System 1 and System 2 Persuasion Tactics and Their Impacts on Secondary School Absenteeism

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Introduction

Palo Alto, California: one of the most affluent neighborhoods in the entire nation hosts some of the highest academically achieving institutions. Just a couple of miles away from the prestigious Stanford University, Gunn High School teaches over 2,000 students; however, teaching all 2,000 students each day is rare. On any given day, it is expected that at least 5% of students are absent (Laurence, 2019). A small (yet concerning) portion of these absences are by those of the *chronically absent* (students who skip 15%+ of school days). While the chronically absent are hard to influence due to the lack of their presence, the remaining, however, have their own array of reasons which they employ occasionally. It is paramount to persuade these *strategic absentees* to alter their behavior and prevent the possibility of them becoming chronically absent. This data has been complemented by the United States' Department of Education having articulated that "Irregular attendance can be a better predictor of whether students will drop out before graduation test scores" (2012). There are strategies that have already been proven to improve attendance. The most direct influences have been to either reward attendance or punish absences, but there have been attempts at indirect influences as well to subvert cognitive pushback. The prominent indirect one having been demonstrating a correlation between attendance and high grades to improve attendance rates (but the experiment did not include any suggestion; the suggestion was in the implications the students made themselves) (Moore, 2004). However, this and similarly associated methods require an external force or party to impose the suggestion for exactly what it is (which might be referred to as *direct* nudging or coercion), when it might be preferable to instill a sense of independence and

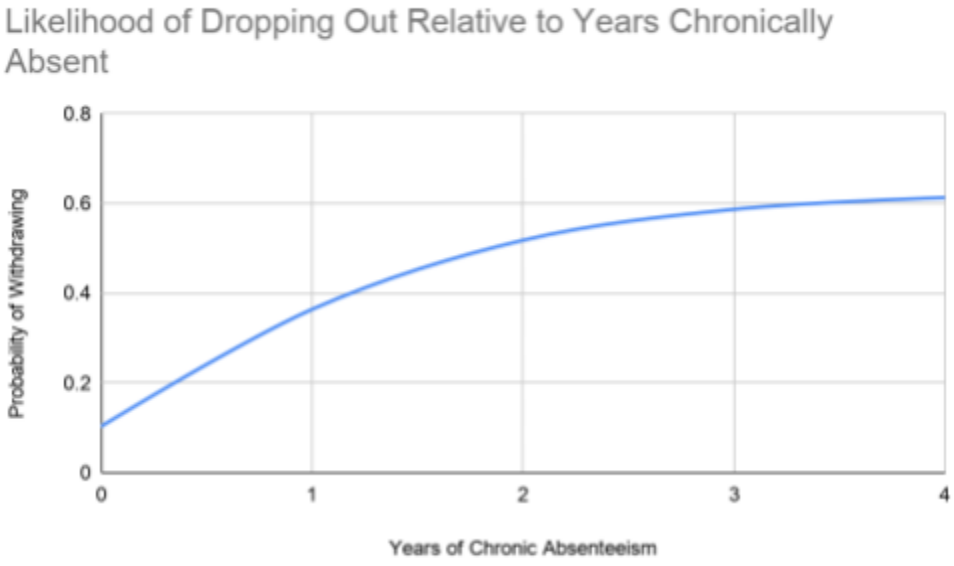

Figure 1: Data relating absenteeism and dropping out in Utah institutions (University of Utah, 2012); it was found that for each additional year of chronically missing instructional minutes, the likelihood of dropping out increased upward by 220%.

self-motivation in students by having them make their own decision and suggestion regarding their attendance. This is one of the issues that needs to be solved in higher educational institutions: the need to instill self-centered motivation, which is key to developing the independence students need to grow into adulthood, especially so as open campuses become more of a staple in both secondary and university level schools. Once established, these liberties, such as open campuses, become essential to maintain, as to not begin hindering opportunities to develop independence and responsibility. Fortunately, within the scope of social psychology and decision-theory, tools and ideas have been provided to present subconscious implementations that maintain students' liberties, while still suggesting behavioral modifications to act in globally beneficial ways. So the current question presented is: how can subliminal influence such as priming and nudges through the environment and a given context, influence secondary school students' attendance rates, compared to that of already tested, more direct persuasion methods?

Theoretical Framework: Social Psychology and Behavioral Economics

In order to be able to understand the experimental model that will be employed to reduce absenteeism, it's necessary to understand the theoretical frameworks and the assumptions they are constructed upon.

Social psychology, decision theory, and behavioral economics are rapidly advancing fields which challenge the norms of classical economics, using mathematically oriented structures that classical economics provides, in conjunction with social and motivational psychology to aid in the explanation of processes used when making a decision. Traditionally speaking, economists' understanding of human behavior followed the *Homo economicus* model, attributing people with perfectly rational thoughts, the inability to make mistakes, and infinite intelligence. But as early as the seventeenth century, as described by Heukelom (2006), challenges to classical justifications appears in paradoxical dilemmas such as the St. Petersburg Paradox -- an idea where an individual's value of money conflicts with the defined value of money (i.e. $10 is worth much more to a working-class citizen than it would be to the top 1%) -- and ever since behavioral economics and decision theory have steadily gained traction for their applicability in modern day analyses when standard reasoning begins to break down (p. 3). Augmented

with proper mathematical models, the idea of perfect rationality began to diminish, along with the rise in popularity of the idea that economic theory only accounted for a part of human behavior. As the field developed, studying emotions, subliminal influences, incentives, and the definition of utility greatly bettered the understanding of why people act the way they do, even if their behaviours are not the most objectively beneficial, as a given individual may have their own value system.

Subliminal Influencing and Nudging

As everyone has their own set of values, we did not try to impose attending class as a necessity upon students or persuade them in any manner, but rather, we suggested it to them as a choice they can make as an individual. We attempted to improve attendance through *nudges*. A nudge, in short, is an indirect suggestion that does not alter the choice architecture -- or ability to decide upon an option -- that promote certain behaviors and outcomes. This idea of being able to *nudge* someone has been suggested and explored for centuries, but it wouldn't garner any significant attention until Richard Thaler and Cass Sunstein (2008) published a book of the same name: *Nudge: Improving Decisions About Health, Wealth, and Happiness*. The reason that nudges have become more and more popular in social engineering is because of their effectiveness and accessibility in their applications as a tool. A common nudge incorporated today is in the form of relative pricing: say a restaurant has a dish that is not selling well. To improve its sales for that specific item, they may include a "fake," slightly cheaper dish that has no intention of actually being sold (at least not as much as the other items). The goal of this dish is to provide a reference point to the original item, making what might have seemed overpriced suddenly appear as a great offer compared to the slightly less expensive, "fake" dish.

The primary framework that nudge and decision theorists have agreed upon often employs two systems working in tandem, aptly named System 1 and System 2 (Lin, Osman, Ashcroft, 2017). System 1 is the cognitive scheme that motivates our intrinsic, instinctual, autonomic responses: those that tend to maintain biases and intuitions, but are extremely quick to process as well. For example, instantaneous attraction is a common product of System 1 processing: the innate attributes one's mind holds to attraction is usually loosely based in physical appearance. Even if these aspects have no justification for one's character, generally System 1 will generate impressions of so using superficial judgements. System 2 tends to be System 1's antithetical counterpart: the

conscious part of reasoning: analytical and adaptive, but rather slow as well. For example, debating whether a coupon justifies purchasing a still very expensive product relies heavily on System 2's capability to reason. For this reason, many favor attributing System 1 for the origins of irrationality, and hence it is frequently used to implement nudges in an attempt to provoke biases and past associations to trigger a desired response. For instance, seeing a "2 for $10" may seem appealing, until noticing that the original price was 1 for $5. The idea of a deal being available can be very attractive even if it has no net value (as that's what the notion of a deal presents). However, we still know very little about how the two processes fundamentally operate due to the discrepancy in understanding whether or not they act in parallel or successively to one another. This has led to many other cognitive models being proposed, including single system networking approaches that look for how the conscious and unconscious parts of reasoning can conflict with each other to impact an outcome, such as a decision, rather than an individual system overriding another. However, there is a consensus that there is a lack of fluidity and flexibility in either model that undermines the complexity of the decision-making as a whole, with no representation fully encapsulating it than another. Although the nudge has only been formalized very recently, it has already been implemented into both the private and public sectors to attempt to improve and influence businesses, health, and society as a whole by promoting what are implied to be the optimal behaviors. However, the keyword here is "implied": as nudges are subliminal, they do present some ethical issues regarding the manipulation of people: coercing them to act in response to System 1 nudges to potentially against their will, can be seen as unethical, especially because of nudges' difficulty to be monitored (Hill, 2018). Although the utilization of nudges does not restrict any of the original options from being chosen (this is sometimes described as "liberal paternalism", a notion coined in 2011 by Sunstein and Thaler in their aforementioned book), the ethical issues in implementing nudges are still heavily debated. Our experiment centers around using nudges to subconsciously incentivize students to act upon the systemic goal of attending class.

Priming

Continuing with nudges, a more specific form of persuasion is done so through the environment: *priming.* Priming is the process of seeding an idea into someone's *implicit memory* (that of association with System 1 frameworks) and exploiting that seed by calling upon it when needed. To prime one's thoughts is to essentially

temporarily restructure one's style of thinking. A common prime used frequently to open people to suggestion is compliments and imitation. Generally, when someone imitates another's behavior (by, say, drinking the same drink as the other), or is generally complimented, they tend to be more open to future criticism by that person, as they see the critiques in good faith, rather than as needless suggestion. All of those preemptive measure interactions were to subtly restructure how the person being imitated views the imitator. This is described from a much more emotional perspective by Carlson, Charlin, and Miller of the University of Southern California (1988): "Presumably, people store material in memory in part on the basis of its affective tone. Consequently, a good mood state is hypothesized to function as a cue that temporarily increases the likelihood that positive cognitions will be generated in response to a subsequent stimulus." As the USC researchers have described, presenting an unrelated idea in a tone, or form that will resonate strongly later provides a higher probability of unconscious behaviour modification. The influence of providing a good mood is to not be underestimated. Among the most common implementations is to present something already in agreement with the subject's consciousness, to make them more likely to agree with your future proposals. These tend to be among the more powerful forms of nudges as these tend to be the precursors to nudges themselves; they reinforce future nudges before they even happen. One of the most ubiquitous priming ideologies is the idea of *defaults*, the predetermined, suggested option in the case the subject is indifferent or has no strong stance on the manner. These have become so influential in the world of surveys and forms, that they tend to no longer appear as a recommended option, but rather the desirable one. Take Austria, for instance, where their organ donation policy is based upon opting *out*: the default is to be enrolled, leading to 90% donating; in the United States, the program is *opt-in* centric, leading to a mere 15% a part of the program (Scheiber). These priming suggestions need not be directed towards a specific value or set of choices that the target already holds, but can be used to prime people with the implication that the default was selected by an expert, adding a sense of credibility that justifies their selection. Priming and defaults are especially important to actions attributed to risk, or with unknown, costly outcomes (such as elections). It has been shown that risk is very hard to properly gauge, and people, in order to reduce the cognitive stress of decision making, revert instinctively to System 1 to rely on to a set of predetermined approaches, heuristics, and biases (Tversky, Kahneman, 1974). Priming is the pathway that allows for one to be more readily persuaded. Similarly, if high school students can be primed to more readily consider the need to attend classes,

then they're more likely to do so. This was seen in Moore's experiment with showing the data to his class: the graph primed his class to be more open to the correlation that the graph presented, which resulted in more coming to class. The experiment that this study will analyze incorporates priming in a manner that does not require teacher and or authoritative intervention in comparison to methods that require so.

Reactance: Inherent Rebellion

Traditionally, economic understanding suggests that professional opinion would be met with high positivity. When the weight of making a decision is too mentally straining, recommendations decrease the effort needed and increase the confidence in making a choice (i.e. the cost and time of thinking). However, under certain conditions, the opposite can be observed: decreased satisfaction and picking the non-recommended option. What this experiment wishes to address is this phenomenon known as *reactance*: the backlash one experiences when a recommendation conflicts in one's original preconceived preference; the cognitive dissonance from expected recommendations contrasting the true recommendation (Fitzsimons and Lehamann, 2004). For example, if a patient comes in with a notion that the doctor needs to treat them, and the doctor refuses as there is no issue, it may reaffirm the idea that the patient thinks they need to self-diagnose. This conflict in ideas usually leads to an even greater interest in the person's original preference, and mentally demeaning the expert's recommendation. Especially in conjunction with one's innate cognitive growth and self-realization of value (sometimes referred to as self-determination theory), the conflicting ideologies between school administrators and students make the prevalently stereotyped "teenage rebel" even more prominent. Reactance can be exploited to specifically reduce the default option's presence; this is a subset of nudges known as *inverted nudges* (Spizman, 2018). The intention of this experiment is to observe the likelihood of subverting System 1 with targeted nudges of the unconscious so as to avoid potential reactance.

Existing Studies

Existing studies have already been conducted on improving attendance rates at institutions, such as those done by Moore (2004): as a teacher, he performed an experiment with his class, where at the start of every lecture, he would show the students a graph that correlated high attendance with high academic performance,

without explaining the implications of the graph; he left interpreting the graph to the students. This did in fact result in a general increase in attendance to his classes. Others have shown that implementing policies that directly punish students for absenteeism is more effective in lieu of rewarding attendance as well (Self, 2012). While these studies do have merit, they primarily focus on direct intervention methods and corroborate with already known ideas in behavioral economics (i.e. loss aversion). While both direct interventions and extrapolations from behavioral economics will also be used in this study, but the idea we want to focus on is whether or not interventions in which the motivation is less clear to the participants, as to avoid any possible reactance that may inhibit suggestion, are more effective than the latter. Existing studies also elaborate that "student absenteeism was negatively related to academic self-perception, attitudes towards teacher and school, goal valuation, motivation/self-regulation, and academic performance" along with many other non-scholastic factors (Balkis, Arslan, and Duru, 2016). While this may hold true for the locale they analyzed, it's interesting to consider the impact of the local demographic Palo Alto and Gunn High School provide, where competitiveness and academic performance are greatly prioritized due to the access to resources and funding they have.

Demographic

Henry M. Gunn High School is one of two high schools, and one of five secondary schools in Palo Alto Unified School District in Palo Alto, California. Although PAUSD doesn't have the appalling absentee rates such as the 95% in a district in Alabama, what makes PAUSD surprising is that it has a greater prevalence of chronic absenteeism relative to what its wealth and competitiveness (relative to the nation) conveys (United States' Department of Education, 2016). Because of the neighborhood's environment, it strongly supports the contention that Gunn's many of Gunn's absentees are of a more specific variant: those deemed as *strategic absentees* (Laurence, 2019). These strategic absentees aren't skipping class because they want to, per se, but rather they see it as a necessary evil: they have to skip a class to go study or prepare for another class's commitment (i.e. test, quiz, presentation, etc.), whose importance is considered to be greater than the one they are skipping. Strategic absentees are skipping class not because they do not care for school, but rather because they do. They skip one class to prioritize another, so the goal is to convince to value all classes, not just a select few that happen to induce more stress. In the *California Healthy Kids Survey*, a survey used to study the spread of a California school's

demographic, in Henry M. Gunn High School, 7% of 9th graders and 11% of 11th graders cut class to prepare for a class, only for the month the survey was administered (California Department of Education, 2017-2018). Strategic absentees are especially worth attempting to persuade, as many are certainly still elsewhere on campus, whether to leverage available resources (i.e. the library, student tutors) or to quickly avoid class. Due to their absence irregularity and likelihood to be present on campus when so, our intervention is expected to more likely reach strategic absentees. However, this may differ in other parts of the nation, where the reasons for delinquency are different -- for instance, the student in question may be required to work since they need to augment their family's income. However, this study hopes to provide a framework and conclusion that is universally applicable. If the experiment concludes only academic performance motivates Gunn students, it may be as a result of the competitive environment, and may not be applicable in a more lax school district, but ideally the methodology will provide a means of discovering and using a district's primary motivators to incentivize attendance.

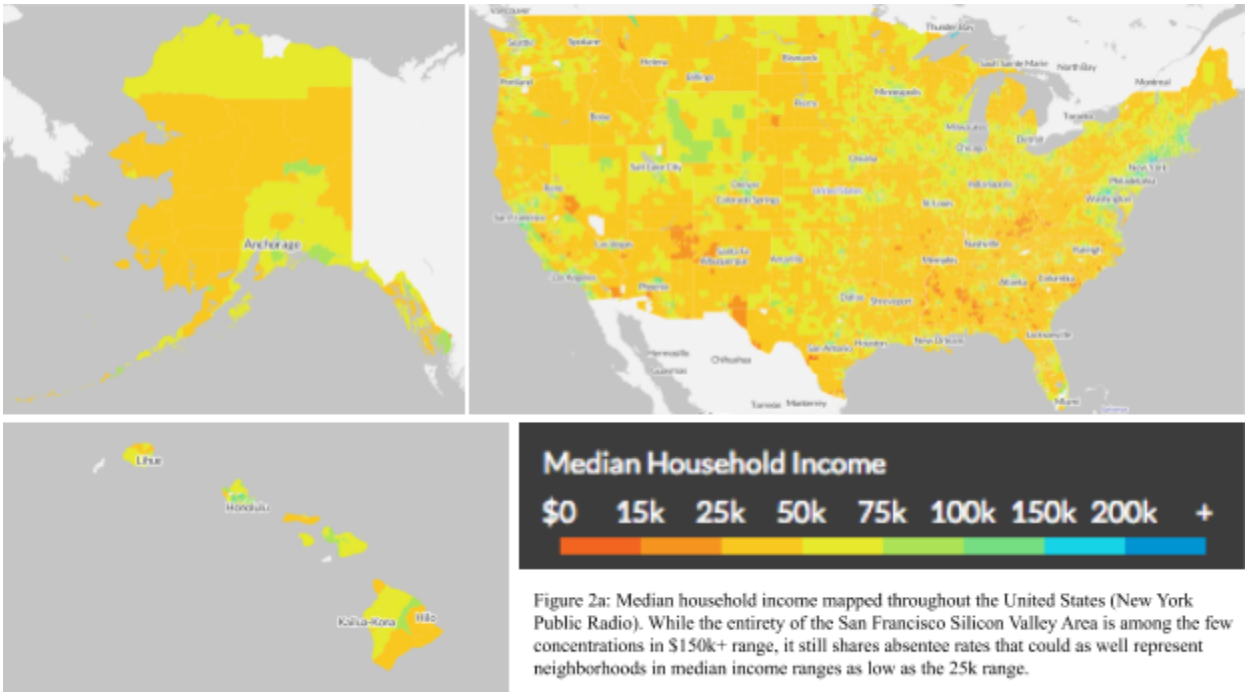

Figure 2a: Median household income mapped throughout the United States (New York Public Radio). While the entirety of the San Francisco Silicon Valley Area is among the few concentrations in $150k+ range, it still shares absentee rates that could as well represent neighborhoods in median income ranges as low as the 25k range.

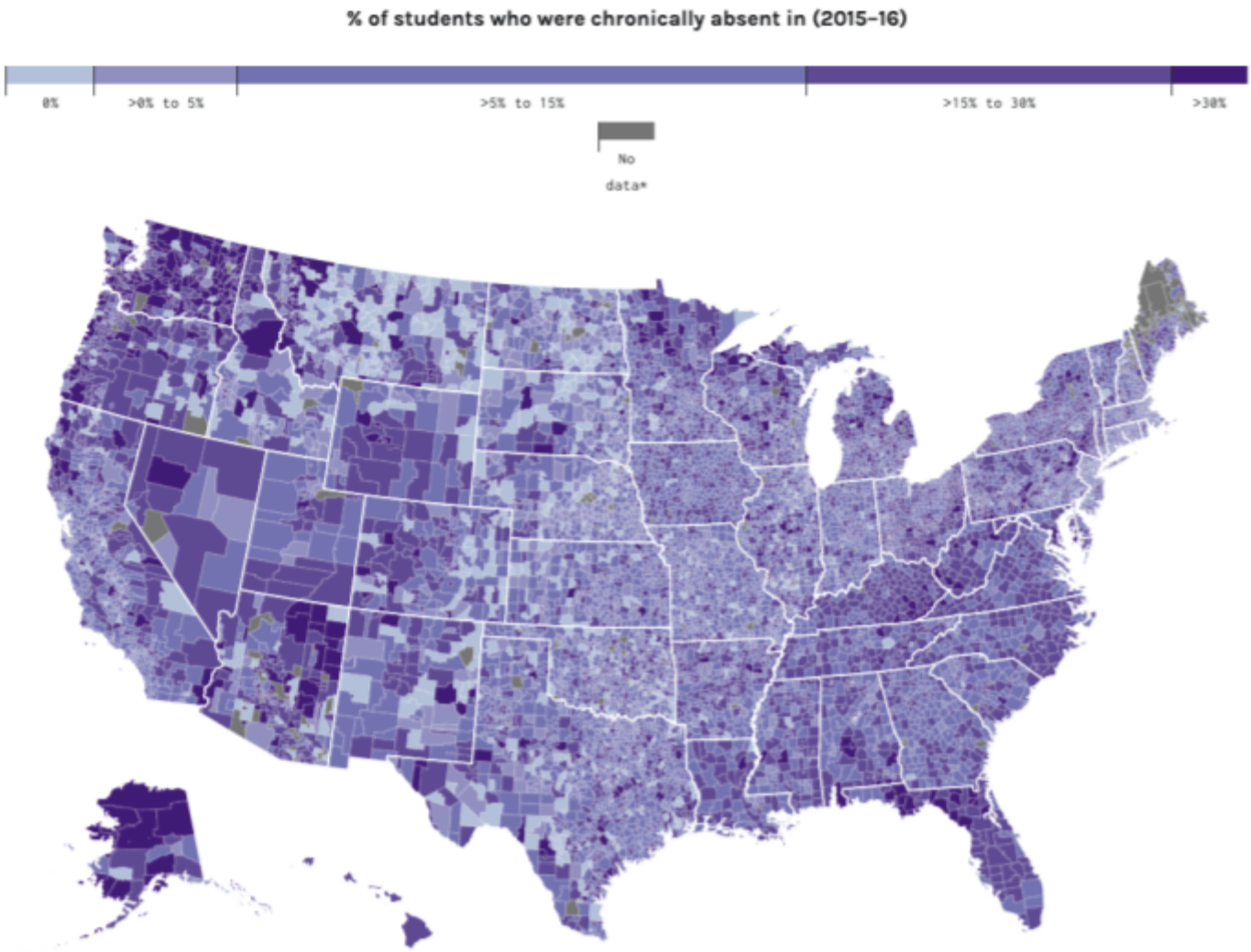

Figure 2b: Chronic absenteeism mapped throughout the United States as observed between 2015-2016 as reported by the U.S. Department of Education. Contrasting Figures 2a and 2b show the discrepancy between expected absenteeism and median income; motivations for students skipping class may differ in the more affluent neighborhood.

Research Methodologies

As stated, this study does not look to target all chronically absent (due to their lack of presence preventing intervention exposure), but rather specifically the strategically absent. Using the model Moore (2004) employed in his original analysis, 4 variations of the intervening suggestion were examined relative to a control. The classes examined are social studies classes: two of which were US History classes (class of juniors) and three were US Government classes (class of sophomores), ranging in student population between 22 and 32 per class. The important detail across these wide variations in each class is that they are under the instruction of the same teacher, in the same classroom; the equal environments presented allow for minimal variance in the influence the

class has on a given student (i.e. whether or not a student chooses to skip is dictated by how important/interesting the student views the class in place of another). Although the demographics between individual classes may vary slightly, the fact that they all are exposed to very similar environments that the

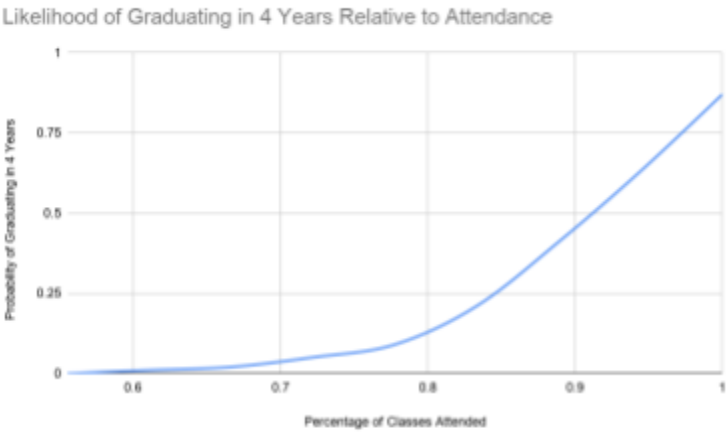

Figure 3a: Graph adapted from University of Chicago's E. Allensworth (2013) study to convey positive correlation between student attendance and likelihood of graduating.

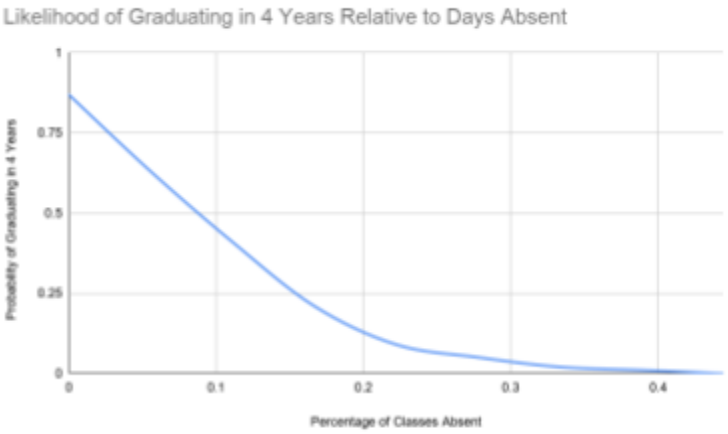

Figure 3b: Graph implied from University of Chicago's E. Allensworth (2013) study to convey negative correlation between student absence and unlikelihood of graduating.

teacher provides negates this factor as the goal is to observe relative changes in attendance records (percent observed), instead of the absolute changes (discrete count observed) of classes. One class was exposed to the original intervention Moore supported to be effective: have the teacher demonstrate a correlation between high attendance and high performance through some illustrative way (i.e. see *Figure 3a*). This direct intervention was exposed to the students about every other day at the teacher's discretion. Another class had the same persuasive information, however, it was not shown directly to the students; instead, it was placed as a poster, prominently in the classroom environment to allow the students to interpret the information passively and independently. Another pair of classes followed with an analogous set of scenarios, but instead of insinuating a positive association with attendance, it provided a negative association with absenteeism (i.e. a graph correlating high absenteeism with low performance; see *Figure 3b*). Each class was observed for three weeks, and for classes modeling teacher intervention, they had regular reintroductions of interventions at the start of each week.

These four variations in experimental method were designed to measure the impact and influence of loss aversion, cognitive endowment, and reactance; as well as to observe the amplification (or lack of) that positive or negative connotations provide to the aforementioned effects.

Data was collected using the teacher interface provided by *Infinite Campus*, in which official attendance is reported to the school's Student Information System (SIS), as to receive an aggregate set of data that does not detail any individual student's name or identification, maintaining their anonymity. Absences and tardies collected were only ones that were *unexcused*: ones that were not waived by a parent for health, an pre-scheduled appointment, an emergency, etc.

Results

The results of the five social studies classes' attendance records (*Figure 4*) exhibit distinct parallel trends between the four experimental models and the control, all showing similar peaks, troughs, and growth patterns across an observation period of three weeks. The classes are labeled according to which intervention was demonstrated and by whom (i.e. "+/teacher" refers to the class in which the positively correlating stimulus was demonstrated by the teacher). The graphs were constructed by taking the absolute value observed, divided by the number of students in the class, divided by class days observed. This gives a set of data that can be compared to other classes using proportional data instead of absolute, as that cannot be compared due to differing class sizes. The use of the line graph across classes is to be able to accurately relate the structure of each graph to the other, as similar structure between two or more graphs indicates a similar impact across all classes.

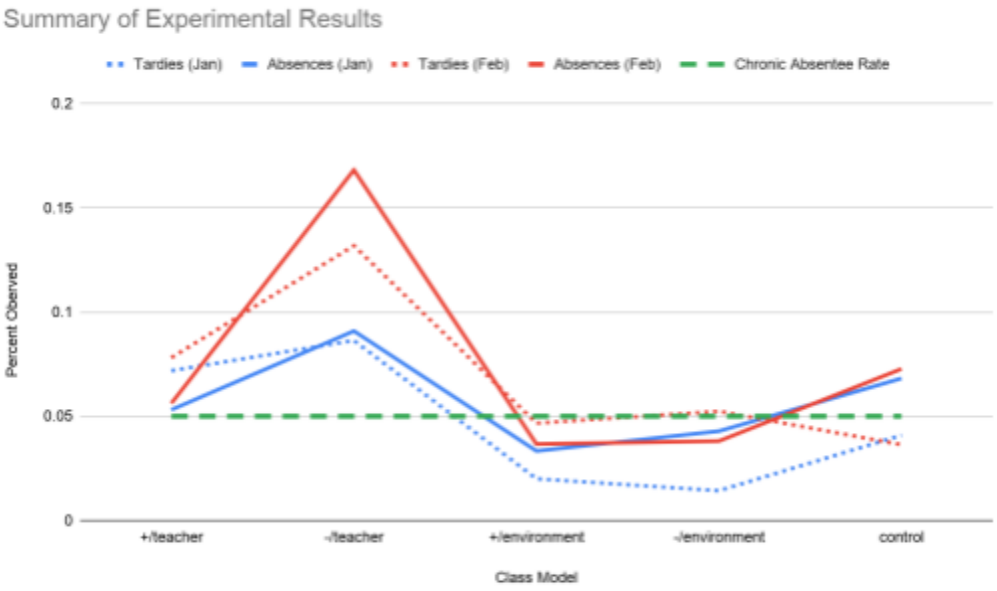

Figure 4: Observed data of recorded absences between 5 environmentally identical social studies classes as to isolate any extraneous factors impacting attendance and punctuality.

Using tardies as an indicator of punctuality, there appears to be a maintaining of graph structure and shape between January and February's tardies, however, this *not* being reflected in the control indicates some

broad overall, negative effect on punctuality. So, regardless of intervention style, it appears that there is a universally mild discouragement of attendance. This corroborates with the presence of reactance within the students, as introducing this experiment in the first place is a mild challenge to their attendance behaviors anyway. More significant, however, is the absentee trend: although most observed classes are within the range of this year's expected 5.3% absentee rate, the class in which the teacher elaborated on *Figure 3b* showed a substantial spike in absentees, reaching almost 17% of students skipping class across the three weeks.

Conclusions and Analyses

Referring back to the intention of this study regarding the impacts are subliminal influence such as priming and nudges through the environment and a given context, influence secondary school students' attendance rates, compared to that of already tested, more direct persuasion methods, it appears that positive nor negative connotation intervention did not have a significant impact over the other, nor did teachers intervening over the environment have a significant impact on student attendance. Comparing all the classes except "-/teacher" to the control, there was no significant decrease in absenteeism, but a general increase in tardies (~3-4%), which is counterintuitive to what Moore's findings suggest (2004). Absenteeism didn't significantly increase nor decrease, which is expected as chronic absenteeism was not anticipated to be reduced, but with a correlation coefficient $r = 0.973197$, it's unjust to say that any other category of absentee (such as strategic ones) were reduced as well for the sample spaces being too small. However, the anomaly that did present itself is the "-/teacher" class seen in *Figure 4*: the class where the teacher used negative connotations to describe absenteeism, absences nearly doubled with a massive increase in absences by 85%. This class, with already high tardiness and absenteeism, the teacher intervention augmented tardiness by 4.5% (as we saw with the other classes), but the truly surprising figure is the increase in absenteeism by 7.7%: the difference between an additional student consistently tardy and an additional two absent. The scale of the class denigrates the consequences unfairly, but when compared to the rest of the student population, an increase of 85% in absences is the difference between another 90 additional students who may become chronically absent in Gunn High School alone, and an additional 560 students across the entirety of the Palo Alto Unified School District. This isn't even including the variance between individual class absentee rates; if this multiplicative effect is individual to the

group receiving the information, these numbers can be even higher for classes that are already above the 5.3% chronic absentee rate, for their rate might be increased much more significantly than the lower, global rate. It's as if the negative imposition amplified the reactance the students felt when their actions were contested, which supports the idea that negativity bias can couple with reactance; it's as if System 1 (negativity bias) coupled with System 2 (reactance). This amplification of reactance may have turned occasional absentees to be that of regular ones, or those who were late to become absent altogether, even if they didn't have a particular reason to be so before. Once the notion that they are being targeted to be behaving "incorrectly", they may find their own justifications for how it benefits them being late to this class specifically.

Implications and Next Steps

The primary takeaway from the results is that loss aversion (the idea that the feeling of negative connotation/losses are felt twice as strongly as positives/gains) and reactance can amplify the effects of one another. So much information is presented to adolescents, and they are constantly at odds with their own intuition and that of others' guidings and experiences, so to know that negative messaging only reiterates their cognitive isolation is extremely beneficial. It also illustrates that for significant change to occur, targeting has to be extremely specific so that students can apply the message to themselves; if one encourages a student to do what they are *not already doing*, they may not react to that as drastically as if it was something that they *are already doing* (that isn't already the default i.e. like attending class). Reactance only applies to concepts that the student *knows* and are aware of what they do. For school administration especially, these results should be extremely useful for reimagining their messaging to students to accommodate this result, and hopefully see more effective communication of intentions. If schools intend to address other issues beyond attendance, such as the rising vaping epidemic or the issue of cheating, knowing how their advice is interpreted by the student population is crucial to see substantial change.

It's also worth considering how different aspects of reactance conflict with each other. For example, as seen here, telling students "absenteeism is bad" resulted in reactance and a strengthened opinion of the students' original thought. However, if the information was presented that a group of people not always highly regarded by the students (i.e. possibly an opinion held by their parents or administrators), such as "*parents* say absenteeism is

bad", can change the result, as suddenly the reactance of the parents' opinion conflicts with the reactance of absenteeism. Will they continue to strengthen their opinion of absenteeism, or will they defy it to strengthen their opinion that parents' opinions need not to be followed? This is worth further testing to see how reactance self-prioritizes itself in one's decision-making process.

The data also contributes to the field of study by addressing a population rarely studied, regarding both attendance and reactance: high school students. It corroborates much data already gathered in other samples, but the specification to adolescents allows for interesting inferences in younger cognition, but for the most part, what was anticipated was observed. The results also infer a possibility that System 1 and System 2 cognitive processes *can* occur simultaneously, with System 2 processing situations while System 1 employs the subconscious effects such as reactance and loss aversion. However, as this was in such a narrow scope of academia, the effects seen in a U.S. History Class can be drastically different from its Advanced Placement complement, or possibly even in a completely separate subject area, as motivations may differ per student and the classes they prioritize. Maybe Advanced Placement US History students would have shown entirely inverted results than what were observed here. Many who take this class do so either for their intrigue, or to bolster their résumé, rather than solely as a requisite class to graduate. This differing perspective on the class may not only lead to students respecting teacher suggestions more, but also acting upon it. The STEM-centric environment both Palo Alto and Gunn High School provide may push students to value their class time in the relevant subjects rather than those of not. More generalized assessments are needed to further realize the notions presented.

Referring back to the idea of concurrent cognitive processes (such as loss aversion impacting reactance), the true inquiry this data proposes, however, is what other cognitive effects can be combined? For example, observing that System 2 can interpret a situation, and System 1 applies innate biases, how can they be leveraged in cases where we originally thought the two systems were disconnected? Considering this experiment focused on a more abstractly valued concept such as attendance, the utility may be more indistinct for an individual than, say, one's notion of currency. So, how does suggestion differ to more distinct concepts of the like? Moving forward, examining these alternative scenarios in both more generalized and specific scenarios among a broader sample would be intriguing to see whether results differ.

The last takeaway to acknowledge is that persuasion is extremely difficult, and to predict how it will apply itself to the target. Knowing what effects will couple when and how to the target is nearly impossible, and anticipating exactly what the target truly holds as a concept or ideal just as so. For this, caution and experimental data is the only hope we have at better understanding both how one consciously and subconsciously interprets the information around them, and how they will act on it.

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