the electric vehicle industry. The paper will additionally cover the environmental and natural resource issues presented by electric vehicles throughout the global market.

The electric vehicle industry spans nearly a century, predating the internal combustion motor powered vehicle. While vehicles have changed drastically throughout time, the need to focus on alternative powered vehicles has become an important change due to the ever depleting resource of oil and the projected increase in oil costs to maintain an internal combustion powered vehicle. Among the many motivators of the Electric Vehicle within the global market, there are many clear influences for this topic, spanning from positive economic change due to government reforms through the EPA, more efficient vehicle transportation, and for many -the advantage of a higher performing electric vehicle in comparison to a comparable internal combustion powered vehicle. The electric vehicle has had a social influence in its emerging of the late, with many economically conscious consumers demanding for higher mileage cars that place an importance on the economic sustainability that gas powered vehicles often lack.

There has been an ever growing cultural change behind the need of the electric vehicle that has slowly altered the way in which automotive manufacturers design, market and sell their products. This spans far more than simply on the sales floor, as educated consumers demand vehicles that are built sustainably while decreasing the tremendous environmental impact that vehicles manufacturing often has. This has become apparent by automotive manufacturers using more recyclable materials, and parts that are significantly more biodegradable. This has lead to lighters, stronger and far more efficient vehicles, all of these attributes necessary to usher in the new emergence of the electric. In addition to the raw material used in vehicles, these resource consumption issue began spanning into the manufacturing facilities themselves, adding more windows to facilities, using less electric and implementing LEED certifications throughout the plants.

Conventional gas powered vehicles have long been a primary contributor to increased pollution, particularly in locations with large vehicle populations such as urban cities and the outskirts of most industrial areas that require the commuting of people from their homes to their jobs. In Los Angeles, nearly half a million workers commute from outside counties into the dense urban working industries, according the the US Census, 2013. This leads to very unhealthy levels of smoke that can be physically seen by residents of LA that appears like fog, commonly referred to as "smog". According to an article in the LA Times, It's not uncommon for air quality to reach unhealthy levels, especially in the Inland Empire, where the air violates federal health standards on most summer days.

As vehicle designs continued to improve from the 1920's throughout the early 1970's, efficiency was never a factor taken into consideration for the majority of vehicles produced. There was never an emphasis on using lighter weight materials such as the use of magnesium, plastics or carbon fiber, as the majority of vehicles were made out of inexpensive steel motors, chassis, and bodies. This lead to inferior gas mileage but kept vehicles cheap to produce. Following the 70's as the price of gas began to

soar, material usage became important and was a large contributor to the ease setting up the successful development of electric vehicles decades to come. With the now lighter vehicle designs, the internal combustion motor was not necessary to push so much weight around and smaller, lighter far more efficient electric motors could be placed into vehicles without losing much of the performance aspects of a gas powered vehicle. In present day, electric vehicles have began to surpass the performance of gas powered vehicles, further increasing the desirability of owning an alternative fueled car. This is particularly important as the consumer plays a leading role into the types of vehicles automotive manufacturers design and build.

II. Introduction

Dawning from the first automobiles that were built in the early nineteenth century, electric vehicles (EVs) have had a tumultuous history. The vehicles use electrical motor propulsion to reduce consumption and emissions from gasoline engines. Electric cars promise zero emissions, non-reliance on fossil fuels and the possibility of autonomous driving. Their history has, however, been unpromiing. After scientists successfully generated motion from electricity in 1827, the first motor was built in 1828. Following this invention, various scientists and manufactured embarked on missions to create carriages from the phenomenon. The electric motor dominated the nineteenth century and by the turn of the twentieth century, electric automobiles held the land speed record. The twentieth century saw a rise in the popularity of gasoline engines, sending EVs into obscurity. In recent times, EVs have gained popularity with both manufacturers and consumers, promising improved performance capabilities. This paper discusses the history, market structure, conduct and performance of the global EV industry.

II. History of the Electric Vehicle

The invention of the electric vehicle dates back to the late eighteenth and early nineteenth centuries, with the invention of the electric motor. Since then, manufacturers and inventors have made great strides in making these vehicles as convenient, fast and efficient as possible. Most versions of modern EVs, such as the Toyota Prius and Nissan Leaf, resemble the mainstream vehicles currently in use. Such strides are achieved through various iterations of quality improvement and technological advancements. This section covers the evolution of the EV from its birth to current issues and controversies surrounding the adoption of their use.

Overview

As the main source of power for the vehicles, the battery plays a central role in the development and growth of the EV market. The invention of the battery is credited to Italian chemist Alessandro Volta. Volta assembled Zinc and Copper plates separated by a pasteboard soaked in an electrolyte fluid. Connecting the bottom and top contacts of this contraption resulted in a recorded current. By doing this, Volta had successfully invented the battery. In 1821, Michael Faraday demonstrated the feasibility of the electric motor. In 1831, Faraday built the world's first Dynamo, generating electric current from mechanical motion.1 Within this period, various scientists undertook experiments to investigate the relationship between motion and electricity. Faraday's theories form the basis of the electrical technology that powers modern EVs.

[1] Wakefield, E. (1994) *History of the electric automobile*. Warrendale, PA: Soc. of Automotive Engineers.

The first demonstration of electricity being put to create motive work was with a blacksmith from New England, US, who in 1828 created a small drifter that utilized the electric motor. A Scottish chemist invented the electric locomotive, which clocked in at four miles an hour. While a practical invention, this locomotive wasn't adopted since the rocket steam locomotive, invented over a decade earlier, achieved speeds of up to 30 miles per hour. i While later electric locomotives achieved better speeds and hauled loads as heavy as 6 tons, they still could not replace the steam engine because the batteries often ran out of power within the first three miles. Besides locomotives, inventors also put efforts into developing horseless carriages. One such inventor was Robert Anderson, who built the first battery powered carriage.

While the horseless carriage was a breakthrough in EV propulsion technology, Robert Anderson's invention could not see fruition. The inventor had to use non-rechargeable fuel cells as the lead-acid battery was invented nearly two decades later in 1859.2 With inventors hell-bent on making the horse-and-carriage obsolete, in 1834 two inventors created the steam engine. Sibrandus Stratingh, a Dutch professor and German instrument maker Christopher Becker were happy with the results. The ride was smokey and uncomfortable, and these two were convinced that there would be a cleaner and more efficient alternative. After reading the works of Moritz von Jacobi and his design of the Electromagnetic motor, Professor Stratingh delivered a lecture explaining the use of electromagnetic motive force in designing a carriage. The carriage he created became the basis of modern electric vehicles, and is viewed as one of the most iconic inventions in the Electric Vehicle industry.

The late nineteenth century saw various developments in automobile technology, including the invention of the first EV powered by a rechargeable battery. This was the first outboard motor, with an engine developed for boats and other marine applications. The same year, he demonstrated the first electric three-wheeled automobile that used self-charging batteries. Such advances prompted businessman Paul Bedford and engineer Thomas Parker to create a battery manufacturing company.2 The company quickly grew to produce batteries, motors, dynamos and controllers, further spurring inventions within the industry. The crude design of early EVs negated their most apparent advantages: refined and smooth rides.

The crude design, however, never stopped enthusiasts from making improvements to the electric car. One notable enthusiast was French innovator and designer Charles Jeantaud, who fashioned his first electric carriage in 1894. Jeantaud's vehicles took part in various races. Often clinching the top spots. Facing competition from the growing internal combustion engine, Jeantaud teamed up with race enthusiast Count Gaston Chasseloup-Laubat to try and set the world speed record. The pair was successful and, in 1898, they achieved the world speed record of 39.34mph (63.13km/h) compared to the then leading internal combustion engine's 33.34mph. In later races, the team posted a record-shattering 43.69mph (70.31km/h).1 This may have marked the beginning of EV dark ages, as popularity of EVs started to decline in the early twentieth century. This is because infrastructural developments necessitated vehicles with a larger range than that offered by EVs. Investors also shied away from EVs because gasoline offered more potential profits.

Since the 1960s, concerns over the environment, noise pollution and depletion of non-renewable energy sources has spiked interest in the EV market. The rising popularity has led to the creation of companies geared toward creating zero emission vehicles that run on little gasoline.

[2] Tillemann, L. (2016) *The great race*. New York: Simon & Schuster.

These companies have invested heavily in R&D to ensure modern EVs don't suffer the same fate their earlier counterparts. Global efforts towards environmental protection and safe driving have helped funnel funds toward projects that enable the successful adoption of EVs.

Early Leaders

Since the beginning of the second EV boom in the 1960s, various companies, engineers and enthusiasts have spearheaded development and growth in the EV market. Before their fall in the early twentieth century, the EV industry was dominated by vehicle makers such as Detroit Electric, Fritchle Electric Car Company, the Baker Electric Company, Babcock Electric, Milburn Electric and the Rauch and Lang Electric Company. Henry Ford and Thomas Edison did extensive research into the mass production of EVs.3 However, due to time, logistics and other constraints, their plan never saw the light of day. The twentieth century saw the invention of electric ignition, reduction in gasoline prices and an improvement in the range of the gasoline engine, reducing the popularity of the electric vehicle.

The resurgence of interest in the Electric Vehicle industry in the 1960s inspired a newer generation of carmakers to experiment with low-emission designs. The modern EV market is dominated by giants such as General Motors, Tesla, Toyota, and BMW.4 General Motors leads the pack in total sales. GM supplies Chevrolet's Volt and Nissan's Leaf, which are the top selling plug-in EVs and Battery Powered EVs respectively. By achieving extensive sales with the Prius, Toyota has earned a top-spot in hybrid vehicle technology. The Japanese Auto giant, however, lags behind in the manufacture of plug-in and battery powered EVs. APPENDIX 1 shows the eco-advantage playing field for the EV in the global industry.

Tesla motors is undoubtedly one of the greatest manufacturers of EVs. The company exclusively creates EVs, with the model 3 being the first budget EV from the carmaker. More than 3% of BMW's sales in the US and 7% of their global sales come from EVs. BMW is committed to electrification, as seen from the fact that they offer four EV models, including plug-in versions of popular models.

Key Inventions/Innovations

It takes several breakthroughs and innovations for a product to reach a wider market. These breakthroughs normally improve the technology behind the manufacture and functioning of the product.

The EV manufacturing industry has witnessed several key innovations which, if improved upon, could allow EVs to dominate sales and manufacture within the automobile industry. This section explores a few inventions that have given EVs their current status.

Various advances in battery technology have helped achieve the propulsion and energy required to move the vehicle. Five emergent battery technologies come to mind. Lithium-Ion Batteries (LIBs), are the most commonly used in modern EVs.4 These batteries have the highest cyclability, meaning they can be recharged plenty of times without losing their efficiency. LIBs, however, exhibit little energy density. Having been around for quite a while, LIBs have undergone various stages of evolution to improve their lifetime and increase efficiency. Solid-state batteries utilize solid components, offering such advantages as reduced leaks & fires, extended lifetimes, reduced bulk & weight, and a wide temperature operation range.

[3] Revenge of the Electric Car (2016) [DVD]. Hollywood.

[4] Durant, B. (2014) *Electric cars*, 2nd ed. CreateSpace Independent Publishing Platform.

Aluminum-ion batteries are a more efficient, less-costly potential alternative to LIBs. While still under research and development, Aluminum-Ion batteries also offer increased flexibility and decreased charging time. Lithium-Sulfur batteries could potentially offer higher energy densities and further cost savings over LIBs and Aluminum-ion batteries. Unfortunately, these batteries suffer low cyclability because of expansion and reactions within the dielectric. Metal-air batteries use a metal anode and an ambient air cathode.4 This construction reduces battery weight and improves flexibility. Those currently under study, however, have issues with cyclability and lifetime, presenting opportunities for further research. The potential impact of improvements in battery technologies in EVs is huge.

Technological Development

Various advances in the fields of electronics and automotive technology have fostered the growth of the EV sector. Recent innovations within the computing industry have enabled the manufacture of low-cost, precise computers that manage power use, and handle high voltage and current without the losses incurred by high-power electromechanical devices. Researchers have also developed materials that make batteries cheaper, stronger and more durable. The reduction in size of batteries and other vehicle components also reduces strain on the vehicle chassis, improving durability.4 Development of alternative energy forms, such as solar power, have promised to further improve the practical application of EVs by improving travelling range.

Externalities/Resource Issues

While the return to dominance of EVs promises reduced environmental degradation and low fossil fuel consumption, future advances are hampered by issues of resource scarcity and other externalities. Rapid growth in EV sales would necessitate the expansion of the current electricity grid to serve the charging needs. This expansion could increase greenhouse gas emissions if this electricity does not come from renewable sources. Experts estimate that the production of one EV could release as much emission as a regular vehicle does in a half a decade of use. Annual Lithium production rates are also too small to cater for the rising demand for EV batteries.5 The growth of the EV market also puts a strain on other resources such as Cobalt and Iron. It is, thus, difficult to manage resource reserves in a way that maintains sufficient supply while avoiding industry malpractices that result in price shocks, hoarding and industry boycotts.

Controversies

Electric cars have the potential to run on clean energy. Most nations have welcomed the move to green cars, as they promise to cut greenhouse emissions and fuel costs significantly. Some EV manufacturers, however, engage in ethically 'unclean' practices in the course of creating these solutions. Cobalt, one of the main components of EV batteries, is usually obtained from underground mineral ores.6 Children and young adults working in these mines are exposed to highly dangerous conditions that could cause complications such as lung disease.

Besides violating human rights, EVs could also potentially affect our health. EVs rely heavily on electrical connections for most of their components to work. These circuits often emit Extremely Low Frequency Electromagnetic Frequencies (ELF EMF). Scientists have warned that this radiation is harmful and carcinogenic in humans. Electromagnetic interference could also interrupt the normal functioning of Cardiac

[5] Times, L. (2018) Latimes.com: *Los Angeles Times 'Very unhealthy' smog levels expected during heat wave, SoCal regulators warn*. Available from: http://www.latimes.com/local/lanow/la-me-ln-air-quality-heat-20170615-story.html [Accessed 26 May 2018].

[6] Fialka, J. (2015) *Car Wars: The Rise, the fall, and the Resurgence of the Electric Car*, 1st ed.E-Triton LLC

Implantable Electronic Device (CIEDs).7 These devices are crucial to the functioning of the heart, and interruptions could be fatal. EVs, being a source of this interference, could be restricted in patients who depend on these devices.

The production of EV motors, batteries and body parts requires the use of processes that require a lot of energy. The manufacture of batteries also releases toxic waste into the atmosphere. Studies have also concluded that the global warming potential of EV manufacturing is twice that of conventional gasoline cars.6 Generally, CO2 emissions from EV come from the manufacture of battery cells (50%), mining & refining (30%), and usage (approximately 20%)

III. Market Structure Characteristics
A. Data

The global EV manufacturing industry is a differentiated Oligopoly. The number of companies that deals with EVs is simply too little for the industry to be a monopolistic competition, yet too big for the sector to be a monopoly. Global financial experts agree on the role of the emerging markets in the industry's growth. Current global use of EVs stands at approximately 11 million miles. EVs currently make up for 1% of global car sales, industry experts expect them to make 30% of new car sales by 2040.4 The joint agreement on climate change has also promised that by 2025, there should be over 35 million EVs on the road. APPENDIX 2 shows the global trends in EV stock between 2010 and 2016.

Electric vehicle, ride-sharing applications and improved fuel efficiency are trends that will influence a global movement towards emission control. As a result, the 2020s will see a steady decline in the demand for gasoline products. Currently, there are approximately 2.8 million EVs on the road, compared to 1.5 billion gasoline fueled units. In the coming decade, the commitment to reduce carbon emission especially in European and Asian countries helps spur the growth of the EV market.8 In 2017, hybrids and other EVs combined displaced about 50,000 barrels of the 100 million we use daily. While the number seems discouraging, it is a step in the right direction for the EV market.

As a differentiated Oligopoly, the EV market competes with the internal combustion engine. EV manufacturers and engineers should work to realize the full benefits of adopting Electric Vehicles to stimulate interest in the EV market. The transport industry accounts for nearly 40% of the world's oil consumption.9 The next decade presents a potential stage for the effects of growth in the EVs since their predicted impact is expected to show up. Most experts predict that the global demand for oil will plateau in the mid-2030s owing to growth in the EV sector among other technologies. APPENDIX 3 shows the strategy framework for the EV in the global industry.

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[7] Kirsch, D. (2000) The electric vehicle and the burden of history. New Brunswick, N.J.: Rutgers University Press.
[8] Anon. (2013) Ibisworld.com: What's in Store for Electric Vehicle Manufacturing? – Industry Insider. Available from: https://www.ibisworld.com/media/2013/06/13/whatsin-store-for-electric-vehicle-manufacturing/ [Accessed 21 May 2018].
[9] (Who Killed the Electric Car, 2006)

The EV market has evolved over time. In 2016, registration for new EVs achieved a new record, with over 750,000 newly registered units. This number represented a 40% increase from the previous years' sales, the first time annual EV sales growth fell below 50%. Despite the declining growth, the EV market is set to achieve all sales targets by 2025. The two main markets for EVs are the United States and China.10 China is the leading market, posting twice as many new units in 2016 as the U.S.A. Another major market for EVs is the European market, which in 2016 accounted for nearly a third of the global sales. Knowledge of trends in the EV market is crucial to the manufacture of vehicles that fit the intended buyers' needs. The next section of this chapter is a market comparison of operations, strategies and performance in the global EV market.

B. Market Comparison

This section highlights the characteristics of supply and demand within the global EV market. In 2016, China cemented its position as the leading supplier of EV vehicles, with Chinese OEMs producing over 43% of the global production. This was the first time the Asian nation surpassed the United States of America in adopting the green transportation method. APPENDIX 4 shows EV sales comparison by country.

China achieved industry leadership by streamlining all aspects of EV supply. The nation has made gains in the production of EVs, their parts and accessories. The Chinese government helped spur this adoption by providing incentives and subsidies aimed at reducing fuel imports, promoting local innovations and improve the quality of outdoor air. Leading Chinese OEMs all appeared on the top 10 list of EV adopters in 2016.11 Chinese Lithium-ion battery producers also raised their share of the global supply to about 25%. China made these advancements at the expense of Japanese car makers, who witnessed a decline in market dominance in 2016. European countries and the U.S.A retained their market share in 2016, only experiencing minor losses due to China's newfound dominance.

Besides supplying the most EVs, China provided a large, ready market for these vehicles. In 2016, the number of EVs on China's roads surpassed that of the United States of America. The total number of EV sales within the country reached 650,000 units. China also saw a 70% increase in new registrations, registering 350,000 new units.3 During the same year, European countries posted a 7% increase. This stagnation can be attributed to changes in subsidies given to companies and individuals who adopt plug-in hybrids and other EVs.

While China leads EV adoption in absolute terms, in relative terms the nation only posts an average performance. In general, EV penetration in the light automobile market stood at only 1.4%. Norway is the world leader in relative adoption, with a 25% EV adoption rate. The Norwegian government provides generous incentives to potential EV customers, making the vehicles more affordable than internal combustion engines.8 Even with a decline in sales in 2016, the Netherlands retained a high penetration of EVs, with about 5% of their running vehicles being electric. An analysis of the big players in the EV industry has shown that e-mobility varies greatly with geographical distribution.

[10] Shnayerson, M. (1996) *The car that could*. Random House.
[11] Burton, N. (2013) *A history of electric cars*, 1st ed. Crowood.

C. Barriers to Entry

Investing in the automobile industry requires high capital costs. Small-scale investors therefore find it hard to bring their ideas to the EV market. In the EV market, most incumbent firms exercise absolute control and supply of raw materials. Newer firms wishing to manufacture EVs often find it difficult to obtain raw materials over which they have no control. Larger firms also have economies of scale-advantages accruing from their large size.2 It is, therefore, difficult for smaller companies to enter the industry and produce enough output to sustain further production. Incumbent firms also have the additional advantage of having established clientele who, so long as they are satisfied by the quality of products, are unwilling to switch to any other firm. Newer firms also struggle to obtain the patents necessary to carry out research and development of new products they offer.

IV. Conduct

A. Price Determination

The EV market uses an oligopolistic price determination scheme. Every seller has the ability to influence the rivals' price-output capability. The EV market shows a stability in market prices since no firms in an oligopoly are willing to experiment with price changes. The market exhibits an indeterminate demand curve because any step taken by one of the firms could result in significant shifts in demand. As in any oligopoly, the demand curve is more elastic than in a monopoly, and not as perfectly elastic as in a perfect competition.10 Firms watch the pricing behavior of rival firms. They follow rises in price, but not declines. The pricing behavior within the EV industry is described as 'sticky downward prices'. The EV market also has unofficial price leaders, mostly early adopters and large automobile makers.

B. Pricing Strategies

The EV industry employs price discrimination, particularly geographically-based d iscrimination. Price discrimination allows EV manufacturers to make offers that look attractive to the different types of potential clients. Price discrimination also allows these manufacturers to achieve the right balance of sales and profit margins, retaining popularity and promoting sustainability.6 Some nations also offer incentives to both prospective buyers and suppliers of EVs. Areas that receive eco-friendly incentives and state refunds often get favorable prices due to the EV friendly environment. Most EV car makers offer their clients the hurdle method of differential pricing. In this scheme, the buyers could choose a basic version of the vehicle at base price, or upgraded options at an extra price.

C. Non-Price Competition

Since all EVs offer the same benefits and are an alternative to current propulsion methods, firms in the market employ non-price strategies to distinguish their products from the competition. Major car makers have electric versions of their models, necessitating the use of such tactics as discounts, placement, promotions and advertisement to pull the EV market toward their brand. Packaging plays a huge role in sales, and recent EV makers have dedicated efforts to creating vehicles that are both functional and aesthetically appealing.6 The EV industry has seen a shift from the golf-cart like pods during the start of the second EV evolution, to high-end, visually striking models such as the Tesla Model X. The firms engage in practices that boost their brand reputation, including environmental protection campaigns, Corporate Social Responsibility (CSR) events and celebrity endorsements.

D. Marketing

The EV industry covers a global market, with a market value of approximately $103,342,000,000 as of 2016. With a projected annual growth of 16%, the industry will achieve a market value of $350,963,000,000 by 2023. Norway is a global leader in the adoption of EVs by density. As of 2016, electric cars accounted for over 5% of the vehicles on Norwegian. In absolute numbers, China leads in adoption, with over 650,000 units in active use by the end of 2016. Governments and environmental lobby groups help push EV sales by promoting their potential to reduce the environmental damage currently caused by internal combustion engines.5 There are currently 165 models of EVs in circulation, with global sales of over 1.5 million. China accounts for 48% of the global market, with Europe coming second at 26%.

E. Eco-Advantage

Sustainability and environment-friendliness are viewed as ethical and responsible virtues in modern business. The EV industry promises to undo the environmental impact of gasoline engines in the past century. Eco-advantage represents the benefits and competitive edge a business gains by choosing environmentally friendly methods. To fully reap these benefits, EV manufactures have taken various steps. EVs are built to use such technologies as fuel-cells, batteries and the electric motor engine to reduce petroleum consumption.3 These vehicles offer better fuel economy that conventional engines.12 For a long time, these cars could only cover limited ranges before needing charge. Players in the EV market have helped improve range using better battery and cell technologies, ensuring the market enjoys the benefits of EVs. Firms that work on such technologies enjoy subsidies, incentives and tax waivers from states and environmental lobbyists.

V. Performance

A. Profits

Significant technological change advance and disruptive change have boosted all forms of electric transport: water, air and land. Growth in the EV industry has created highly profitable niche markets in supporting sectors. Improvements in Electric Vehicle Supporting Infrastructure (EVSI) have led to an increase in EV stock over the past two decades. Further, government incentives and subsidies have helped spur profitability within the industry. According to market analysts and experts, revenues in the EV sector will rise by approximately 10% CAGR, with a revenue value of over $36 billion in 2025.7 EVs are projected to take over the car market in the mid-21st century as most states enforce laws promoting environmentally vehicles. This move is a result of global efforts to reduce congestion, improve air quality and to provide safe, affordable and reliable energy to the population. APPENDIX 5 shows the growth in revenue in the EV market between 2012 and 2017.

B. Efficiencies

Developments in the manufacture of EVs and supporting activities have helped develop techniques to help improve mobility using electrical propulsion. The EVs themselves have posted increased fuel efficiency by reducing dependence on gasoline. Reduction in gasoline use has also helped reduce CO2 emissions, reportedly by 60%. This reduction promises an improvement in air quality and energy balance within settlements. Advances in battery technologies have led to a decline in the costs and size of batteries. Lower battery costs imply lower EV costs, making it easier to buy and own an EV. Smaller batteries with improved capacities allow vehicles to cover large ranges without needing to recharge.

[12] Bureau, U. (2018) The United States Census Bureau: *471,000 Workers Commute into Los Angeles County*, Calif., Each Day. Available from: https://www.census.gov/newsroom/press-releases/20 13/cb13-r13.html [Accessed 26 May 2018].

7 The smaller size also allows for design flexibility, thus making the vehicles more desirable. Further developments in EV technology will help uncover more efficiencies, further improving the appeal of the vehicles. APPENDIX 6 shows the eco-advantage toolkit for the EV in the global industry.

C. Changes in Market Share

EVs have experienced a slow and steady growth in popularity since their revival in the 1960s. The last decade has, however, seen unprecedented leaps in the design, development, production and purchase of these cars. Environmental concerns as well as rising oil prices have led to an increased public support for the shift to green mobility. In 2016, electric cars posted a stock growth rate of 15%. In the same year, the number of charging stations increased by 20%. The United States of America had been the biggest market for EVs, but was recently overtaken by China, who now form 48% of the global EV market.7 Spurred by environmental concerns, most nations are adopting strategies to support the adoption of EVs. These programs aim to increase the global market share of EVs to nearly 50% by 2040. With EVs projected to be the leading cars of the future, an investment in electric mobility is a sure payoff.

D. Product Diversity and Innovation

Having been around for nearly two centuries, EVs have benefited from various inventions and innovations. Moreover, firms utilize advances in electronics, product design and automotive mechanics to distinguish their products from those of rivals. Discoveries in battery technology, fuel cell experimentation and material science have led to the development of EV components that improve aesthetics, fuel economy and handling.10 Large vehicle makers also utilize advances in robotics, computer science and precision manufacturing to improve the quality, timeliness and efficiency of the EV manufacture process. States and governments also spur innovation within the EV manufacturing industry, further contributing to product diversity, creativity and innovation within the sector.

E. Raw Material Sources

The main difference between Internal Combustion Engine (ICE) vehicles and EVs is the source of motive energy. ICE vehicles derive motion from burning gasoline. EVs, on the other hand, develop movement from electrical energy. These sources both have their advantages and disadvantages, which this section discusses.

Oil is ubiquitous. Due to a century of use, sources of oil have been scaled up to meet the demand by ICE vehicles. ICE engines also operate over a wide geographical range, making them desirable for modern road infrastructure.6 EVs use a system of batteries and motors to produce motion. Electrical circuits release little, if any, emissions into the atmosphere. These systems are also immune to accidental fires common in gasoline crashes.

Batteries are made mainly from Cobalt and Lithium, which are found beneath the earth's crust. Mining these elements presents and environmental challenge: the process leaves open quarries and releases harmful waste into the environment. Oil mining also affects the atmosphere and geology around the mines, causing significant environmental impacts. These materials also come from non-renewable sources. Therefore, the availability of material is a cause of concern for both ICE and EV engines.

F. Eco-Advantages

EVs offer advantages in costs and environmental impact. First, EVs have brought a significant reduction in total cost of ownership (TCO). A study by market experts showed that, over a twenty year period, the TCO of an ICE is 40% higher than that of an EV. While the cost of purchasing an EV is higher than that of ICEs, the lifetime ownership includes gasoline costs and other fuel expenses. Maintenance costs of EVs are nearly half as much as those of ICE cars, thereby reducing ownership costs in the long run.10 Growth in the EV market is spurred by shifts toward cleaner, more energy efficient cities. Firms that deal with EVs also enjoy massive subsidies, incentives and tax cuts, further reducing operation costs. Thus, investing in EV manufacture guarantees more profits and improved air quality.

G. Externalities/Resource Issues

A major issue surrounding the adoption of EVs is their energy source-electricity. Adoption of EVs would mean that the transport sector will consume nearly a quarter of the electricity on the grid. This consumption is a cause of concern since it would necessitate the creation of other, potentially unclean sources of energy.4 Players in the EV sector have tried to solve this problem by investing in alternative sources such as solar power. Besides diversifying sources of electricity, a lot of research has been put into the development of large capacity, single charge batteries that reduce the charging load on the national grids. APPENDIX 7 shows the AUDIO table analysis for the EV in the global industry.

VI. Public Policy

A major issue surrounding the adoption of EVs is their energy source-electricity. Adoption of EVs would mean that the transport sector will consume nearly a quarter of the electricity on the grid. This consumption is a cause of concern since it would necessitate the creation of other, potentially unclean sources of energy.4 Players in the EV sector have tried to solve this problem by investing in alternative sources such as solar power. Besides diversifying sources of electricity, a lot of research has been put into the development of large capacity, single charge batteries that reduce the charging load on the national grids. APPENDIX 7 shows the AUDIO table analysis for the EV in the global industry.

A. Laws

The United States Federal Government has enacted several laws to promote EVs. The federal government provides opportunities through tax credits, investment in research & design and programs that encourage the adoption of EV technology. The American Recovery and Reinvestment Act (2009) sets out tax credits for purchase of vehicles and kits that convert conventional vehicles into EVs. Corporate Average Fuel Economy (CAFÉ) standards help reduce barriers of entry into the EV market.8 CAFÉ standards establish an increase in fuel economy. State laws also influence the adoption of EVs locally. Over 47 of the United States have laws and regulations that promote the usage of EVs. These states typically offer rebates and tax benefits for EV buyers. Additionally, some states enforce clean air standards that require vehicle manufacturers to reduce greenhouse emissions.

B. Antitrust Actions

The EV market creates an environment in which anti-trust breaches are committed. Introduction of new participants into the EV market further complicates the demand and supply situation. For batteries, the most common issue is the replacement/spare used to service vehicles.2 Competitors are highly unlikely to challenge the current leaders in battery manufacturing due to the significant value of the battery in EV manufacture. Another antitrust issue that arises is tying or bundling. EV manufacturers make their products such that buyers will be forced to buy certain brands of car accessories. The antitrust authority also lists monopolization claims, vertical integration, mergers & acquisitions and market definition as some antitrust issues that could arise in the EV industry.

C. Controls

Various national and state governments have incentive to promote electric vehicles to citizens. These incentives typically come in the form of tax exemptions, credits, and additional benefits such as waivers on parking fees. In 2015, the United States pledged federal grants of up to $2.4 Billion to support the manufacture of next generation batteries and EVs.4 The Environmental Improvement and Extension Act of 2008 identifies qualified plug-in motor vehicles and grants them tax credits. Some states give EV owner the right to use High Occupancy Vehicle (HOV) lanes, further boosting the attractiveness of these vehicles.

D. Protections

EVs offer various advantages that make them an attractive alternative to conventional vehicles. The government plays a huge role in stimulating local demand for EVs and battery products.10 The government should also enforce rules and regulations that ensure investors in EVs work within the most promising environments. The government can achieve this enforcement by creating protection programs. These programs reduce operational costs, mitigate risks and ensure that their products have a ready market. These moves improve investor confidence in the EV sector.

VII. Conclusion

EVs offer advantages in cost benefits and environmental impact. The electrical vehicle has evolved tremendously from the horseless carriage in the early 19th century to the modern designs. Improvements in battery technologies, material science and electronics have led to the development of vehicles that achieve the highest benefits of using electric propulsion while eliminating drawbacks such as range. The government plays a huge role in the adoption and use of EVs. Government incentives and subsidies reduce production costs, while protection programs reduce barriers to entry. The increased focus on environmental protection will continue to spur growth in the EV market, improving market penetration and domination.

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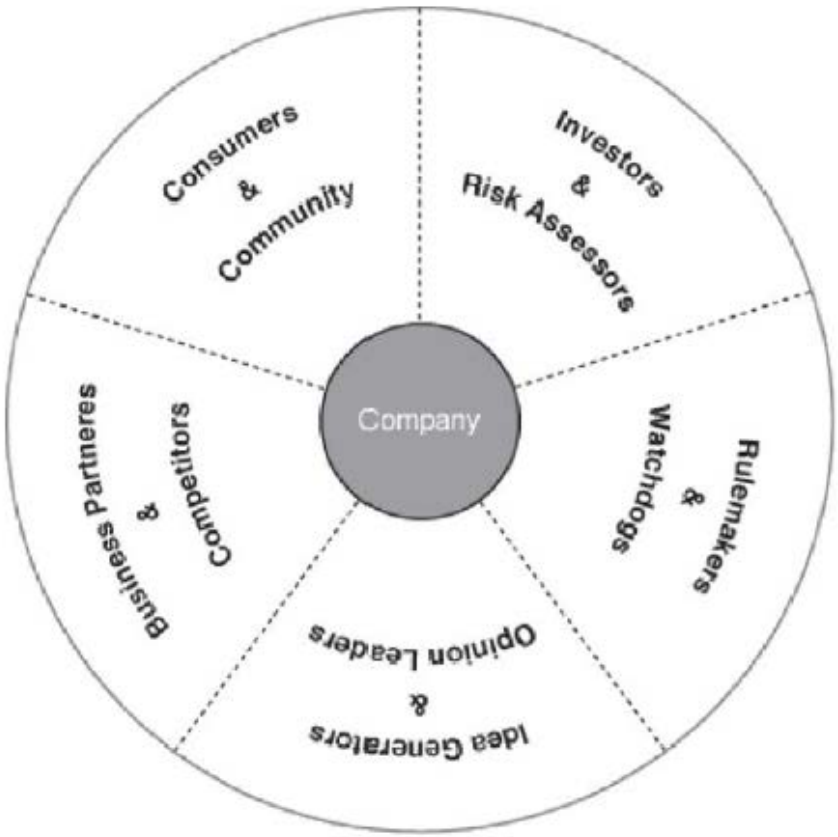
APPENDIX 1



Stakeholder Group	Key Participants
Rulemakers and Watchdogs	*DOT, Alternative Fuels Data Center, EPA, US Department of Energy*
Idea Generators and Opinion Leaders	*Elon Musk, Tesla, Henrik Fisker, Steve Saleen, Dieter Zetsche*
Business Partners and Competitors	*Tesla, Faraday, Nikola, GM, Daimler, Chrysler, Ford, Fiat, Think, Fisker, Tango, GEM, Coda Automotive*
Consumers and Community	*Private residence, military, government, fleet business acquisitions*
Investors and Risk Assessors	*Private Technology firms (Google, Apple, Waze, Mullen Technologies), Major Automotive Manufacturers (Daimler, GM, Nissan, Faraday, Tesla), battery producers (Samsung, Tesla, Johnson Controls)*

Figure 1: *Eco-Advantage Playing Field for the EV in the Global Industry.*

APPENDIX 2

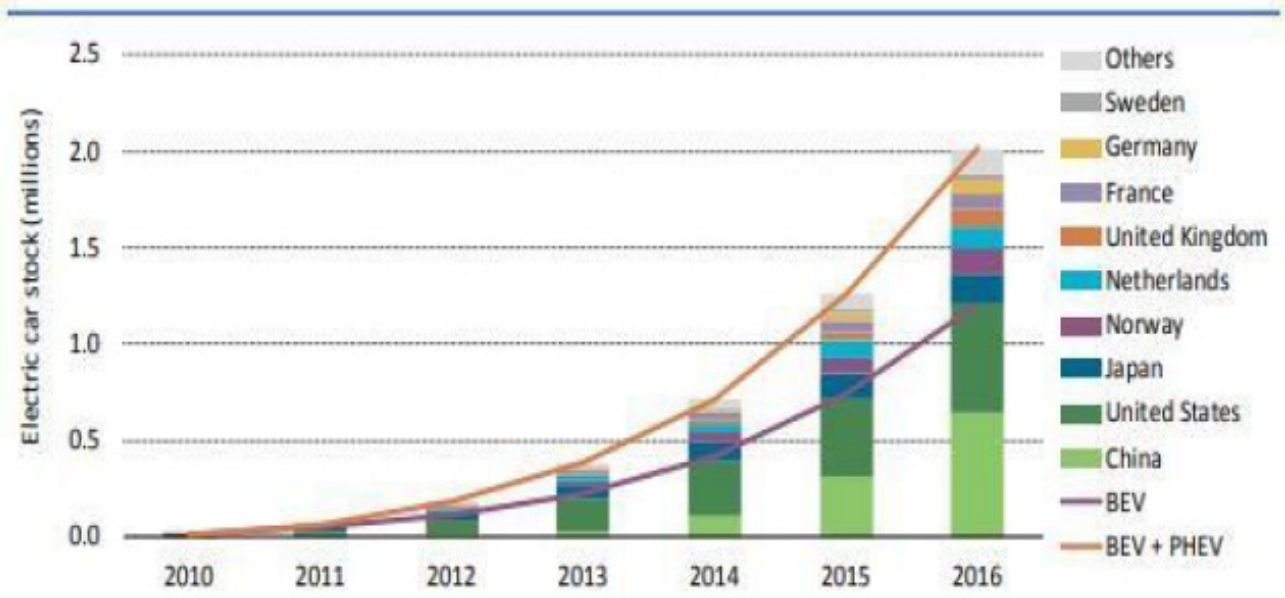
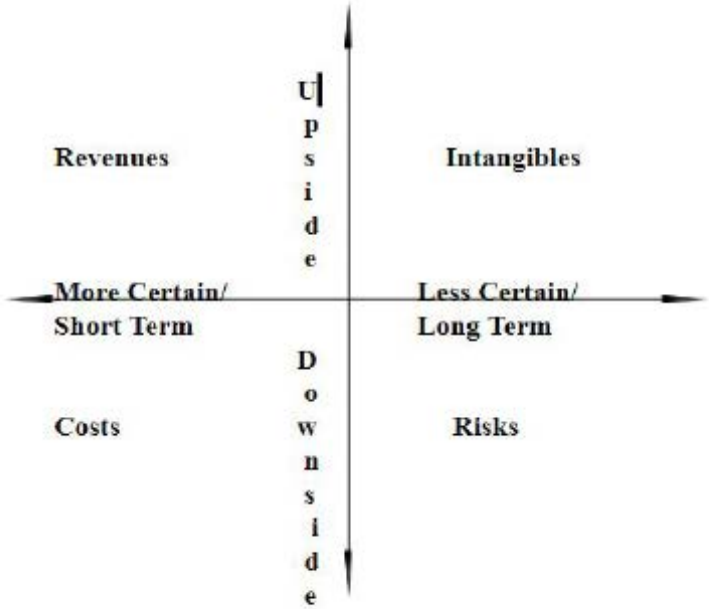


Figure 2: *Global EV Stock Between 2010-2016*

APPENDIX 3



Managing the Downside of the Electric Vehicle in the Global Industry	
Costs	**Key Strategies**
Short Term/More Certain	*Volatile battery generator as the major limmitor.*
Long Term/Less Certain	*Battery advancement rapidly progressing for effectiveness and efficiency due to industry profits.*
Risks	
Short Term/More Certain	*Primary issue with one battery producer (Tesla) dominating industry technology.*
Long Term/Less Certain	*Inability for market competitors to enter market due to high resource necessary to break in.*

Building the Upside of the Electric Vehicle in the Global Industry	
Revenues	**Key Strategies**
Short Term/More Certain	*Government Incentives, Early Adopters, Wealthy Owners able to front EV cost difference*
Long Term/Less Certain	*General Consumer, Business Fleet Vehicles, Government Military, Trucking Industry*
Intangibles	
Short Term/More Certain	*Ability to implement into an otherwise stubborn oil dominated industry.*
Long Term/Less Certain	*Passion of the automotive culture, treating the EV ownership as an extended family member.*

Figure 3: Strategy Framework for the EV in the Global Industry

APPENDIX 4

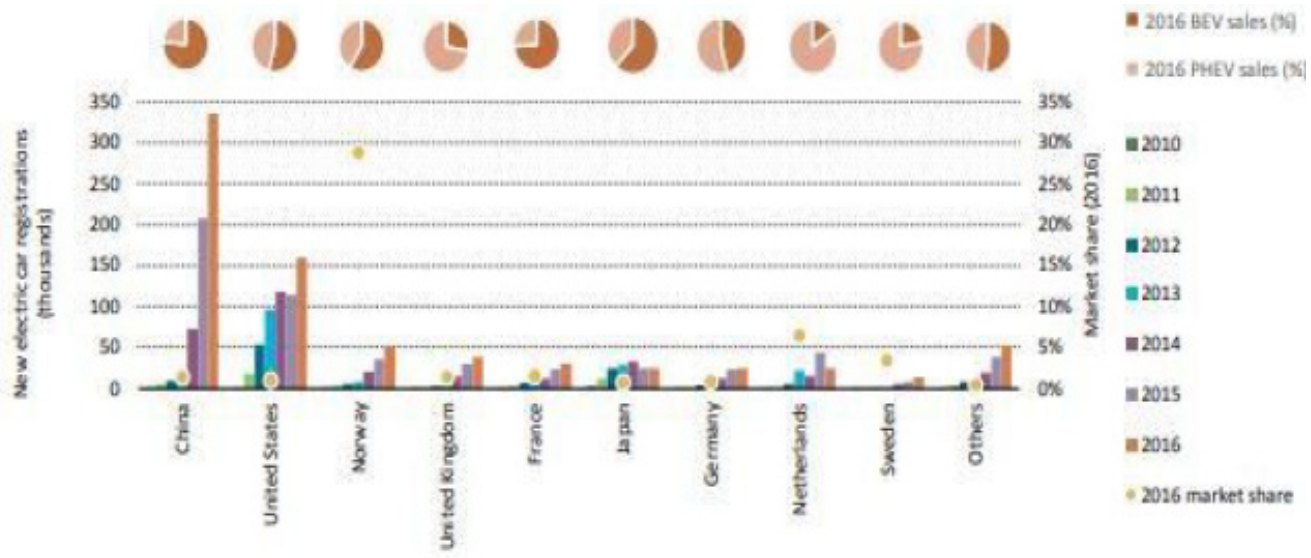


Figure 4: EV sales by country

APPENDIX 5

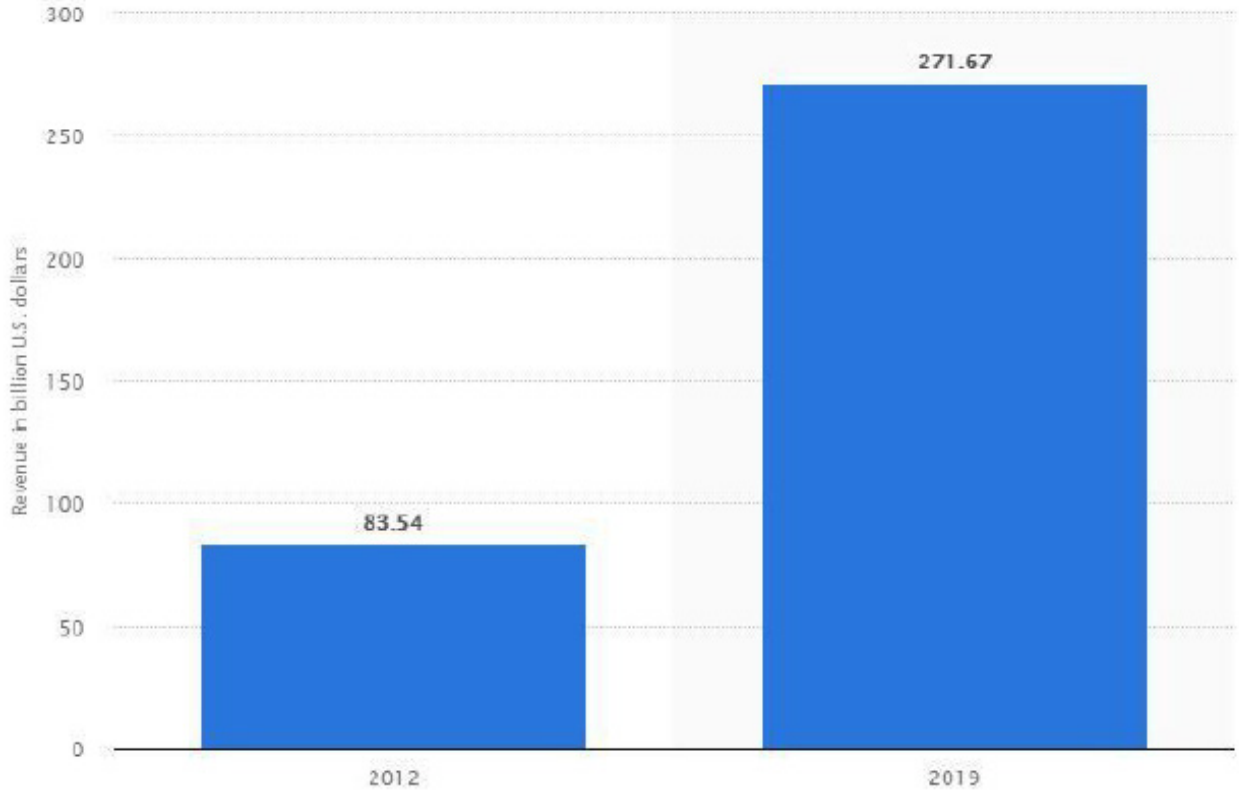
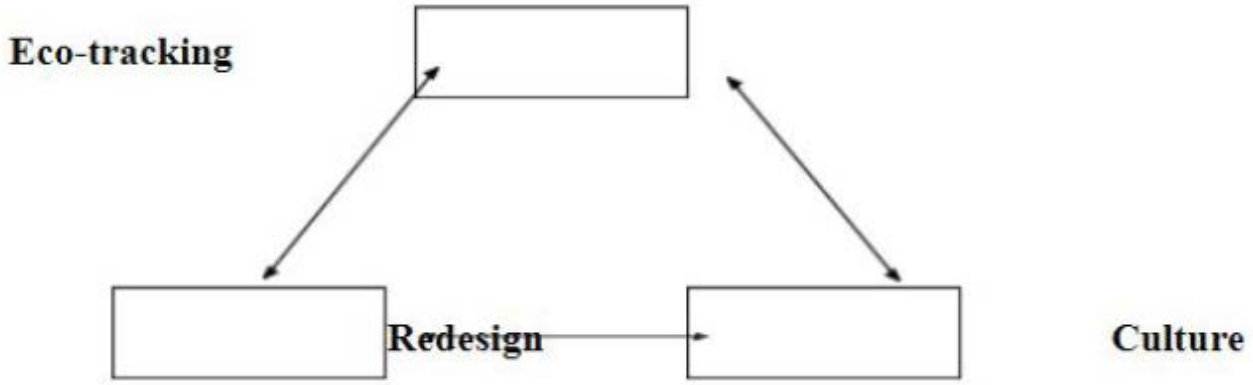


Figure 5: EV Revenue Comparison

APPENDIX 6



Eco-Advantage Toolkit for the Electric Vehicle in the Global Industry	
Tool	**Strategy**
Eco-tracking	*Tracking the amount of petrol saved vs. emissions deposited from hybrid vehicles as opposed to the all electric lithium ion contamination of production. Future experimental propulsion cell's used to have known mass emissions as current battery tech progresses. Amount of CO2 emitted into atmosphere form electric power stations.*
Redesign	*Over a century's worth of internal combustion motor technology to be radically altered into a more efficient, effective, and potent Electric Motor.*
Culture	*Vehicles have strong brand loyalty and possessive culture, electric vehicles have even stronger fondness as they are currently a primarily enthusiast propulsion vehicle.*

Figure 6: Eco-Advantage Toolkit for the EV in the Global Industry.

APPENDIX 7

Challenge	Aspects	Upstream	Downstream	Issues	Opportunities
Climate Change	*Emissions from lithium ion use.*	*Vast network of many vendors using synthetic materials.*	*Vehicle owner driving, consuming coal recharging.*	*Battery Cell toxins.*	*Dramatically reducing pollution that IC engines produce.*
Energy	*Energy consumption of coal power plants.*	*Vendor of batteries choice of energy efficiency.*	*Consumption of energy from sold vehicles.*	*Reliance one primary battery manufacturer.*	*Retrofitting existing IC powered vehicles into electric powered.*
Water	*Contamination from hvac freon.*	*Water in use for battery production.*	*Toxic waste such as Freon, antifreeze, battery acid leakage.*	*Washing EV's in doubt ridden areas.*	*Not having to clean up oil leaks with water of conventional IC vehicles.*
Biodiversity	*Factory and vehicle routes altering wildlife routes.*	*Synthetic materials that endanger wildlife.*	*Unsuspecting owners of EV's that don't understand the use of toxics.*	*Potential factory built in third world country affecting wildlife.*	*Regulations intact by government to assist natural habitats.*
Chemicals/ Toxics	*Use of toxins in battery production.*	*Waste runoff from lithium ion factories.*	*Residual chemicals in battery of vehicles.*	*Accident or crash of vehicles cause fire hazard.*	*Develop less invasive technologies in battery development.*
Air Pollution	*Emissions from coal factories providing power to charging stations.*	*Emissions generated by all power plants producing EV's.*	*Emissions from Products.*	*Regulating the unregulated battery production.*	*Increasing air quality by not using petrol propulsion.*
Waste Management	*Where to recycle Lithium?*	*Toxic chemicals that are dumped into field reserves, unrecyclable.*	*Vehicle disposal after end of life usage.*	*Increasing the battery waste due to toxins.*	*Dirty oil changes will no longer need to be collected as it will no longer be necessary.*
Ozone Layer	*Freon from HVAC emitted into air.*	*HVAC chemicals released into atmosphere.*	*HVAC leaks into the parking garage.*	*Potential of pets licking freon as it is sweet in flavor.*	*Highly unlikely as much less is needed for EV's.*
Oceans	*Drainage of lubricants into water system.*	*Rising oil prices means less use of oil.*	*Consumers no longer need to do dirty oil replacements.*	*Runoff into oceans from sewage systems.*	*EV's are considered "dry" vehicles, not needing many liquids to operate.*
Deforestation	*Luxury automobile interior wood trim.*				*Very small impact as only a small number of ultra-luxury EV's may use them.*
Other	*Mining new exotic materials to enhance battery longevity.*			*Unknown long term effects of new materials.*	

Figure 7: AUDIO table analysis for the EV in the Global Industry.

APPENDIX 8

Country	2015 vs. 2016 policy developments		2015 vs. 2016 sales growth		2016 sales	
	BEV	PHEV	BEV	PHEV	BEV	PHEV
China	~		75%	30%	257 000	79 000
United States	~		22%	70%	86 731	72 885
Norway	~	↗	6%	164%	29 520	20 660
United Kingdom	~		4%	42%	10 509	27 403
France	~		26%	36%	21 758	7 749
Japan	~		48%	-34%	15 461	9 390
Germany	~		-6%	20%	11 322	13 290
Netherlands	~	↘	47%	-50%	3 737	20 740
Sweden	~	↘	0%	86%	2 951	10 464
Canada	~		19%	147%	5 220	6 360
Denmark	↘		-71%	-49%	1 218	182
Korea	~		75%	-40%	5 099	164

Figure 8: Policy and EV

Amalia Gonzalez
Dr. Amalia Llombart
*RSCA

This paper was presented at the Annual Student RSCA Conference at Cal Poly Pomona

Learning Together: The Effect of Mother to Child Reading Practices at Home on Limited English Proficiency Latino Mothers

Abstract

A large body of research has been done about the importance of family literacy and reading to young children to increase literacy, gain vocabulary, build background knowledge, develop language and listening skills, and stimulate their imagination. However, less attention has been given to how family literacy--such as reading to young children--impacts the mother second language development. This case study investigates the English development of four Low English Proficiency (LEP) Latino mothers who read in English to their children at home in comparison to four mothers who do not read in English to their children. Data has been been obtained from an analysis of participant interviews, the participants' self- evaluation, and the results of a pre- and post- English proficiency and vocabulary test. Through the exploration of the effect of mother to child reading activities, this study aims to provide an additional method that would help LEP mothers to improve their English skills while spending meaningful time with their children.

Purpose of Study

The purpose of this case study is to examine the effect of mother-to-child reading practices on the mother's English proficiency and determinate how participation in these activities helps or hinders mother's English development. It is very important that parents (especially mothers) develop the ability to speak, write and read English fluently in order to communicate effectively with teachers, community members, and most importantly, their children, and to have social mobility. It is important to gain a better understanding of the factors that influence English development on LEP mothers using reading practices with their children. This study will investigate mother's reading practices and examine the changes that occur in the mother's English literacy skills when they have a meaningful interaction with their children.

The mother to child reading activities we are analyzing in this case study are not conceived as teaching/learning activities, but rather as activities to be enjoyed in a playful environment. However, this study will link mother to child reading practices, in addition, to the ESL classes that will lead to the mother's English proficiency. For the purpose of this study, increasing English proficiency levels is defined as the ability to read, write, and speak English with the sufficient level to communicate and understand others. This study does not aim to suggest that occasional reading activities will master the mother's English language, but instead, this study will analyze the changes that occur in the mother's English proficiency when she is constantly reading to her children.

Significance of the Study

The significance of this study is that it presents an additional method such as mother to child reading practices at home to address the need of increasing English proficiency on parents, especially LEP mothers in order to benefit themselves and their children English development. The implications are that both mother and child would benefit from the use of reading practices in order to make a big difference not just in the child development but also in the mother's ability to improve their English skills and apply those skills in her life. In the same way, this study aims to create awareness of the importance of parental English literacy skills not just for their children education but to survive in a community where effective communication is key to success in every field.

According to The National Early Literacy Panel (NELP) "mothers are the primary agent of intervention that actually confer a benefit to the children in terms of their literacy development". Studies show that mother to child literacy activities at home are positively correlated with the children success at school because it improves vocabulary, grammar, background knowledge, cognitive ability, memory, and oral language. This study proposes to explore mother to child reading activities at home as a vehicle to improve English proficiency.

REVIEW OF THE LITERATURE

The Power of Reading on English Learners

According to Krashen (2004), there is not an actual literacy crisis in the US because the great majority of people already know how to read and write on a basic level. However, people do not read and write well enough to handle the complex literacy demands of the actual society (Krashen 2004). The best option that Krashen recommended to improve English skills is practicing reading. By reading, adults and children will be able to improve their reading comprehension, vocabulary and grammar (Krashen 2004). Specifically, for English learners, reading is the best way to improve Literacy English levels. Krashen (2004), states that "reading is one of the best things a second language acquirer can do to bridge the gap from the beginning level to truly advanced levels of second language proficiency".

Likewise, reading for pleasure and without pressure or formal settings, such as formal classes, is also a great technique to improve English proficiency for ESL students because they acquire the language without notice. Krashen (2004) explains that language is too complex to learn one rule at the time, so reading for pleasure will give you the tools to acquire a language without pressure or formal instruction. This author also explains that "reading is the base and foundation of language education". However many ESL programs are missing this very important ingredient in their instruction. "Reading for pleasure is just as good as traditional instruction" (Krashen 2004 p. 2). In one study made in South Africa and Siri Lanka students who read for pleasure had a better performance on literacy tests. Studies in both second and foreign languages confirm that those who read more do better on a wide variety of tests (Krashen 2004 p. 9). Several studies confirm that those who read more in their second language also write better in that language (Krashen 2004 p.10).

Second Language Acquisition VS Learning

A large body of research state many variables that influence second language acquisition in adults. However, this study will focus on-how the theory of acquisition vs. learning relate with home literacy activities such as reading where a mother is expected to learn and acquire language by reading to her children. Krashen (2014), in his Acquisition/Learning Distinction theory states that acquisition is a subconscious process whose main purpose is to communicate rather than focus on correct forms. On the other hand, Krashen explains that learning is a conscious process where people master a language by knowing the rules, being aware of them, and be able to talk about them (McGroarty 309). ESL programs provide a variety of rules and instruction to learn rather than acquire a language: formal instruction. This formal instruction is based on memorization of a long list of verbs and grammatical rules. For example, a adult persons who enroll in a ESL porgram must memorize all the verb tenses and forms and a long list of new words in order to gain vocabulary. Krashen and Seliger (1975) have noted that all language teaching systems utilized for the adult use activities in which linguistic rules are presented one at a time and in which some sort of feedback (error correction and/or error detection) is present. For example, a ESL teachers use activities such as small conversations to correct their students' use of language and detect grammatical errors with the purpose of develop the student's self-monitor system.

However, studies showed that informal instruction (such as home literacy practices (reading) mother to child that points out this study) contribute to some aspects of second language competence and acquisition. "Adults can not only increase their second language proficiency in informal environments, but may do as well or better than learners who have spent a comparable amount of time in formal situations" (Krashen 197 6). Adults are able to acquire language in informal situation without correctness and following linguistics rules. "Conscious linguistic knowledge acts only as a "monitor," altering the output of the acquired system when time and conditions permit" (Krashen 1976). However, active involvement in informal activities (such as reading) and consistency are necessary in order to learn and acquire a second language.

Importance of Parents English Proficiency

Parental involvement in school is very important in the child's education. Children whose parents have an active participation in school perform better academically. Language proficiency plays a significant role in parental involvement because it allows parents to effectively communicate with teachers, understand school documents, attend school meetings, and volunteer in school organizations. LEP Parents are less likely to communicate with teachers about their children's progress, and help students with homework. DiGirolamo (2009) points out the importance of investing in adult education programs in order to impact literacy of future generations and promote parental involvement. This author states that "educating adults who are parents of children in K-12 programs increases the chances of success for generations of children at school" (p.19). According to Di Girolamo, The National Center of Family Literacy studies show that children whose mothers complete high school earn higher scores on national achievement tests and perform better in school than those whose mothers did not graduate from high school (p.19). Children whose parents do not read English normally do all the school work by themselves without academic and family support, leading to low performance at school. Some parents provide all the necessary school supplies and items for school, but they do not provide academic support due to their language barrier. In this way, parental English proficiency is related with future generation school success.

Adult education and proficiency in English also increase the possibility of obtaining a better job opportunity. Most LEP adults, have very limited options regarding their labor opportunities because of their lack of basic English skills. As a result, their socioeconomic status plays a significant role in the whole family education. Adults who are unable to keep a job because of their LEP are very likely to live in poverty and have no resources towards education. "The effect of socioeconomic status is commonly viewed as contributory between poverty and low literacy levels" (DiGirolamo p.21). Increasing LEP parents levels of English proficiency will enable them to compete in labor opportunities and provide more resources for their families.

Adult education and English proficiency increase parents self-esteem. Parents who invest time on education and English improvement will be able to gain independence and help other family members. This factor will give the adult a feeling of purpose, happiness and usefulness. Di Girolamo explains that low self-esteem is also one of the adult education barriers (p.21). For example, when a mother starts to learn English, she feels confident about herself, so she transmits her confidence to her family members, especially to her children. Otherwise, LEP parents feel excluded from social and school events with English speakers because of their lack of confidence in English. In general, adults who start learning English in ESL classes feel happy to learn new things and communicate with new friends. Di Girolamo (2009) explains that selfÂconfidence is very important for immigrant families, since they face many challenges because of their legal status and LEP (p.22).

Similarly, effective English skills lead to better communication, not just within the family but with other members of the community, such as teachers, doctors, and social workers. Parents who learn English are not dependent of their children's translation and interpretation but are capable of doing things by themselves.

Factors that impact Home Literacy Practices such as Reading

There are some factors that influence the lack of home literacy practices such as mother to child reading activities: parents' perspective about education, their resources, and motivation. Parental perception about education most of the time depends of their past experiences and their background. Parents who have bad experiences of their school years are less likely to implement and believe in home literacy practices such as reading. Also, parents who do not prioritize education as a path of success transmit this feeling to their children and see school as an imposition rather that a vehicle to success. Many immigrant's parents did not have the opportunity to attend school in their native countries, some dropped out from high school because of the lack of familiarity with school, the absence of parental model, and support. Once they arrive to US, their main goal is working and provide for their families leaving school, education, and family interaction a side.

Alongside with lack of educational culture, the access to resources and information are important factors that contribute to implement home literacy practices. For example, the rich print environment at home is key for literacy activities. Also, the time parents spend on literacy activities at home are important since the more time invested a better results. In many cases, immigrant parents have to work, so they do not have enough time and money for literacy. They are not aware of the library programs for children such as story time and free access to books.

In the same way, many parents are not well educated even in their native countries, so they do not model literacy practices at home such reading and writing. In many cases, parents do not feel motivated to spend time with their children doing literacy activities such as reading and writing together because of their lack of English literacy skills. In this way, these factors contribute to the lack of implementation of literacy practices at home, and as a result, increase the enormous gap in education and literacy in immigrant families.

Importance of Family literacy

Family is the first agent and the most important source ofleaming. Since 1983, family literacy was emerged as a concept that describe the rich and varied ways that families use literacy in home and community settings (Anderson, Smythe, and Lynch 2003). DiGirolamo (2009), explains that "the first component of family literacy is adult education" (p.12). This author points out that parents should have basic knowledge in order to contribute to their family literacy. For that reason, the concept "family literacy" is strongly related with programs whose main goal is to instruct parents as the first teachers. These programs may include ESL classes and child development information. "The aim of such programs includes drawing parents into discussions about family life, concerns about their own learning needs, and ways to make the relationship between families and school more democratic" (Anderson, Smythe, and Lynch 2003).

Parents must understand the importance of family literacy in order to complement the school goals. The evidence of the literacy problem in industrialized countries with mass schooling systems has revealed that schools cannot alone meet this need (Anderson, Smythe, and Lynch 2003). It is very important to recognize that school is a complementary source of learning that in partnership with family builds a complete source of knowledge for its members since a very young age.

Research supports that literacy activities in family shape each other's knowledge construction (Simpson, Kibler, and Palacios 2015 p.153).

Family literacy activities not only help their members to develop, learn and apply literacy skills but also create a strong bond within the family, which contribute to a better communication and unity. Some research has been done on the field of family literacy using reading as main home activities. "In home literacy events the family members are able to leverage their linguistic and/or literate strengths to construct meaning mutually during literacy events" (Simpson, Kibler, and Palacios 2015 p.14 7). In other words, mother and child develop each other' s literacy during meaningful interactions and specific behaviors, such as reading. "The parent-specific behaviors include also the amount of time spent with the child, teaching strategies, career guidance, encouragement to participate in various activities, and so forth" (Yuko Goto Butler 2013).

RESEARCH QUESTIONS

The following research questions will be address:

Question 1 : Is there an effect on the mothers' English proficiency if they are using mother to child reading practices?

Question 2: What effects do mother to child reading practices have on the mother's reading comprehension?

Question 3: What effects do mother to child reading practices have on the mother's language use level?

Question 4: What effects do mother to child reading practices have on the mother's vocabulary?

Question 5: Does the reading practices have an effect on the mothers' feelings of self-efficacy in working with their children on literacy activities?

Methodology

To address the research questions, this case study employs a qualitative method to understand the benefits of increase English proficiency, and the effect of mother to child reading practices at home on LEP mothers. It is important to analyze mother to child reading practices on informal settings in order to analyze possible changes that would occurred on the mother's' reading comprehension, language use, and vocabulary levels, and their ability to improve their English skills. According to Digirolamo (2014), "there is no formal assessment that can measure life changing accomplishments such when parents are able to communicate with their child's teacher for the first time". This author states that even when those accomplishments seem to be very small, for LEP mothers and their children those achievements represent a victory. However, this qualitative study focuses on analyzing those accomplishments and changes from the participants responses.

Participants

I purposeful sample of eight women between 21 and 59 years old are participating in this study. The participants are divided in two groups: experimental and control groups. Four of the participants in the experimental group are immigrant in California, speak Spanish as first language, and have children between 6 and 8 years old born in the United States whose are fluent speakers of English. The other four participants in the control group are immigrant in California, and speak Spanish as first language. These participants do not have children. All participants are enrolled in Mount San Antonio College ESL program receiving formal instruction in English.

All the participants states that their dominant language is Spanish, and their communication with their family members and friends are in spanish.

The primary sources of this research are key informant interviews. The interviews will follow a semi-structure format asking open questions and collecting all additional notes during the interview in addition to a pre-and post-test to measure general literacy English skills of the two participants involved in the study. The data will be collected by interviewing the four participants for 6 weeks. Just the participants with children will practice mother to child reading activities. The reading practices between mother and child will be conducted at least two times a week and the material such as narrative books, paper and color pencils will be provided and pre-selected according to the mother and child level of reading and comprehension. These activities will not be observed, the study will be based on the mother's responses. The rest of the participants will be only receiving formal instruction in an ESL program. All participants must be in the same level of English Proficiency. A demographic questionnaire also will be given at the beginning of the study. In addition, all the participant must provide a pre- and post-selfassessment of their English Levels.

Research Progress

The IRB protocol was submited last november 16, 2018 under the expedited review and was aproved on January 24, 2019. The participants were recruited via flyres posted throughout the Mt San Antonio Collegue, Claremont Adult Education, and Cal Poly Pomona ESL programs. Researcher met with the participants face to face in Mt San Antonio College in separate days for about 30-60 minutes in order to provide consent forms and detailed information about the study. Once the consent form was signed and completed the study formally started. The researcher met with the participants again to complete the pre-tests , the demographic survey, and receive instruccions about their reading practices for 40 minutes in separated days. Even though all the participants showed very interested in participating in the study, their availability was limited and this process took about three weeks.

In the following weeks, the four participants mothers will start with the -mother to child reading practices at home- with the purpose of collect data to address the research questions. The the researcher will meet with the participants who are doing the mother to child reading activities at home every week. The interview process will take approximately 30-60 minutes and will depend of how much information the participant wants to share. The interview will be audio-recorded and transcription of the audio recorded will be made.

Project Delays

Even though the study was inicially plan to begin in the first week of February, unexpected events cause a delay in the project. However, it is estimated to finish the study on time. Some of the causes that have caused the delays are: participants unexpected events and unavalilability, tasks complexity, and inadequate estimations of supplies funding for the project. At this point of the study, no data is yet collected due to the delays.

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Evan Greco
and Jeffery Scott Mio
Professor Jeff Mio

The Most Convincing Metaphors Arising During the Trump Administration

Abstract

Previous studies using the Metaphor Extension Hypothesis establish the effectiveness of figurative language within political debates. More specifically, the Metaphor Extension Hypothesis found how metaphor extension was a prominent response choice compared to non-related metaphors and literal language. Previous research (Mio 1996, 1997, 2005, 2015) has studied the use of metaphor during the George H. W. Bush, Bill Clinton, George W. Bush, and Barack Obama administrations. This study aims to test the effectiveness of metaphor extension within social debates that arose during the first six months of the Trump Administration. Metaphors within topics of political discourse during these first six months were collected from articles in Time Magazine. For this study, participants are to pretend they are a speaker in a political debate with someone who presents a position using a metaphor. As the respondent, participants are to select a response to the primary speaker choosing between a metaphor extension, competing metaphor, or a literal response. Data from 50 research participants (37 female, 13 male) found metaphor extensions were preferred over their metaphor non-extension counterparts, 65.5% to 34.5% respectively, and metaphor extensions over their literal counterparts, 61 % to 39%, respectively. Additionally, female participants identified 43 metaphor extensions as the most convincing responses, opposed to only 12 metaphor non-extensions and IO literal responses. Male participants identified 20 metaphor extensions as the most convincing, compared with 4 metaphor non-extensions and 4 literal responses.This data found support for the Metaphor Extension Hypothesis.

The Metaphor Extension Hypothesis in the Age of Donald Trump

The use of figurative language to convey meaning within conversation has been a staple of social situations stretching as far as Ancient Greece. Devices such as the metaphor had been of interest to philosophers like Aristotle and Plato because it allowed them to carry and convey complex meaning through relatively accessible means. Ortony (1975) proposed metaphors consist of three important characteristics which contribute to their educational value and further scientific study: theories of compactness, inexpressibility, and vividness. Metaphor is useful because it allows us to succinctly convey a message (compactness), through ways in which literal language might not be able to (inexpressibility), and in a manner which one can better imagine or visualize (vividness).

Fainsilber & 01tony (1987) studied the effect of figurative language in emotion. The study involved participant description of personal events, in which participants would describe an experience in which they felt either positive or negative emotions (finding money on the street or losing their wallet) as well as low or high in intensity (losing a dollar versus losing one hundred dollars). Participants were asked to describe both their feelings and actions in whichever story they told. It was found that a higher usage of creative language was present in participant's description of feelings about an event versus their actions. Intense, positive emotions evoked the highest amount of figurative language usage compared to mild, positive emotions which had low creative language. From this, it can be inferred that metaphor has strong roots in emotive language and that we use creative language more when we want to convey intense feelings.

The Metaphor Extension Hypothesis (MEH) is proposed by Mio (1996, 1997) as a way of determining the effectiveness for metaphor within political debate. Mio hypothesizes that while metaphor on its own is an effective method of political persuasion, the act of extending a speaker's metaphor can lead to higher levels of follower receptivity. These findings are supported through analysis of metaphor use during the George H. W. Bush, Bill Clinton, George W. Bush, and Barack Obama administrations.

This study aims to extend previous research by Mio (1996, 1997, 2005, 2015) in an eff01i to measure and understand how figurative language is utilized within social debates to elicit follower receptivity. To do so, the goal of this study is to understand the most convincing responses that have been selected by participants. I hypothesize that Hypothesis 1) metaphor extensions will be selected by participants as the most convincing responses compared to metaphor non-extensions and Hypothesis 2) metaphor extensions will also be selected by participants as the most convincing responses compared to literal responses, and Hypothesis 3) females will have a higher identification and selection rate of figurative language responses compared to males. I also predict, Hypothesis 4) females will have a selection rate of extending metaphors as compared to metaphor non-extensions and literal responses Hypothesis 5) males will similarly have a higher identification rate of extending metaphors versus metaphor non-extensions and literal responses.

Method

Participants

50 participants (37 female, 13 male) were recruited through Cal Poly Pomona's online Psychology Research Participation System (SONA). Participants were compensated with 0.50 research credits, equivalent to 16-30 minutes of research time. One point, or one hour of credit, can be used to receive extra credit in a select amount of participants' enrolled courses.

Materials and Measures

Participants signed up for this study through Cal Poly Pomona's Psychology Research Participation Website (SONA). Debate segments from articles that appeared in Time magazine during the first six months of the Trump Administration were compiled into two separate booklets. The first debate segment on each page was a "filler debate" containing no figurative language responses, meant to mask the paiiicipant from detennining the true nature of the study. These booklets were counterbalanced in order to ensure internal validity. Prior to beginning the study, participants were asked to fill out a demographics page, asking for the following information: gender (male, female, nonbinary), if English is their preferred language (yes or no), and if not, to indicate which language they prefer. Participants were also asked their ethnicity.

Design

The study consisted of an experimental, within-subjects design. The independent variables were metaphor-type variables (extending metaphor, non-extending metaphor, or literal response). The dependent variable were participant response-type preference based on those choices.

Procedure

After signing up for a selected time slot through the online SONA system, participants met at a designated classroom on the day of the study for a half-hour session. Once reading through a small description of the study and signing a consent form, (stating that their participation in the study was voluntary and they may withdraw at any time and receive credit) participants were handed a research booklet. Demographic information was collected at the start of the survey, where respondents filled out age, gender, and race. This information was used solely as an identifier to ensure that an equal

opportunity was given to every demographic for participation in our study.

Participants then began the study, where they were to pretend they were a speaker (Speaker 2) in a political debate with someone who presents a position (Speaker 1), using a metaphor. As the respondent, participants selected a response to the primary speaker choosing between a metaphor extension, a competing metaphor, or a literal response. Pamphlets were composed of six pages, each containing three debate segments and two response choices per debate segment. At the end of the response-selection, participants were asked to go back and select the three most convincing responses from the packet. The first, or "filler" debate segment, was to be ignored as it did not contain any figurative language so participants were to choose from each page's second and third debate segments. Participants were instructed to write why they found such responses convincing in as many words necessary. After completion of the packet, participants were thanked for their time and researchers assigned research credits within the day once the study had been completed.

Results

Data from 50 research participants (3 7 female, 13 male) found overall support for the Metaphor Extension Hypothesis. Metaphor extensions were preferred over their metaphor non-extension counterparts, 65.5% to 34.5% respectively ($F = 36.99$, $p < .001$). Metaphor extensions were preferred over their literal counterparts, 61 % to 39%, respectively ($F = 16.38$, $p < .001$).

The interaction between gender and response-type found overwhelming support for the hypothesis as well ($F = 6.19$, $p < .01$). Female participants identified 43 metaphor extensions as the most convincing responses, as opposed to only 12 metaphor non-extensions and 10 literal responses (70%, 14%, 14%, respectively). Male participants identified 20 metaphor extensions as the most convincing, as compared with 4 metaphor non-extensions and 4 literal responses (68%, 20%, 14%, respectively).

Discussion

Data found support for the Metaphor Extension Hypothesis, in which research patiicipants prefeITed responses that extended a debate opponent's metaphor as opposed to one that used a competing metaphor or a literal response. Limitation of this study is that participants were collected from the Psychology Depatiment, which narrows our ability to generalize our results. Additionally, there is notably more data for female students than male students. Future research involving the Metaphor Extension Hypothesis should consider allowing participants to generate their own responses to their opponents metaphors. Moreover, extending the Metaphor Extension Hypothesis to more areas other than politics could provide more generalizable results.

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Appendix A - Materials

Packet Cover Page: Demographics

_____ Male _____ Female _____ Nonbinary

Is English your preferred language? _____ Yes _____ No

If no, what is your preferred language?

_____

What is your ethnicity?

_____

Packet Study Introduction: Description of Study & Instructions

Pretend you are in a debate. You will first be given a little background of the political or social debate. Speaker 1 will then present a position in a sentence or two. Your job is to imagine that you are Speaker 2 and that you need to respond to Speaker 1's position in a single sentence or two. **Please write a response to Speaker 1's position that you feel will be an effective response.** Of course, in debate situations, the debaters never convince one another of the other's position. However, there is an observing audience, so please try to be convincing to this observing audience so that they will agree with your position and not Speaker 1's position. These issues arose during the first six months of President Trump's term of office (first half of 2017), and while some of the issues involved Trump or his policies directly, some of the issues were merely issues that occurred during that year. In order to balance out your own political position, some of the debate positions will be those you might agree with, some will be those you might disagree with, and some you might not feel one way or the other about. Remember, regardless of your own personal view of the content of the debate, you need to take the position of Speaker 2 which is the opposite of Speaker 1's position and try to convince an audience that your position is the correct position the audience should follow.

Packet Stimuli

There have been some protests, especially on college campuses, where people have protested speakers being paid to speak. Some believe that all views need to be heard, whereas others believe that those who hold truly offensive points of view should not be paid to voice their views.

Speaker 1:

Free speech means that all speech should be heard.

Speaker 2:

In order to try to defeat ISIS, the United States, Russia, and Turkey have had to make an alliance with one another and some rebel groups, but there is danger involved when making alliances with those whose values are quite different from ours.

Speaker 1:

When trust, constancy, and shared values are absent, the world is left to build its alliances on shifting sands.

Speaker 2:

Some people felt that Donald Trump's campaign to win the presidency was unconventional which has its advantages, whereas others feel that he needs to become more conventional in order to govern the nation properly.

Speaker 1:

Donald Trump's race for the White House was one long, looping detour from convention.

Speaker 2:

Snapchat is used by some to avoid any responsibility by being separated from the internet, but some believe that there are still some ways that information from Snapchat can be preserved.

Speaker 1:

Snapchat accomplishes privacy because you cannot save its information on the internet.

Speaker 2:

Donald Trump's inaugural address was as unconventional as his campaign for the presidency. His speech depicted the United States as faltering and on the verge of collapse. Many have debated about what this means for his governing strategy.

Speaker 1:

For all his reputation as a builder, he entered office as a wrecking ball.

Speaker 2:

There was immediate and intense opposition to Donald Trump once he took office. Some believe that this opposition can be used to hamper Trump's presidency and agenda, but others feel that just because there is a great deal of opposition does not mean that this opposition can be focused against Trump.

Speaker 1:

There was a rushing river of energy against Trump.

Speaker 2:

A series of elections in Europe have revealed that there are some serious divisions that threaten the European Union (E.U.). These elections have revealed strong nationalistic feelings where people want to go back to the old Europe where each country was separate, but some others believe that there is still some underlying desire for a united Europe.

Speaker 1:

Populists have been allowed to seriously challenge the existence of the E.U.

Speaker 2:

Donald Trump entered his office promising to cause great disruption in Washington in order to cause real change. Some support his intentions to disrupt Washington, but some believe that this will come at too great a cost.

Speaker 1:

Trump said he would shake things up, and it is good that he has produced tremors more reliably than the San Andreas Fault.

Speaker 2:

Kim Jong Un of North Korea had his own half-brother, Kim Jong Nam, assassinated. This was because it was thought that some opposed to Kim Jong Un wanted to overthrow Kim Jong Un and install Kim Jong Nam as North Korea's leader. However, no one knows how this would have turned out.

Speaker 1:

Opponents of the Kim Jong Un regime wanted to install Kim Jong Nam as the puppet head of the government.

Speaker 2:

In France, there was a possibility that Marine Le Pen, a right-wing ideologue, could win the French presidency. Many felt that this would have been a disaster, but some supporters of Le Pen believed that she was the kind of leader that France needed at this time.

Speaker 1:

Marine Le Pen's election would have sent France into a very dark period.

Speaker 2:

Many of what President Trump says are clear lies that can be documented. However, some believe that these lies are harmless and are designed to disrupt Washington's way of thinking, whereas others believe that Trump cannot help himself from lying, which will lead the country into very bad policies.

Speaker 1:

President Trump just tells little lies to liven up a party like a little alcohol does.

Speaker 2:

There were rumors that the White House operations were very dysfunctional, there were factions within the White House warring with one another, and people were secretly letting the press know how bad things were. Despite these rumors, President Trump said that everything was going well. Still, reports of problems persisted.

Speaker 1:

Donald Trump has called his White House a fine-tuned machine.

Speaker 2:

If one of Donald Trump's aides gets favorable press, Trump seems to resent this and puts the aide down or even fires him or her. Some defend Trump's actions because no one should be larger than the president.

Speaker 1:

If an aide's public profile gets too big, Trump tends to get rid of that aide.

Speaker 2:

ISIS invaded and took over Mosul in Iraq. However, it turned out that ISIS had a much more difficult time governing Mosul than conquering it, and services like electricity and plumbing were unreliable if existent at all. Because of this, the people of Mosul turned against ISIS, making it easier to defeat ISIS and drive them out of Mosul.

Speaker 1:

Mosul was supposed to be a laboratory for an experiment in Jihadist government.

Speaker 2:

President Trump thought that by firing FBI Director James Comey, he would eliminate the investigation into his connections with Russia, but as it turned out, the problem became much worse.

Speaker 1:

Trump tried to put out a little fire by dismissing Comey.

Speaker 2:

In Afghanistan, there was some discussion on trying to distinguish between terrorists who wanted to destroy American troops and terrorists who wanted to defeat those opposed to the Afghani government. Some felt that we should make alliances with the terrorists who wanted to help us, whereas others cautioned against making alliances with any terrorists.

Speaker 1:

There cannot be a distinction between good and bad terrorists, they are both terrorists.

Speaker 2:

James Hodgkinson was a man who used an AK-47 to shoot at Republican lawmakers practicing for a baseball game against Democratic lawmakers. Some tried to downplay this incident, saying that it was the price we had to pay for preserving our 2nd Amendment rights to possess guns, whereas others feel this problem is getting out of hand.

Speaker 1:

Hodgkinson was just another symptom of a creeping national disease.

Speaker 2:

President Trump has made many misstatements, both by speech and by Tweet. This has caused numerous problems and have detracted attention away from legislation he is trying to pass (like revamping the health care system). Some believe that these are minor problems, but others believe that the accumulation of these problems will become something overwhelming.

Speaker 1:

Most of Trump's problems have been just little self-inflicted wounds.

Edwin Hernandez

Nicholas Gomez & James Sturges

Drug Use and Voting Behavior

It is a popular idea that marijuana (cannabis) is a gateway to the use of other drugs. It follows that use of cannabis might be associated with different attitudes toward broader legalization of drugs. Research from Trevino and Richard (2002) found that although using specific drugs such as cannabis was associated with more positive attitudes toward legalization of the same substance that participants used, it was not associated with positive attitudes toward drugs with more severe side effects. Additionally, the use of more harmful drugs, however, was a predictor of positive attitudes toward legalizing all drugs. Yet, further research is needed to better understand differences between cannabis users and nonusers in terms of their views and voting behavior.

In the present study, 102 community college students were given a series of questions using a 6-point Likert scale measuring their support of legalization of all drugs in the United States, a similar measure of attitudes toward the use of other drugs in moderation, and whether they had used cannabis since it was legalized.

The results did not support the idea that the individuals who used cannabis since its legalization in California were more likely to vote for the legalization of all drugs in the United States ($t = 1.84$, $p = .07$). Though the group difference approached significance, it was not conclusive that prior cannabis use was associated with voting for legalization of all drugs in America.

Using a scale comprised of statements of positive attitudes toward general drug/substance use in moderation, we found that having used cannabis since its state legalization was significantly correlated with having a positive attitude toward drug use in moderation ($t = -5.94$, $p < .001$). Scores on this moderate drug use attitude scale were also positively correlated with the attitude that drugs should be legalized in the United States ($r = .32$, $p < .01$). Additionally, agreeing with an item stating that clarity of mind was important for college success was negatively correlated with positive attitudes towards drug use in moderation ($r = -.22$, $p < .05$). Our goal with this question was to measure the belief that sobriety is important for college success.

The main objective of this study was to see whether there was a correlation between college students' recent use of cannabis and their current endorsement of legalization of all drugs in the United States. Since cannabis's California legalization, many people have feared the ramifications. However, this study failed to definitively show a relation between a person's drug use and their self-predicted voting behavior. This was likely indicative of inadequate power resulting from our relatively small sample, but it may also have been the result of a relatively small effect size of cannabis on these political views, if there was a direct effect at all. The results instead suggest that drug attitudes are a mediating variable: Cannabis use related to attitudes toward drug use, and those general attitudes toward drug use were a more proximal predictor of views on legalization.

Discussions of cannabis legalization often include statements about the consequences this would bring to society, such as that cannabis is a gateway to drugs whose side effects can be more extreme (e.g., when a person uses heroin, overdose can be life threatening; NIDA, 2018). Although we did not find support for the gateway idea in terms of self-predicted voting for legalization, as mentioned previously, there was a difference in attitudes between users and non-users that could be argued to be even more akin to the gateway hypothesis: The relation between use of cannabis and positive attitudes toward other drug use. However, we do not know whether those views were pre-existing (prior to use of cannabis). Work by Palamar, Griffin-Tomas, and Kamboukos (2015) showed that there were multiple reasons for drug use and suggested that use of one drug is not strongly associated with the desire to use other drugs. Attitudes surrounding substance use and the factors in substance use problems are complex. For example, those who prioritized keeping a clear mind for academic success were less likely to endorse drug use in moderation, demonstrating that other considerations may factor into whether students endorse the use of drugs.

Palmar and colleagues (2015) showed that there are many situations involved in the use of cannabis, or any drug, such as social/recreational context, coping with negative affect, compulsive use, and the desire for drug effects. Additionally, they showed that wanting to use a substance can lead to patterns involving use of other substances. Their results revealed that experimentation with cannabis did not mean greater use of any of eight other drugs/substances. Taken together, previous research suggests that drug use is associated with attitudes about the legalization of drugs in the United States, but cannabis use alone may not be. However, further research needs to be done.

It is important to make a distinction between the use of cannabis, general attitudes about drug use, and endorsement of drug reform. Furthermore, beliefs and priorities (such as school success) may have more of an effect upon attitudes toward drug use and legalization than actual cannabis use.

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Abbey Ibarra
Dr. Gwen Urey
*RSCA

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Who Can Afford California's High Speed Rail

Abstract

California High Speed Rail has proposed to impact the state's economy significantly. This infrastructure has committed to ensure this project creates a sustainable structure in order to provide accessibility and mobility for everyone. California High Speed Rail has reiterated the importance of employment, eco-friendly environment, and preserving land. This paper will analysis California High Speed Rail Business Plans which includes a travel demand model creating an estimate of ridership and revenue throughout predicted trips. The idea of the plan is to analyze travel performance in order to anticipated population, travel value, and transportation systems throughout a predicted year. The new drafted plans of California High Speed Rail has increased the estimated cost that the system was projected to initially be as well as the cost of fares. This research will analyze the Business Plans conducted by California High Speed Rail Authority and related literature reviews to help analyze the long term impacts. Comparing the cost to alternative modes of transportation will contribute to how affordable California High Speed Rail and who will be using the infrastructure. This paper explains that California High Speed Rail is more costly than the alternative modes of transportation which include air and auto travel. The four points that the study will be looking at are the over-optimistic prediction of projected load factors, the over-optimistic predictions of mode shifts, the underestimated predictions of rider fares and the over-emphasized speed of the high speed rail.

Major Objectives:

- Over-Optimistic prediction of projected load factors (high)
- Over-Optimistic predictions of mode shift (high)
- Underestimated predictions of rider fares
- Overemphasized speed of the High Speed Rail

Background research with analysis and summary of literature reviews.

The project of the High Speed Rail started in 1996 when the High Speed Rail Authority was created. The objective of the recommended project was to provide a connection to major metropolitan areas and additional services between northern and southern California. Throughout the years since the High Speed Rail Authority was created, an investment of about $60 million was used for pre-construction plans which include environmental studies and long term planning.1 The predicted High Speed Rail was intended to run on electricity while connecting all the major metropolitan areas. In 2006 the HSR was predicted to cost about 45 million.

In 2008, the voters of California passed Proposition lA to help fund California's new proposed infrastructure, California High Speed Rail. California proposition lA or better known as the High Speed Rail Act is a "legislatively referred bond act" that delegated 9.95 billion in general obligation bonds in addition to 9 billion for the construction and the process of planning this "800 mile" high speed rail system that proposed to connect San Francisco to Los Angeles.

[1] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA

2 General bond obligations are debt used to funds public projects that serves as a public good rather than providing a direct source of revenue. The general bond requires the state to pay the principal and interest cost on the proposed bonds. Funds from the general obligation bonds were authorized to fund 1) "Pre-construction activities and construction of a high-speed passenger train system in California" and 2) "Capital improvements to passenger rail systems that expand capacity, improve safety, or enable train riders to connect to the high-speed train system." 3California Transportation Commission allocated funds under the appropriation of the legislature to construct "intercity rail lines, commuter rail lines, and urban rail systems that provide direct connectivity to the high-speed train system as set forth in Streets and Highway Code, Division 3, Chapter 20, Section 2704.04, subdivision (b) or that provide capacity enhancements and safety improvements."4 The ballot information guide explained that the High Speed Rail would link major populated cities and connect San Francisco Transbay Terminal to Los Angeles Union Station and Anaheim. From the connection of the terminal the High Speed Rail would expand its lines to surrounding cities which include Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The High Speed Rail created a two part phase of how the project would be developed. The first phase would consist of San Francisco to Los Angeles with an extension to Anaheim. The second phase would extend from San Jose to Oakland, Stockton and Sacramento and from Los Angeles to San Diego through the Inland Empire. 5The completed project was estimated to run in 2 hours and 40 minutes from San Francisco to Los Angeles. The construction of the HSR began in 2017. In the 2008 ballot the HSR was "estimated in 2006 that the total cost to develop and construct the entire high speed train system would be about 45 billion".6 The ballot also stated that the
"High-Speed Train Network [would] relieve 70 million passenger trips a year that now clog California's highways and airports." 7The fares in the 2008 ballot were predicted to be "SO dollars per person".8

The High Speed Rail Authority demonstrated through several studies and analyzes that the HSR will contribute to "greater economic, mobility, environmental, and community benefits along with livable communities, sustainable housing and developments."9 There are seven goals that are emphasized in the 2012 business plan:

1. Ensure protection for the health of California's residents and maintain California's natural resources
2. Reduce air and water pollution, energy use and further environmental impacts
3. Ensure local goods and concerns are addressed through the promotion of sustainable housing and development trends.
4. Ensure station accessibility to the surrounding communities
5. Create multimodal connectivity and provide suitable goods, services and employment
6. Create a reduction of passengers to emission throughout California which leads to an overall reduction of environmental and health impacts.
7. "Protect ecologically sensitive and agricultural lands"10

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[2] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[3]California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[4]California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[5] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[6] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[7] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[8] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[9] CHSRA EJ Guidance 8-14-2012.pdf (n.d.).

The High Speed Rail project is intended to be an additional alternative transportation system that will eliminate the congestion and creations of new lanes and airports. But has the promises of California's High Speed Rail been kept? This study is focused on the lack of transparency and the inadequate information that has been repeatedly changing. Many details have been changing since 2008. The four main points that the study will be analyzing are the over-optimistic prediction of projected load factors, the over-optimistic predictions of mode shifts, the underestimated predictions of rider fares and the over-emphasized speed of the high speed rail.

The first measure that the study will focus on is the changes of predicted projected load factors of California's High Speed Rail. Projected load factors refers to the amount of passengers that will fill up seats in the High Speed Rail. According to the 2012 Business Plan the HSR estimates were used through the observation on national intercity rail and HSR examples in order to determine the ridership prediction.11 One issue that was brought up from Reason's 2012 Due Diligence Report is the method of ridership were predicted through "peak hours" and was predicted through the estimated travel time (2 hours and 40 mins) from the 2008 ballot. According to the 2008 Due Diligence Report "the CHSRA is projecting higher passenger use of the California system than is found on the Japanese and French HSR networks despite the fact that these countries have conditions that are far more favorable to the use of HSR".12 The formula that is used for ridership projection is used through estimated number of trips, estimated population level, estimated income of travelers and estimated level of services. According to proposition lA voters were told that "ridership would be between 65.5 and 117 million annually"13 but the revised changes estimated that now ridership would be between 19.6 to 31.8 million only in Phase 1 (Los Angeles to San Francisco). According to a report conducted by Charles River Associates "the largest contributions to ridership and revenue are predicted to come from trips between the Los Angeles or San Francisco regions and the Central Valley and between San Diego and Los Angeles regions."14 Another section that the study focuses on is the idea that these Business Plans for the High Speed Rail are based on a certain year or period in order to evaluate the "potential demand"15 at the time that the plan studies.

[10] CHSRA EJ Guidance 8-14-2012.pdf (n.d.).
[11] CHSRA EJ Guidance 8-14-2012.pdf (n.d.).
[12] Reason Foundation. (2013). California High Speed Rail: An Updated Due Diligence Report
[13] Reason Foundation. (2008). The California High Speed Rail Proposal: A Due Diligence Report
[14] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[15] BPlan_2000_TS_RiderRevenue.pdf (n.d.).

According to the High Speed Rail Authority the High Speed Rail has estimated that there would be "12 stations per hour and 1000 seats per train"16 and the load factor was calculated by the average number of passengers divided by the number of seats available. In the plan each train was forecasted to hold about "42 to 68 million passanages in 2020".17 The Business Plan calculated that an 80-seat train would ho.Id about 60 passengers which would lead to an "75% load factor".18 According to the studies by Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study and Cambridge Systematics the Environmental Initial Study stated that the prediction of the Altamont and Pacheco Pass network have a high ridership potential. A representative of Planning Conservation League stated "the ridership studies need to be redone"19 Much of the ridership has underestimated the amount of ridership throughout the stations connected to the High Speed Rail. California's High Speed Rail has been criticized by researchers, agencies and peer review groups because of the impracticable high predictions of ridership projection. The assumptions are based on "faculty models and flawed assumptions"20 According to Reason's 2008 Due Diligence Report the California High Speed Rail Authority ridership projection are approximately 200% higher than than most high speed rails. 21In the 2008, the California High Speed Rail Authority forecasted that there would be a yearly ridership of about "65.5 million intercity riders with a high projection of 96.5 million intercity riders by 2030"22.The studies done by the Due Diligence report conduct a model estimation and used 23.4 million intercity riders and the result of their study was nearly "60 percent below the CHARA's high of 96.5 million". 23

The second point the study will be focused on is the over-optimistic prediction of mode shift. Mode shift described in the study is the amount of alternative transportation such as airplanes or cars and shift to California's High Speed Rail. There are two methods that are used in order to measure modal shifts 1) conducting an ex-ante for demand of HSR in the future and 2.) conducting an ex-post of changes in HSR demands.24 According to a study done by Berkeley "the mode [shifts] actually used by the travelers were not representatives of traveler population". 25The study analyzes the importance of the different services is dependent on the different modes of transportation that the traveler is using "the resulting model gives a distorted view of the eyes of the average California traveler."26 California's High Speed Rail business plan explains that the additions of freeways and airport would be much more costly if the high speed rail is not built. With the implementation of the High Speed Rail it will relieve congestion among highways and freeways. "Shifting more trips from flying or driving to high-speed rail will increase capacity [in] airports, as well as reduce roadway congestion in corridors."27 California's High Speed Rail Authority claims that the expansion of additional airports and highways would cost about $171 billion. According to the Due Diligence report CHSRA alternative cost analysis assumes:

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[16] Reason Foundation. (2008). The California High Speed Rail Proposal: A Due Diligence Report
[17] Reason Foundation. (2008). The California High Speed Rail Proposal: A Due Diligence Report
[18] BPlan_ 2000 _TS_ Rider Revenue.pd/ (n.d.)
[19] ITSBerkeley, (2010). Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
[20] Reason Foundation. (2008). The California High Speed Rail Proposal: A Due Diligence Report
[21] BPlan_ 2000 _TS_ Rider Revenue.pd/ (n.d.)
[22] ITSBerkeley, (2010). Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
[23] BPlan_ 2000 _TS_ Rider Revenue.pd/ (n.d.)
[24] Mineta Transportation Institute. (2014). Modal Shift and High-Speed Rail: A Review of the Current Literature
[25] ITSBerkeley, (2010). Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
[26] ITSBerkeley, (2010). Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study
[27] BPlan_ 2000 _TS_ Rider Revenue.pd/ (n.d.)

1. Trains will have twice as more seats than planned
2. More trains will be operated than planned
3. About 65% additional highway miles would need to be added to have the same length as the high speed rail
4. Highway construction cost is higher than the Federal Highway Administration cost factors28

The train seating inconsistency is predicted by using a model prediction of 1,000 seats instead of 450 seats.29 As for the expansion of the airport CHSRA has been inconsistent with its prediction of seating within a plane. The first analysis was done with a plane average seating of 70 and another analysis was done with a plane average setting of 135.

The models used to run both the highway and airport expansion have been conducted with "old population growth estimates that indicate more need for future infrastructure than current population trends."30 But if California's High Speed Rail does not meet the expectations of ridership then the rail will technically not reduce the needs for the alternative modes of transportations. According to the Legislative Authority

> "**Alternative Cost Estimate Overstated**. The draft business plan compares the estimated $99 billion to $118 billion cost of constructing high speed rail with an estimated $170 billion cost of adding equivalent capacity to airports and highways. This comparison is very problematic because $170 billion is not what the state would otherwise spend to address the growth in inter-city transportation demand. The HSRA estimates that the high speed train system would have the capacity to carry 116 million passengers per year but their highest forecasted ridership is significantly Jess than that amount-44 million rides per year (roughly 40% Jess than capacity)" 31

The third point the study will be analyzing is the underestimated predictions of rider fares. According to the 2008 ballot the fares for the high speed rail was estimated to be $51 dollars for a trip to San Francisco to Los Angeles. 32 But throughout the years and updated business plans the fare of the High Speed Rail has only been increasing. California's High Speed Rail Authority has predicted that local and commuter ridership will be higher but the alternative modes of transportation has cheaper fares than CHSR. According to the Due diligence they have made two comparisons that reports "about 4.5 million annual intra-regional trips on Antelope Valley and Orange County lines, [has an] maximum undiscounted fare of about $20 dollars"33 but compared to the High Speed Rail with a similar route and a higher projected carry will be charged a fare of about $34 dollars. Another example is Caltrain located in the San Francisco Bay Area which "carries approximately 11 million annual riders at a maximum fare of $13.00. But compared to California High Speed Rail with the same route distance will be charged at a fare of

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[28] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[29] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[30] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[31] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[32] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA
[33] California General Election. (2008). Safe, Reliable High-Speed Passenger Train Bond Act: Proposition IA

about $23.00. The fares of the High Speed Rail would need to be higher because of the construction cost of the infrastructure. In 2016 phase 1 estimates that the rail would be completed with $64.2 billion but in the 2018 business plan phase 1 total increased $13.1 billion more to $77.3 billion.34 The inconsistency of the pricing of the high speed rail makes it difficult to generate an close estimate of fares.

The fourth point his study will be address is the overemphasized speed of the High Speed Rail. According to the CHSRA draft 2011 business plan an "express/non-stop"35 train ride from San Francisco to Los Angeles in 2 hours and 40 mins. In order to achieve this estimated time CHSR must operate at a speed of 220 mph. With the change of "blended system" which mixed it operations with Caltrain and metrolink stops which will connect to California's High Speed Rail. Due to the other connections California High Speed Rail will not be a one way stop train it will need to incorporate multiple stops with commuter trains, and freight trains. One point is the Peninsula line where the CHSRA stated its trains will connect San Francisco and San Jose within 30 minutes36• According to CHSRA the same estimated time was proposed "which was based on running trains on low-obstruction, no at-grade rail/highway crossing, elevated, four-track structures at speeds between 100 and 150 mbps"37 but because there is a blend system now proposed there are changes such as multiple stops and shared tracks. According to a study done on California High Speed Rail San Jose to Merced Corridor "Shifts in transportation mode choices can influence transformations in built, physical, and social environments"38 which is one factor that can affect urban areas studies performed by Due Diligence there are several safety concerns with a high speeds (220 mph) in stations and crossings. According to the study "traversing railroad/street crossings used by vehicles and pedestrians, [could have] potential demands to reduce excessive noise by operating at slower (noiseless) speeds."39 Analysis done by Transportation Research Board a noiseless to a high noise speed in urban areas are about 60 to 100 mphs. The proposed speed of the phase 1 blend is equivalent to the highest speed in France for about 199 mph. As of today the highest high speed rail is in France with a speed of 199 mphs. A difference of 21 mph proposed by California High speed rail (220 mph). Other trains around the world do not run at that speed, most of the trains that are successfully running are under the predicted speed. 40Additionally, some speed had to be reduce for safety concerns which include environmental impacts and pedestrian safety.

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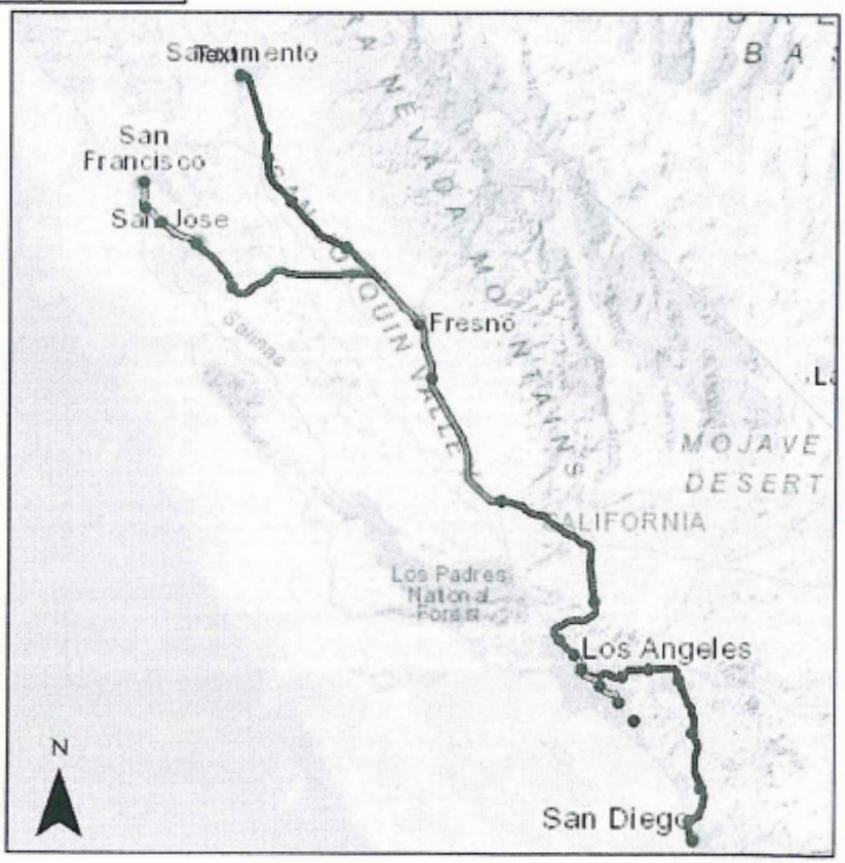
[34] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[35] California High-Speed Rail Authority Draft 2011 Business Plan (2011).
[36] CHSRA EJ Guidance 8-14-2012.pdf. (n.d.)
[37] BPlan_2000_TS_RiderRevenue.pdf (n.d.).
[38] University of California Berkeley. (2011). Health Impact Assessment California High Speed Rail San Jose to Merced
[39] University of California Berkeley. (2011). Health Impact Assessment California High Speed Rail San Jose to Merced
[40] Reason Foundation. (2008). The California High Speed Rail Propasal: A Due Diligence Report

California High Speed Rail



HSR Route

Stage

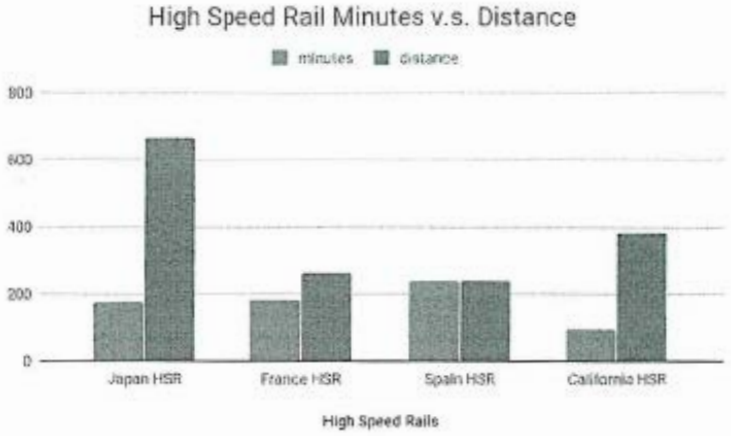
- 2019
- 2022
- 2026
- 2028
- Possible Future Phase 2
- CA_State_TIGER2016

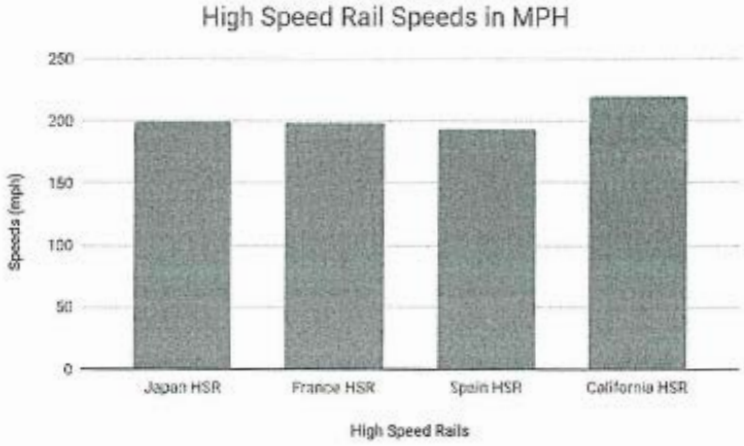
0 37.5 75 150 Miles

Service Layer Credits: Sources:

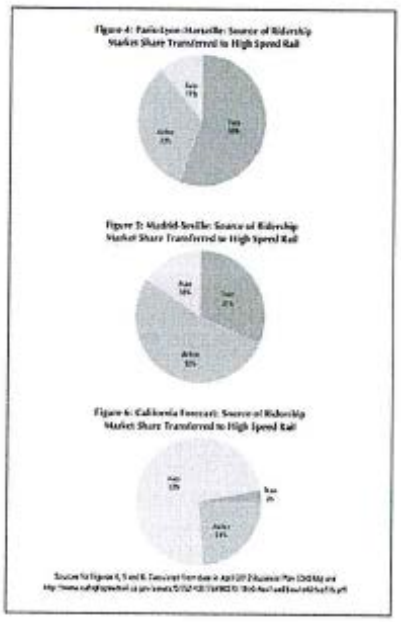
Discussion:Case Study international High Speed Rail compared to California High Speed Rail

The question this study is focused on is who can afford California High Speed Rail? This question is analyzed through a comparison of the business plans from High Speed Rail Authority and international high speed rail. The business plans were used to analyze the technical feasibility on the performance of the policy and if it has been achieving its outcomes. Then from the international high speed rail comparison it would help determine how that data could be transferred to California High Speed Rail and whether it will have the same impacts. A modal shift is when passengers select High Speed Rail over other modes of transportations such airplanes, cars or trains. The modal shift is consider a competitive shift by the passenger in order to pick which mode would better service them. Some modal shifts are made because of lower fare prices, and reduced travel time. This case study was only analyzed through distance and time prediction as well as other variables that international high speed rails analyzed. I have created two charts that explained the speed for high speed rails and time among distance. One chart analyzed the average speed that CHSR predicted and compared it to international high speed rails that are currently taking place. The second chart demonstrates distance between international high speed rail and CHSR. The chart also looks at minutes compared to the distance between the international high speed rail and CHSR. The distance that were looked at were route lines that were similar to CHSR (san francisco to los angeles)

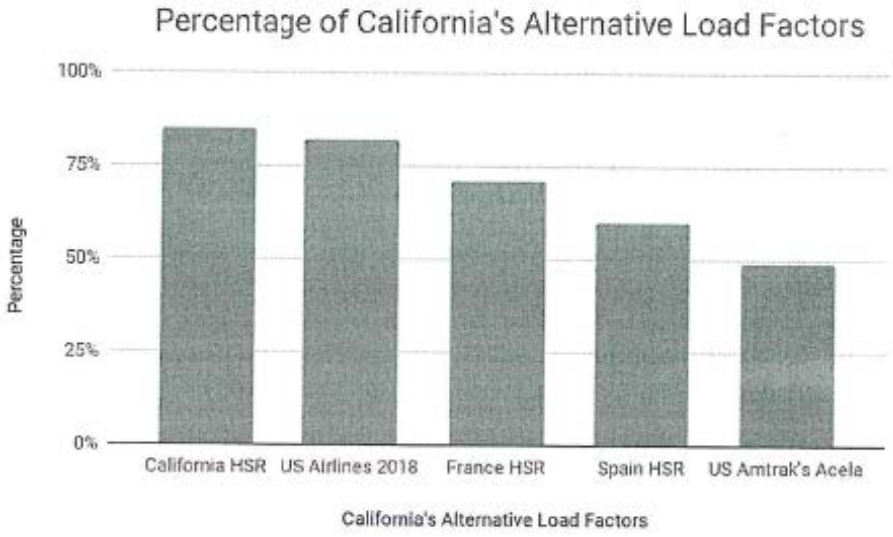




I also compared literature reviews that analyzed the main points mentioned earlier in the study. The charts that were provide by the literature review, I was able to make a similar table that showed the load factor that alternative modes use for current data such as us airlines(2018) and amtrak. .



Sources: Calculated data in April 2012 and https://reason.org/wp-content/uploads/files/california_high_speed_rail_report.pdf[41]



According to UK Web Archive, " the most commonly identified reasons why people use cars rather than other modes is that car travels offers opportunities that [time and/or cost of

[41] Reason Foundation. (2008). *The California High Speed Rail Proposal: A Due Diligence Report*

alternative modes do not compete with]." [42]The case study also introduced me to research that attempted to figure out the modal shifts but exposed me instead to how difficult it is to predict how the communities would be affected if the High Speed Rail was not constructed. Many studies have attempted to conduct research on the prediction but can be limited. In Japan during 1965, the transportation that was used was primarily roads. With the high use of roads Japan decide to construct a High Speed Rail and with the success of the high speed rail "Japan has opened at least one new line on average every 4 ½ year."[43] but because of the high speed rail it created more options for residents to expand their home to suburban areas. Many families created homes in areas further away, leaving the choice of the high speed rail to take them to inner city when their new homes were further away. But with this new homes the suburban areas expanded to have an environment that was filled with amenities for children and adults. "By moving that shopping, dining, and attendance at school out of tokyo, the center city lost demand and lost economic activity and there on net."[44] Creating new life and homes in areas further away from the city left people back to the use of cars that the high speed rail was intended to remove. "It is hard to identify any aggregate gain from the tokaido line."[45]

The analysis and numbers used for my data construction was not consistent and was not based on a specific year. According to reason foundation French revenues for HSR lines does not cover the service cost that the HSR provides for the people. According to a french economist, french taxpayers pay "about half the total costs of providing the service" [46]According to a detailed study conducted by reason foundation airplane travel are faster than rails.[47] The high speed rails in Japan and France are "cheaper and faster than rail travel."[48] There are many variables that have not be analyzed that can contribute to the lack of modal shift to HSR, but from the charts that are demonstrated the shifts to HSR may not be any better than the alternative transportation. According to Reason 2008 Due Diligence Report "automobiles would fall by 50%, while interregional ridership would lower by 35%-estimates that reflect international experiences and which demonstrate that the California High Speed Rail auto Attraction forecasts are implausibly high".[49] While other factors involving the preference of high speed rail can come from automobiles most of the shifts come from existing train users that prefer the use of a faster rail and airplane users who would prefer a lesser wait time that airports have when checking bags or customs. Comparing the international high speed rail, a majority of shift are existing train users and air flyers. The analysis on the international high speed rail is what is being compared to California High Speed Rail.

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[42] U.K. Web Archive.(2003). T*ransportation Research Group Barriers to Modal Shift*
[43] *Wang et al. - 2017 - A gravity model integrating high-speed rail and se.pdf.* (n.d.).
[44] *Wang et al. - 2017 - A gravity model integrating high-speed rail and se.pdf.* (n.d.).
[45] *Wang et al. - 2017 - A gravity model integrating high-speed rail and se.pdf.* (n.d.).
[46] Reason Foundation. (2013). *California High Speed Rail: An Updated Due Diligence Report*
[47] Reason Foundation. (2013). *California High Speed Rail: An Updated Due Diligence Report*
[48] Reason Foundation. (2013). *High-Speed Rail in Europe and Asia: Lessons for the United States*
[49] Reason Foundation. (2008). *The California High Speed Rail Proposal: A Due Diligence Report*

Methodology/limitation:

I conducted this research through a case study of international high speed rails in order to determine the mode shift of alternative transportation to the high speed rail. From comparing international high speed rail trains the analysis was then transferred to California High Speed Rail. The question of affordability is determined by the average choice of riders who will pick to use California High Speed Rail. Some limitations in this research is the inconsistency of years analyzed. The years are not consistent because there are studies that have been reviewed from 1996 to 2018. My comparison is also based on international high speed rail and replicating similar routes and environmental factors that California High Speed Rail may have. Another limitation are the values throughout the research are not consistent. Some dollar value are made in 2008 rather than 2018 value. The inconsistency of dollar value can be limited to the analysis because it lacks the comparison of today's dollar value which can be better understood. Some of the data in my charts were found through literature reviews which can also be a limitation because of the inconsistency of data found in different years. I attempted to find the most current data as best as I could.

Results/conclusion

In conclusion, the findings I have made through the help of literature reviews and case studies on California High Speed Rail has not been true to what the High Speed Rail authority had initially proposed in Assembly bill 1A. The first proposed value of fares for California High Speed has increased. The speed the High Speed Rail proposed is faster than other High Speed Rail. The speed the High Speed Rail Authority predicted is faster than any other high speed rail with the same distance of miles per hour. The amount of High Speed Rail users is higher compared to other high speed rails around the world. High speed rail users is referred to the predicted ridership that the High Speed Rail predicted. The way ridership is measured is by the amount of seats filled in the High Speed Rail. The number that the high speed rail predicted is the nearly as much as other high speed rail have predicted or filled. The shift from other modes of transportation to the high speed rail was higher than what other international high speed rail have data for. California High Speed predicted that the mode shifts would come from automobiles and air travelers when international mode shifts are air travelers and train users. Most of the train users shift to a High Speed Rail because they wanted to travel in a faster train. The findings helped me come to the conclusion that air travelers and train users will be riding California's High Speed Rail. For future research the study could be better organized to make an analysis on other factors that can contribute the modal shift such as environmental factors and location preferences. I would also want to continue the research to make the an analysis on California High Speed Rail Business Plan from 2018 to Assembly 1A. An additional mode of transportation can be beneficial but it does not mean that the other user would significantly decrease.

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Sara Margala
Dr. Nina Abramzon

Surface Modification of Stainless Steel Using Radio-Frequency Generated Cold Plasma

Abstract

Atmospheric pressure non-thermal "cold" plasma alters the surface properties of a material while leaving the bulk characteristics unchanged. This treatment has been shown to expedite the sterilization of medical equipment, destroy and prevent biofilms, and enhance the adhesion of coatings. However, there remains a need to optimize and understand the mechanism of the surface energy enhancement. If the mechanism is understood, efficient and effective treatment protocol can be tailored for individual applications. Here, 330 series stainless-steel was treated using a helium and oxygen cold plasma AtomfloTM 250 reactor (SurfxTechnologies, CA) and the change in surface energy was observed and quantified using a water droplet contact angle technique. Results from contact angle measurements along with optical emission spectral analyses of the plasma, obtained using a 0.5 nm resolution CCD spectrometer (Ocean Optics HR-4000CG-UV-NIR), indicate that the reactive oxygen species (ROS) in the plasma cause an increase in the hydrophilicity of a material's surface. Additionally, we find that more reactive species are present at lower oxygen flow rates where the most effective surface modification is observed, as suggested by the largest change in contact angle. Our findings indicate that cold plasma is an effective tool for surface modification and show that reactive oxygen species are responsible for this surface modification. Further analyses into the interactions between ROS and the material’s surface are planned as are efforts to determine optimal plasma parameters for specific applications such as corrosion prevention.

Elizabeth McKinney
Dr. Katherine Gasdaglis

Autonomy, Depression, and Dignified Death: A Discourse of the Moral Permissibility of Physician-Assisted Death for the Severely Depressed

Abstract

In this paper, I discuss the moral permissibility of physician-assisted death for psychiatric patients with severe depression. While the majority of our depressed community do respond positively to treatment, like certain physical illnesses, there are certain cases in which treatment options run out for the clinically depressed. Society has loosened its paternalistic grip in our medical decisions by recognizing the importance of autonomy and its contribution to our overall well-being. For this reason, I argue that the principle of autonomy defends the view that patients with untreatable, severe depression should have access to physician-assisted death. I will discuss why untreatable cases of severe depression are analogous to terminal illness cases by demonstrating that there are more similarities than differences between the two. There are certainly many arguments that oppose my stance; however, I will demonstrate how a closer examination of physician-assisted death may legitimate my view. In order to do this, I will address objections to physician-assisted death in general, then I will address the more narrowly tailored objection of physician-assisted death for the severely depressed. I will show, through refutations, why these objections ultimately fail. Finally, I will discuss how the intrinsic value of autonomy supports the provision of physician-assisted death services to our severely depressed community.

1.0 Introduction

In January 2018, twenty-nine year old Aurelia Brouwers drank a lethal mixture of barbiturates prescribed to her by her doctors and laid down for her final rest. Unlike most terminally ill patients that are allowed physician-assisted death, Aurelia Brouwers was not terminally ill in the conventional way; rather, she was granted her request to die because of her severe psychiatric illness. The end of Miss Brouwers life marked the end of a long history of mental illness that started at the age of twelve: Borderline Personality Disorder, attachment disorder, and chronic depression. She claimed she was also chronically suicidal, suffered from anxiety, had psychoses, and heard voices. Describing her condition, Aurelia Brouwers said: I'm stuck in my own body, my own head, and I just want to be free...I have never been happy - I don't know the concept of happiness" (Pressly par.11). From her diagnosis starting at age 12 to the end of her life at twenty-nine, it is safe to say that Miss Brouwers exhausted every treatment option available.

Aurelia Brouwers' case is unique because it diverges from the conventional moral permissibility of physician-assisted death. Currently, physician-assisted death is usually granted only to patients with terminal somatic illnesses, such as cancer or amyotrophic lateral sclerosis, who have less than six months to live. Physician-assisted death is prohibited and illegal in most countries for patients with psychiatric illnesses. However, in 2002, the Netherlands became the first country in the world to allow physician-assisted death for psychiatric-related illnesses (CBSNews.com).

The concept of patient autonomy has gained traction within the last few decades, departing from the traditional paternalistic approach to medicine. We have begun to recognize the importance and significance of the patients' ability to decide. However, the prima facie judgment would be that patients with severe depression should be precluded from this ability to self-govern. After all, it is a generally accepted thought that a sense of clarity is required for autonomy and most people do not believe that patients with mental illnesses like severe depression possess this ability.

Yet, in the case of Aurelia Brouwers, Sander Paulus, a journalist who spent a majority of her last days with her, said: "You just felt there was a lot of pressure in her head. She didn't speak that well anymore - except when we talked about euthanasia. She was very clear on that" (BBC News).

Does the seemingly apparent presence of clarity and lucidity justify a depressed patient's right to autonomy in their decision to die? In Aurelia Brouwers' case, it did. Dutch law requires that the patient's request for assisted-death is "voluntary and well-considered" and Miss Brouwers seemed to have met this criterion. Many others, however, would argue that she did not have the capacity to make this decision for herself. Some think that suicidal tendencies and thoughts are irrational in and of themselves. Is this necessarily true? I argue that wishing for death is not necessarily irrational; rather, in some cases, suicide can be a rational choice.

Severe depression is not like a somatic illness in that it is detectable in blood work or scans. Its hidden nature causes most of society to erroneously believe that it is always treatable, or even worse, question the legitimacy of the disease. I assert that psychiatric patients with severe depression are patients with real diseases. When possible, most patients, whether physically or mentally ill, should be afforded autonomy with careful guidance and consideration. The basic principle of autonomy allows patients the right to self-govern and access to physician-assisted death after all treatment options have run out. Thus, psychiatric patients with untreatable severe depression should be afforded access to physician-assisted death through the principle of autonomy.

In order to defend my thesis, I will first provide and clarify the terminology used throughout this paper. Then I will discuss the currently-held views and guidelines on autonomy and physician-assisted death for both somatic and psychiatric illnesses. Next, I will discuss the distinctions and similarities of patients with somatic and psychiatric illnesses and show that both patients experience similar levels of suffering. Then, I will discuss and refute both commonly raised and tough objections raised against my stance. I will first be addressing the moral permissibility of physician-assisted death in general, and then focus on misguided views of depressed patients. Finally, I will defend my stance on physician-assisted death for severely depressed psychiatric patients by explaining the intrinsic value of autonomy and why it is necessary for our well-being.

2.0 Terminology

For the purpose of clarity, I will need to clarify the terminology used in this thesis in order to avoid confusion. In my thesis, I will only be referring to the right to access physician-assisted suicide and voluntary euthanasia. Non-voluntary and involuntary euthanasia, for the sake of my topic, are not morally permissible and will not be considered factors in my argument.

Physician-assisted suicide, a self-inflicted method of ending one's life, occurs when the doctor prescribes a lethal dose of medication that is orally taken by the patient, at the patient's explicit request, and for the purpose of hastening death. Voluntary euthanasia is when the physician physically injects the patient with life-ending medication, at the patient's explicit request, and for the purpose of hastening death. Some people hold the view that voluntary euthanasia is impermissible because the doctor is physically killing the patient, whereas the method of physician-assisted suicide can be morally permissible since the patient is essentially killing themself. While there are ongoing debates about the moral differences and permissibility between physician-assisted suicide and voluntary euthanasia, I will consider them both morally permissible and absent of distinctions. This moral permissibility applies to both cases of somatic illness and severe depression. For the sake of brevity, I will be using the term physician-assisted death when I am referring to both physician-assisted suicide and voluntary euthanasia.

Additionally, when I refer to psychiatric patients with depression, the terms "clinically depressed" and "severely depressed" will be used interchangeably.

2.1 Current Views on Autonomy

Autonomy is generally known as the ability to self-govern. However, in granting autonomy, it is a reasonable requirement that we require that the patient possesses rational capacity in making decisions for themselves. While the definition of rational capacity may vary, there are four shared elements on what this can be: understanding, appreciation, reasoning, and choice. The patients must understand, at least at a basic level, the facts involved in their decision. Then, they must be able to appreciate the nature and significance of their decision. Also, they must possess the ability to engage in reasoning involved in their decision. Finally, they must be able to express their decision. (Charland par. 7-10).

Rational capacity is crucial in physician-assisted death for obvious reasons. We must be able to determine that the patient is of sound mind and not acting in a temporary or deluded state of mind. If we can determine that the patient is lucid and fulfills the criteria required for rational capacity, there seems to be no reason why we should not allow the patient to exercise their autonomy.1

2.2 Current Views on Physician-Assisted Death for Somatic and Psychiatric Illnesses

Currently in the United States, there are seven states that allow physician-assisted suicide: California, Colorado, Oregon, Hawaii, Vermont, Washington, Montana, and the District of Columbia. While specifications may vary within each state, there are three consistent requirements: a) you are an adult resident within each respective state that you are applying for physician-assisted suicide in, b) you are mentally competent, and c) you are diagnosed with a terminal illness that will lead to death within six months. Currently, in the United States, psychiatric illness is not recognized as a terminal illness and is precluded from the requirements for physician-assisted suicide.

3.0 Distinctions and Similarities Between Somatic Illness and Severe Depression

It is important to clarify the distinctions and similarities between somatic illness and severe depression. Generally, somatic illnesses have an observable effect on a patient's body while psychiatric illnesses manifest their symptoms mainly through behavior. While patients with depression may not exhibit the same kind of symptoms as patients with somatic illnesses, the act of disregarding the clinically depressed patients' symptoms is harmful. Despite recent efforts to de-stigmatize mental illness, it is not held in the same regard as physical illness. Depression is commonly viewed as a treatable condition that people will "get over". Yet, many people carelessly discredit the similarities. While it is true that severely depressed patients may not have failing organs or cancer-ravaged bodies, they do, much like patients with physical terminal illnesses, have a condition that is undesired and requires prescribed medicine and therapies under the supervision of a doctor.

Therefore, the idea that severe depression is not a terminal illness can be a false one. I argue that severe depression can be considered both a somatic and terminal illness. In a psychiatry podcast called Psyched, Dr. Charles Nemeroff argues:

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[1] I understand that this statement might suggest that people with delusions (i.e. schizophrenic patients) are not capable of understanding what's going on while they are in the middle of a psychotic episode. However, unless the patient is in a permanent state of delusion, I hold that temporary states of delusion does not necessarily preclude a patient from access to physician-assisted death.

> Depression is a systemic illness. It affects the whole body. Part of having depression is being very vulnerable for other medical disorders, including diabetes, heart disease, certain forms of cancer, stroke. Depression is a killing disease. Not only does it kill you by suicide, it kills you because your life expectancy is shorter because of the biology of the illness. What I mean by that is the biology of depression is not just in the brain. It's in the whole body.

The biased notion that depression is just "in your head" is clearly not the case. It is not something that someone can simply snap out of; rather, depression has very real, and sometimes very serious, effects on the body. While I admit that depression, in itself, does not necessarily kill a patient, I argue that there are many serious physical illnesses that people do not die directly from either.

This can be explained by examining certain somatic diseases. For instance, patients with HIV/AIDS do not die from the virus itself - simple infections take advantage of the weakened immune system of HIV patients and the common cold can ultimately kill them. Cancer patients can also die from infections due to their compromised immune systems. Patients diagnosed with ALS or even pneumonia do not die from the disease itself; rather, they can die from respiratory failure. Similar to Dr. Charles Nemeroff's claim, there is growing evidence that depression is a systemic disease. In a 2002 article in the Journal of Psychosomatic Research, they investigate how "depression may contribute to morbidity and mortality through immune dysfunction" (Glaser). Similarly, a 2015 article examined how "depression is a risk factor for cardiovascular disease" (Seligman, Nemeroff). Recently, the American Heart Association just added depression as a risk factor for heart disease. The comparison between terminal illness and severe depression are quite clear: depression is not a disease that should be considered limited to a mental state; rather, it can cause real and negative effects to the body.

Also, many people with severe depression will die from their disease - through suicide. According to the American Foundation for Suicide Prevention, suicide is the tenth leading cause of death in the United States. Each year, about 44,965 Americans die by suicide and over half of all people who die by suicide suffer from major depression. While arguments of distinction can be made (deterioration of the body from physical ailments versus self-inflicted harm), I am not convinced that a clear demarcation exists. The arguments of distinction seem to imply that physical illnesses are fundamentally different than mental illnesses. This erroneous distinction results in more options and autonomy for the physically ill - a faulty and unjust disservice for severely depressed patients.

Most cases of depression are treatable: about "80 to 90 percent of people with depression respond positively to treatment" (American Foundation for Suicide Prevention). However, just like treatable physical illnesses, treatment options are finite for both the physically and mentally ill. For a small percentage of the untreatable cases for severely depressed patients, there will ultimately come a day where they have run out of available treatments. Since certain cases of severe depression can be considered terminal, we should not refuse this portion of our community to the same dignified options that patients with terminal physical illness have access to.

3.1 Similarity of Suffering

Let us examine the similarities of suffering shared by patients with somatic and psychiatric illnesses. According to Oregon's 2017 Death with Dignity Act Data Summary, the loss of autonomy was the top reported end of life concern (87.4%) and has been the main concern since the inception of the Act (91.4%). The other top reasons that constituted a majority were the decrease in ability to engage in enjoyable activities (88.1%), the loss of dignity (67.1%), and the fear of being a burden on family, friends/caregivers (55.2%). Surprisingly, the fear or concern of inadequate pain control only made up a very small part (21%) of patientsâ€™ reasons for seeking end-of -life options. It is not the pain or the fear of pain that causes patients to seek end-of-life options; rather, it is the loss of autonomy, dignity and quality of life.

According to the DSM-5, the diagnostic criteria of major depressive disorder are as follows:

1. Depressed mood most of the day, nearly every day.

2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day.

3. Significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.

4. Insomnia or hypersonic nearly every day.

5. Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down.)

6. Fatigue or loss of energy nearly every day.

7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick.

8. Finished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).

9. Recurrent thought of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

I argue that severely depressed patients experience similar levels of suffering as terminally ill patients and therefore seek hastened death for similar reasons. For instance, somatically terminal patients' main reason for seeking physician-assisted death is the loss of autonomy. Criteria 1, 2, 4, 5, 6, and 8 most certainly would seem to result in a loss of autonomy: chronic depression, slower thoughts and movement, chronic fatigue, and a decreased ability to think would contribute to a decrease ability in doing what one desires. Similarly, the next top reason for physician-assisted death is the decrease in ability to engage in enjoyable activities. Criteria 2, 7, and 9 would result in this as well: diminished interest or pleasure, excessive feelings of worthlessness, and recurrent thoughts of death would unquestionably result in the decreased ability to take part in activities that should be enjoyable.

Similar to patients with terminal somatic illnesses, it is safe to surmise that patients with clinical depression also experience a lower quality of life and a loss of autonomy and dignity. We can see that both types of patients experience similar types of suffering and seek hastened death in the fear and anticipation of their condition worsening. It follows, then, that generalized and dangerously stereotypical attitudes we hold about depression are doing a great disservice to our severely depressed patients. Therefore, we must hold severely depressed patients with the same regard as the terminally ill.

4.0 Arguments Against the Permissibility of Physician-Assisted Death

4.1 First, it is imperative that I make the moral distinction between "killing" and "helping to die". Many critics of physician-assisted death argue that there is no difference and that the term "helping to die" is simply a way of avoiding the truth. They structure their argument like this: P1: Helping a patient die is killing them.
P2: Killing is morally wrong.
C: Therefore, helping a patient die is morally wrong.
I argue that this is manifestly false. Albeit the lack of another word for ending someone's life ("kill"), there is a significant difference in killing a patient and helping a patient die: the distinction exists in that the former is absent of consent. Jean Davies offers an analogy:

> Consider, for example, the physiological phenomenon of sexual penetration and ejaculation. There are two most commonly-used four letter words for this act, one being rape. No one is in any doubt about what constitutes (sic) the difference between love-making and rape; it is the consent of the receiver of the act. So it seems that we do need two very different words for what may be an identical sexual act, the crucial difference being whether or not it takes place by consent (148).

Thus, we should accept that "letting die" is not merely another way to say "kill"; rather, "helping to die" means something entirely different. There is a clear moral distinction here and the two terms must not and cannot be used interchangeably. Although they are consequentially the same, the distinction lies in the moral value.

4.2 One common objection to physician-assisted death is that the very act of ending a patient's life is not consistent with the goals and aims of medicine.2 In fact, the Hippocratic oath directs physicians to do no harm. Many would argue that the very act of ending a patient's life is harming the patient. This argument fails because there is a general consensus that it is acceptable to stop life-sustaining treatment if the patient is suffering greatly and the continuation of treatment is futile. Also, this claim would only be true if the patient's life was ended without their explicit consent or against their request. The contention that allowing a patient to end their life is inconsistent with the goals and aims of medicine is problematic because it implies that the physician must do anything and everything to keep their patient alive. It is easy to imagine many cases where medicine and life-sustaining treatments can actually have a detrimental or negative impact, by "preserving biological existence rather than [a] meaningful personal life […] Instead of becoming victims of medical power, patients should decide when and how to use medical technology" (Palliative Medicine, 507). I think a more reasonable aim of medicine is to "only preserve and prolong human life for as long as it is worthwhile" (Palliative Medicine, 507).

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[2] In his article "Voluntary Euthanasia, Physician-Assisted Suicide, and the Goals of Medicine", Jukka Varelius provides a list of goals that he believes makes up appropriate goals of medicine in bioethics literature. Two of these goals are 1) the avoidance of premature death, and 2) preservation of life.

Additionally, we know and expect that doctors should also be concerned with our well-being, which includes the alleviation or elimination of suffering. Thus, the goals and aims of medicine are not to merely keep someone alive; rather, the value of medicine lies in optimizing the quality and meaning of life.

4.3 Another objection to physician-assisted death is the claim that we should not allow this kind of practice since death is irreversible. Proponents of this claim protest that the permanent consequence of death makes physician-assisted death impermissible. I would argue, then, isn't the widely-accepted method refusal of life-sustaining treatment with the intent to die also irreversible? I find it highly unlikely that many people would find it morally egregious for a patient to refuse life-sustaining methods, if they should so desire. So where, exactly, does the distinction lie between the irreversibility of physician-assisted death and refusal of treatment? I argue that both decisions have the same consequences with the same level of permanence. Therefore, the principle and deference of patient autonomy has afforded us options for our crucial, end-of-life moments that provide us with dignity and control over our bodies.

4.4 Another common objection to physician-assisted death is the slippery slope argument. Malcolm Parker writes: "Here are slopes down which we could fall, first towards a reduced sensitivity to killing and increased convenience killings, and second towards a slackening in professional resolve to save and prolong life" (31). Ronald Dworkin refutes these objections by claiming: "This contradicts common sense. Of course doctors know the moral difference between helping people who beg to die and killing those who want to live. If anything, ignoring the pain of terminal patients pleading for death rather than trying to help seems more likely to dull a doctor's humane instincts" (A19). Further, we can limit these kinds of concerns by 1) making clear distinctions both in principle and in practice and 2) requiring the necessary condition of explicit request by the patient.

Since the Netherlands was the first country to legalize voluntary euthanasia, it is helpful to observe their statistics and occurrences. In 2010, voluntary euthanasia accounted for approximately 2.8% of all deaths in the Netherlands.3 The frequency of physician-assisted suicide has remained extremely low: at about 0.1%.4 Bernard Lo argues that abuse of this practice is not widespread, nor is there disproportionate use of physician-assisted death in vulnerable populations. He furthers his claim by writing: "Physicians do not substitute hastening death for the provision of palliative care. Instead they intensify the alleviation of symptoms […] much more often than they undertake euthanasia or physician-assisted suicide […] Physicians grant fewer than half of euthanasia requests from patients" (The Lancet). Here, the statistics and empirical evidence suggest that, while well-meaning, the slippery-slope argument is not a strong objection for physician-assisted death.

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[3] Onwuteaka-Philipsen, et al. claims that "of all deaths in the Netherlands, 2.8% (95% CI 2.5-3.2; 475 of 6861 were the result of euthanasia. This rate is higher than the 1.7% (1.5-1.8' 294 of 9965) in 2005, but comparable with those in 2001 and 1995".

[4] Onwuteaka-Philipsen, et al. The years of 1990, 1995, 2001 showed that the frequency of physician-assisted suicide were 0.2% but dropped down to 0.1% in 2005 and that frequency has remained stable through 2010.

4.5 Opponents of physician-assisted death also argue that the autonomy defense is ludicrous. They would argue that if we abide strictly by the principle of autonomy, anything, both reasonable is ridiculous, would have to be respected by the doctor. For instance, if a patient wanted a doctor to cut off one arm because of their desire for transability (the desire for able-bodied individuals to become physically impaired), under the principle of autonomy, the doctor must respect and follow through with the patient's wish. While the concept of autonomy is important, it does not necessarily mean that doctors should abide by every wish of their patients. It is within reason to refuse a patient's request to unnecessarily cut off a limb, just as it is unreasonable to unnecessarily remove an eye. These kinds of requests imply that an issue with rational capacity may be present.5 I argue that this objection defies both common and practical sense because it is a known requirement that doctors must stay within guidelines set by their Code of Ethics. Similarly, where physician-assisted death is available, sets of guidelines are followed by doctors in order to ensure that they are acting within legal and reasonable limits.

In both the United States and the Netherlands, the criteria that the patient must meet for physician-assisted death are quite conservative and strict. For instance, under the California End of Life Option Act, to qualify for physician-assisted suicide, the patient must be terminally ill and within six months of death. From this initial starting point, the patient must make their first oral request to their physician, who then confirms that all of the eligibility criteria are met. The physician must inform the patient of all alternatives, including palliative care, hospice and pain management option, and explain that the patient should notify their next-of-kin of the prescription request. A second, consulting physician must confirm the patient's diagnosis, prognosis, and mental competence. After the first oral request, there is a mandatory waiting period of at least fifteen days to make the second oral request. Somewhere between the first and second oral request, the patient must submit a written request to their attending physician, which must be witnessed by two individuals. After the two oral requests and the written request, if approved, the physician will write the prescription to the patient. The patient is free to fill the prescription anytime they wish. They are also free to not fill the prescription. Finally, the patient must complete a Final Attestation Form 48 hours prior to taking the life-ending prescription. (California End of Life Option Act)

Similarly, in the Netherlands, physicians must also abide by a strict set of guidelines in order to approve physician-assisted death for psychiatric patients that seek hastened death. According to the International Journal of Law and Psychiatry, the physician must:

a. Be satisfied that the patientâ€™s request is voluntary and well-considered;
b. Be satisfied that the patientâ€™s suffering is unbearable, and with no prospect of improvement;
c. Inform the patient about his or her situation and prognosis;
d. Have come to the conclusion together with the patient that there is no reasonable alternative in the patient's situation;
e. Consult at least one other, independent physician, who must see the patient and give a written opinion on whether the due care criteria set out in (a) to (d) have been fulfilled;
f. Exercise due medical care and attention in terminating the patient's life or assisting in suicide.

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[5] I understand that the desire for transability may not necessarily mean that the patient does not possess rational capacity.

We can clearly see that access to physician-assisted death is not as easy as some may claim. There are clear guidelines physicians must follow and determine based on the merits of the patient's case. Without guidelines, the autonomy defense, admittedly, would be very weak.

However, it is sufficient to say that legislators have taken this concern seriously and proactively created reasonable boundaries that physicians must work within. Therefore, the autonomy defense is not as ridiculous as some would claim because the defense works within carefully constructed safeguards and parameters.

Even with objections to physician-assisted death addressed, some people might still find it morally impermissible to allow and provide severely depressed patients access to hastened death. This concern is reasonable. However, this stance is both unjust, wrong, and a result of the stigma that follows mental illness. I argue that it is permissible to allow severely depressed patients access to physician-assisted death because they possess the ability to make such a decision for themselves.

5.0 Arguments Against Physician-Assisted Death for Depressed Patients

5.1 Some people would argue that severely depressed patients do not have a true world view; therefore, this would render the patients incapable of making "correct" decisions and preclude them from autonomous choices. The theory of depressive realism suggests that this view could be wrong. The concept of depressive realism stems from the theory that "people tend to overestimate the relationship between their actions and reinforcers, even if these events occur noncontingently … [this phenomenon is called the] illusion of control, because it consists of people believing that they have personal control over uncontrollable events" (Blanco, et al. 551). To put simply: a study by two psychologists, Alloy and Abramson, suggested that depressed people may actually possess a more realistic appraisal of the world. Alloy and Abramson were able to come to this conclusion because depressed people exhibited behavior that showed an understanding of uncontrollable events in relation to things that were in their actual control. This suggests that people with depression might not have an unrealistic and negative view on life. In fact, depressed people may actually have a more accurate outlook than people with a positive outlook; positive people may actually be walking around with proverbial "rose-colored glasses".

Next, I contend that we allow many people autonomy in their medical decisions on the basis of their religious convictions. We honor Jehovah's Witness' refusal of blood transfusions, even if the refusal would result in inevitable death. We also honor the Christian Scientists' refusal of most medical treatments. Further, we honor parents' choice, religious or not, not to vaccinate their children, even when an outstanding amount of literature and studies prove that vaccines are effective and herd immunity is crucial in keeping infectious diseases at bay. Hence, if we are able to respect the autonomy of these aforementioned groups in their medical decisions without questioning their world views, we should also respect the autonomy of depressed patients in their medical decisions.

I would also argue that many people with false or farcical world views are afforded autonomy every day. For example, in 2017, Sean Corbett of Chandler, AZ won the right to wear a spaghetti colander on his head in his driverâ€™s license in observance of Pastafarianism, a religion that follows the tenements of the Church of the Flying Spaghetti Monster. While quite ridiculous in nature, it would be highly unlikely that anyone would strip Mr. Corbett of his autonomous rights, especially medical in nature, because of his world view. Hence, if we can afford someone who practices a religion that is seemingly satirical in nature autonomy, we can surely allow severely depressed patients autonomy in their search to end their unbearable suffering.

5.2 Similarly, many people contend that severely depressed patients do not possess the rational capacity required for autonomy. I would argue that this claim is quite simply untrue. To make this claim, I shift the burden of proof: why are people with depression necessarily irrational? For instance, not all severely depressed patients are necessarily deluded. In fact, if we refer back to the criteria and definition of clinical depression in section 3.1, delusion is not a necessary factor for diagnosis. Further, even if the psychiatric patient experienced bouts of delusion, such as a schizophrenic patient, this does not necessarily negate the patient's ability to self-govern. Unless the patient is in a permanent state of delusion or paranoia, it is safe to surmise that the patient will have the moments of clarity needed to make autonomous decision.

Another objection that stems from this rational capacity argument is that the act of killing oneself is irrational. I refute this objection with the argument that suicide simpliciter is not necessarily irrational; rather, suicide can be a rational act. This philosophy goes back to ancient philosophy with the Stoics whose point was "not to live as long as possible […] but rather to lead a life that satisfied one's own rational standards". This worldview is within reason: no one should be forced to continue to live a life that is unbearably poor in quality. I'm not sure if there exists an irrefutable argument that proves "the optimistic assumption that every life is worth living" (Wittwer 424). Additionally, it is not challenging to demonstrate that severely depressed patients who seek physician-assisted death act in a rational manner. Hector Wittwer writes: "Firstly, they are not taking their own life spontaneously. Instead they make at least medium-term plans for their suicide with the physician's assistance. They are not acting from affect but rather from careful deliberation. Second, they do not try to hide their intention. Quite the opposite: they tell their physician that they wish to leave life" (421). The clear and deliberate seeking of a dignified death demonstrates the rationality of a patient's state of mind as compared to the plausible irrationality of someone who jumps off a bridge in a manic or desperate state. While some cases of suicide may be considered irrational, the desire to continue futile treatment can also be viewed irrational. Therefore, it would be a false assumption to regard all cases of suicide irrational since patients seeking hastened death do so in an organized manner that reflects their comprehension of their prognosis.

6.0 Argument in Defense of Autonomy for Severely Depressed Patients

In 1973, Dax Cowart suffered a tragic accident that left him with severe burns on over 65 percent of his body, including his face and eyes. During his first hospitalization immediately proceeding the accident (a 232 day encounter), he endured what anyone would call torture: bleach baths every other day, skin grafts, dead tissue removal, amputation of his fingers and the removal of his right eye. During his excruciating ordeal, Dax repeatedly demanded that the treatments stop so that he could die. The doctors refused. Soon after his first discharge, he was readmitted for infection from his wounds, malnourishment, and severe depression. Cowart again demanded that he be discharged so that he could go home to die. The doctors, again, refused. After a grueling fourteen month stay at the hospital, Cowart was allowed to go home. About a decade later, after a long battle with depression accompanied by attempted suicides, life finally got better for Dax. He got married, passed the bar, and has lived as an advocate for the right to die and as a practicing lawyer.

Two decades later, Dax Cowart delivered a lecture at Pacific Lutheran University advocating for patient autonomy and their right to die. In his lecture, Cowart argues that the right to make choices about your own body is an inalienable right. He asserts that no one can make decisions for you because you are the only one with the accurate perspective. He also quotes John Stuart Mill: "when the act is self-regarding in nature, the individual should be left to make his or her own decisions".

It is interesting to see a man, who has endured and conquered unimaginable pain, in both the physical and mental sense, would still advocate for the right to die. He admits that while he was in the hospital, fighting for the right to die, he was wrong in thinking that he would not want the quality of life he has now. However, he still contends his quality of life now remains secondary to the pain he was experiencing then and that he should have been afforded autonomy at that time: "Freedom, true freedom, not only gives us the right to make the correct choices; it also has to give us the right sometimes to make the wrong choices".

Autonomy is synonymous with freedom. Freedom allows us the opportunity to make both right and wrong choices. Although Dax Cowart still maintains that he should have been allowed to die, the message Cowart wants to convey is that the question of being right or wrong is irrelevant. Rather, the fundamental issue that lies at the heart of the right-to-die debate is that our intrinsic right to freedom and autonomy allows us, and only us, to make decisions about our lives - even if that decision is wrong.

Autonomy is intrinsically valuable to who we are: it is a fundamental component of self-government that allows us to live our lives as we see fit and so desire. It is an inseparable part of our well-being and essential to our ability to live fulfilling lives. Autonomy "implies the ability to reflect wholly on oneself, to accept or reject one's values, connections, and self-defining features, and change such elements of one's life at will" (Christman, 3.2,par 1). This ability to reflect, accept, and reject necessitates access to a diversification of choices at one's own discretion. This ability also presupposes the right to make right and wrong choices:

> The possibility of behaving in morally wrongful ways is seen to be necessary for the constitution and and maintenance of a moral self and the conduction of a moral life. Forming and sustaining a moral self and leading a moral life is taken to require the possibility of making meaningful choices between moral right and wrong, choices that one, according to proponents of this view, cannot make unless one has real option for performing morally wrongful actions. For one to have sufficient space for moral wrongdoing, proponents of this view take, one's possibility to perform morally wrongful actions must be protected by a moral right to do wrong. Accordingly, the advocates of a moral right to do wrong conclude, giving due respect to personal autonomy entails accepting that one can have a right to do wrong (Varelius, 236).

If we apply Varelius' argument to the right-to-die debate, like Dax Cowart's stance, it implies that it is irrelevant whether the patient is making a right or wrong choice in her decision to end her life - the principle of autonomy protects her in doing so.

Critics of the view may object to this claim and argue that autonomy also implies the ability to do whatever anyone wishes: does this mean that the principle of autonomy even protects people's actions that result in the harming of others? This is clearly not the case. The distinction lies in the fact that the patient's decision affects himself and not others. 6 In fact, a quick look at John Stuart Mill's harm principle in On Liberty supports this stance: "the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others" (Heydt, par 1). Thus, the defense of autonomy for physician-assisted death stands because the patient's decision solely affects the patient himself.

[6] While the debate continues of whether or not a person is truly isolated remains, for the sake of this paper and brevity, I hold that in cases of physician-assisted death, a patient physically affects himself only. To be charitable, I concede to the fact that a person choosing to die can emotionally affect others around him.

How we live our lives is important. However, it is equally important how we live the last part of our lives. For patients suffering from untreatable severe depression, they battle unbearable qualities of life while bearing the stigma of mental illness. These specific patients seeking elimination of their suffering should be considered terminally ill, just like our somatically-ill patients. And like their somatically-ill counterparts, physician-assisted death is medically appropriate and should be considered as a final act of mercy for that small proportion of our population. To respect their request for death is to respect their lives as autonomous beings. And just as we should not dictate how people should live their lives, we should not be able to tell people how they should die either. As Jean Davies so succinctly puts it: "People should be allowed to die on their own terms and […] not those of nature's cruelty or doctors' ingenuity".7

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Julissa Loza Mendez
Dr. Eleomora Rossi
Dr. Amalia Llombart
*RSCA

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Spanish Heritage Language Processing: Using Rosetta Stone to impact Heritage Spanish

Abstract

Throughout history, millions of individuals migrated to United States of America, bringing along their native language. When Heritage Spanish Speakers are born, they are typically exposed to their family's language and the country's majority language. In the academic system of United States of America, minority languages are treated as "foreign" with a negative c01motation. As a result, many heritage speakers do not continue learning their heritage language and become more dominant in the majority language, English. The goal of this study is to start investigating if and to what extent engaging in furthering Spanish through a computerized program (i.e., Rosetta Stone) will affect proficiency levels for Heritage Spanish Speakers (HSS). Moreover, in line with recent findings that show that short, intensive exposure to a new language modulates cognitive performance, we will test whether the process of engaging in relearning the heritage language leads to similar effects. The study will be a pre-post between-group design. We plan to test and compare performance between the participants who further their Spanish skills through Rosetta Stone.

Author Keywords

Heritage Speakers, Spanish, Rosetta Stone, bilingual

Introduction

Throughout the history of United States of America, different ethnic populations have immigrated bringing along not only their cultures, but their native language as well. In United States of America, there exists at least two types of minority languages (Montrul, 2011). The first includes indigenous languages that have become the minority where a new majority language exist (Montrul, 2011). For example, Native American Tribes and their languages have become the minority to English in United States of America. The second type, which this study will focus heavily on, is "languages spoken by groups of immigrants who move to a host country where another majority language is spoken" (Montrul, 2011). For example, individuals from South America who immigrate bring their native language to United States of America.

When the minority language is exposed to the majority language, a certain linguistic shift begins to occur. The children from monolingual parents in the language minority groups are now exposed to two languages during the developing process. This situation has an enormous impact on the children's oral, audio, and grammatical ability (Polinsky, 2011). These bilingual children are known as heritage speakers. According to the Valdes definition, a heritage speaker is "a student who is raised in a home where a non-English language is spoken, who speaks or merely understands the heritage language, and who is to some degree bilingual in English and the heritage language" (Valdes, 2000).

In United States of America, different minority languages are treated as "foreign", especially in academic settings. For example, Jim Cummins explains that the term heritage language in the United States, "refers to the languages of immigrant, refugee, and indigenous groups" (Cummins, 1995). Thus, the United States School System develops programs to "Americanize" heritage speakers by transforming fluent speakers of foreign languages into

monolingual English speakers (Cummins, 1995). Consequently, heritage language speakers understand from a young age that school is an English-only zone and develop shame in their linguistic and cultural language (Cummins, 1995).

In United States of America, languages such as Spanish continue to persevere in the count1y because of the continuous immigration, but the pattern of declining bilingualism shows that heritage languages do not survive intergenerational transmission. The pattern of declining bilingualism can best be explained as a linguistic cycle when the family transitions away from their heritage language and into the dominant language. The cycle starts with first-generations. The first-generation immigrants tend to preserve full command of their native language as they learn the majority host country language since it is assumed that they established a linguistic foundation in their native country (Montrul, 2011). For example, a Mexican immigrant, who spend most of their linguistic development time in Mexico, came to United States of America. They are considered first-generation immigrants. This individual would usually be monolingual and very dominant in their Spanish ability. Second-generations are children of the firstgeneration immigrants or immigrant children who come to the host country before age of 5 (Montrul, 2011). Second-generations have the most variability in bilinguals' ability and undergo dramatic linguistic change because they have been exposed to two dominant languages at a young age: their family's language and their country's language (Montrul, 2011). As a result of its covert English-only language policies and wanting to fit in into society, the second-generation heritage speaker becomes dominant in the majority language by the time they reach young adults (Montrul, 2011). Due to this rapid shift, the heritage speaker is now a native speaker of the majority language by the third generation and the heritage language is no longer used in the family by fourth and subsequent generations (Montrule, 2011). This transformation of the heritage language being replaced for the dominant language illustrates the end of the pattern of declining bilingualism.

Given few language opportunities for the child to use or become literate in their heritage language, the child's heritage language begins to undergo gradual attrition over its life-span. Polinsky compared child and adult heritage speakers who have a comparable language learning background and that arrived in the country at roughly the same age or were born there (Polinsky, 2011). The results of that study revealed that heritage children perform equivalent to monolingual children, but heritage children outperform heritage adults; therefore, the linguistic knowledge of adult heritage speakers shows significant degradation (Polinsky, 2011). If a language is not properly used, the heritage speaker starts to undergo gradual attrition. As Polinsky described, "In the absence of sustained input and without the influence of the dominant language, their heritage language system undergoes restructuring" (Polinsky, 2011). This means that language is extremely flexible and can undergo dramatic changes to the point where it undergoes gradual attrition. This may explain the pattern of declining bilingualism, and the declining proficiency in the heritage language.

My research will focus on the linguistic and cognitive effects that relearning of the heritage language has_ on heritage speakers. More specifically, in this study, I seek to investigate to what extent engaging in relearning Spanish through a computerized program, such as Rosetta Stone, will affect proficiency levels for Heritage Spanish Speakers (HSS). Additionally, a second goal of the study, will be to investigate if active relearning of the heritage language modulates non-linguistic cognitive functions such as memory and cognitive control. Recent evidence has indeed suggested that a short but intensive period of learning of a new language shapes cognition (Bak et al., 2016).

In the current literature, the definition of heritage language varies from very broad to very nan-ow (Montrul, 2011). As Montrul states, "unlike monolingual children, the range of linguistic ability and proficiencies reached by the heritage language speakers in the adulthood varies considerably- from minimal comprehension ability to full fluency in written and spoken registers, and everything else in between" (Montrul, 2011). Under this framework, having a very narrow language ability means that the individual is more dominant in the family's minority language; in contrast, having a very broad language means that the individual is more dominant in the language of the local environment (Montrul, 2011).

For the purpose of this research, I will be aiming at working with individuals who are closer to the narrower scale. Ideally, these individuals will have had the most exposure to the heritage langtiage from a young age. The idea that early language exposure shapes its processing has been supported by a large body of literature demonstrating that individuals categorize lariguages already prenatally and in the first stages of life. For example, newborns learn to group speech sounds into consonants and vowels during their first year (Au, 2002). We predict that pai1icipants will increase their cognitive performance and vocabulary when they practice Rosetta Stone. Moreover, past literature has demonstrated that overhearing any language regularly during childhood helps heritage speaking and monolingual adult learners to speak that language with a better accent later on (Au, 2002).

Methods

Participants

The sample (N = 13) consisted of pai1icipants who are Heritage Spanish Speakers (1-ISS) and varied in gender, age, and college grade level. All participants were 18 years or older to participate. Participants were recruited on campus through snowball methodology and flyers. This study contacted University Clubs and Societies, that might have a large number of Heritage Spanish Speakers, through email. All participants were part of the Voluntary samples. Participants were chosen depending on their level of proficiency in Heritage Spanish. In this research, we were looking for individuals located around the conversant spectrum; these individuals are not proficient in Spanish, but have a decent level of understanding in Spanish, such as speaking and/or writing. Participants who are closer to the narrower scale of conversant spectrum were chosen to continue the study. In addition, all participants in the experimental group were part of the Spanish learning class in which they participated for service learning hours.

Procedure

The study was a pre-post between-group design. There were two groups in this research: a Control Group and an experimental group (who will learn Spanish through Rosetta Stone ADV ANT AGE program). Participants who will be tested in the Control Group did not utilize the Rosetta Stone Program. The Control Group will be tested two times throughout the Fall Semester 2018. The first testing session took place around week three and the participants were given a Verbal Fluency Test, a Grammar Test through Diploma de Espanol como Lengua Extranjera (DELE), Linguistic Battery and Cognitive Battery, also known as OSPAN. The second session was done around week eleven and the participants were asked to perform the same tests as the first session.

A Verbal Fluency Test is a test to measure the participant's recall memory. For example, we asked participants to name as many animals as they can in 15 seconds in Spanish, then we asked them to repeat the exercise in a different category, but in English. Overall, there were eight

different categories: clothing items, animals, fruits, vegetables, professions, colors, body parts, and musical instruments. There were two random groups the participants could be placed: A 11 A2 or B1/B2. For the Al/A2 participants, the English categories were: body parts, colors, fruits, & professions. For the A 1/ A2 participants, the Spanish categories were: animals, clothing, musical instruments, & vegetables. For the B 1/B2 participants, the English categories were: animals, clothing, musical instruments, & vegetables. For the B 1/B2 participants, the Spanish categories were: body parts, colors, fruits, & professions.

The Linguistic Battery and Cognitive Battery tests, also known as OSPAN, are computerized tests which records the participant's cognitive ability--mental capacity and the extent in which it's used. This test has two parts: the math portion and the memorization portion. The participant will have to first solve a math problem and then they were given an alphabetical letter. This procedure continues until OSPAN tests participants by asking them to recall, in order of the words presented, all the letters that were given to them. In addition, OS PAN tracks the participant's math portion. It tells the participant how many math problems they got right and wrong. The participant must get overall a math score higher than 70 percent.

Diploma de Espafiol como Lengua Extranjera (DELE) is a Spanish grammar test that contains 50 multiple choice questions. The questions vary from asking participants about which word(s) needs an accent, the definition of a word, or adding a word that best fits in the sentence. Participants in the experimental group (the Rosetta Stone Program Group), learned and practiced their Spanish through Rosetta Stone for five weeks. Rosetta Stone ADV ANT AGE program had participants take two pre-test to place them in the correct level. Overall, there were three levels with three categories each. The levels were beginner, intermediate, and advanced. In the beginner level, categories such as introduction and ordering were given to the participants. In the intermediate level, categories such as clothing items and careers were given to the participants. Lastly, in the advanced level, categories such as business terms were given to participants. Participants were required to practice Rosetta Stone for three hours each week for three weeks.

Weekly emails were sent to participants to remind them of the study. Participants in the experimental group were tested two times: around week five and around week eleven to complete the Verbal Fluency Test, a Grammar Test through Diploma de Espanol como Lengua Extranjera (DELE), Linguistic Battery and Cognitive Battery (OSPAN). All participants who agreed to paiiicipate in the research received consent forms prior to the staii of the study. After the post-test participants only in the Rosetta Group were audio recorded and asked four questions. Question one, "What was your experience with Rosetta Stone." Question two, "How did this research impacted you, if any." Question tlu·ee, "Have you seen any improvements since Rosetta Stone; if so, which ones." The last question was, "Any feedback." This question was especially important as it allowed the participants to talk negatively or positively about the research and give the researcher an inside perspective of how to improve in the future.

To ensure confidentiality, participant names were removed from interviews prior to data entry, and the interviews will be identified only by a number code. The information from the interviews were stored in a locked computer in which only the main researcher and faculty adviser will have access.

Results

Scoring

The scoring our research utilized was Excel to code all the data for DELE and Verbal Fluency. We used a two-samples T-Test and CI to analyzed the data for Pre (SPN/ENG) and Post (SPN/ENG). In addition a Mann-Whitney was done to adjust for ties (DELE and Verbal Fluency). OSPAN records the results as soon as the participant finishes.

Descriptive Statistics

All participants described themselves as latino/latina and were 18 years or older. All pariicipants were from different ethnicities. For example, one participant described herself as Afro-latina, another participant described herself as Mayan, four participants described themselves as Mexican-American, one as only Mexican, two were Savadorianos, and the rest described themselves as biracial. In the pre-test, there were thi1ieen individuals (n = 13). In the post test, there were ten individuals (n = 10).

Inferential Statistics

In the two-sample T-Test for English and Spanish verbal fluency, we compared the pretest with the post-test for both the control group and the experimental group. In the english pretest, the mean was 25.38 (Jvl= 25.38, SD = 9.07). For the English post-test, the mean was 22.9 (M = 22.9, SD = 11.2). The test for estimation of difference was conducted. There was a 95% Cl for difference (11.67). The T-value for both the English test was .57 (T = .57) and the P-Value was .576 (P = .576); therefore, the p > .05 and there was no significant difference. We failed to reject the null: Ho: μ1 - μ2 = 0. In the two-sample T-test for the Spanish pre-test, the mean was 19.23 (M = 19.23, SD = 6.64). For the post-test, the mean was 18 (M = 18, SD = 4.64). The test for estimation of difference was conducted. There was a 95% CI for difference (6.14). The Tvalue for both the Spanish test was .52 and the P-Value was .607; therefore, the p > .05 and there was no significant difference. We failed to reject the null hypothesis: Ho: μ1 - μ2 = 0. Mann-Whitney was done to adjust for ties (W = 165, P = .598) .The estimation for difference was (-5, 7) and the achieved confidence was 95.62%.

The next test we analyzed was the DELE test. There were thirteen participants in the pretest (n = 13) and ten participants in the post test (n = 10). We did an estimation for difference in which the CI difference was 5.07 and the achieved confidence was 95.62%. A T-test was performed for English. In average, the pre-test had a lower grade (M = 31.46, SD = 6. 75) than the post-test (M= 31.6, SD = 5.21). The p > .05 (P = .956) and there was no significant difference. We failed to reject the null hypothesis: Ho: μ1, - μ2 = 0. Mann-Whitney was done to adjust for ties (W = 153, P = .876) .The estimation for difference was (-6, 5) and the achieved confidence was 95.62%.

The next test was the Ospan which showed diverse numbers of the Ospan total. 50 being the minimum and 65 being the maximum. This test tested their cognitive abilities by testing their memorization scores and their math scores.

Lastly, we conducted audio recordii1gs for the experimental group to record their satisfaction rate. When asked about "What was your experience with Rosetta Stone" three participants said that Rosetta Stone was too easy for them and that they would have prefered a more challenging environment. When asked to explain more details, two said that they wished they could choose higher

categories to learn more about medical or business terms instead of learning basic Spanish words such as mesa (table) or pelota (ball). Two participants explained that they wish that Rosetta Stone explained more grammar rules and less emphasis of repetition for the word(s). In addition, one participant explained that she did not liked the puzzles and was glad when she found out she could skip it. In question two, "How did this research impacted you, if any" two participants explained that they did not see much difference in their cognitive skills. Two participants said they enjoyed Rosetta Stone because it allowed them to learn vocabulary from different parts of Latin America. For example, one participant explained that she never heard this word being used to describe something, when she asked her mother, her mother explained that in some parts, the people prefer using that word (she did not mention what was the actual word). One participant also explained that they did not enjoy how much Castilian Spanish was influenced in the Rosetta Stone Advantage since his native Spanish did not sound like Castilian Spanish. The third question, "Have you seen any improvements since Rosetta Stone; if so, which ones" two participants said that they felt more curious to explore the Spanish language and that it was refreshing to relearn some Spanish words. Two participants said they did not see any cognitive changes with this research, but that finals (a week of testing for students) may have been a bigger priority for them than this research. The.last question was about any feedback, all participants said they enjoyed being part of this research. Several participants added that they wish Rosetta Stone Advantage was more user-friendly and that it explained more about Spanish rules.

Discussion

When Heritage Spanish Speakers are born, they are typically exposed to the minority family's language (e.g. Spanish) and the majority country's language (e.g. English). In the academic system of United States of America, minority languages are treated as "foreign" with a negative connotation; therefore, at a young age, Heritage Speakers feel pressured to conform to society and they end up sacrificing their first dominant family language to the country's . dominant language. If a language is not properly used, the heritage speaker starts to undergo gradual attrition. As a result, United States of America is going through a pattern of declining bilingualism.

This research was inspired as a way to understand more about Heritage Spanish Speakers in hopes of breaking the pattern of declining bilingualism and gain an understanding on the impacts of relearning the minority language using Rosetta Stone. Rosetta Stone was chosen since it is an easy and affordable language program that goes at the same pace as the individual. This was important because all our participants are college students and we wanted the participants to have an overall satisfaction to this research. Most importantly, we hoped that this research would provide guidelines for academia on assisting Heritage Speakers through their academic progress by encouraging them to preserve their family's language(s) instead of feeling ashamed of it.

Unfortunately, this research had a small sample size since most participants were interested to become part of the study, but could not dedicate their time to this research; therefore, we decided to reach out to the Spanish department for students who needed Spanish service hours. This allowed us to get more participants but there were some complications afterword.

An important part to discuss is the feeling of regret. All participants, except one, talked to the researcher about their journey(s) being bilinguals. Many participants wished their parents thought them Spanish as they felt awkward speaking their first language with an accent or limited words. In addition, several broiight up the topic of communication problems within their families.

For example, three participants revealed that they wished they could fluently communicate with their grandparents i1istead of using family members as translators. Several participants also brought up the fact that being fluent in both languages would increase their employment opportunities, as bilinguals are always a valuable asset to companies. The one paiiicipant who did not talk about regret was a student parent who explained that she will do everything in her power for her child to grow up speaking both languages. Although this researched did show insignificant results, we hope that in the near future with other techniques and better methods, we are able to prove a strong case for bilingualism.

Limitations

There were a few limitations to this study. The main limitation in this study was the small sample size. Although this research had many advertising, the significant time dedication required discouraged them to partake in this research. In addition to the small sample size, many participants in the experimental group did not retake the post-test; therefore, we did not have significant data to analyze for the results section. In addition, the OSPAN scores were hard to decode as the test gave us three scores but did not explain what their value was. Another complication was the Rosetta Stone program as there was multiple communication problems between the research group and the administrators. For example, the software was not registering all participants, when that issue was fixed, we noticed that certain researchers were not allowed to enter their accounts to oversee the participants. In addition to the having technical problems, may participants shared with the researcher that the software was not user-friendly. This resulted in them being confused on how to access the programs its categories. In certain conversations, participants explained how they felt Rosetta Stone was too easy for them and they were looking for a challenge. Another main reason for this communication gap is that Dr. Rossi, a faculty advisor, moved to another state; therefore, there was time difference in communication between our research group.

Ideas for Future Research

Significant limitations to the study is that the sample are only California Polytechnic University of Pomona's Students; therefore, in the near future, having a more diverse sample from different universities will help diversify the data. In the future, our research will consider participants with more diverse levels of education and similar age.

Future Directions

In the near future, outreach and adve1tising must be a problem addressed ahead of time. A possible way to gain more participants in the near future is through the SONA system, a popular research system used by the :Psychology and Sociology department to gain participants. Also, many classes require students to have certain amount of units tlu·ough the Sona system for their grade requirement. In case the SONA system is not available, every team member must plan ahead on the proper steps to outreach in hopes to obtain the most participants for their research. In addition, if more participants are included in the research, the results would better reflect if the overall research was significant or not significant.

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Conflict of interest
The authors declare that they have no conflict of interest.

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Evan Haze Nunez
Dr. Breanna A. Binder and
Dr. Matthew S. Povich

A Sensitive Method for Age-Dating Stellar Birthplaces

Age Indicators

Knowing the age of objects in the universe fulfills multiple curiosities for humanity. For instance, knowing the age of the Sun tells us that it will continue to shine for the next 5 billion years, which is comforting. From a scientific standpoint we care about age because of the astrophysics that can be derived. How do a star's luminosity (its radiant power output), temperature, and size vary with time? How long does it take for a massive star to end its life? How quickly do stars form?

The most profound difficulty in determining the age of an object, or age-dating, stems from the brevity of the human lifetime. Even relatively short-lived astronomical objects, such as the most massive stars, last tens of millions of years (107 years) where as a human lifetime typically lasts at most one hundred years (102 years). The most massive stars being born then dying is one hundred thousand times (105) longer than a human lifetime.

We are just looking at one frame of a cosmic movie. Everything seems static and ageless since we cannot look at any of the other frames. To help piece together this movie we must use age indicators of the preceding and superseding frames. An example of this can be seen in the Orion Nebula (Figure 1 in appendix). There are two main age indicators here that let us know that the region is young. The first is that there are massive stars that exist in the region which do not live very long. The second is that we still see the gas and dust that these stars were born from which implies that star formation is ongoing.

Intermediate-Mass, Pre-Main-Sequence Stars (IMPS)

In this work, we develop a new technique to age-date regions using Intermediate-Mass, Pre-Main-Sequence Stars (IMPS). These stars (1) have masses between 2 M and 8 M (solar masses), (2) are not yet on the main sequence, meaning that they have not begun fusing H into He for their power but instead are powered by gravitational contraction, and (3) have spectral types G or later (the Sun is a G2 spectral type star) (Povich et al. 2011).

This gravitational contraction heats up IMPS such that their effective (surface) temperature is ≤ 5500 K (9,440 ºF) putting their peak luminosity (power output/brightness) in the infrared (IR) (Povich et al. 2011). Since IMPS are cooler but much larger than the Sun, they are bright and easily detectable at IR wavelengths.

The X-ray emission of IMPS is time-dependant since it relies on the rapidly-changing interior structure of the star (Gregory et al. 2016). IMPS initially have fully convective interiors that give rise to magnetic activity in the outer atmosphere, or corona, of the star. This coronal activity produces powerful X-ray flares that are detectable from Earth. After some time, this fully convective interior becomes partially convective due to the development of a radiative core. Once the radiative core develops there is a decay of X-ray emission. This time of the development of a radiative core and subsequent decay of detectable X-ray emission can be calculated with the parametrized expression:

$$t_{haltx} = \left(\frac{1.494}{M/M_{\odot}}\right)^{2.364}$$

Where the thaltx is in millions of years (Gregory et al. 2016). Substituting 2 M for M into this expression, stellar X-ray emission begins to decay rapidly after ~five hundred thousand years (5x105 years). This means if we find a 2 M IMPS and detect its X-ray emission, then the star is at most five hundred thousand years old.

Data

The Great Nebula in Carina (Figure 4 in appendix) is a beautiful star-forming region located in the Southern Sky at a distance of 2.3 kpc. Carina is of particular importance because there are multiple clusters inside of it that are at different stages of evolution

To find IMPS in Carina we use two independent datasets of IR and X-Ray wavelengths of light. Our IR data came from two sources with one of the sources being the Spitzer Space Telescope. Spitzer is a NASA-JPL (Jet Propulsion Laboratory) space based telescope whose data is beamed down to Caltech in Pasadena, California. The data was taken as part of the Vela-Carina survey which used Spitzer's Infrared Array Camera (IRAC) to acquire data at wavelengths 3.6 μm, 4.5 μm, 5.8 μm, 8.0 μm and used Spitzer's Multiband Imaging Photometer for Spitzer (MIPS) for 24 μm data (Spitzer proposal ID 40791, PI: S. R. Majewski). For reference, the human body emits radiation at roughly 8 μm. The other IR data source came from the Two-Micron All-Sky Survey (2MASS) that used twin telescopes in the Northern and Southern hemisphere, Arizona and Chile respectively, to acquire a complete picture of the night sky in the IR. We use archival 2MASS data at 1.25 μm (J-band), 1.65 μm (H-band) and 2.15 μm(Ks -band).

Our X-ray data came from the Chandra X-Ray Observatory which is NASA's premier space-based X-ray telescope. The data were the result of a large project called the Chandra Carina Complex Project (CCCP) which was a total five hundred thousand second exposure of the Carina Nebula (Broos et al. 2011; Townsley et al. 2011). CCCP used the Advanced CCD Imaging Spectrometer (ACIS) on Chandra to acquire x-ray data from 0.5 keV to 8keV or (1.55 Å-24.8 Å).

Modeling/Analyzing of Data

We classify our sources as IMPS or three other classifications (Figure 2 in appendix) by modeling the 1.25 μm to 8.0 μm (24 μm when available) photometry to construct the spectral energy distribution of the star (Povich et al. 2011). The result of this yields temperature, age, mass, bolometric luminosity and absorption, which is the amount of material between us and the star. One visualization of the outputs can be seen in Figure 2 in the appendix. The output of the models are not absolute but are a probability distribution showing the preferred placement on the diagram from the different models. Thus, we refer to the stars in our study as IMPS candidates.

Once we have classifications for each of the sources we match their position on the sky to sources found in CCCP. These matches then have their X-ray spectra modeled. The models try to fit plasma models to match the stars specific spectra (Figure 3 in appendix) (Arnaud 1996). These models then output absorption, uncorrected flux, absorption corrected flux and temperature of the plasma in the star's corona. With this absorption-corrected flux and the distance to Carina an X-ray luminosity can be calculated. This X-ray luminosity can help characterize whether or not our sources fall into the expected range for IMPS, $Log L_x \geq 31$ (erg/s) (Preibisch et al. 2005).

Both our IR and X-ray models independently calculate an absorption parameter, which gives the amount of gas and dust between the star and Earth. The comparison of IR and X-ray absorption is one of the strongest arguments for the reasonableness of our approach to modeling the stars. I visually review the X-ray spectrum of each source and select the best-fit model to the data. I calculate the X-ray luminosity and note whether it falls into the expected range for IMPS. I note the certainty of our IR-model-based classification from looking at plots like Figure 2 (in appendix). Finally, I compare the IR and X-ray calculated absorptions with one another and make note of the (dis)agreement. Based on all of these parameters I assign a quality grade to each source

Results and Next Steps

After performing this analysis on the 68 IMPS in our particular sample in Carina, I found that 48 of them (70%) are fit well, the calculated absorption from the IR and X-Ray were in agreement with one another and subsequently received a high quality grade. I am continuing this analysis on the rest of our sources (Figure 2 in appendix).

We plan to propose new observations to obtain spectra of each IMPS candidate with a telescope in the Southern Hemisphere, for example Gemini-South. This will confirm whether or not they are IMPS by providing us with the spectral type of the star.

With this confirmation we can then begin age-dating regions in the Carina Nebula. We could then constrain each subclusterâ€™s star formation rate and then aggregate all of them to find one global star cluster average. The importance of doing this fundamental science is tied to how we determine current star formation rates in other galaxies. Unless a galaxy is very close we can only observe regions that are as big and luminous as Carina, so if we constrain the star formation rate in Carina we can extend this to calibrate star formation rates in distant galaxies.

Acknowledgements

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Appendix

Figure 1. The Orion Nebula, located at a distance of 1600 light years from Earth. This *Hubble Space Telescope* composite image shows gas, dust and massive stars, implying that the region is very young.
HR Diagram

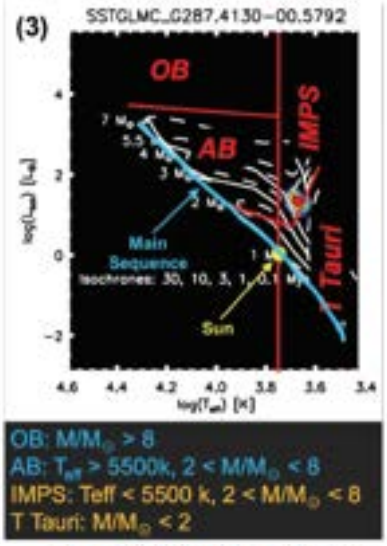

Figure 2 (above). Probabilistic showcasing the four main classifications of our sources and the model preference of an IMPS candidate. Luminosity increases vertically by powers of 10 and temperature increases to the left. Here the models show great agreement in the placing of this IMPS candidate.

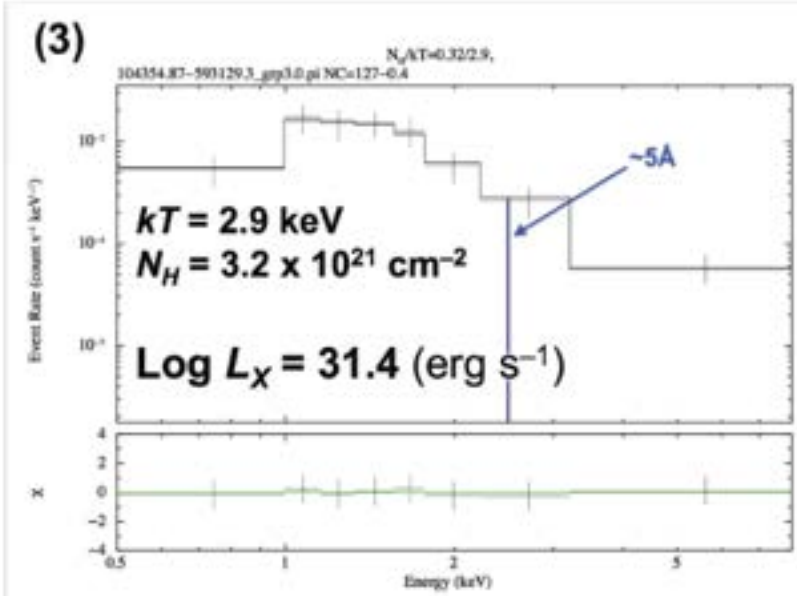

Figure 3 (left). Modeled X-ray spectrum of the same IMPS candidate as Figure 2. Number of photons received increases vertically by powers of 10 and energy of the photon increases to the right (wavelength increases to the left). The plasma model temperature, calculated absorption

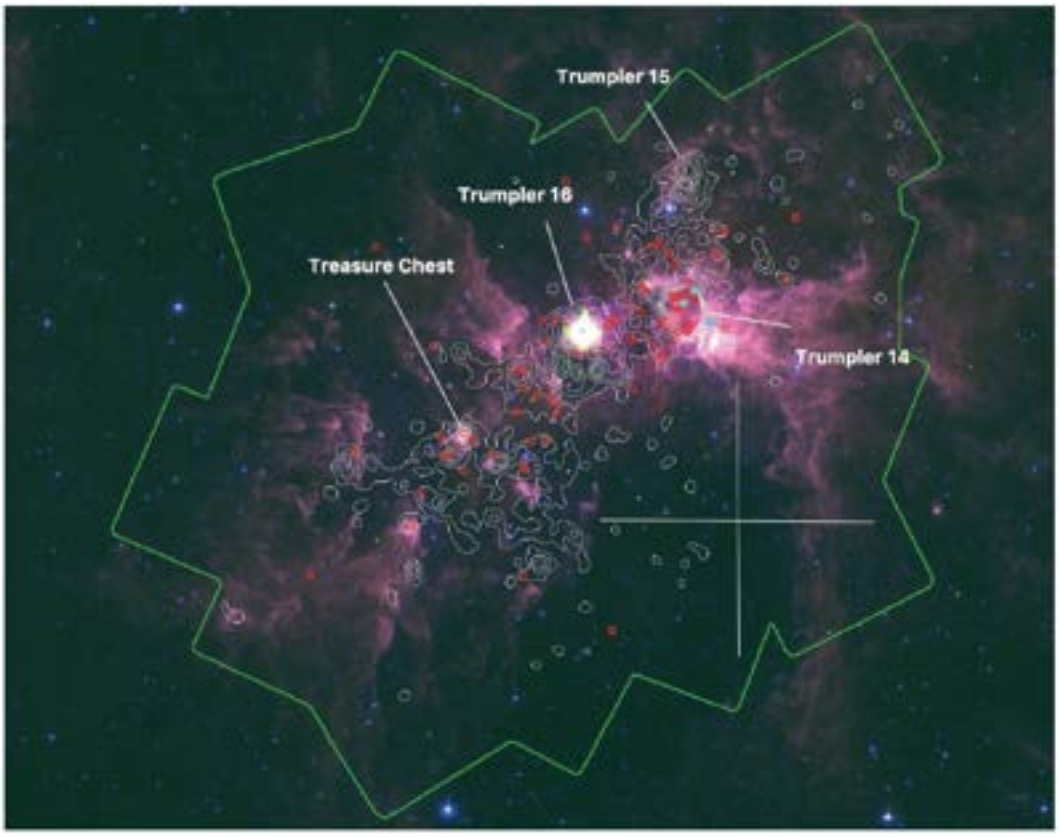

Figure 4. The Great Nebula in Carina (Carina Nebula), located at a distance of 2.3 kpc (~7500 light years). The color composite is made from infrared images at wavelengths 3.6 μm (colored blue), 4.5 μm (colored green) and 8.0 μm (colored red). The green outline shows the entire field of the *Chandra* Carina Complex Project (CCCP) (Townsley et al. 2011). The red circles highlight IMPS candidates that were detected in the CCCP (Broos et al. 2011). The white contours show X-ray point source density where Trumper 14 (~1 Myr) has the most dense region with almost 1400 X-ray point sources (Feigelson et al. 2011, Getman et al. 2014). The white crosshairs located off center to the bottom right show the angular size of the Moon on the sky for comparison.

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Adriana Ramirez
Dr. Katherine Gasdaglis
*RSCA

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Cops and the Duty to Whistleblow Abstract

In this essay, I outline a duty to whistleblow by police officers. Police officers are morally obligated to whistleblow about any misconduct or illegal activity. Police officers should whistleblow about policing practices that do not work and/ or contribute to harm. First, I outline two problematic actions by police: procedural and illegal. Next, I explain background details about the act of whistleblowing. Next I explain that cops should whistleblow because they have credibility surplus, are privileged, and in a position of power.

After a Ferguson police officer shot and killed Mike Brown in the back, America seen the rise of social justice activists, such as the Black Lives Matter, bring awareness about the ways in which police officers contribute to public harm. And, even though there is much public backlash about police misconduct and policing procedures, there is still juxtaposition about perception of the police. It seems as though everyday there is a new headline about a police officer shooting someone, making a wrongful or forceful arrest, or some other type of misconduct hits the news. Much of America has faith in the law and police force, while other Americans do not trust that the police force at all. Cops do contribute harms into their communities and they must be held accountable for it.

Cops have a special obligation to whistleblow to the public. They should be required to whistleblow when they are breaking procedures, and when those procedures are contributing to harm within the communities they are policing. They should also whistleblow when they are breaking the law, or unjustly enforcing the law. Their duty to whistleblow is grounded in their credibility surplus that the public does not have.

First, I will outline two types of unjust and problematic actions of the police: procedural and illegal. Next, I will offer a special obligation of whistle blowing to the public. Cops should whistleblow about procedural actions that are harmful and do not work to fight crime; and, illegal actions that often go unaccounted and unnoticed. The duty to whistleblow is grounded in their credibility surplus. Lastly, I will be addressing the objection of victims' epistemic privilege. Victims also have credibility with regards to their epistemic privilege. I have two different replies to this objection. First, I explain that cops have knowledge about injustice, which is inferred through their code of silence. Second, requiring victims of police misconduct to come forward may exacerbate the harm they are subject to.

Police misconduct is not at all rare. I distinguish two categories of misconduct and unjust actions: procedural and illegal. When someone commits an illegal act it is assumed that they will be held accountable for committing that act. But, there are some people in American society that are exempt from accountability even when illegal. Some of these people are police officers. Cops are hardly held accountable when they have acted unjustly, whether it is through routine procedures or illegal conduct. First, I will be focusing on procedural harms, and then I will explore illegal harms. Lastly, I will write about the "Code of Silence" and what it means for accountability and research of police misconduct.

1.0 Two Types of Contributions to Harm

1.1 Procedural Harms: Stop and Frisk

Cops are in charge of the safety of the communities they police, but they, too, can be the who cause harm through their policing procedures. Stop and frisk is an example of a policing procedure that does more harm than good. Stop and frisk was put into place by the Supreme Court, during the case Terry v Ohio in 1968, then exacerbated through the War on Drugs, and is a routine police procedure today. Terry v Ohio states,

> "so long as a police officer has reasonable articulate suspicion that someone is engaging in criminal activity and dangerous, it is constitutionally permissible to stop,

question, and frisk him or her-even in the absence of probable cause" (Alexander, 63). This means that if a cop suspects you of a crime they are permitted to stop and search your person under the guise of security for the community. Stop and frisk contributes to over-policing in minority areas, and the War on Drugs has given cops more incentive and rights to search just about anyone. If a cop has some suspicion of drugs on your person then under the law they are allowed to stop and search you, no matter how arbitrary their reasoning. They need little suspicion to pull someone over, then all they need is consent to search your car or your person1. Even more so, cops need as little as your consent to search your person and your belongings in the search for drugs or any dangerous activity. Stop and frisk gives cops the discretion to chose who they can and will stop.

> Stop and frisk is a completely intrusive procedure that does not work. Michelle Alexander writes,
> "tens of thousands of motorists find themselves topped on the side of the road, fielding questions about imaginary drug activity, and then succumbing to a request for their vehicle to be searched - sometimes torn apart- in the search for drugs... Up to 99 percent of traffic stops made by federally funded narcotics task forces result in no citation and that 98 percent of task-force searches during traffic stops are discretionary searches in which the officer searches the car with the driver's verbal consent but has no other legal authority to do so." (Alexander, 71).

The results of this procedure prove that it is problematic and show little results of identifying crime. The War on Drugs has given police precincts monetary and resource incentives to escalate drug related arrests. A precinct is given about $153 in federal and state funding per drug arrest (Alexander, 78). This funding incentivizes arresting anyone who seems 'suspicious', because precincts receive funding for those arrests. Cops may be stopping, searching, and arresting persons for federal and state funding, instead of the safety of the community.

Stop and frisk is problematic not only because it does not work, but also because it allows cops racial biases to take reign on who they will stop2. Cops, too, are subject to implicit and racial biases that can influence who they stop or pull over. In fact, Alexander writes, cognitive bias research demonstrates that both unconscious and conscious biases lead to

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[1] One might object that all a person needs to do is deny consent to a cop, but this denial very rarely happens. When cops stop persons almost always the person will comply with the officer's demands (Alexander 66).
[2] Stop and frisk is also problematic on the grounds that it is an obvious invasion of privacy, but that will not be the focus of this section.

discriminatory actions, even when an individual does not want to discriminate" (Alexander, 106). Implicit biases may lead cops into discriminating against racial minorities when using stop and frisk, even when they are trying to be conscious of their biases. Implicit biases may lead to discrimination, even when someone is trying to be conscious of their internal biases. There is much evidence to prove that racial discrimination is a present factor when using stop and frisk (Alexander, 133). Statistics in the above paragraph shows that the vast majority of traffic stops conducted by cops result in no citation, which means that the stop and frisk procedure absolutely does not work. Cops are lucky when stop and frisk does work. The stop and frisk procedure is often unchallenged, because of the political authority of a cop. This must change. Cops should come forward with their accounts of how and why stop and frisk, along with other routine procedures, does not work.

1.2 Illegal Conduct: Sexual Misconduct

There are several different accounts of police misconduct; this essay will focus on sexual misconduct. Illegal misconduct on the part of cops often goes unaccounted, because it is unreported, hidden from the public eye, or precincts lack the resources needed to investigate such conduct. Sexual misconduct includes: on-duty consensual sex, sexual harassment of crime victims, criminal suspects, and female drivers, forcible rape, forcible sodomy, etc (Stinson, Police Sexual Misconduct, 2). Consensual sex with a police officer is common; police 'groupies' are often women who are 'lonely or mentally disturbed', women who want affection or attention, or women who want a 'get out of jail free card" (Stinson, Police Sexual Misconduct, 4). The fact that consensual sex is a factor is quite absurd. Cops are in a place of political authority, so to assume that a citizen under cops jurisdiction is able to consent to sex is exploitive. Sure, a person can find it stimulating to want to have sex with a cop, but if the cop is on-duty and in uniform a victim may feel they have no choice but to say yes to what an officer asks of them. In the case of police sexual misconduct there is a fine line between consent and exploitation. Sex with the people in their communities is nothing but exploitive. "Police commonly encounter citizens who are vulnerable, usually because they are victims, criminal suspects, or perceived as suspicious and subject to the power and coercive authority granted to police' (Stinson, Police Sexual Misconduct, 2). Police are to be protecting the most vulnerable people in their communities, and sexual misconduct is absolutely abhorrent and needs to be accounted for.

Sexual misconduct by police officers is not as uncommon as one might think. A CNN article, from October 2018, states that from 2005 to 2013 there were 636 forcible fondling, 405 forcible rape, and 219 accounts of forcible sodomy by police officers (McLaughlin). In the same time frame 98 officers were arrested for indecent exposure, 58 sexual assaults with an object, and 186 statutory rape cases (McLaughlin). These two statistics show the disparity between cops that are committing sexual misconduct, and cops who are being held accountable for it.

Studying it is exceedingly difficult, because the data for it is just not there. Victims of sexual assault are discouraged by society to report their abuse; now imagine the discouragement and fear someone will have about reporting their sexual assault by a cop. Victims of police sexual misconduct often neglect to report their abuse because they fear retaliation by the cop, the humiliation they feel, and also because going into a precinct and reporting can be very intimidating. Once the crime is reported, cops may not even be held accountable. After being arrested for sexual misconduct, the officer most likely will not lose their job, and they avoid losing their certification as an officer by simply moving to a new jurisdiction (Stinson, Police Sexual Misconduct, 7). The numbers at the beginning of the paragraph do not come from only police precincts; they come from news articles, data coming from court cases, etc. It is estimated that sexual misconduct happens more often that the data on it suggests, because

acquiring the data necessary to study this type of misconduct is incredibly difficult. Acquiring data for any type of police misconduct is incredibly difficult. Police precincts also do not have the resources or funding needed to investigate reports of sexual misconduct, or any misconduct. Police officers should not be exempt from the law, and must be held accountable for their illegal actions. They ought whistle-blow with their testimonies of police misconduct, whether it be sexual misconduct, police brutality, and procedural harms such as stop and frisk.

1.3 The Code of Silence: a Challenge to Studying Police Misconduct

Studying any type of police misconduct is an incredibly difficult task, because of the 'Code of Silence'. The Code of Silence refers to "the reluctance of police officers to report corrupt activities of their fellow officers… and the reluctance of police administrators to admit the existence of corruption" (Klockars, 6). The code of silence makes studying the lack of integrity within the police system more than difficult. A person by the name of Fabrizio "surveyed experienced police officers attending the FBI's National Police Academy and, under the veil of confidentiality, asked them to describe incidents of police corruption in their Agencies. None of the respondents provided an answer to this question" (Klockars, xii). This is alarming, because cops will not admit any type of misconduct even to the FBI. The police code of silence created challenges to Stinson's study of police misconduct, Because, police officers do not report misconduct or illegal activity.
They state that

> "some studies use officer surveys to identify police attitudes toward misconduct or to measure their propensity for criminal behavior under particular scenarios, but these methods are unlikely to produce valid data on actual police crime because police tend to maintain a code of silence or provide socially desirable responses to sensitive questions in regard to their own criminal behavior and/or the criminal behavior of fellow officers (Stinson, Police Integrity, 30)".

These quotes explain the difficulties of studying police behavior, because cops may withhold information of misconduct from outside jurisdictions. Additionally they will 'sugarcoat' the facts about misconduct when asked. Cops are reluctant to give information about their procedures, and conduct, even when scholars want to study their culture.

Further difficulties in studying police behavior and misconduct are shown by the Department of Justiceâ€™s study of police behavior. Persuasion to uphold the code of silence comes from the Fraternal Order of Police, and also the loyalty that police officers have between each other. Enhancing Police Integrity, cites a study granted by the Ohio Governorâ€™s Office of Criminal Justice Services expanded their study of behavior to Pennsylvaniaâ€™s police departments and Illinois Police departments; and, both statesâ€™ Fraternal Orders of Police persuaded their police officers not to contribute to their study thus damning the studies before they even began (Klockars, xii). This lack of resources to study police misconduct shows that cops are actively trying to hide their misconduct from public perceptions. Hiding their actions suggests that they are committing illegal actions and abiding by unethical procedures. Cops must break their code of silence and whistle-blow on their precincts, because they are actively hiding their corruption.

2.0 Government Whistleblowing

2.1 What is Whisteblowing?

Delmas states that whistleblowing is 'the intentional disclosure of information about an agent or entity's suspected illegal or unethical conduct (Delmas, 80). There is a distinction between internal and governmental whistleblowing.

Government whistleblowing is publicly publicizing critical information, and internal whistleblowing is bringing awareness about the critical information within the organization, but not publicizing the information. In the case of cops, I think that they should whistleblow to the public, rather than internally.

> "The whistleblower in each case is someone with privileged access to critical information; the subject is some suspected misconduct, that is, illegal or unethical activity; both public and government whistleblowing target the government or a state agency; and the intended outcome… is the entry of information in to the public domain. (Delmas, 81)"

A whistleblower usually publicizes 'critical' information that only they are privy to. The information that is publicized is usually 'misconduct, illegal, or unethical activity". A whistleblower will publicize private information, because they believe that the information is not being handled internally. Someone might whistleblow about a cop's misconduct, because they know that the misconduct is going unaccounted for. Publicizing the information is thought to hasten accountability. Or, someone will whistleblow because they believe that what the company or agency is doing is illegal or immoral. When someone whistleblows it is important to note the significance of the subject of the information. One must also have ethical intentions behind the information they want to disclose. Before whistleblowing, the whistleblower must go through the proper channels to bring awareness to the misconduct or illegal activity. For example, the person must have gone through human resources, headquarters, or whatever internal channels to try to get investigations or accountability for the misconduct or illegal activity, before they whistleblow publicly. Whistleblowing should be a last resort, if all other channels of accountability fail. Whistleblowing is a complex act. I think that cops are obligated to whistleblow. But, I also acknowledge that it is up to the officer if they are going to whistleblow.

2.2 Protections for Whistleblowers

The fear of retaliation and penalties for whistleblowing against whistleblowers deters people from whistleblowing. Protections for whistleblowing are very limited. Whistleblowers may be subject to retaliation in the form of harassment or losing their job, etc. There are some laws protecting whistleblowers rights, but it is hard to predict when they will be used to protect whistleblowers in court. In 1989 the Federal Whistleblower Protection Act came about, it "shields government employees who reveal fraud and other wrongdoing from penalties and employer retaliation", but it does not protect NSA, CIA, and FBI agents (Delmas, 82). Most whistleblowers do in fact lose their jobs (Patrick). And, some whistleblowers may be subject to different types of harassment and discrimination from their employers. When planning to whistleblow is it important to note what the different laws say and permit what information whistleblower are permitted to disclose. Because, about twenty-two percent of whistleblowers lose their court cases due to technicalities in the law that they did not follow (Patrick). Though there are channels that police who whistleblow can take. There are different resources for cops who have information they want to make public.

There must be more protections for whistleblowers than what is currently in the laws. Whistleblowers are deterred from whistleblowing because of the lack of protections. The above paragraph mentioned that twenty two percent of whistleblowers loose court cases based on technicalities. Or, this may be a problem with the way that the court is interpreting the laws. We should reward ethical whistleblowers, not punish them.

2.3 The Moral Permissibility of Whistleblowing

Whistleblowers often cite moral reasoning behind the intent of the act. Although some would argue that whistleblowing goes against professional duties, I think that whistleblowing is a very ethical act. Government employees are often obligated to keep classified information disclosed from the public. This professional duty can also be grounded in the duty to keep promises. When some government officials are sworn in, they are obligated to keep an oath of keeping classified information from the public. And, although this oath can be seen as making a promise, the duty to keep promises does not undermine other ethical duties. I do not doubt that cops are required to keep some information about policing practices and procedures from the public. Though, if a cop is told to keep illegal conduct from the pubic because of their code of silence, the duty to keep promises does not extend to this type of information. The duty to keep some information disclosed depends on the type of information. The act of whistleblowing can also be viewed s utilitarian. The whistleblower must weight the pros and cons of whistleblowing. They must decide whether or not the information they are disclosing is going to incite change or awareness of the problem. Although the whistleblower is acting against their professional duties, they are whistleblowing for the greater good of society.

One might also argue that whistleblowing against policing agencies may undermine the function and the publicâ€™s reliability of the agency. If cops are always whistleblowing on their precincts, then the public might start to believe that they are a 'useless' institution. I do not think that cops being arrested and imprisoned for their illegal action will send a bad message to good cops or cops in general. I do not think that the public will view the institution as failing either. It would put more trust into the integrity of the agency, because the whistleblowers would be 'weeding out' the bad cops who are causing harm. It would send the message that cops are not above the law, and that they too should comply with the law. Whistleblowing and accountability would make for a much more moral police force.

3.0 Testimonial Injustice: Credibility Surplus and Deficit

3.1 Testimonial Injustice

Epistemic exploitation, testimonial injustice, and credibility surplus and deficit, are phenomena that are interrelated. Victims of all types of injustice are met with skepticism when they share their experiences of injustice. Epistemic exploitation happens when ‘privileged persons compel marginalized persons to produce an education or explanation about the nature of the oppression they face”; this education often goes ‘unrecognized, uncompensated, [is] emotionally taxing, [and a type of] coerced epistemic labor” (Berenstain, 570). Epistemic exploitation is harmful because it emotionally exhausts marginalized persons when they are forced to relive their experiences of injustice when answering questions about their experiences. Marginalized persons are harmed when citing explanation of injustice to privileged persons, because they are made to relive the injustice that they have faced and their testimonies are often met with skepticism.

Fricker states that testimonial injustice happens “when prejudice causes a hearer to give a deflated level of credibility to a speaker’s word” (Fricker, 1). An example of testimonial injustice is when a cop does not believe the testimony of a person because they are a person of color. Another example is when a victim comes forward with allegations of sexual assault against a high profile person and the victim’s testimony is not believed because they were drunk when the incident happened. This phenomenon is harmful because it projects a credibility deficit onto the testimonies of a victim, or marginalized person. Nora Berenstain explains that testimonial injustice often happens when a privileged person meets a marginalized persons testimony with skepticism. She states,

> "when marginalized persons offer testimony about their general knowledge or lived experience of oppression, privileged persons often respond with skepticism about the content of their claim" (Berenstain, 578).

Skepticism harms the credibility of victims; and, if they decline to answer questions about oppression they are then they are even more so not deemed as credible. Marginalized and minority persons are the ones who are often subject to testimonial injustice and credibility surplus. Testimonial injustice often takes two forms: credibility surplus and deficit. Credibility surplus and deficit often go together. When someone has a credibility surplus, it means that another person has a credibility deficit. Often times it is privileged persons who has a credibility surplus, and a marginalized persons who have credibility deficit. Even, when the marginalized person has more knowledge about the subject than the person of privilege.

3.2 Credibility Surplus and Deficit

Credibility surplus and deficit are types of testimonial injustice. Fricker explains that credibility surplus is 'prejudice [resulting] in the speaker's receiving more credibility than she otherwise would have" and credibility deficit is "[prejudice] results in her receiving less credibility than she otherwise would have" (Fricker, 17). Credibility surplus and deficit are two sides of the same coin. Berenstain states

> "the nature of privilege is that it comes with a credibility surplus. Privilege persons are more likely to believe claims about privilege and oppression when they come from another persons who share their privilege" (Berenstain 582).

Privileged persons will believe testimony about oppression and injustice if it comes from another person of privilege rather than a marginalized person. Privileged persons are given a credibility surplus, and marginalized persons are given credibility deficit, even though more often than not marginalized persons are the ones with epistemic privilege and credibility of knowledge on injustice. â€œPrivileged persons are simply less likely to believe claims about oppression when they come from those who actually experienced it (Berenstain, 583). Because victims are met with skepticism, privileged persons should educate themselves about the nature of oppression and injustice. Their testimonies will be believed more than that of marginalized persons and victims. Therefore, they should use their credibility surplus to bring awareness about the different types of ways oppression manifests itself.

3.3 The Credibility Surplus of the Police

Cops are afforded a credibility surplus that citizens lack and should use it to bring attention to misconduct and corruption within their precincts. Officers of the law are offered additional trust and credibility for the very fact that they are officers. Citizens must rely on them to act morally upright. We create a police force because we as a society do not trust the average person to police with integrity (Klockars, 5). Officers are trained on how to treat the people who they are policing with respect. Cops should be accountable for the ways that they police in communities. Cops are expected to treat citizens with respect. Citizens trust cops because they are expected and assumed as morally upright and respectable. The public affords cops trust in being morally upright. Cops are afforded more credibility than they deserve. Often times police testimony is deemed more credible than the average citizen, regardless of whether or not the cop is being truthful (Innocence Staff). Police testimony is hardly met with skepticism. When the average citizen's testimony is posed against a cop's testimony, the cop's testimony will most likely be believed over that of the citizen. This surplus of credible testimony is a privilege of the police. A cop's credibility surplus shows that their testimonies about injustice within their police precincts means that their testimonies of injustice will be trusted more than

the victims of police misconduct. When someone commits a crime, that person is no longer viewed as a credible person. When cops are over policing in minority areas they know that marginalized and minority personâ€™s testimonies are met with skepticism. Credibility deficits are exploited when cops over police in these areas. Then, the people in these areas are viewed as criminals, and then their testimonies are viewed as not credible. Police officers should not be exploiting their credibility surplus and citizens who are stigmatized with credibility deficit. They have a credibility surplus which means they ought to come forward with their testimonies of injustices that happen within their police precincts.

4.0 Objections: Victim's Epistemic Privilege

Although police officers have a credibility surplus, it is the victims who have true epistemic privilege of police misconduct. In Epistemic Privilege and Victims' Duties, Vasanthakumar argues that victims of injustice ought to come forward with their testimonies of injustice, because they have epistemic privilege with regards to their firsthand experiences with injustice. I think that if victims of injustice want to come forward with their testimonies of injustice they should be afforded the right and the platform to do so. Because they have an epistemic privilege we should have victims come forward rather than asking cops to whistle blow. To do this we should give victims more credibility, so that they may be the ones to speak out about police misconduct. Vasanthakumar argues that victim's have epistemic privilege of injustice that other persons who are connected to that injustice do not have. Their knowledge is special on two accounts: one, they have knowledge of injustice, and second, their knowledge is experiential (Vasanthakumar, 469). The information that they have about injustice is first hand, they know what injustice looks and feels like. They have details that others involved do not like: "the nature of the oppression faced, the mechanisms by which it is inflicted, the personalities involved, and the gravity of the injuries suffered" (Vasanthakumar, 470). These details show that victims of injustice have more credibility of knowledge of injustice than others. Bystanders or oppressors may have information too, but the information of victims is special. Victims are on the receiving end of injustice; because of this they have special information about how the injustice felt and a better 'understanding' of why and how certain injustices are harmful. Vasanthakumar also argues that victims are more credible, because they are appropriately motivated to combat injustice by truthfully testifying about the injustices they have faced; this credibility gives them greater authority about injustice (Vasanthakumar, 471). Victims are in the best position to fight against injustice because of their epistemic privilege and authority about it.

According to Vasanthakumar, victims of police injustice should come forward with their accounts of police misconduct, because they have a credibility and privilege of knowledge. If a police officer is so indoctrinated in following policing procedures and norms, they may not be able to identify the ways in which they contribute to injustice. Police officers may not be able to understand why they are causing harm, because they are so caught up in finding crime in the communities they police. This means that the victims are obviously better at identifying the harm. The victim has knowledge of the experience. They know what methods or things said on the part of the officer that led up to the assault, etc. And most importantly, they know the specific officer(s) involved. In the above paragraphs, I described some difficulties that come with researching and studying police misconduct. Police officers neglect to hold themselves accountable and actively hide their corruption. Police are not motivated to rectify the injustices they contribute to. But, according to Vasanthakumar, victims are the most motivated. If society affords more credibility to the victims of police misconduct, then they will be even more motivated to come forward with their testimonies of injustice.

4.1 The Code of Silence and Exacerbating Harm: Two Replies

My replies to the objection come in two parts. The first is addressing the idea that police officers are too indoctrinated into their procedures and norms to understand how they are contributing to injustice. The second reply is addressing the idea that victims are the ones who should come forward with their testimonies of police misconduct.

4.1.0 Code of Silence

Police officers are indoctrinated into their policing procedures and norms, but this does not mean that they cannot identify the ways in which they contribute to injustice. The code of silence is obvious evidence to show that police officers know when they are contributing to injustice or acting illegally on the job. Police officers actively hide facts about the procedures that they use that do not work. An example is stop and frisk. Much of the history of stop and frisk is not widely known. The public has some conceptions of the stop and frisk phenomena. But, the facts about how the courts have allowed stop and frisk are not common knowledge. Knowledge about federal aid in the War on Drugs through stop and frisk is not publicly common. It is obvious that the code of silence plays a big part in enabling police corruption, by covering up problematic behavior. The code of silence shows that police officers know when they contribute to injustice illegally. Police officers should not be abiding by a code of silence, because it makes investigating and researching police misconduct more challenging. They should be outspoken about the misconduct and the procedures that do not work, such as stop and frisk and the illegal misconduct of their fellow officers.

4.1.1 Exacerbating Harm

The second reply addresses the objection of epistemic privilege of victims, and asking them to come forward with their accounts of injustice rather than requiring police officers to whistleblow. I do not want to negate a victim's duty to come forward. I wish to show that it will most likely subject them to further harm if they do come forward. The focus of this paper is to show that cops have the privilege and the power to speak out against injustice. Because they are privileged and have power they should be required to come forward with their testimonies of police misconduct, illegal activities, and problematic policing procedures.

Victim's epistemic privilege does gives them an authority of knowledge of injustice, thus giving them a distinct position in the fight against injustice. But, requiring more victims of police misconduct to come forward with their testimonies can subject the victims to further harm. If victim of police misconduct want to come forward with their testimonies about the happening, they should be able to. Victims often do not come forward because they are afraid of retaliation, especially in cases of police misconduct. Victims often feel shame about the harms that have happened to them, which makes them reluctant to come forward. In cases of sexual abuse, victims are often too traumatized to speak out. Since victims are already trying to cope with the injustices they face, it causes more harm to require that them come forward with their testimonies. Coming forward about injustice may subject a victim for further epistemic exploitation, which means that cops are in a better position to come forward than victims.

Victims of stop and frisk are more likely to be marginalized persons, or people living in marginalized communities. Police officers exploit this skepticism of credibility when they are over-policing minority areas. Officers know that they are in a place of privilege and that they have a credibility that no other citizen is afforded. Police often prey on people who are marginalized, because they know that marginalized communities do not have the resources to combat police misconduct. These communities are seen as crime ridden. Once someone is labeled a criminal, they automatically lack the credibility of

all other citizens. This lack of credibility is harmful, because if a victim of police brutality has committed a crime, or is suspect in a crime, their lack of credibility will not help them in court. The fact is that cops have a credibility of surplus, are in a place of power, and have political authority. The cop will have a credibility surplus, and the victim will have a deficit, therefore making their fight against police misconduct over before it even began. If people are more likely to believe testimonies of injustice when it comes from a person of privilege, then cops absolutely should whistleblow.

Cops should come forward with their testimonies of procedures that are contributing to injustice; and, they need to come forward about other cops who are acting illegally on the job. Cops should not be getting a pass when it comes to being held accountable for illegal actions. They too need to be held accountable. Requiring cops to whistle-blow on the procedures that are contributing to injustice and that do not work, like stop and frisk, is a way to hold them accountable for contributing to injustice. Requiring cops to whistle-blow about the illegal actions that they are not being held accountable for, like sexual misconduct, will also help. Cops should not be abiding by a code of silence, because it halts justice. If a cop is upholding the code of silence then they are complicit in injustice, which is the opposite of what their job requires.

Cops are in charge of upholding the judicial system in America. They ought to be the most moral and just in American society. But, when they are upholding problematic procedures and acting illegally they are neglecting their judicial duties. Cops cannot be trusted to hold themselves accountable, because they abide by their code of silence. Cops should whistle-blow to the public in order to bring awareness for their problematic actions and procedures. Although, victims have epistemic privilege with regards to knowledge of injustice, they should not be the only ones who should fight against injustice. Requiring victims to come forward with their testimonies of injustice may subject them to further harm. Cops should whistle-blow because their credibility surplus ensures that they will be believed over victims when it comes to testimonies of injustice.

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Cindy Toscano
Dr. Steve Alas
*RSCA

This paper was presented at the Annual Student RSCA Conference at Cal Poly Pomona

Immune Response by Inflammatory Cells to Experimental Human Prosthetic Alloys

In the past three decades there has been an increase in the number of joint replacement surgeries among the US population. People in need of these surgeries include individuals of all ages for various physiological reasons. This has led to a large demand for prosthetics and better prosthetic materials. A prosthetic is a device that substitutes a missing or defective part of the body. The overall goal of a prosthetic is to sustain and improve the health and vitality of an individual. However, due to the limitations of implant durability, many implants must be replaced at one point during the recipient's life. Prosthetic loosening is one of the major reasons associated with implant replacement surgery, known as revision surgeries. The most common finding with failed prosthetic implants is aseptic loosening associated with periprosthetic osteolysis, the degradation of bone surrounding the implant. Aseptic loosening can be caused by the body's own immune response by a series of interactions with multiple cell types within the body. The cell types of interest to this study include macrophages, osteoclasts, fibroblasts, and osteoblasts. As metal particles are released from the prosthetic, macrophages clear the debris through phagocytosis. When macrophages become active due to the metal particles they also begin to increase their secretion of bone resorbing cytokines. The bone surrounding the prosthetic will be degraded making revision surgeries more difficult as there will be less bone to anchor the prosthetic. Furthermore, it is also important to study fibroblasts as they play a critical role in the recovery process after surgery. Therefore, we will examine whether fibroblasts have a circumstantial migratory response on the surface of different types of alloys that comprise human prosthetics. Additionally, macrophages will be differentiated from HL-60 cell line and tested against the different alloys for the secretion of pro inflammatory cytokines. The experimental metal alloys will include commercially pure titanium (CpTi), titanium-based alloys Ti-6V-Al (Ti64), and stainless steel (SS3 l 6L). The goal of this experiment is to examine the human inflammatory response in vitro against new metal alloys. We aspire to find a metal that will increase the longevity of prosthetics.

A. Objective and Specific Aims

One of the greatest threats to prosthetic durability is the loosening of the implants as time progresses, known as aseptic loosening. This occurs due to inflammatory factors secreted in response to the metal. Once inflammation occurs, the inflammatory factors (cytokines) activate osteoclasts. Osteoclasts are responsible for bone erosion around the implant which causes loosening and necessitates replacement of the prosthetic. The goal of this study is to examine the immune response against stainless steel, commercially pure titanium (CpTi), and novel titanium-based alloys, which can potentially serve as new generation prosthetic materials. The specific aims are the following.

- Examination of cytokine secretion of human macrophages, osteoclasts and fibroblasts in the presence of the biometals
- Testing the activation of human osteoclasts and bone resorption in response to various prosthetic alloys.
- Analyze the rate of migration of bone-forming osteoblasts and connective tissue forming fibroblasts on differing alloy surfaces.

B. Background and Significance

1. Overview

In the past thirty years, there has been an increase in the number of joint replacement surgeries in the United States. The need for joint replacement affects individuals of all ages for various physiological reasons. This has led to an increase demand in more durable prosthetics. A prosthetic is an artificial limb that should perform all normal functions of a normal limb or joint.

It is essential that prosthetic material can withstand the daily activity of people in today's population. The life span of a weight-bearing prosthetic is approximately fifteen years. This means that for younger recipients, the prosthetic may need to be replaced more than once in their lifetime. Aseptic loosening occurs in approximately 25 percent of total joint arthroplasty (TJA) patients. When this happens, the prosthetic becomes loose in the implantation site where it is anchored to the bone (2). Undergoing a second surgery is more difficult since the bone around the implantation site has eroded, making it difficult to implant the second prosthetic and making recovery time longer. The costs for these revision surgeries and the therapy for the patient's recovery add billions of dollars to Medicare costs and increases the need for more durable and biocompatible materials for prosthetics.

2. Prosthetic Loosening

One of the leading causes for joint replacement is aseptic loosening (10), also known as periprosthetic osteolysis (33). Aseptic loosening has been found to be caused by debris particles from the prosthetic limb (2) that come from corrosion, mechanical stress, or increased activity on the implant (11). In addition, the loosening of the prosthetic has been connected to an inflammatory response by the patient's immune system. The loosening of the prosthetic is based on periprosthetic osteolysis (12). Aseptic loosing is not the body's first reaction to the prosthetic, it is a delayed response leading to bone eroding, which is caused by an immune response to the debris particles released by the prosthetic over time.

Periprosthetic osteolysis is the process of bone degradation, in this case it occurs around the implant. When metal debris particles are released from the prosthetic into the surrounding tissue, macrophages attempt to clear the body of the debris through phagocytoses. As the particles are being destroyed by phagocytoses, macrophages also increase the secretion of resorbing cytokines, mainly TNF-a, IL-1B, and IL-6. At the same time an increased level of proteolytic enzymes has been noted (2). When this occurs, revision surgeries become more difficult due to less bone present to anchor the replacement prosthetic (12).

3. Immediate inflammatory immune response to implanted prosthetics

The body's immune reaction to prosthetic implants is regulated by three central criteria: the first is hypersensitivity to the implant material, second is the response induced by wear particles, and third is the response induced by corrosive and ionic products produced by metal implants (13).

When the metal prosthetic is first implanted, it triggers an immediate short-term response

and a delayed long-term response. The short immediate response is caused by immune cells surrounding the implantation and results in pain and swelling. This short-term response is treated with anti-inflammatory drugs and steroids and generally does not cause failure of the implant.

4. Secondary inflammatory immune response to prosthetic wear debris

The delayed/long-term immune reaction is caused as a result of small particles released from the surface of the prosthetic. The nano-sized wear particles facilitate a unique immune response separate from the initial response to the implant surface.

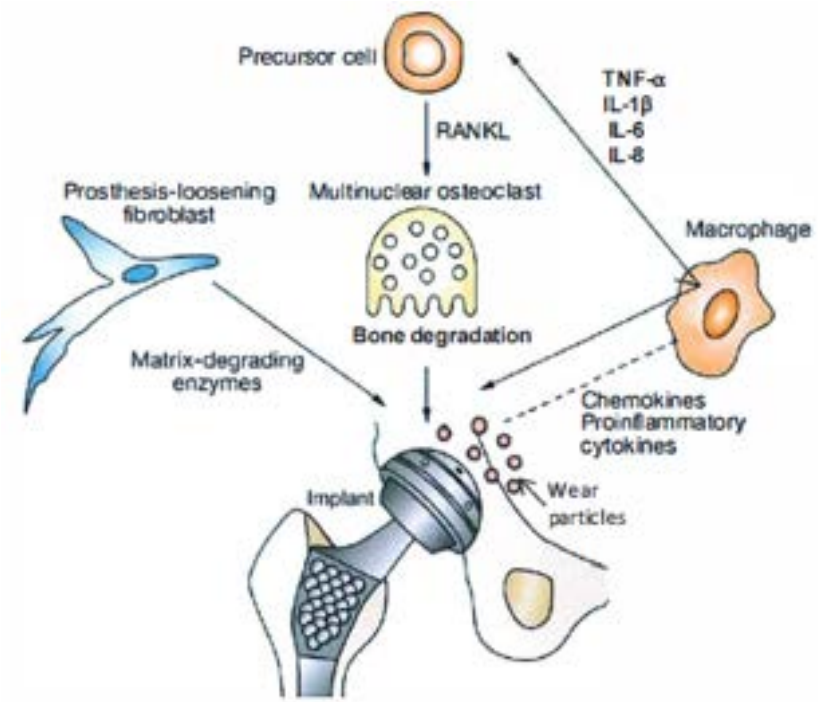

Figure 1.1 Immune inflammatory response. Macrophages, fibroblasts, and stromal cells interact with the implanted prosthetic and wear particles by secreting cytokines and growth factors which increase inflammation and induce osteoclasts. (Image modified from http://npg.nature.com).

During this inflammatory response, tissue macrophages encounter metal wear particles and metal ions (5) which stimulate the secretion of pro-inflammatory cytokines and chemokines including TNF-a, IL-1B, IL-6 and IL-8, at the implant site (15). Macrophages possess specific receptors that allow them to identify and bind foreign particles including those of metallic composition. The molecular response of the macrophages to wear debris involves the MAP kinase signaling pathway, transcription factors and cytokine paracrine or autocrine cell signaling, all associated with stimulation of their surface receptors (5). Macrophage Receptor with Collagenous structure (MARCO) is a scavenger receptor unique to macrophages. MARCO is associated with innate immune reactions and is classified as having a broad range ofligand specificity, including metal debris (16). Its role in particle recognition has been partially characterized, the role of other macrophage scavengers includes sensing, chemotaxis, and phagocytosis (34).

Cytokines are proteins secreted by immune cells that function in cell signaling. Proinflammatory cytokines are the specific cytokines responsible for mounting a mature inflammatory response against foreign antigen. They recruit additional cell types that contribute to the inflammatory response, induce differentiation of immune cells, and stimulate the secretion of other factors involved in inflammation (18). They have a significant role in bone remodeling, as well, by either inhibiting or activating cell types associated with bone and its components (19). These cytokines include (among others): tumor necrosis factor alpha (TNF-a), Interleukin I-beta (IL-1B), Interleukin-6 (IL-6), and Interleukin 8 (IL-8) (Table 1.11).

Table I.I Pro-Inflammatory Cytokines. Summary of cytokine function and association With cell types involved in aseptic loosening.

Pro-Inflammatory Cytokines	Aseptic Loosening Associated Functions	Secreted By
Tumor Necrosis factor-α (TNF-α)	• Mediate osteoclast differentiation and bone resorbtion • Signal stromal cells, fibroblasts, and lymphocytes • Stimulate secretion of IL-6 and IL-8	• Macrophages • Fibroblasts • Bone marrow stromal cells
Interleukin-1β (IL-1β)	• Initiates inflammation • Stimulates stromal cells ad fibroblasts to secrete IL-6 and IL-8 • Mediates bone resorbtion	• Macrophages • Fibroblasts • Bone marrow stromal cells
Interleukin-6 (IL-6)	• Activate osteoclasts and influence bone resorbtion • Signals macrophages and fibroblasts • Increase IL-8 secretion by stromal cells	• Macrophages • Fibroblasts • Bone marrow stromal cells
Interleukin-8 (IL-8)	• Enhance IL-6, TNF-α, and IL-1β secretion	• Macrophages • Fibroblasts • Bone marrow stromal cells

TNF -a is a multifunctional cytokine with a central role in the effecter functions of activated macrophages and other immune cell types. It is known to induce the differentiation of osteoclasts and, thus, play a critical role in osteolysis (20). TNF-a is also associated with pathological inflammatory conditions. TNF-a disrupts the normal synthesis of collagen and alkaline phosphatase activity required by osteoblasts, thus decreasing osteoblast function and bone reconstitution (19). IL-1 p another key initiator of the inflammatory response is upregulated by metallic wear particles both in vivo and in vitro (21). IL-1 p is responsible for pathological tissue damage resulting from inflammatory and autoimmune disease (11). IL-6 is a multifunctional cytokine involved in various immune responses including activation, proliferation and differentiation of cell types associated with inflammation. Some of the target cell types include macrophages, fibroblasts and osteoclast precursor cells. IL-6 stimulates bone resorbtion by targeting mature osteoclasts, and also works by autocrine cell signaling (19). IL-8 is another inflammatory cytokine with many biological effects, including neutrophil chemoattraction and activation. It is secreted by a number of cell types including monocytes/macrophages and fibroblasts. The production of IL-8 is enhanced by TNF-a both in vivo and in vitro (8).

Fibroblasts are pivotal in the recovery process after an injury or surgery. They are particularly important for laying down the extracellular matrix and connective tissue at the interface between the prosthetic and surrounding bone. They comprise nearly 30% of the periprosthetic membrane and have the highest proliferation rate of any cell type present in the interface membrane (22). The periprosthetic membrane is a fibrous pseudomembrane that surrounds the implant. This pseudomembrane contains high concentrations of both fibroblasts and macrophages (20). However, fibroblasts can also contribute to the inflammatory response against implanted prosthetics. They secrete an abundance of proinflammatory cytokines, including TNF-a and IL-6 (20). Due to the continuous shedding of metallic wear particles, fibroblasts in the soft periprosthetic tissues are under a condition of high stress. This is partly caused by the direct stimulation by the particles themselves (23). Fibroblasts have shown the ability to phagocytose particulate wear debris (22). Their stimulation is also a response to elevated concentrations of cytokines including TNF-alpha, ILl-beta, IL-6, IL-8 and growth factors such as VEGF and MCSF produced by macrophages, osteoblasts and stromal cells. Under cytokine stimulation, fibroblasts secrete proteases that are responsible for degrading the extracellular matrix (20). The constant activation of fibroblasts and their secretion of cytokines contribute to the inhibition of calcification and bone remodeling which is a normal function of osteoblasts, and is important in the dynamics of prosthetic loosening.

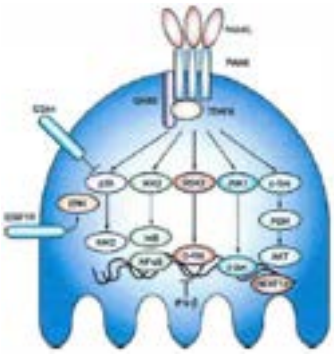

Figure 1.2 RANKL induces RANK-dependent intracellular signaling pathways in osteoclasts. Binding of RAN KL to its receptor RANK leads to activation of signal transduction and osteoclast differentiation. Image taken from (I).

5. Osteoclastogenesis

As stated, the increased secretion of pro-inflammatory cytokines by macrophages, fibroblasts and stromal cells leads to the rapid proliferation and differentiation of osteoclasts. Mature osteoclasts are the only cell type capable of resorbing bone (20). Osteoclasts are specialized multinucleated cells, which play the central role in aseptic loosening. Differentiation of precursors into osteoclasts requires the presence of macrophage-colony stimulating factor (MCSF) and the Receptor Activator of the NF-KB Ligand (RANKL). Osteoclast precursor cells express the surface receptor counterpart, RANK, which is directly targeted by the RANKL (24). The RANK/RANKL complex stimulates bone loss associated with inflammatory disease and periprosthetic osteolysis (12).

Osteoblasts, under normal non-stressful conditions, function in rebuilding damaged bone (2). In the presence of prosthetics and wear particles, osteoblasts will express RANKL, contributing to osteoclast formation and osteolysis (20). Importantly, fibroblasts and stromal cells also express the cell surface protein RANKL (12) (25) (Figure I.3). As fibroblasts are exposed to metal, they increase their amount of RANKL expression on the surface (29). Their ensuing cell-cell interactions with osteoclast precursors drive the osteoclastogenesis at the site of implantation.

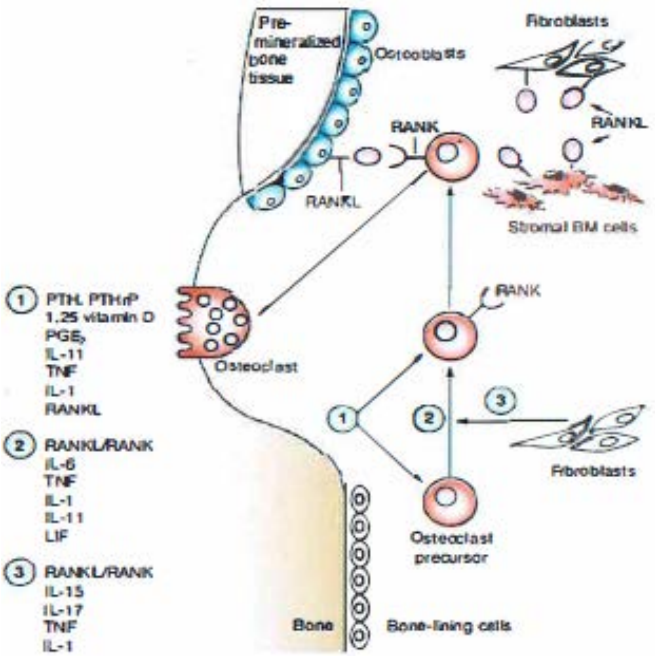

Figure 1.3 RANKL/RANK influence on osteoclastogenesis. Expression ofRANKL by bone marrow stromal cells, osteoblasts and fibroblasts mediate RANKL/RANK interaction. The binding of RANKL with RANK, located on the surface of osteoclast precursors, promotes osteoclast maturation. Image taken from (30).

Bone marrow stromal cells play a crucial role in the pathogenesis of osteolysis and aseptic loosening when they come into direct contact with the implanted prosthetic (20) (Figure I.3). Marrow stromal cells derived from the bone mediate osteoclast differentiation through their expression of not only RANKL, but of growth factors and cytokines (25). MCSF and IL-6 are two of the most important factors secreted by bone marrow stromal cells during their role in the formation of osteoclasts. Marrow stromal cells also express accessory surface proteins including osteoclast differentiation factor (ODF) and osteoprotegerin ligand (OPGL) which mediate cell signaling to osteoclast progenitor cells for their differentiation into osteoclasts (31).

6. Metal Alloys Used for Prosthetics

There are several standards that must be met in order to establish a good biometal. Aside from practical criteria, such as availability and cost, mechanical properties must also be examined. These properties include strength, stiffness and corrosive properties. The corrosive properties of a metal depend on the composition, as well as the electrode potentials to stress and surface tension (38). It is believed that corrosion changes the structure of metallic implants (39). Metallic orthopedic devises begin to corrode postimplantation due to their interaction with the physiological microenvironrnent. This corrosion leads to the release of metal ions originating from the implant (13). Metal ions have been detected in the serum and urine of metal prosthetic recipients. In high concentrations, metal ions have been shown to induce adverse effects, such as cytotoxicity and carcinogenicity. Lower concentrations are known to induce the release of cytokines, which trigger the resorbtion of bone at the implant interface. Ions released from prosthetic devises will also generate reactive oxygen species, leading to similar bone resorbing complications (13). Metal ions are also associated with mediating a hypersensitivity reaction in prosthetic recipients (40).

In addition to metallurgic and mechanical standards, the most significant criteria for biomaterial development is its biocompatibility with the physiological host environment. A biocompatible material elicits a weak or non-existent immune response, does not cause cytotoxicity to surrounding cells or tissue, allows cells to integrate into its structure or on its surface, and does not interfere with cellular/molecular processes vital to the host.

Some of the most commonly used metals for implants include stainless steel 316L, vitalium (CoCrMo), titanium (Ti) and titanium alloys (Ti-Al-V). In vitro studies have shown that Ti-Al-V and CoCrMo wear particles enhance the release of inflammatory cytokines involved in osteolysis (41). Titanium has currently set the standard for implanted metals. The foremost reason for the success of titanium as a prosthetic biometal is corrosion resistance. The corrosion resistance has been attributed to the formation of a passive oxide film (Ti02) that separates the microenvironrnent within the body from the metallic surface. In addition to corrosion resistance, the material also exhibits good strength, stiffness and biocompatibility. Titanium encompasses all of these properties and is not known to elicit any allergic reactions in vivo (42). A new class of titanium alloys, such as titanium-boron (Ti-B) has recently been developed (43). In preliminary studies, corrosion tests in a range of media, including NaCl, Hank's saline solution, and phosphate buffered saline (PBS), indicate that Ti-Al-V-B alloys also have excellent corrosion resistance. Ti-B alloys exhibit comparable corrosion resistance to base alloy Ti-6Al-4V depending on the boron content (44).

Titanium-Boron alloys also have superior mechanical properties. Titanium-Boron alloys have a unique microstructure which differs from other types of titanium, including commercially pure titanium (CP Ti) and Titanium alloy (Ti-6Al-4V). The microstructure of Titanium-Boron surface includes three distinctive phases: a-phase, P-phase and Ti-B phase (Fig 1.4). The Ti-B phase can range from nm to Âµm in size. Due to these characteristics, Titanium-Boron alloys demonstrate greater stiffness and strength when compared to CPTi, Ti-6Al-4V and other commonly used metals. It also has a higher modulus of elasticity than stainless steel, cobalt-chromium and other alloys (45).

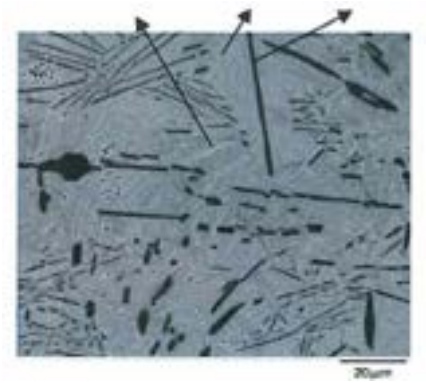

Figure 1.4 Titanium-Boron alloy. Surface of alloy viewed by SEM. Backscattered electron image of Ti-6Al-4V-B alloy composed of [Symbol]-phase, [Symbol]-phase, and TiB phase as labeled above. The microstructure of Ti-B alloys will differ depending on the Boron content (Personal communication with V .A. Ravi).

Titanium alloys have been found to be advantageous for use in prosthetics due to the quality of strength and weight bearing capacity. The stronger the metal used in the prosthetic, the less likely the occurrence of fracture and loosening. Wear resistant metals are less likely to shed particles, and therefore less likely to induce potent inflammatory reactions.

C. Preliminary Studies

1. Establishment of an activated macrophage culture through the differentiation ofHL-60 promyelocytic cell line.

The HL-60 promyelocytic cell line will be treated with I 0nm of PMA in order to induce their differentiation into macrophages. Following a 72-hour incubation period in PMA, cells are expected to exhibit morphological changes as seen in Figure IV. I. In the undifferentiated state, HL-60 cells grew as suspension cells in culture, exhibiting round morphology (Figure 1.5). Cell morphology will be monitored for a 72-hour period to ensure differentiation

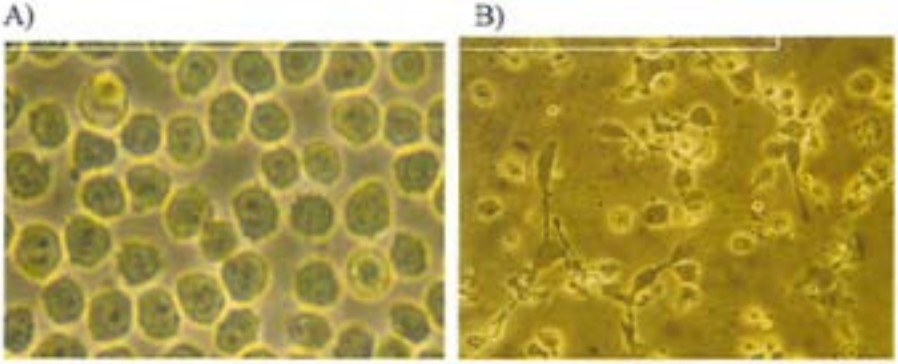

Figure 1.5 Induction of HL-60 cells into human macrophages and evidence of morphological changes. A) Untreated HL-60 cells growing in culture suspension. B) HL-60 derived macrophage cells adherent in culture following 72-hour incubation with lOnM PMA. (Original magnification 40X).

2. Macrophage phagocytosis assay

In order to examine whether differentiated macrophages possess the ability to actively engulf targets in culture, a functional phagocytosis assay will be established. The need for this assay is to ensure that the HL-60 derived human macrophages will take up alloy particles and show the same immune response in vitro as they would in vivo. The murine macrophage cell line, J-774, is well known to actively take up fluorescent beads as phagocytic targets.

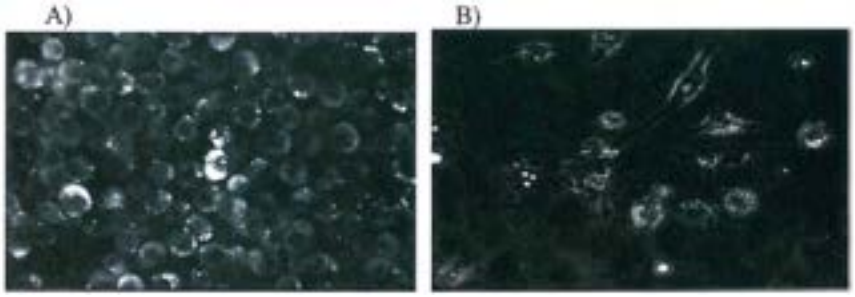

Figure 1.6 HL-60 macrophages phagocytose fluorescent particles. A) J-774 murine macrophages actively phagocytose fluorescent particles. B) HL-60 differentiated macrophages actively phagocytose fluorescent particles. (Original magnification 40X).

3. Differentiation ofHL-60 promyelocytic cell line into activated osteoclasts

The HL-60 cell line will be treated with 10nm of 1 a, 25 dihydroxyvitamin D3 and 50nm of PMA to induce osteoclast differentiation, as described in the Materials and Methods. Untreated HL-60 cells grow as suspension cells in culture as seen in Figure I. 7 A. At 48 hours post osteoclast induction, the cells began to adhere to the culture dish. The differentiated cells began to clearly exhibit globular morphology, as shown in Figure I.7B. At 48 hours following osteoclast induction, cells appeared spread and displayed elongated lamellipodia.

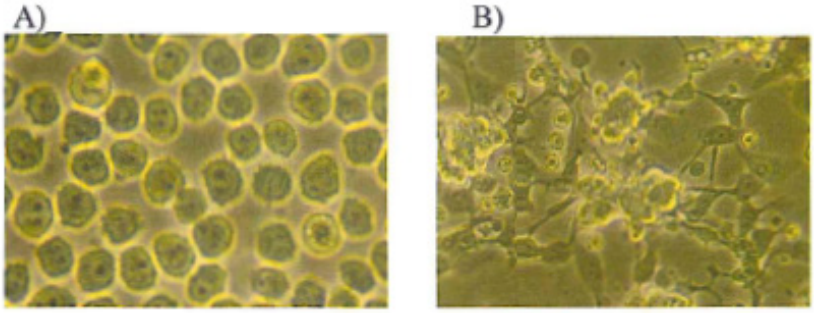

Figure I. 7 Induction of HL-60 cells into human osteoclast cells by la, 25 dihydroxyvitamin D3 and by 50nm of PMA treatment. A) Undifferentiated HL-60 cells in culture suspension. B) Differentiated osteoclasts in culture at 48 post-treatment with 1 a, 25 dihydroxyvitamin D3 and PMA. (Original magnification 40X).

4. Human fibroblasts migration assay

Fibroblasts contribute to the recovery of tissues after an injury by laying down extracellular matrix and connective tissue. Therefore, it is important to know whether fibroblasts have a different migratory response on the surface of certain types of alloys that comprise prosthetics. KHOS/240S human fibroblasts will be plated on the surface of metal discs at a density of 4.0xl05 per disc and treated with 4ug/ml of mitomycin C to prevent cell proliferation, as described in Materials and Methods. Confluent metal surfaces will be manually scraped with a micropipette tip as demonstrated in Figure I.8 (46). This creates a clearing into which fibroblast migration can be observed. Fibroblasts will be immunostained for fibronectin to visualize the cells on the discs.

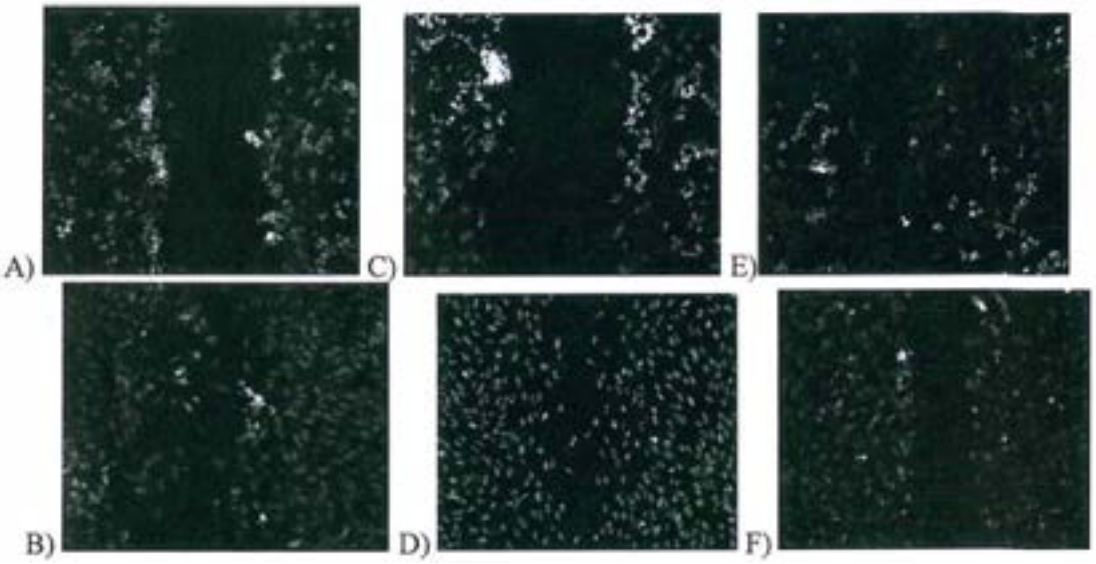

Figure 1.8 Fibroblast wound recovery by KHOS/240S human fibroblasts favors titanium alloy surfaces. A) Ti-6Al-4V at Ohr time point demonstrating scraped zone. B) Ti-6AL-4V at 24 hr time point demonstrates cell migration and closing of scraped zone. C) Experimental alloy Ti-6Al-4V-l B at 0 hr time point demonstrating scraped zone. D) Experimental alloy Ti-6Al-4V-1B 24 hr time point demonstrates cell migration and closing of scraped zone. E) Stainless steel (SS 316L) at O hr time point demonstrating scraped zone. F) Stainless steel at 24 hr time point demonstrates poor cell migration and poor recovery of the scraped zone. (Original magnification lOX).

D. Research Design and Methods

1. Solid Metal Samples
Metal rods of commercially pure titanium (CpTi) with varying boron concentrations (0.02, 0.1, and 0.4), Titanium alloy (Ti-6AL-4V) also varying in boron concentrations (0.001, 0.01,0.04, and 0.1), and Stainless steel (SS 316L), were supplied by Dr. VilupanurRavi (Department of Chemical and Materials Engineering, California State Polytechnic University Pomona, CA).

2. Metal Particles
Duplicates of the metal rods will be given to Dr. Vilupanur and his team m the Engineering department to be converted into particles.
3. Cell Cultures
The promyelocytic cell line, HL-60 will be obtained from previous stock. If the cells do not replicate new cells will be purchased.

4. Differentiation ofHL-60 Cell Line
Cells will be cultured at a density of 4.0xl05 cells/well in a 24 well culture dish (Becton Dickinson, NJ) before induction of both macrophage and osteoclast differentiation. Terminal differentiation of promyelocytic cells into macrophages will be achieved upon the addition of lOnM Phorbol 12-Myristate 13-Acetate (PMA; SigmaAldrich, St. Louis, MO). Cells will be allowed to differentiate for 72 hours at 37°C with 5% CO2. Terminal differentiation of promyelocytic cells into osteoclasts will be induced by treatment with 50nM of PMA and 1 OnM of 1 a, 25 dihydroxyvitamin D3 (Biomol International, LP, Plymouth Meeting, PA). Cells will be incubated at 37C with 5% CO2 for 48 hours.

5. Fluorescence Microscopy
KHOS/240S human fibroblast cells will be immunofluorescently (IF) stained in order to visualize cells on and to conduct cell migration and proliferation assays on the surface of all metal alloys and compare them. Cells will be viewed under a Nikon Eclipse TE300 fluorescent microscope and analyzed using Spot Advanced software.

6. Fibroblast Migration Assay
The migration assay is conducted in order to analyze cellular migration of KHOS human fibroblasts on the surface of titanium-boron alloys compared to baseline metals: Ti-6Al-4V and stainless steel 316L. The assay is designed to mimic wound recovery of in vivo fibroblasts across implanted prosthetics. Solid metal alloy discs Ti-6Al-4V, stainless steel 316L and Ti-6Al-4 V -1 B were sterilized as previously described. Cells will be harvested and placed on the surface of the metal. An incubation period of2 hours will be allowed for the

cells to adhere to the metals. A strip of cells will be scraped across the diameter of the metal (Fig. 1.9). Migratory results will be viewed at O hours and at 24 hours using fluorescence microscopy.(46)

Figure 1.9 Fibroblast migration assay. Fibroblast monolayer manually scraped using a micropi**pette.**

7. Cell Proliferation Assay
This assay was designed to analyze the effects of metal composition on cell proliferation. KHOS human fibroblasts are plated at a density of I .Ox 105 cells/well on solid metal discs to achieve 25% confluency. Metal discs will be sterilized and placed into empty wells of a 24-well culture dish. Cells are incubated at 37°C with 5% CO2 for 24 hours. Discs are removed from the wells and cells were stained for IF following incubation. Proliferation of fibroblasts is visualized by fluorescence microscopy.

8.Macrophage Phagocytosis Assay
To determine whether macrophages take up metal particles once they had differentiated, a phagocytic functional assay must be performed. J-774 murine macrophages (supplied by Pearl Viggers, Department of Biological Sciences, California State Polytechnic University Pomona, CA) will used to establish the functional phagocytosis assay. J-774 cells are known to actively phagocytose particles in cell culture assays. HL-60 derived macrophages will be analyzed for phagocytic activity.

9. Cytokine Secretion Assay
a. Metal particle assay

HL-60 cells will be differentiated into macrophages, as previously described. Following a 72-hour incubation, media is removed from each well and replaced with complete supplemented Iscove's modified Dulbecco's medium (previously described). Metal particles are added at a concentration of 1OOOug/1.0x106 cells. At 24-hour and 48-hour time points, 200uL of supernatant is collected and placed at -80C for future cytokine analysis (Figure 1.10).

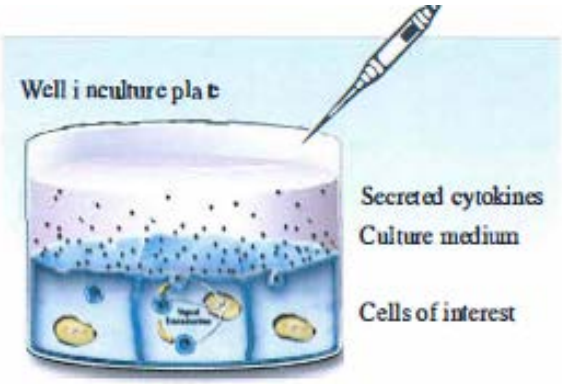

Figure I.10 Metallic particle assay. Tissue Culture well containing a monolayer of cells co-cultured with metallic particles (1000µg/10^6cells). The supernatant which contains secreted cytokines is collected for future analysis.

b. Solid metal disc assay

Solid metal alloy discs along with baseline metals, Ti-6Al-4V, CP Ti, and stainless-steel discs are placed into wells of 24 well culture dishes (Figure I. 11). HL-60 cells are plated on top of the metal discs. HL-60 cells were differentiated into macrophages as previously described. Cells were allowed to incubate at 37°C with 5% CO2 for 72 hours to allow terminal differentiation into macrophages. At 12 hour and 24-hour post differentiation timepoints, 200µ1 of supernatant is collected and frozen back at -80°C for later cytokine analysis. KHOS/240S human fibroblasts and human bone marrow stromal stem cells (HBMSSC) are also plated on the metal discs. At time points 12 hour and 24-hour timepoints, 200µ1 of supernatant will be collected and frozen back at -80°C for later cytokine analysis.

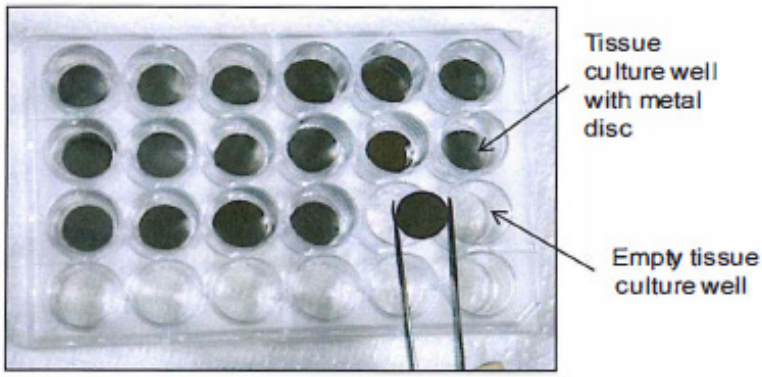

Figure I.11 Ti-B alloy and control metal solid disc assay. Macrophages, fibroblasts and stromal cells were cultured on the surface of metal discs in order to study cytokine secretion, cell migration and cell proliferation. Ti-B alloys with 0.05, 0.4 and 1.0 boron content were tested in triplicate. Control metals SS 316L, CP Ti andTi-6Al-4V were also tested in triplicate.

c. Multiple Cytokine Immunoassays

Using the Luminex 100 system (Luminex Corp, Austin, TX), cell supernatants will be analyzed for induction of cytokine secretion. The Bio RAD Bio-plex, multi-cytokine assay (BIO-RAD laboratories Inc, Hercules, CA) for Luminex technology will be used to assay for specific inflammatory cytokines from all cell types, according to the manufacturer's protocol (Figure I.12). The Bio-Rad Bio-plex system utilizes color-coded beads capable of conjugation with a specific reactant, e.g. anti-cytokine antibody. Each reactant is specific for a different target molecule, in this case a specific inflammatory cytokine. Up to 100-color coated beads can be used in an assay, so that potentially 100 target molecules can be analyzed per super-natant sample.

10. Bone resorbtion assay

HL-60 promyelocytic cells were plated at a density of 1x104 cells/well on synthetic hydroxyapatite-coated slides (BD Biosciences, San Jose, CA). Cells were differentiated as previously described and allowed to incubate at 37°C for 48 hours. Post 48 hour incubation, 50µ1 of sample supernatant is added. For this experiment, sample supernatant is collected during the metal particle and solid metal disc assay, as previously described. (47) Wells are stained with fresh 5% silver nitrate for 30 minutes followed by 3 washes in distilled water. Next, wells are developed with 100µ1 of fresh 5% sodium carbonate in 25% formalin for 60 seconds. Wells are washed 3 times with distilled water and fixed with 100µ1 of 5% sodium thiosulfate for 2 minutes. This step was followed by 3 washes with distilled water. Images of the hydroxyappetite wells are captured on a digital scanner and analyzed in Adobe Photoshop (Adobe Systems, Inc.). Images are changed to grayscale and inverted. The percentage of resorbtion is calculated based on the area of black pigmentation over total surface area, as according to BD Biosciences technical bulletin #444 (BD Biosciences, Bedford, MA).

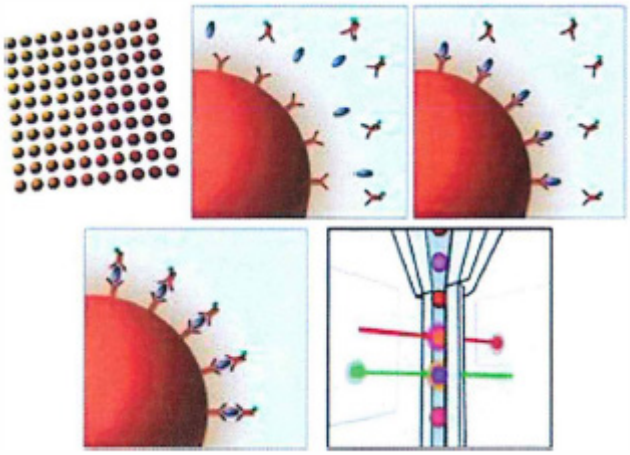

Figure I.12 Luminex Technology. Antibody coupled beads react with the sample, wash steps remove unwanted proteins. A biotinylated detection antibody is added with a specific epitope which sandwich around the desired cytokine. Strep-avidin is added which has affinity for the biotinylated conjugate. Detection occurs through flow cytometric technology. (http://www.bio-rad.com)

F. Results

Metals are seen at O and 24 hours to check the migration of human fibroblast (KHOS) and osteoclast (Saos-2). Data shows that fibroblast and osteoclast have little to no migratory response when incubated with stainless steel metals. In contrast, both cells had increased migration after 24 hours of incubation with the metals containing boron.

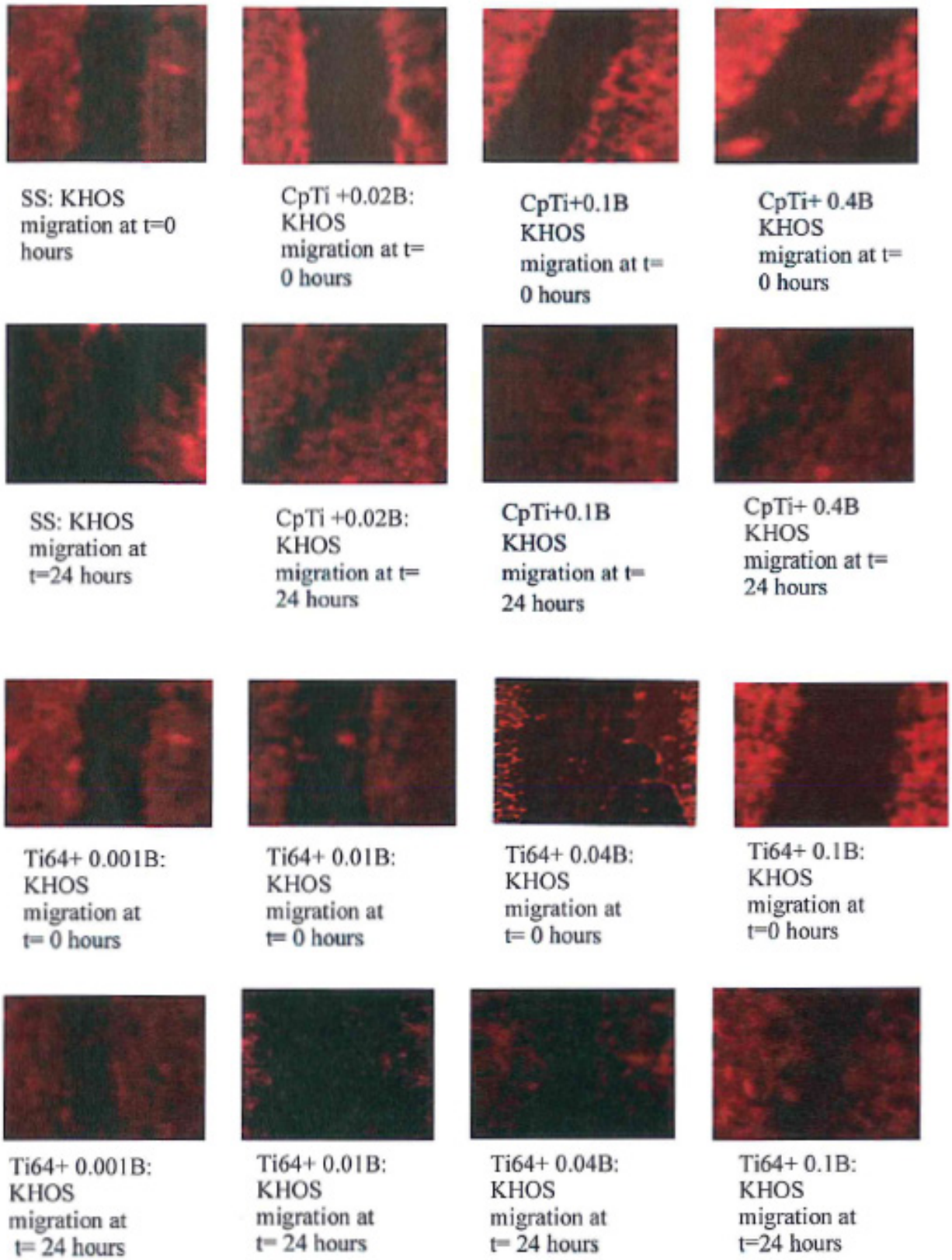

Figure I.13 Fibroblast (KHOS) Migration. Migration of fibroblast cells on the surface of metal alloys. Fluorescent microscope images seen at time zero and 24 hours after initial scrape.

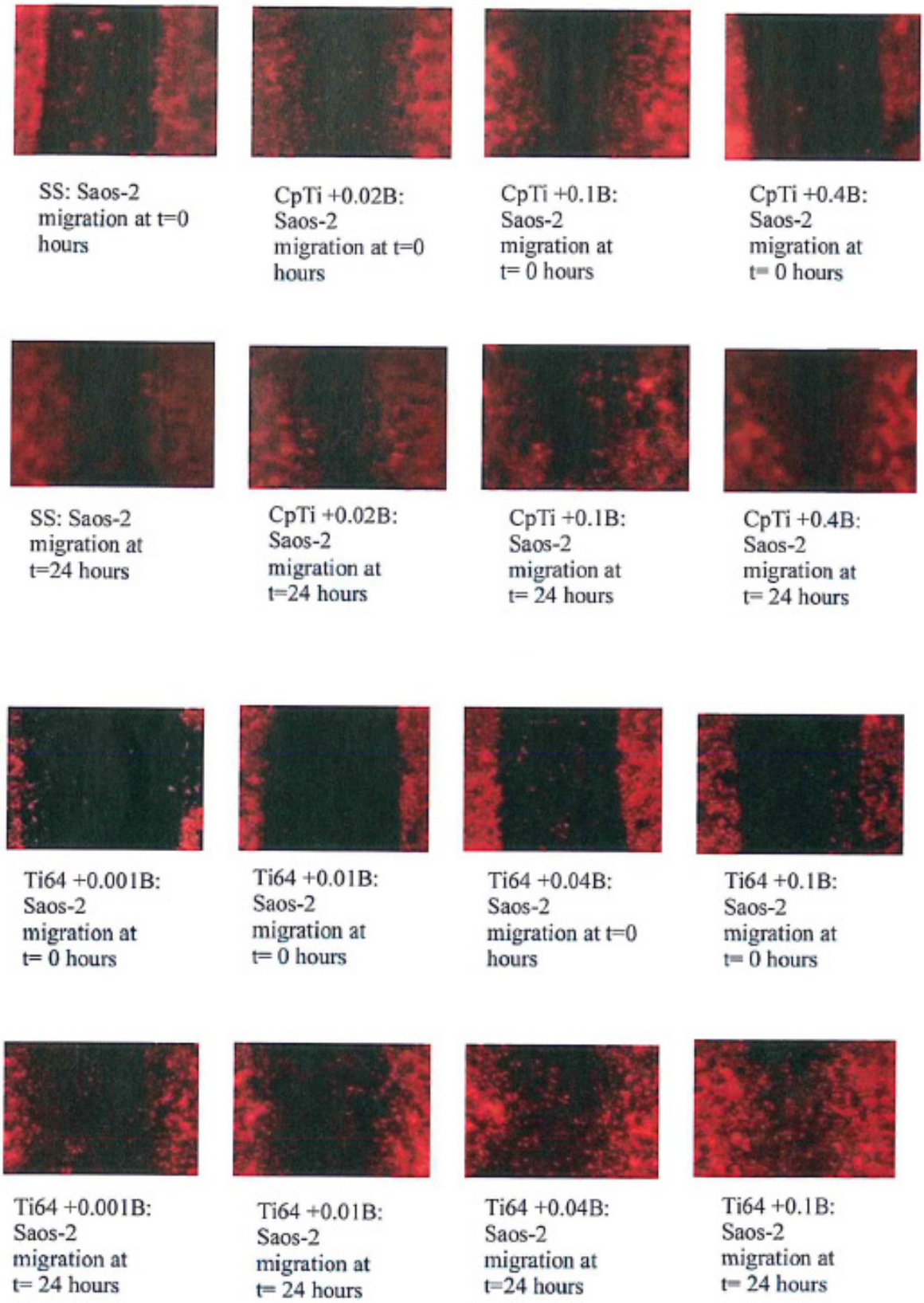

Figure I.14 Osteoblast (Saos-2) Migration. Migration of fibroblast cells on the surface of metal alloys. Fluorescent microscope images seen at time zero and 24 hours after initial scrape.

G. Discussion

As hypothesized, due to its biocompatibility properties, stainless steel had the least fibroblast cell migration after the 24-hour incubation period when compared to the rest of the metals. Conclusively, human fibroblast cells (KHOS) showed a migratory preference to the metals with increasing boron concentrations. This correlation can be seen for both commercially pure titanium (CpTi) and titanium-based alloys (Ti64). The same migratory pattern was observed for the osteoblast (Saos-2) migration. Thus far the data suggests an inclination towards higher boron concentrations, possibly indicating a more suitable element for fibroblasts to migrate and carry out their crucial cellular functions.

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Evelyn G. Vazquez

Dr. Mario Guerrero

Political Engagment in High School Students: Why We Should Implement Civic Courses Sooner

Abstract

Low political participation is an ongoing issue in the United States. There has been no one definitive cause identified for this matter. This paper argues that what is being taught now is not enough and if public schools were to start teaching students about American government sooner and continue to reinforce it throughout their K-12 education, instead of just high school seniors, we would have more involved citizens. This paper examines civic engagement amongst all different grade levels in high school to estimates the respective levels of political knowledge and political participation. Using a survey, this paper argues that there is a distinct difference in engagement amongst different grade levels in high school. Additionally, this paper argues that distinct levels of knowledge lead to different levels of participation amongst high school students. Instilling an importance in political involvement could lead to more participation and better representation in politics.

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Next, I would like to thank my Mom, Dad and brothers for always reminding me I can do whatever I set my mind to. Thank you for never giving me limitations and pushing me to be the best version of myself.

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Introduction

Lack of political engagement in the United States is abysmal. When looking at prior research, the demographics of who participates in politics shows just how disengaged younger generations are from politics. This is specifically true for high school students. Studies have shown that high school students are not only lacking in participation but have severe deficits in their level of political knowledge. These facts have been a major influence on the status of a growing issue in our country. People are not going out and fulfilling their civic duties. Whenever anyone talks about young people, they always refer to them as the future. We need to focus on this group in order to ensure our future for a better United States.

Political scientists have examined this issue time and time again, and there has never been a definitive answer. People have their own reasons for why they do or do not engage in politics, but previous research has uncovered specific patterns in political engagement. Citizen engagement goes hand in hand with their socialization. When research has examined political socialization, the groups that are most influential tend to be: family, peers, social class, media, religion, gender and education.

Many people do not have direct control over socialization forces. The two that usually can be molded and changed are media and education. When it comes to media, we do not always have access to extensive sources and restrict ourselves based on convenience. With the Internet and social media, this has changed, but even with access, citizens will still only interact with media that aligns with their political views. Education is the most malleable of the socialization forces and has a higher chance of being able to influence how a person will interact with politics for most of their life. We do encounter problems with education as well. Public school curriculum is supposed to be relatively similar throughout the nation, however this is not the case. Although there is not an equal starting point, we have seen people achieve their American dream through education.

High school students in the California public school system are required to take a semester long government class their senior year. This is intended to have students better understand how our complicated government works. The course also teaches students about their rights and responsibilities as citizens of the United States. Although these reasons are important, the American public remains unknowledgeable and disengaged. For this reason, it is important to ask how high school civics courses affect a high school student's political engagement.

In the public-school system, course requirements are meant to help make students knowledgeable citizens, but this is not enough. There is more we can do to mold more engaged students, because students are not being exposed to politics in an adequate manner. This project argues that if we were to introduce politics and the importance of being involved earlier in a student's educational career, we would have more engaged citizens. Specifically, this project assesses if there is any kind of development of political knowledge throughout their four years in high school. The literature does not examine high school students as they move through high school, so this research can add more detail to a topic that has been looked at for a long time.

I hypothesize that political exposure at a younger age will lead to a more engaged electorate. Political engagement is defined as a student's level of knowledge about politics as well as their attitude towards politics. Learning about how the government works earlier in life will make politics seem less intimidating. Just like anything else, if we learn something little by little, we do not get overwhelmed. Nothing turns someone off from a situation faster than the complexity of the topic. For many students, their biggest role models are their parents as well as their teachers. These are the people they spend most of their time with and look up to for answers. If these influential people prioritize teaching how the government works and their role in society, we might see students engage in politics because they have been better socialized to do so.

Like previously mentioned, there are various factors that come together to socialize a person, so education might not be the only answer. Civics courses might be being taught in a way that is causing students to look at politics in a negative light. There is also the case that even though a student knows a lot about politics, they do not take the extra step to participate in politics later in life. Here, we would need to examine other confounding variables to find a better answer. We would have to include other

factors that have led this person to think it is not important to use their knowledge and implement it to be better represented.

In order to find out the effect of high school civics courses, this thesis uses a survey with three parts. The first includes the how much political knowledge each grade level has. This includes ten questions taken from the United States Citizenship and Immigration Services (USCIS) website.

The second part of the survey asks questions about political participation and their likelihood of being involved in certain forms of participation. I will be using this data to look at the perspective these students have on politics. There are also questions about their level of satisfaction with their civics courses and how helpful they find them to be. Unlike the first part that is done in multiple choice, these are fill in answers that will later be coded. The final part of the survey asks standard demographic questions that might affect they way students answer the questions.

The survey will be given to twenty students of each grade level. These grade levels include freshman (9th grade students) through seniors (12th grade students). To measure the development, if any, of the students, the same survey will be given two times. Once at the beginning of the semester and the second one at the end of the semester. Seniors that are taking a government class at the time should arguably be more politically engaged in the second iteration of the survey. Doing two waves of the survey will highlight what is not taught in classes, and if, with the knowledge they have gained, they feel compelled to engage in politics. Along with this, I will look at what the current curriculum for California Social Science courses. This curriculum will help reflect what California is doing now and where there is room for improvement. We will also examine the results and see how they can be interpreted for implementation on the greater scale.

Literature Review

The youth are the future of our nation. For decades, we have seen of political disengagement grow, but have not been able to pinpoint the cause, nor offer a concrete solution. Many scholars have looked at young people as being neither knowledgeable or willing enough to become politically engaged. There is a big disconnect between the younger generation and their older counterparts in the way they view politics and our government. Aside from growing up in different times, there are multiple factors that have contributed to today's status quo. Socialization has allowed us to look at specific components that make up a person's political attitude. Of these, education is often looked at by scholars. Education is an opportunity to help shape the minds of our youth.

In the United States, education is used as a source to create good, well rounded Americans. The curriculum is created to focus on the techniques and information that will help the student thrive, but also to benefit our nation1. When it comes to politics specifically, civics courses are mandated for high school seniors. The curriculum taught is intended to carry on with the students for the rest of their lives. There are elements that shape the type the perspectives a student will have on politics and later the decisions they will make about participation that researchers have determined as significant. Among these, there is teacher influence in the classroom, demographic influences, classroom tactics to encourage political engagement and tactics outside the classroom. This literature will cover each in the pages to follow.

[1] (Campbell 2008)

A Teachers Influence

Students are influenced by different authorities throughout their lives, in particular their parents and their teachers. The primary principle is the way one is taught something, and it is likely the way you will always remember it. Obenchain, Balkute Vaughn, and White2 looked at the way teachers view material they teach students and evaluate how it aligns with the ideals we hold as a nation. Teachers in the United States undergo similar schooling and trainings to be able to give students the education the nation sees fit. The authors inform us that historically, public schooling was made so we could have American citizens that carry around and execute American ideals in a similar fashion. This is challenged by Obenchain, Balkute Vaughn, and White who argue that teachers are able to interpret material with personal influences. This may skew the "American ideal" based on how that teacher understands and executes the material to her classroom. This idea is an explanation for the attitude that we see from the youth towards politics. Even if there is no change in the curriculum in the public-school system, there are other ways for teachers to "work with what they have".3 If teachers do not feel a sense of importance towards politics, that will be reflected in the students.

B. Ã–zdemir, Stattin, and M. Ã–zdemir4 examine the forces that affect a student's level of participation. The authors did their study in Sweden, looking at perception of seventh and tenth grade students. They looked at various factors in schools, including demographic composition that makes up the school, the civic education taught, and the democratic school climate. The democratic school climate measures the control a teacher has on their classroom and eventually the lives of the students. The role and perception of the teacher both create a learning environment in a classroom. Teachers are either passive or inclusive with their teaching style in the classroom. Although this is a Swedish study, there is mention of the approach most commonly seen in the U.S., the passive style. This includes having students read from textbook, do worksheets and report back. Although this is a good way to gather information, this is not going to "leave a mark" on the student's mind. The other approach is active teaching, this encourages discussion in the classroom about what things are and how they work. This tactic helps students develop a feeling towards the issues.5 If teachers were to bring up politics at a younger age, in an inclusive manner, they would be much more approachable as students become voting adults.

Cognitive Development

Around the age of 12, students go through adolescent cognitive development. There are three stages in this part of development. Early adolescence, middle and late. Each of these is very significant and should be taken into serious account when referring to education. During early adolescence, children begin thinking more complex about issues at home and at school. Some things include questioning authority and society standards as well as formalizing and verbalize their own thoughts. In middle adolescence, now that they have gotten used to thinking in a complex manner, they take it a step further and apply this to "philosophical and futuristic concerns"6. They are questioning and analyzing more extensively. They may also begin to form their own code of ethics. In late adolescence, they use their complex thinking skills for more personal decision making, including thoughts about more global concepts such as justice, history, politics, and patriotism, idealistic views on specific topics or concerns,

[2] Obenchain et al. 2016)

[3] Sevgi Bayram Özdemir, Håkan Stattin, and Metin Özdemir, "Youth's Initiations of Civic and Political Discussions in Class: Do Youth's Perceptions of Teachers' Behaviors Matter and Why?," Journal of Youth and Adolescence 45, no. 11 (November 1, 2016): 2233–45.

[4] (Bayram Özdemir, Stattin, and Özdemir 2016)

[5] (Bayram Özdemir, Stattin, and Özdemir 2016)

career decisions -Will they move out? Will they go to college? - and very importantly focus on what role in they plan to play in an adult society.

This is when a student's brain is developing its own opinions, opinions and habits they will likely carry with them for the rest of their lives. Introducing civics courses similar to those we introduce senior year of high school can explain their roles in society, explore their rights as Americans, go through their duties as early as junior high, or freshman tear of high school. This will eventually help solve the issue of lack of political engagement we are facing now.

Demographic Influences

Flanagan and Levine7 remind us that not all people begin on an even playing field. This may be due to where you live, your socioeconomic status, your gender or your age. These factors can affect your likelihood of participating in politics. In the past, students have become involved in politics and political issues when they enter college. This is a fantastic opportunity for college students, but those less fortunate are left out of this opportunity and cannot be involved in politically driven activities mostly due to financial restrains. The authors also mention immigrant students and the political hardships they face because of legal status. We are not all given the same opportunities, which is a plausible reason for the disconnect mentioned. While all students are mandated to go to schooling through the twelfth grade, it is no surprise that there are discrepancies in the way students are taught.

Those who live in less affluent neighborhoods will not get the same opportunities as those in a wealthier area. These students may not learn the importance of politics because there are bigger issues at hand. Students across the nation are faced with realities that maybe generations before ours were not. There are cases where high school students work multiple jobs to keep their families afloat. This was not the case for previous generations. A studentâ€™s responsibility was to go to school and get good grades, leaving time to become engaged in politics, but now that time is spent elsewhere.

Eckstein, Noack and Gniewosz8 focus on attitudes of children from the ages of twelve to sixteen. Education and gender were found to be the two most important factors. When looking at gender, it is significant because gender, again, does not present an even playing field. Women are not as well respected in politics as much as men. This changes the way boys and girls perceive their role in politics from a very young age. Girls might be less willing to participate because they do not see many people â€œlike them". The authors claim that students who are more geared to go to college have â€œpositive attitudes towards engagement".9 They are the students that will turn into Americans that are willing to go out and do perform their civic duty. Aside from college attainment, the school's attitude towards politics will influence the way the student views politics. If there is a negative connotation associated with politics and engagement, unless the student is socialized with politics from a different outlet, they are not likely to feel compelled to go out and participate in politics. The age groups this study examined is also very important

[6] ("Default - Stanford Children's Health" n.d.)
[7] (Flanagan and Levine 2010)
[8] Katharina Eckstein, Peter Noack, and Burkhard Gniewosz, "Attitudes toward Political Engagement and Willingness to Participate in Politics: Trajectories throughout Adolescence," Journal of Adolescence, Political and Civic Engagement Development in Adolescence, 35, no. 3 (June 1, 2012): 485–95.
[9] (Eckstein, Noack, and Gniewosz 2012)

because the habits kids learn will be those they display as adults. If people begin to participate and learn at a young age, engagement will be with them into their adulthood. This theory is known as the impressionable year's hypothesis10. There is some overlap in the age groups that are examined by these authors, but specifically, this thesis looks at seniors in high school of the age 17-18. Even if this does not fall under the impressionable years, it is still significant for young people to be involved because they are the ones who can engage in voting at other forms of participation sooner. In order to get the most accurate results, we must consider all areas that may influence the study. Although easily looked over, demographics play a strong role in all aspects of a student's life.

California Curriculum

There are three levels to the California School System: elementary school, middle school, and high school. In elementary school, students are taught things historical events and how they shape American history. Students recognize the American flag, the bald eagle, Statue of Liberty, etc. We teach ideals we want to instill in our American people, such as sharing, being honest, courage, and to be patriotic. A popular form in which this patriotism has taught us through songs and the Pledge of Allegiance. As they move through the public-school system, symbols become more complex introducing documents like the Constitution, and Declaration of Independence. They are taught that some people make rules, and some follow them and how this is evident in their daily lives-like in their families and in the classroom. Important figures such as the founding fathers and significant presidents are the foundation of our history at this time. By the end of elementary school, students are made aware that there are levels of government and are exposed to history outside the United States.11

In middle school, there is a continuation of the exploration of other civilizations. Before students leave middle school, they are exposed once again to American history. Here, there is more detail on the role of the United States on the global spectrum. For example, what side we were on during the world wars. This idea continues to be explored in high school.

There is no social science class in 9th grade, but in 10th grade students learn about historical cultures and how that has led to the modern world we live in today. In 11th grade, there is focus on U.S. history during the twentieth century. It reemphasizes the issues discussed in 10th grade but go over the history of what was going on in the U.S. during that time. During the final year of high school, for one semester, seniors pursue a deeper understanding of the institutions of American government.12

Classroom Tactics to Encourage Political Engagement

Classroom tactics can assist learning by fostering a dialogue and letting students establish their opinions on something. Multiple scholars have taken a deeper dive into how to present civics course material in a way that will help students to better understand the material. Campbell13 opens his study by posing a question about how successful the public-school system has been in fostering well educated and politically involved adults. He believes that this topic and this age group has been understudied. The American school system has made it, so schools are mandated to create a knowledgeable electorate by the time they are done with their K-12 education. Campbell makes a point that teachers are so often caught up with other subjects such as math and science, they forget that the importance of social sciences. Even with these mandates, political participation of students graduating high school is still low.

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[10] (Eckstein, Noack, and Gniewosz 2012)
[11] (Klingensmith, California, and California 2000)
[12] (Klingensmith, California, and California 2000)
[13] (Campbell 2008)

Our society puts so much emphasis on the importance of STEM on students from a very young age, there should be similar emphasis on social science.

The classroom climate gives us a glimpse into how students view politics and participation. The way political information is being presented to young people will likely affect their perspective for the rest of their life. Campbell14 states that if there were to be more open discussion, we would see attitudes change. If there was more discussion in the classroom, this idea of politics as being a topic that nobody should talk about, would be less prevalent. We should be encouraging discussions and differing opinions. Students should feel free to express their opinions on a topic, but they should also learn to listen to other opinions.

Tactics Outside the Classroom to Encourage Political Engagement

Within school, we see students get lots of extracurricular opportunities that help them advance in life. This may be anything from learning an instrument to learning a sport. Kahne and Sporte15 examine some ways to further civic participation outside the classroom. They look at a large sample of students from Chicago. Although it is not always possible for students to participate in activities like Model United Nations Club or Debate Club, there are other, simple ways, to foster a political environment. The authors talk about the importance of conversation. If parents were willing to sit down and have a conversation with their children about what is going on in the world and ask children about their opinions, it would make a big difference. Repetitiveness has an incredible impact on the mind. If you learn something at school, talk to friends about it, then go home and have a conversation with your parents about it, it is more likely to register to your long-term memory. Mere exposure to something multiple times, like the importance of participation, will lead to politically active people.

Digest16 brings up the point that even if someone is knowledgeable about politics, that is not the only thing that will drive them to the ballot box. For those cases, he states here is a strong relationship between civic knowledge and various attributes of democratic citizenship, such as a propensity for political interest, civic/political engagement, political tolerance and commitment to the common good.17 Digest mentions that these are also things that can be adjusted for. He is of the mindset that children should be exposed to politics in extracurricular activities. In a classroom, students learn and memorize facts. They do not have a way to express what they learn and develop an opinion. Having these activities allows them to put their knowledge to use and feel a connection to it.

Academic Success

Researchers have also evaluated civics curriculum, for both young students, but also adults. Kahne, Crow and Lee18 do not think that the current civics courses offered in California are not up to par to get significant results. These courses should have a much bigger impact on individuals than it does now. They introduce this study by explaining how little those under age thirty know about politics. They examined civics course material in California and Colorado but examined politics in two scenarios; open discussion and service learning. In civics courses, politics is narrowed down to two categories. There are "little p" politics, which include issues that will affect your day-to-day life, and "big P" politics, which include institutional issues. People, specifically the youth, respond better to "little p" politics because they feel a personal connection to these issues. The open discussion route was used to target

[14] (Campbell 2008)
[15] (J. E. Kahne and Sporte 2008)
[16] ("The Civic Mission of Schools: Key Ideas in Aresearch-Based Report on Civic ...: EBSCOhost" n.d.)
[17] ("The Civic Mission of Schools: Key Ideas in Aresearch-Based Report on Civic ...: EBSCOhost" n.d.)
[18] (J. Kahne, Crow, and Lee 2013)

learning of the "big P" politics. The study reasons that if students were to talk about state and federal issues in an open forum, the students would not be turned off to these issues. The service-learning courses intended to immerse students into the mind set of helping your community, which they hope in turn with result in participation to better their community. Their hypothesis found discussions in an open forum were successful. The way we are teaching our youth can no longer be ignored as it may be the factor that changes the status quo. This thesis will evaluate the approach the California curriculum takes and why it has not been as successful. In the survey given to the participants, there are in depth reasons and explanations of what students feel is important and useful.

Giersch and Dong19 discuss the effects that come with having mandated civics courses in public school. Their data demonstrates a positive relationship between these courses and learning about politics. They argue that schools should take it a step forward and not only have a mandated civics class, but also a culminating quiz or test that examines what the topics learned and how it can be applied. There needs to be some form of accountability where school should demonstrate that they have successfully taught the student some basics about politics and their government. A "political exit exam" is a good way not only to keep the school accountable, but the teachers as well. There has been a lot of focus on the students not using the skills that they learn in civics classes, but there should be more accountability on the facilitators. If facilitators are not putting their best efforts forward, it is hard to expect the students to.

Campbell and Niemi20 also argue that in order to make sure our students are knowledgeable participants in society, we need to mandate an exam after taking a civics class. Having to take a civics course is mandatory, but beyond that, there is not much more to it. Teachers given leeway to potentially emphasize their personal biases. There are slight differences in what the state believes should be added or taken away from the curriculum, but we have no way to know the successes of these differences. Having an exam would give us results on how this change influenced the students. If curriculum or strategies work well, we can implement similar requirements nationwide. This study looked at states that have already implemented a civics test and they have seen successes in their level of participation. Having a civics test will reinforce the level of knowledge students are learning. If students were to study rigorously and store this information in their long-term memory, they would be able to recall it later in life. This will allow citizens to think back on what they learned in high school as a foundation to further their knowledge.

Dudley and Gitelson begin their research with the development of the "Task Force on Civic Education for the New Century", an initiative created by Elinor Ostrom when it became clear there was a real threat on the youth becoming less and less engaged in politics. This research helps pose alternatives that help in the development of positive attitudes towards politics while they are children. They focus on associative conditioning models. In hoping to help children as they grow older. When children are conditioned to think one way or do something, it is likely that this will stick with them for a very long time. They have to be actively trying to unlearn this idea in order to get rid of habits learned early on. This idea can only be considered for ideals in politics such as importance of participation, but we must still find other solution for learning about new administrations. We cannot teach children who sits in which seat, but we can teach them ways to research people and issues.

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[19] (Giersch and Dong 2018)
[20] (Campbell and Niemi 2016)

Ahern21 mentions the importance of talking to kids about politics. The cause of declining political knowledge among our youth cannot be put on only the school system. She thinks "making young people feel engaged is the key to get them voting".22 Being excited about something will not only drive everyone to the polls, but it will have the domino effect. If you encourage one person, they will encourage the next. With technology, it is clear. It only takes one click to share a story with lots of people. This cannot be taught in a classroom, but teachers should use this excitement to their advantage to better inform students.

Self Interest Leads to Low Participation

Self-interest is deeply rooted in politics. Galston23 looks at a UCLA study on political knowledge, participation and attitude. The results of this study are remarkably low, and he assesses why that is. He sees a connection between those participating in politics and their attitude towards society. Although passionate and caring, the young people are self-absorbed. They mostly worry about their own lives and what is happening immediately around them. This is significant because it is an issue that goes beyond politics. Students are not going out and participating because they will not face the consequences of what happens to the rest of society if they do not go out and vote. This is something civics courses could directly address. A lot of people in general are turned off to politics because they feel their voice or vote will not make a difference. We should instead be sympathetic and understand how we can help our community with our participation.

Snell24 examined the lack of participation amongst young adults and wanted to understand reasons for their lack of engagement. She believed she would find significant explanation in religion, political affiliation, following their parents' footsteps in politics and voluntary associations. From her various types of data collection, both quantitative and qualitative, she found that this was not the case. She talked to young adults over the phone and in person. She looked at citizens from eighteen years old to twenty-four years old, a little older than the group in this thesis. This age group is old enough for forces like their parents and religion to be less influential. They instead take the issues that are prevalent to their own lives and vote that way. When we look at students under the age of eighteen, we see more ties with parents and other authorities in their lives. These kids still look to their parents, their teachers, their social circle and even their religion to take a stance on something. Therefore, younger students are more susceptible to these types of influences.

Cole25 hit on the point of "ignorance is bliss". For many, it is easy to not even think about politics. If one pushes something to the side, it is easy to pretend that it has not significance. Cole brings up the fact that this idea is not limited to those in society who would typically not engage in politics, it is everyone. He mentions that even those who are highly educated were not able to answer typical civics questions. He also brings up the case of politicians, like Gary Johnson, not knowing what is going on. There needs to be a higher standard for all Americans to be more aware. With the implementation of political education at a younger age, we can teach children to also look at what is going on around the world and understand it is just as important as domestic issues.

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[21] ("Talk Politics with Your Kids (and Get Them to Vote!)" n.d.)
[22] ("Talk Politics with Your Kids (and Get Them to Vote!)" n.d.)
[23] (Galston 2004)
[24] Patricia Snell, "Emerging Adult Civic and Political Disengagement: A Longitudinal Analysis of Lack of Involvement With Politics," Journal of Adolescent Research 25, no. 2 (March 1, 2010): 258–87.
[25] Jonathan R. Cole, "Ignorance Does Not Lead to Election Bliss," The Atlantic, November 8, 2016.

Fry26 from Pew Research looks at what elections would look like if millennials and the younger generations were to vote. "As of April 2018, 59% of adults who are eligible to vote are Gen Xers, Millennials or "post-Millennials."27 This makes up most of the electorate, yet they show up the least. There needs to be more of an understanding of the potential there is here.

Technology's Effect On Political Attitude

There are outlets outside of the classroom that will influence a student's feelings towards politics. Senongyi and Woo-Young28 looked at Korean teenagers and their attitudes towards politics due to media and access to the Internet. With infinite access, one may assume that we would see a more knowledgably electorate that goes out and participates. In Korea, after the 2008 Candlelight Protests of Korea, there had been an increase in the amount of participation amongst the youth. In this case, there was a bigger jump in the number of young females voting than in young males. Past generations feel that the Internet is a threat to society, but it does not have to be. We should be using it to our advantage. If this is a way teen are positively responding to politics, this is another strategy that can be implemented in the classroom.

McKinney and Chattopadhyay29 specifically examine the 2004 presidential candidate debates. This debate had television views that were historically high. They concluded that students and young voters were confident in their knowledge which lead to an increase in the polls. Another aspect they took into consideration was exposure to politics from different outlets. These included popular cultural television channels that are geared towards a younger audience. The effect that confidence in their knowledge was a big reason as to why they decided to go out and participate. There is something to be said about the feelings these advertisements created for the young voters. It made voting and participation "cool" because it became accessible. An exposure as small as a ninety-minute debate made a big difference in turnout results. There was nearly a ten percent increase in the number of people that voted from 2000 to 2004. Knowledge creates confidence, and confidence leads to voting. Teaching and engaging kids at a younger about politics will give them the confidence to go out and participate.

Successes In Education

We have seen some successes in the traditional school system. Van de Werfhorst30 looked at educational institutions in twenty-four European countries from 2002 to 2012. He compared two types of educational systems. The traditional school system and the vocational school system. This study showed that there was a big difference in the way students participate in politics. Those that were on the traditional public-school track showed a better understanding of politics, leading to more participation in election and other forms of participation. At times, students are not taught about civics because it is not in the interest of the employer, but nonetheless, this shows the power of education, leading to the affect this will have on how much a student will participate in their adult life. This is a European study, so their curriculum is different than the United States, and more specifically different than the curriculum in the California public school system.

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[26] "Will Millennial, GenX Voters Match Older Generations in 2018 Turnout?," Pew Research Center (blog), accessed November 2, 2018.
[27] ("Will Millennial, GenX Voters Match Older Generations in 2018 Turnout?" n.d.).
[28] Yun Seongyi and Chang Woo-Young, "Political Participation of Teenagers in the Information Era," Social Science Computer Review 29, no. 2 (May 1, 2011): 242–49.
[29] Mitchell S. McKinney and Sumana Chattopadhyay, "Political Engagement Through Debates: Young
[30] "Vocational and Academic Education and Political Engagement: The Importance of the Educational Institutional Structure," n.d.

He mentions that although vocational systems are not as popular in the U.S, we have other factors that influence our curriculum, such as social class. Understanding this leaves us a lot of opportunity and hope for a more effective and active electorate. Knowing that students respond to what they are taught means we should change what we teach to encourage them to be more engaged.

Hillygus31 examines between political behavior amongst students in higher education. She comes up with three hypotheses to explain behavior: the civic education hypothesis; the social network hypothesis; and the political meritocracy hypothesis. The civic education hypothesis specifically discusses education prior to college. Hillygus, because of the civic education theory, believe that education is fundamental to get people to go out and vote in the most fundamental matter. She brings up that without education, we would not even know how to read our ballots, but because we do acquire that skill, we can go out and vote. Beyond that, she claims that we are given the social literacy to be engaged citizens. Regardless of what the class is, is it giving you the skills to go out and participate. The further you get in your education, the more likely you are to do your civic duty even if your focus is not in politics, all your education has given you the skills to be politically active. This leads us to believe that students have the skills to go out and vote, but it may be the case that what they lack is the want to go out and vote. Therefore, it is important to teach children at a younger age how politics can impact their life and why they should be in control of it.

In conclusion, there are several factors that must be considered when coming to conclusions about political engagement. Whether it be the environment in the home of the student or the biases of the teacher in the classroom, understanding the influences a student comes across is beneficial in order to come to an adequate answer for our research question. Scholars have found some successes, and this thesis looks to be an addition to those.

Research Methodology

In an attempt to prove the declining political knowledge and participation amongst high school students in California, this thesis uses quantitative surveys in questionnaire form. Due to accessibility and to ensure that there is a representation of lower income educational locations, the students surveyed are from Chino High School (CHS) in Chino, California. This high school is located in a small town in Southern California in the San Bernardino County in the Chino Valley Unified School District (CVUSD) which has four high schools included in it. Chino High School has an enrollment of around 2,400 students32 of diverse ethnicities. Students at Chino High School are academically and financially on all sides of the spectrum although they are considered a Title 1 school.

Close to sixty percent of the students are on free or reduced lunch33 meaning they are below the average level of poverty. Although this is the case, students from Chino High have achieved tremendous successes. There are students who have played in national professional sports teams as well as being accepted into ivy league universities. The population on campus similarly reflects that of the California average student population. This makes the high school a great contender for this thesis project.

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[31] D. Sunshine Hillygus, "The MISSING LINK: Exploring the Relationship Between Higher Education and Political Engagement," Political Behavior 27, no. 1 (March 1, 2005): 25–47.
[32] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)
[33] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)

The majority of the students identify as Hispanic, making up 79% of the school's population. Although high, it must be noted that at the California state level, Hispanics also take the largest majority of students34. The lowest represented ethnicity is a tie between Asian students and Black students at 4%. This rings true at the state level. Another important aspect to consider when talking about students at the high school level is graduation rate. For the 2015-2016 school year, 94% of seniors at CHS graduated35. This is over 10% higher than at the state level's 83%36. Noting this is significant because it shows that students take their education seriously and the school finds importance is helping students successfully make it through their four years at Chino High School. Although this is just one high school being looked at, there are major benefits in taking a closer look and directly talking to the students about what drives their level of participation.

Participants and Design

There was no criteria for who could or could not participate in the data collecting process. In order to make sure there was enough information for all grade levels: freshman, sophomores, juniors and seniors, this study includes twenty students from each level, with a total of eighty students. The survey is to be administered at two time period in order to closer examine the development of a student's political knowledge, if any. The first is closer to the beginning of the school year, mid-September 2018, and the second survey was conducted mid- February 2019, once the fall semester was over. This is particularly important with the senior students because government courses are typically a semester long, with the exception of the advanced placement government course that runs for two semesters.

The survey is taken by students in groups of five or less at a time. This is to make sure the person administering it can assure that students are not being affected by outside sources. Students were taken out of class time and given as much time as needed to complete the survey. They were told to not use electronic devices to find answers. They were also restricted from communicating with those around them. This was the best possible way to ensure that the answers they put on the paper were a true reflection of what their level of knowledge is. The same survey questions were given at the two periods, with the exception of an additional two questions attacked to the second survey.

The survey is split up into three sections, each have around 10 questions. The first is made up of ten questions taken from the United States citizenship exam. In the naturalization process, one needs to answer seven correctly in order to pass. The questions I selected were purposeful to ensure that their knowledge went past the surface level. For example, instead of asking what the three branches are, I asked who the head of them is as well as when and how often they are elected. Knowing questions on a more profound level allows us to gage the amount of effort put forth by the students. It takes more than a passive observation to be able to answer these questions. There was also influence from scholars who have looked at questions that are often answered incorrectly and added a question (Who is the Vice President?) as influenced by their research.

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[32] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)
[33] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)
[34] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)
[35] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)
[36] ("Chino High School Profile (2018-19) | Chino, CA" n.d.)

The second part goes through a studentâ€™s likelihood of participation and if that have participated in politics in the past. Here we will see if there is any political influence already instilled in them through other means of socialization or if this is a brand-new concept for them. There is also a question regarding satisfaction with their social science classes and if they have suggestions to better facilitate their learning environment. This is where I added the additional two questions: "In the time since the last survey, did you feel more inclined to go find the correct answers?" This was a yes or no answer. I also asked, "In the time since the last survey, how invested do you feel in keeping up with political news?" This was scaled with the options of answering, "more invested, moderately invested more, somewhat invested more, same investment or less invested". The final section is questions about the student's demographic details. This is added to better understand what their background looks like. These surveys were graded, and the written answers were translated and coded.

Consequences of Using Survey's

By the time seniors are done with their government class, there should be a clear progression in the amount of questions they answer correctly that are being asked in the survey. There are two possible explanations for this. The first being that the curriculum has given them all the tools to be able to answer these "basic"questions and the second being that because they have been previously exposed to this material, they will feel more comfortable with their own capabilities. The second reasoning is not specific to seniors but can be applied to all four grade levels.

There are restriction put on this question due to timing. Students are only able to answer with limitations their level of participation. They were only able to answer what they think they would participate in when they are able to. For example, they can say that they will go out and vote, but because we are not able to follow them into their adulthood, where most of this participation takes place, we are not able to have proof that they actually did the things they wrote.

If we were able to follow a student from the freshman class, teach them about politics in a gradual and steady manner and test them along the way, we would be able to look at their voting patterns and their level of participation. If we see an increase in comparison to those who were not taught civics earlier, we could be able to truly confirm or deny the hypothesis.

Results

Like previously mentioned, the survey conducted for this thesis projects were split up into three sections; political knowledge, political attitude and the students demographics. This is the way that is the way the results will be provided. There will be an interpretation of what these results mean as it pertains to the hypothesis, being exposed to politics at a younger age will lead to a more engaged electorate. Findings from the California K-12 Social Science curriculum help us understand what is already being done and where these results will best set a lasting precedent.

Like previously mentioned, the survey conducted for this thesis projects were split up into three sections; political knowledge, political attitude and the student's demographics. This is the way that is the way the results will be provided. There will be an interpretation of what these results mean as it pertains to the hypothesis, if students were exposed to civic material at two different time periods, they would do better the second time and their interest in politics would increase. Findings from the California K-12 Social Science curriculum help us understand what is already being done and where these results will best set a lasting precedent.

When looking through scholarship on this topic was difficult. There has been a large emphasis on college aged students and the effect they have on the reasons for low voter turnout. Historically, college students have been the root for the wave of change in the status quo of society. Times have changed and I believe that the role college students once played can be shifted to high school students, if given the right tools. There are reasonings that are given for why college students have been so successful in manipulating the current state of affairs, but this does not always translate for their younger counterparts. For this reason, although there are similarities in the way college influences are interpreted, there is still a significant difference when comparing them to high school students.

The first section refers on the knowledge side of political engagement. Students were surveyed at two time periods. The four grade levels were given the same survey and the information wad graded the same both times. This first portion was corrected out of ten possible correct answers. In the initial survey, the 9th grade students answered an average of 5.9 questions correctly. This was not surprising given that most of these students have not been exposed to civic material in a school setting. Some of the questions asked were more historical than civic, which likely helped the scores. I expected the freshman to start with the lowest scores, but to have a larger jump in how well they did the second time around. This could be due to the fact that they do not have a social science class this year. Additionally, I expected them to have the most to learn, in a sense.

There was an increase in the number that the freshman got correct the second time around. In mid-September, we see 5.9 jump to 6.474 questions answered correctly. This is almost a .6 increase. In relation to the results from the other three grades, this is significant.

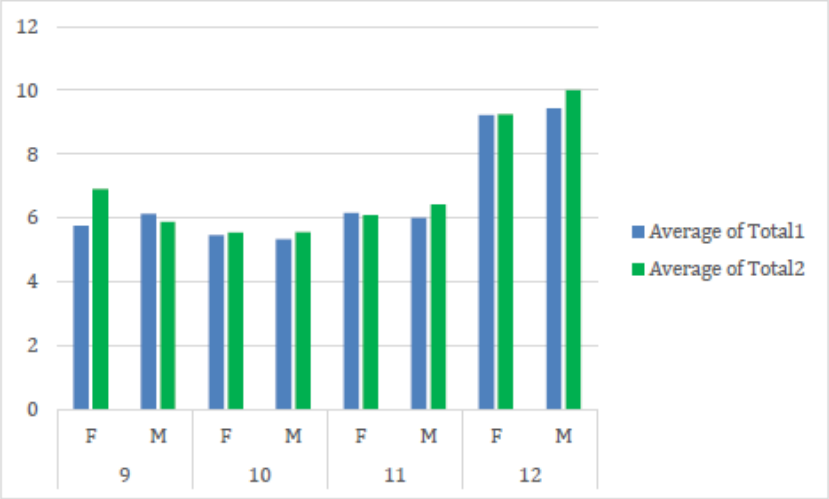
For the 10th grade sophomores, this is the year that they explore world cultures, so there is not much enfaces on the political role of the United States. I believed they would do better than the freshman, but not as well as the juniors or the seniors. One the first survey, the sophomores averaged a total of 5.4 questions correct. There was an increase in how they did the second time, but it was not as significant as the freshman. They averaged a total of 5.55 the second time around. They did .15 points better. When the survey was administered to this group, the first time around, they were the ones who took the longest to answer all the questions. Reflecting back, this could have been because they were having such a hard time with the material.

Next, is the results for the 11th grade juniors. The social science curriculum for this group focuses on the United States during the 20th century. There are many political hues to the history taught this year. Although I did not have many expectations for initial score for the 11th grade students, but the end of the first semester, I expected they will have been exposed to enough American history to see a more significant jump in the second round of surreys. In September, the juniors averaged a total of 6.1 questions correctly. Their average in February was 6.211, meaning that there was .111-point jump after the second survey. This was even less than their sophomore counterparts.

Finally, we have the 12th grade seniors. This should be the best model for implementing civic courses sooner. Because these students are the ones who were actively being taught this material during the time of the survey, we should see an overall increase in their level of knowledge. The first survey resulted in a 9.3 average of questions answered correctly. After the second survey, we see their scored go up to 9.471 points. This is an increase of .171, a bigger jump than the sophomores and juniors. I was surprised with how high the first score was, as I reflected on that, I realized that these students had already had about three weeks of instruction. In a year-long course, three weeks would not be as

significant, but because Government is only a semester long course, the material is accelerated. It is likely that the seniors had already discussed the material that was being asked on the survey. This would explain why the seniors were already far ahead of the other grade levels.

Table 1:



As a whole, we are able to confirm the part of the hypothesis that predicts that students will do better the second time, once they have already been exposed to the material. Although they did better, it was by a lot less than expected. The freshman had the highest point increase, more than the three other grades combined. Some consistent questions that we students get wrong, at least for the first survey is questions 5, How many amendments does constitution have? and questions 8, how many judges are on the Supreme Court?. One of the reasons I believed the students would do better on the second survey was their likelihood of going out and finding the correct answers for the questions they got wrong. Over half of the students claimed that after the first survey, they went and found the correct answers to the questions they believed they answered incorrectly.

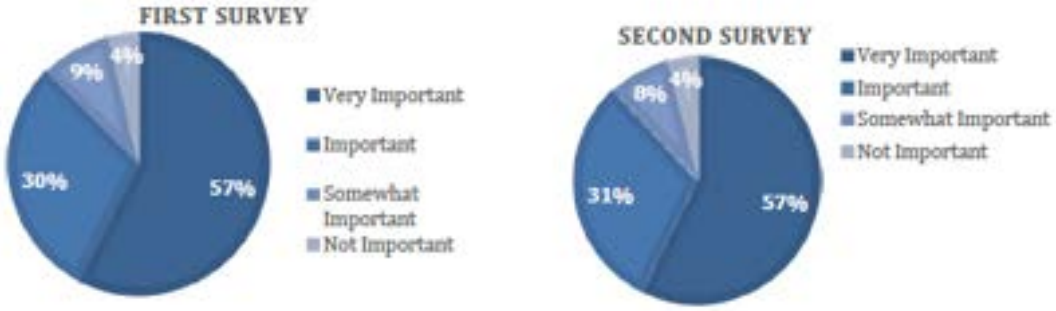
Attitude

The second part of the survey was intended to measure these students' attitudes towards politics. The way to measure of attitude is not as straight forward as knowledge, it is measured through open ended questions. There were some questions that were more geared to depict their classroom experience, but others are to the political system as a whole. The three I focused on to determine this was, "How important do you think it is to vote?", "Once you are of age (18 years old), how likely are you to go out and vote?", and "How likely are you to engage in political action?". I also asked, "How likely are you to engage in these activities?". This question was followed by forms of participating where being 18 is not required. Having an understanding of what you can do prior to being able to legally vote, will likely lead to students having a more positive attitude towards politics and their perception of the role they would play in the political arena. Although each grade level may have a different view in the way they interpreted the part of the survey that talked about the environment in the classroom, the way they viewed willingness to participate was similar

For the first question, asking how important students found voting, the scale asked them to pick one that best applied to them from "Not Important" to "Very Important". The first time the survey was given 4% of the students answered, "Not Important", 9% answered "Somewhat Important", 30% answered "Important", and 57% answered "Very Important". If we were to consider the total of

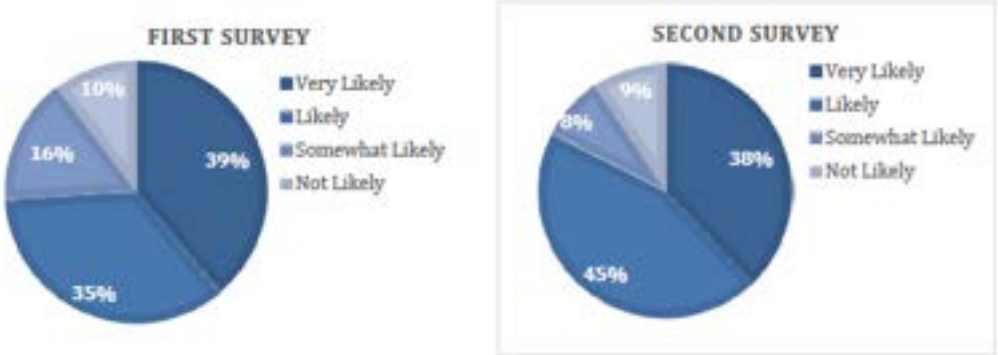
students who felt warmly towards considering voting as an important civic duty, it would make up 87% of the answers -combining "Important and Very Important". The second survey shows us similar results. For this question, 4% of students still answered, "Not Important", 8% answered "Somewhat Important", 31% answered "Important", and 57% answered "Very Important". There was a 1% increase in the "Important" category and 1% decrease in "Somewhat Important". Although now largely significant, there was a switch towards the warmer side of the scale.

Table 2:



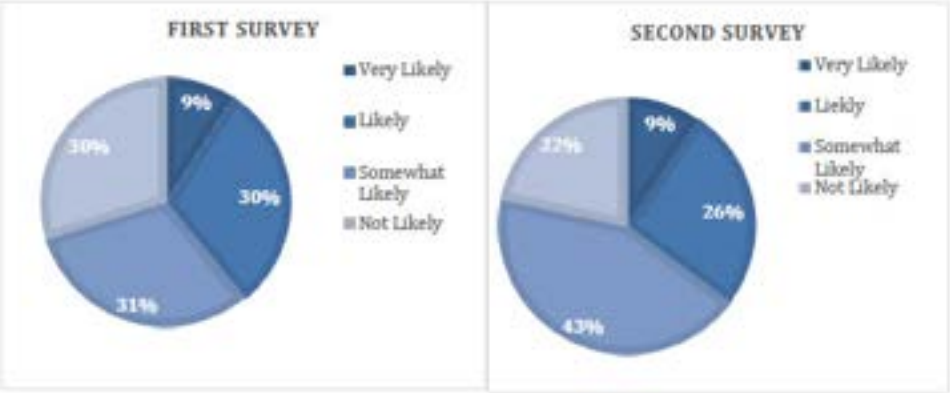
The following question I will using to depict attitude is "Once you are of age (18 years old), how likely are you to go out and vote?". Although students may think that voting is important, that does not always translate to them willing to go out and actively vote when they are able to. In the first survey, 39% of students said "Very Likely", 35% said "Likely", 16% said "Somewhat Likely", and 10% of students said "Not Likely". There was a significant change in the second survey. There was a 1% decrease in students who said they were "Very Likely", so now 38% of students answered "Very Likely". There was a 10% increase in those who answered "Likely", so 45% of students said it is "Likely" they would go out and vote. Only half -8%-of the students who had previously answered "Somewhat Likely" and 9% said "Not Likely". There was not a lot of change in the final category with only a 1% change. It was very interesting to look at how the attitude in this category changed. Whether students feel it is important to vote or not, that is not always the determining factor of their level of political engagement. 57% of students said they though voting was "Very Important", but only 35%-45% of students said they are "Very Likely" to go out at and vote.

Table 3:



The next question that extends the previous question. We will be examining "How likely are you to engage in political action?". Although this does incorporate voting, but it also encompasses other aspects of political action. Some of these political actions could be done by students at their current age. In the first survey given, 9% said "Very Likely", 30% said "Likely", 31% said "Somewhat Likely", and 30% said "Not Likely". During the second survey, there was a shift towards a more positive attitude overall. There was a 4% decrease in "Likely" (now 26%), there was an 12% increase in "Somewhat Likely" (now 43%) and an 8% decrease in "Not Likely".

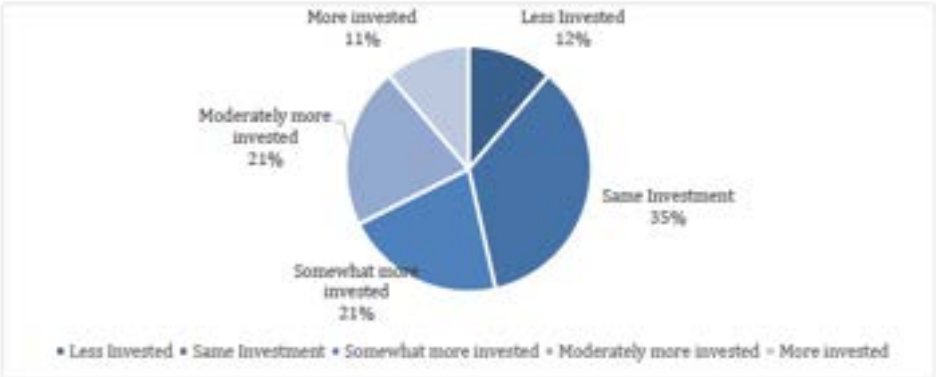
Table 4:



The next two questions were additional questions that were asked in only the second survey. They were reflection questions that were meant to gage how much a student thought about the survey. Students were not told that there would be a second part of the survey, and they were not given time to study. The first of the two questions were, "In the time since the last survey, did you feel inclined to go find the correct answer". I felt that this was particularly important because students were reflecting and making themselves more familiar with the material. The more students are exposed to this material, the more likely it is that it will stick in their heads. 58% of the students surveyed answered yes. It was great to see this; it shows the interest that comes from the students.

The final question that was asked was, "In the time since the last survey, how invested do you feel in keeping up with political news?". Students answered this question based on a scale from "Less Invested" to "More Invested". 12% of the students answered that they were less invested. 35% of them said they had the same level of investment, 21% said they were "Somewhat More Invested", 21% said they were "Moderately More Invested" and 11% they were "More Invested".

Table 5:



When looking at demographics, it is difficult to concur if there are colorations with what a student answered correctly. I asked a series of questions that asked students to define their own age/grade, gender, and family income level. Most of the students were not able to identify their family income level, so it was not possible to find patterns there. Their age and grade level only made a significant difference when it came to seniors, this is likely because these are the students who have taken a civic course. When it came to the knowledge questions, based on gender, the results were sporadic. For freshman and seniors, the males did better both times. For the sophomores and juniors, we see that the females are the ones who do better. This also leads us to believe that gender does not play a huge role in the level of knowledge amongst high school students.

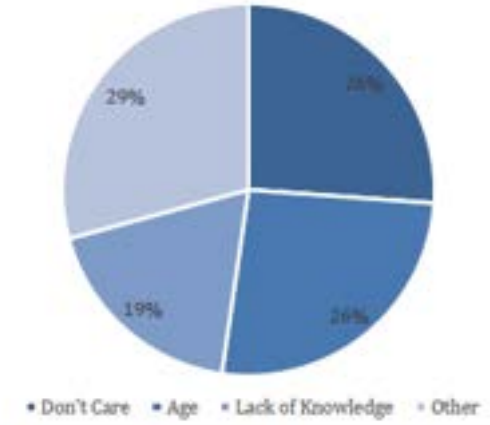
Overall, students did in fact do better after being exposed to civic material. The total average for the second survey was .17 higher. When looking at the perception and attitude questions, there was a general shift towards the "warmer" end of the spectrum. Some questions had larger shifts than others and it is likely that this is because of the timing of the survey. Midterm election were the main focus in most media outlets, so it was likely that students were being bombarded with politics in their media accounts as well as on television networks and newspapers. Some students informed me that one of their teachers had begun showing ten minute segments to ensure students knew what was going on during the election season. These were the junior (11th grade) students. There was not an extremely large jump in the knowledge portion of their results, but they felt as though they had a stronger attitude about political actors.

Conclusion

The results reveal that students are in fact receptive to civic education. There was an overall shift to a more knowledgeable future electorate and students showed that they felt more willing to go out and participate both in voting and in other forms of participation. Their willingness to take part in political action was clear and is beneficial for the rest of the nation. When students are done with their semester in government their senior year, there is a general feeling of excitement about their possibilities of changing the United States with the political power they are granted at the age of 18.

Implementing civic education at an earlier age will give students this level of excitement sooner. Currently, students do not think they have any political power until they turn 18. When I asked why they do not vote, the most common answers were that they do not know enough about politics, they do not care about them and that they think they are too young to do anything that will affect their communities.

Table 6: What Keeps You From Being Engaged?



One of the questions I asked in the survey was which political actions students currently take. They were given a list of things (go to a rally or protest, sign a petition, put a bumper sticker on your car, put a campaign sign on your lawn, share a political news story online, and boycott a company for political reasons) and from these they were asked how often they partake in these actions. One common comment that I got over and over again from a multitude of students was, "I did not know that was considered political participation?" When I informed them that it was, students' faces were beaming. They were proud to know that them sharing a post online was making a difference.

These reactions only emphasized the second part of my argument more. Students feel that politics are a very complex topic to tackle, but when it is simplified and they are taught the material, it becomes more attainable. If civic material was taught little by little throughout K-12 education, students would not only understand the material better, but teachers could work with their communities and students could find ways to become more involved while they are in junior high/ middle school and high school. Students can build relationships with their local politicians and take part in bettering their community.

Throughout history, we have known college students to be the ones who petition and shake things up in the political world. College students today have had to take a back seat due to students needing to have jobs and lives outside the college campus. They are no longer able to do sit ins and boycott for hours or attend multiple day rallies. Situations such as the Parkland shooting tragedy has shown us that students at the high school level are capable of protesting and making their voice heard. They are ready to make a change. It is likely that we would see high school student protestors a lot more if we were to give them the educational foundation earlier in life.

Although with the survey students were presented there was an increase in the level of knowledge and political attitude, there are some things that I would change and adjust. To begin, I would have really liked to look at more than one school. Chino High School has a high rate of students who are under the poverty line. This, as well as the fact that most of the school is Hispanic/Latino likely played a role in how the students did overall. It would be interesting to do the same survey in an affluent neighborhood and compare how well the students do. It would have also been more representative if I made sure to do the first survey before the senior students had any civic education. I think this would have given us a better representation of where their level of knowledge began.

In addition, I would have liked to give students more than ten questions. It would have been interesting to see how students would have done if they were given all 100 of the potential questions for the citizenship test. If you ask a wider range of questions, it would be clearer to see what teachers have focused on and what they seem to skim over. Lastly in order to see if there was indeed a positive change in the long run, it would be great to do a long term experiment where a group of students would actually be given the early civic education and we would follow them into their adulthood and see if these students engage in politics more than their counterparts who only received civic education their senior year of high school.

As mentioned earlier, this project was conducted around the 2018 midterm elections. This meant that political news was everywhere. Even when people do not intend to look for campaign news, it is there. I cannot help but assume that this had some influence on the student's attitudes towards politics. If this survey had been conducted during a time when there was not an election going on, maybe the student's attitude would have not shifted positively.

One student mentioned that they watched a portion of the election day coverage because they were interested to know what was going on. The following time she saw me, she had multiple questions about what she had seen. It was rewarding to know that students are understanding who represents then and whether or not they are happy with the status quo.

Based on all of my finding, I accept my hypothesis that political exposure at a younger age will lead to a more engaged electorate. There is currently not enough emphasis on the lack of civic education given to students who attend public schools. In addition, there is also not enough research being done by scholars on the topic. Most research focuses on college/university aged student, but it is so significant to look at the effects of the even younger audience. High school students are at a vulnerable age, and we should be giving them the tools to create their opinion on the role they are going to play in their community. In turn, I think we will have an electorate that is more knowledgeable and more willing to engage in politics that will lead to an overall better representation of our nation.

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Office of
Undergraduate
Research
CalPolyPomona

Our Office: Building 1, Room 10
3801 West Temple Avenue, Pomona, CA, 91768
Tel: 909-869-5296 Email: our-cpp@cpp.edu