# THE ROLE OF PERSONALITY IN DEFINING THE BOUNDARY BETWEEN PERSUASIVE TECHNOLOGY AND COERCION

by

Patrick John Crysdale

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*Dedicated to the memory of Alec Dressler (1999-2018) who committed suicide the weekend before I started this degree.*

*He was the little brother that I never had.*

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# List of Abbreviations Used

**ADHD** Attention Defeceit Hyper-activity Disorder.

**AMT** Amazon Mechanical Turk.

**BFI-2** Big Five Index-2.

**CR** Conditioned Response.

**DSM-V** The Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition).

**FBM** The Fogg Behaviour Model.

**FOMO** Fear of Missing Out.

**OCEAN** Openness, Conscientiousness, Extroversion, Agreeableness, Neuroticism.

**UCR** Unconditioned Response.

**UCS** Unconditioned Stimulus.

# Abstract

Persuasive Computing is a sub-discipline of Human Computer Interaction and Computer Science. It is focused on motivating users to improve their lives through technological intervention. Examples include fitness applications, smoking cessation tools and screen time loggers. The discipline actively specifies that users must be persuaded through positive reinforcement and it actively condemns coercion but has never offered a definition of the boundary between persuasion and coercion. For ethical and practical reasons scholars in this field avoid coercion as they understand it, but little has been done to examine how users perceive persuasion and coercion when enacted by technology, particularly mobile devices. We conducted a within-subjects study ($N = 407$) on Amazon Mechanical Turk. Participants were asked to evaluate several storyboards depicting a personified mobile device interacting with a user. Using a 5-point scale, participants rated each storyboard as to where it falls on a scale between coercive, neutral and persuasive. We calculated the Big-5 personality score of participants using the 61-question BFI-V2 survey and compared their personality traits with their responses to storyboards. We tested the hypothesis that elements of personality are directly correlated to perceptions of persuasion/coercion and found no evidence to support it. This finding is a different result than found in similar existing literature that have stated persuasion styles are related to personality; however, our finding is not a contradiction as more generalized research methodologies were used in this study. We conclude that the role of personality in defining the boundary between persuasive computing and coercion cannot be assessed using generalized parameters.

# Chapter 1

# Introduction

## 1.1 Introduction

Computer technology has been an ever-present and growing phenomenon in the 21st century. It has become a ubiquitous feeling in present society to be frustrated with a piece of technology not performing as expected, just as one would be with a co-worker that is not meeting expectations. As such, technology is changing to present users with more enjoyable and usable interfaces to improve efficiency and user experience. Persuasive Technology is a discipline that uses the psychological and sociological sciences present in Human-Computer Interaction and User Interface Design to reward good behaviour and train new habits [7]. It does not punish bad behaviour.

The community has rigidly defined the parameters of this discipline as positive forces only (no negative reinforcement) [8] and often explicitly stating that it is without coercion [9]. B.J Fogg, the founder of the discipline defined it as "an attempt to change attitudes or behaviors or both (without using coercion or deception)" [7]. As soon as coercive or manipulative forces appear in an application it is no longer deemed persuasive computing. A literature review reveals little prior research on defining the boundaries of coercion and persuasion. It is an undefined and important boundary for the field – especially as this boundary is likely subjective.

## 1.2 Previous Work

Recent work in the area of defining persuasion and coercion [9] evaluated if the entire discipline was seen coercive or persuasive. They did not look for the boundary line within the field. Researchers conducted an online survey ($N = 488$) to learn the attitudes and feelings of the community in terms of persuasion and coercion [9]. Their investigation was limited to the nature of the term "Persuasive Computing" and they explored if other proposed terms such as Behaviour Change Support System

and Digital Behaviour Change Interventions could be seen as less coercive. They concluded that language is often perceived more forcefully than intended because participants responded more positively to the alternate titles for persuasive technology [9]. This suggests that language will be key in determining the boundary between coercion and persuasion.

[4] investigated a link between Big-5 personalities types and responses to positive leadership strategies. Using competing storyboards depicting different styles of leadership, instruction, motivation and reinforcement, participants ($N = 240$) on Amazon Mechanical Turk recorded their own responses to the storyboards in terms of enjoyment, likelihood of use, helpfulness, quality of life, ease of use and time saving. Researchers were able to identify significant relationships between personality and the persuasive technologies used. Researchers concluded that the Big-5 personality test can be used to cater individual personalities to Persuasive Technology strategies [4].

Research since has been able to link Big-5 traits as predictors in the self-paced exercise video game, Pokemon Go (which has been called the most successful persuasive game [5]) where users are expected to walk around their towns collecting virtual monsters known as Pokemon. Shown in Fig. 1.1 is a graphic produced by researchers [2] that depicts the likelihood of engagement/success in Pokemon Go based on Big-5 traits. It is possible (and common) to compute a user's Big-5 profile from their social media footprint [10]. This data is readily available from social media giants and is most easily accessed through social login - a feature where users link their social media profile instead of creating a new account when joining a new digital service. This enables free-flowing data between the social media platform and the content provider (or app developers) [11]. This means that those developing persuasive applications could buy the Big-5 data of their users and tailor the experience to each user. Fig. 1.1 is drawn from research [2] that examined the habits of Pokemon players in Italy. They found that players high in Big-5 traits agreeableness and conscientiousness were most likely to be early adopters of the game. Those high in Extroversion were most likely to catch the most Pokemon while those high in Openness were found to be the most skilled at playing the game [2]. In Pokemon Go, catching Pokemon is a mechanic that requires interaction with others and going to new places locally; however, once
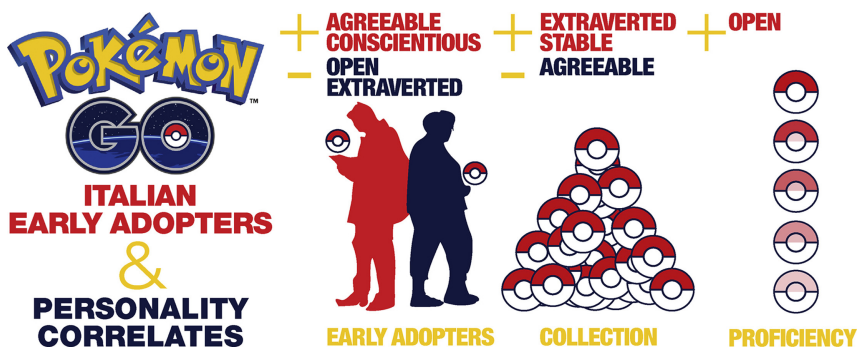
Figure 1.1: Results of a Study on Pokemon Go usage and Big-5 Traits [2]

the Pokemon are caught they must be trained for success in battle - which requires a different skill set held by people high in openness. We see in this research that different aspects of personality lend themselves to different proficiencies in the game. This suggests that applications can be tailored to the individual to maximize their success with the game or application. Similar research [12] found that extroversion and agreeableness predicted higher use/success in Pokemon Go while conscientiousness was a limiting factor. Matheiss [13] et al found that players typically lacked trait conscientiousness and were more spontaneous and disorganized in their play-style. These researchers also found that neuroticism was a key factor in determining prolonged play of Pokemon Go. Neurotic people were less likely to continue playing the game when compared to people low in the same trait [13].

## 1.3 Research Question

Our research objective is to investigate the relationship between personality traits and perceived persuasion/coercion in technical applications. We hypothesized that elements of personality are directly correlated to perceptions of persuasion/coercion. This thesis documents our efforts to test this hypothesis.

## 1.4 Methodology

We constructed storyboards depicting an anthropomorphized smart-phone interacting with its owner in gray areas between persuasion and coercion, using Biderman's Chart of Coercion. This is a chart often used by Amnesty International and other

social services groups [1] to assess a human landscape for signs of hostility. See Chapter 3 for chart. Elements of persuasion were adapted from Halko and Kientz [4]. We asked participants ($N = 407$) on Amazon Mechanical Turk to rate these storyboards using a 5-point scale ranging from extremely persuasive to extremely coercive.The storyboards were designed to be purposely ambiguous as obvious cases of coercion such as weapons, violence, or insults are easily identified. The goal is to identify the subtleties at the boundary between persuasion and coercion such as "tough love". As an example, the archetype of the drill sergeant helping a person get fit in a gym environment could be considered a "tough love" style of persuasion or coercion. The difference is likely rooted in personality. We focused on items that enable the use of emotional manipulation that can be contrasted with tough love motivational strategies. We are looking at the ambiguous boundary between coercion and persuasion and are not evaluating user responses to either extreme. We hypothesized that this boundary is a variable line that shifts based one's personality. For this reason, we have chosen to assess users as Persuasive Technology is most effective when the user feels persuaded and not coerced. Finding the boundary of persuasion/coercion will enable app developers to reach a larger base of users by creating a personality tailored persuasive experience.

## 1.5   Road Map

Chapter 2 will explore existing literature in psychology and human computer interaction to establish the context for this research and properly define the research gap. Chapter 3 describes the research methodologies used to test our hypothesis. Chapter 4 details the results of hypothesis testing. Chapter 5 discusses the results. Chapter 6 concludes the thesis by outlining the contributions this work makes to the research community.

# Chapter 2

# Literature Review

This section will provide an overview of the history, major players in the discipline and where the discipline seeks to go in the future and provide context to explain how we shaped our research question. It will show that discipline of Persuasive Computing is nothing more than a clever application of Pavlovian and Skinner response conditioning to dopaminergic and stress effects related to push notifications and social networking. Further, most research in this area can be derived from behavioural & computer scientist, B.J Fogg who originally noted how to illicit human responses from computer interactions based on the work of Pavlov and Skinner.

## 2.1 Foundations of Persuasive Technology: Psychology

"It is well established that emotionally neutral stimuli can acquire the capacity to evoke striking emotional reaction following temporal pairing with an aversive event. Conditioning does not create new emotional responses but instead simply allows new stimuli to serve as triggers capable of activating existing, often hard-wire, species specific emotional reactions" [14]. Ivan Pavlov conducted an experiment [15] wherein he rang a bell and each time it rang, he fed a dog. Pavlov continued this process until he was certain that the dog had become accustomed to eating each time the bell rang. Finally, Pavlov rang the bell and observed the dog's behavior if it wasn't fed [15]. Pavlov found the dog to be salivating as though it was actually in the presence of food. Pavlov's conclusion was that an unconditioned reflex (UCR) e.g. salivating, that is normally a paired response to an unconditioned stimulus (UCS) such as food – can be retrained to be paired with a conditioned response (CR) [16]. This means that given the proper conditioning, an animal can be trained to respond to any stimulus with a desired reaction. Research since [17] has evolved to train other animals based on different types of stimuli. Zoos and aquariums use response conditioning as a method for training their animals and have developed and continue to work on refined training

techniques. Researchers [18] have also able to condition fish behaviour in multiple aquariums to respond with a desired response to given stimuli such as a simple water jet pulse, a light or a sound.

B.F Skinner a behavioural psychologist, proposed an alternative learning method than Pavlov's classical conditioning approach [19]. As discussed, a classical conditioning approach pairs an involuntary response and a stimulus; however, B.F Skinner proposed a technique called Operant Conditioning where a voluntary behaviour is paired with a consequence [20]. This approach involves showing an animal how to do a task and the consequences that will come from completing that task. A dog shown that if it rings a bell, its owner will know to let it outside is Operantly conditioned. A rat shown that if it pushes a button, food will be dispensed has been Operantly conditioned. Skinner even managed to teach pigeons to play Ping-Pong (with their beaks rolling the ball) and rewarded the birds with food only when they scored a point in the game [21]. Skinner later tried teaching Pigeons to guide missiles by building specialized missile compartments for the Pigeons. He proposed that a missile be launched if 3 Pigeons pecked in agreement that they'd reached their target [22] (of course, his efforts were rendered pointless by the invention of computer guidance systems) [21]. Humans are not exempt from conditioning and are currently being conditioned by electronic communication devices and social media in the same way.

Researchers [23] have reported that cell phone use in the developed world has become an addiction. These researchers conducted a ($N = 1649$) study of university aged participants concluding that factors such as personality played a role in the degree of addiction. This addiction is the same idea as an addiction to alcohol. Addiction is a collection of the same conditioned response to different stimuli [24]. A person with an alcohol addiction has the conditioned response of consuming alcohol to many stimuli such as feelings of happiness, sadness, loneliness, or frustration. The Journal of the American Medical Association (JAMA) defines alcoholism as a pattern of continuing to consume alcohol despite obvious physical, mental and social problems caused by its consumption [25]. Further, JAMA records that a component of alcohol abuse is consuming in situations that would defer individuals from completing their goals (school, work) or that alcohol would render unsafe (driving a vehicle, using heavy

machinery) [25]. Using a cell phone in similar situations such as driving is considered to be comparably dangerous to consuming alcohol [26]. This suggests that as the addiction grows, it becomes the response to an increasing number of stimuli even if it is obvious that it shouldn't. Cell phones and social media have conditioned our behaviour in the same way [27].

Devices are constantly being used in our daily lives as solutions to problems. Cell phones are frequently used to respond to all types of different emotions (just like alcohol). Humans are social animals that crave attention, friendship, acceptance and community [28]. Cell phones have become a ubiquitous tool to share these emotions & experiences with anyone from anywhere. It's been reported [29] that Fear of Missing Out (FOMO) is one the root causes of social media addiction (note that the literature appears to use the terms: social media, internet, cell phone, device and other similar modifiers of technology addiction interchangeably [30]). It should not be difficult to imagine one feeling as though they have been left out of the social activities and while feeling lonely, opening their cell phone and turning to social media to connect with others. The cell phone has now become a tool to meet one's psychological needs that would otherwise either go unfilled or require more effort to satisfy as nature intended.

Researchers [31] have studied the impact of using social media as a tool for satisfying unmet psychological needs. Their finding was that anxious users or those suffering from FOMO used social media to satisfy their need to belong as well as their needs for self-preservation and assertiveness [31]. Excessive use of social media has been shown to lead to mental health complications such as mood modifications, salience, tolerance, withdrawal symptoms, conflict and relapse [29]. Digital addiction can also cause Narcissism, low self confidence, anxiety, depression, ADHD, stress, sleep disturbances, relationship problems and impaired childhood socialization [30]. Further, digital addition encourages a sedentary lifestyle which can lead to obesity and introduce the risk of heart-disease and diabetes and complicate issues of anxiety relating to self perception [30]. The Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) DSM-V, published by the American Psychiatry Association states that some of the previously stated psychological disorders (e.g. Depression) carry increased risk of suicide in patients [32]. This suggests that cell phones and their applications including social media have been able to negatively condition their

users to suffer (to an existential degree). Further, other researchers [33] were able to use these mental health conditions as accurate predictors for behaviours on social media. In a study of Facebook users ($N = 555$), their findings included that people low in self-esteem were more likely to post about relationships and that narcissists were much more likely to post about their diet and exercise routines. They also found that extroverts generally updated their Facebook about their daily lives and social activities more frequently than introverts. Users high in Big-5 trait openness were most likely to post topics prompting intellectual discussion [33]. The research shows evidence that dependency on devices is independent from personality; however, personality will determine how dependency on a device will manifest itself.

This concept of extreme dependency on devices has been echoed throughout popular culture. In a 2013 interview with Conan O'Brien, comedian Louis C.K joked that he believes people text and drive because the idea of risking lives is easier to process than the idea of being alone (without a device) [34]. In 2014, the long running TV show, South Park aired an episode entitled "Freemium isn't Free" where the main character's lives begin to crumble due to an addiction to mobile gaming and the high cost of in-game purchases called Micro-transactions. The episode included a scene where Satan himself explains to the lead character that micro-transactions are an abuse of dopamine systems [35]. The environment of the electronic device and the community of social media have become so familiar that several large scale thriller films starring famous actors such as Elijah Wood (Lord of the Rings) and John Cho (Harold & Kumar, Star Trek) have been shot entirely from the perspective of a user on social media [36]. This suggests that as a society we are aware of the role these devices are playing our lives.

Social media and cell phones offer notifications to alert users that their frienm have interacted with them. The notification may be a comment that a friend liked a recent status update or thinks that their new profile picture looks great. The brain responds to these types of notifications by releasing dopamine [37]. This is the brain's method of reward. "Rewards are defined as those objects, which we will work to acquire through allocation of time, energy, or effort; that is, any object or goal that we seek" [38]. As an example, the positive feeling of being hungry at a restaurant and seeing your food coming is a dopamine release that conditions the desire to eat. It is

important to note that the dopamine rush does not come from eating but from food becoming available [39]. The brain also has a need for social stimuli [40] that is made easily available by mobile devices and social networks. The UCR in Pavlovian terms is to find community when one feels lonely. Prior to the internet, if an adolescent were feeling lonely they would go to a friend's house or go to a restaurant to find others as it was quite likely that the adolescent was not the only one feeling in need of company. Although, in modern times, the adolescent simply logs onto social media and finds the bare minimum social connection to satisfy their need for social stimuli. The brain becomes conditioned to social media as an outlet to satisfy the need for social interaction and thus every notification from social media is a ringing of the Pavlovian bell. Further, not all notifications are sufficiently satisfying to trigger a dopamine response. Notifications from advertisers or automatically generated notifications from software are less likely to trigger a dopamine release [37]. If an event occurs where dopamine is expected to release but does not, the brain begins to withdraw. This can compound leading to a variety of mental health disorders [29]. Casinos have been aware of the exploitability of dopamine for decades. This has led to much research [37] in the area of dopamine reward prediction - a statistical model of how much positive and negative dopamine is required to addict a user to a behaviour. As an example, what is the relationship between wins and losses when using a slot machine? If the player won every game, it would be no fun. If the player always lost it would be too frustrating. . . finding that balance has been the goal of Casinos and Social media giants for years.

This attempt to balance the of rewarding target behaviour is also the goal of Persuasive Computing. App developers must reward their users for correct behaviour but cannot do it too often or the user will find the app annoying. If users are not rewarded enough, they'll be too frustrated to continue. In 1981, Dr. Jaak Panksepp [41] conducted a study using juvenile laboratory rats to learn more about how rats socialize with each other. Panksepp left the rats alone and observed as they played. The rats often played rough and typically the object of a rat game was for one rat to pin another rat – much like human wrestling. Panksepp's findings found that the bigger rats let the smaller ones win 30% of all wrestling matches [41]. Suggesting that the smaller rats did not find the experience fun or playful unless they at least won

some wrestling matches. One could argue that losing all matches would not feel like play but like bullying or abuse.

It is possible that human interactions with their goals and/or mobile devices can have a similar success ratio. If the user is not rewarded for positive behaviour on at least 30% of goal-oriented interactions, then they may not find the application to be supporting their goals and instead find it to be demoralizing. Panksepp further found that prior isolation had a direct impact on willingness and desire to play with other rats. Previously isolated rats were much more interested in play than already socialized rats [41]. This suggests that rats innately feel that play is an essential part of their existence. As previously shown, rats need to win at least 30% of their matches to enjoy play; however, this suggest that there is a minimum amount of playtime required to sustain this ratio. Winning 30% of 0 matches would obviously not be satisfying; however, it's likely that when the prospect of play is rare, the rat may be more excited about the prospect than the results. A parallel can be seen in humans as the concept of too many unimportant notifications is near universally frustrating. But a single notification from any application among no others may be much more inviting given the right context.

Responses to stimuli are dependant on the context [14]. There are times when when some conditioned or unconditioned responses are overridden by overpowering stimuli or primordial impulses. As an example, fear is not a conditioned response to danger - our modern idea of security is simply (and temporarily) unlearned when exposed to danger [14]. Humans have innately developed an internal hierarchy for responding to impulses and stimuli [14]. If a person is drowning, that person will have no interest in anything that doesn't increase the chance of their survival. Further, drowning disables the victim's ability to think critically [42]. Direct contact rescues are extremely dangerous for lifeguards rescuing drowning persons as the victim's instinctual response is to climb onto the lifeguard (putting the lifeguard in a drowning position). Lifeguards have specialized techniques for minimizing risk when rescuing drowning persons but consider direct contact a last resource given the victim's primordial instinct state of mind [43]. It follows that a drowning person will completely ignore any other stimuli presented - including stimuli that would lead directly to the completion of lifelong goals. While imagining the terror of drowning it is very difficult

to imagine negotiating a dream job or conversing with an ideal partner. The goal is simply to survive and only when out of the water and given the chance to breath normally can a person begin to regain interest in other stimuli. If a user is struggling with chaos in their life, no type of mobile device notification can enter their purview. The notification will simply be white noise in the abyss. That being said - the mobile device is capable of creating the chaos in one's life. An angry email from one's boss, an irate text from an intimate partner, a passive aggressive note from a frustrating colleague, a notification of a bad grade, seeing bad news on social media are all examples of ways chaos can manifest from a mobile device. These likely relatable scenarios are capable of creating a virtual sensation of drowning in chaos.

It is worth noting that withholding a conditioned negative stimuli to behaviour can be an effective positive stimuli. This is a technique that is favoured by tyrants for keeping their rule [14]. Consider a child that has misbehaved and knows they are in trouble. A parent that chooses not to discipline the child in that specific instance can reinforce positive behaviour by providing the relief from fear that comes from assuring the child they are not in trouble. The child's brain acts as though in that instance they've escaped the terror of the unknown but should not trifle with it further [14]. This is distinctly different from a parent who does not discipline their child as such a parent has not conditioned their child to fear the consequences of misbehaving. A user that accidentally deletes an entire morning's worth of edits and is able to recover most of their work - will quickly learn to save their work more often as they've narrowly avoided chaos. Recovering their work will be taken as a positive stimuli that reinforces the necessary behaviour of saving often.

The psychology of Persuasive Technology and digital addiction has been growing since the early work of Pavlov and Skinner [30] and continues to be developed based on new research in psychology such as the work conducted by B.J Fogg [7]. This will be discussed in the next section.

## 2.2   Applications of Persuasive Technology

The previous section should sufficiently demonstrate the relationship between psychology and the mobile device for the reader to understand that with the right reward/punishment system, a user can be conditioned to either have a conditioned

response to a stimuli or a voluntary response to achieve/avoid a consequence. This section will be an overview of the existing literature in the realm of persuasive technology to demonstrate the applications of conditioning a user.

B.J Fogg a behavioural and computer scientist was the first to explore the potential of persuasive technology and as such coined the term. Fogg defines Persuasive Technology (sometimes calling it "captology") as the intersection of any digital device and motivation technique [7]. Some members of the community use the term "nudging" or "steering" instead of Persuasive Technology but this is not universal [9]. Further, the definition is frequently given with the understanding that it is persuasion without coercion, manipulation or deception [9]. In his original publication, Fogg defines a functional triad of different approaches towards applying persuasion. Persuasive Technology as a: tool, actor, and medium [7]. A look at the references for many papers submitted to the annual conference in Persuasive Technology (across many years) make reference to Fogg's functional triad or another portion of the same text [44][45][46][47]. The same work is also cited by Halko and Kientz in their work [4]. It is therefore necessary, that I review these ideas before discussing how they've been applied in the community. Although the functional triad has been critiqued as being too general for designing and evaluating Persuasive technology, many frameworks have been built upon the triad to improve its usefulness but the core principles remain present [48].

**Tools**

Fogg defines persuasive technology as a tool a service or function that makes a target behaviour easier to do by either leading by example or providing motivation [7].
A practical example in the real world of this form of persuasion is doing the dishes so that it is socially easier to ask your roommates to take out the garbage. Another example would be a software updater that prompts the user that there are updates to be done and lets the user choose with a single click whether or not the updates should be done.

**Medium**

Fogg explains the Medium component of the functional triad as something that persuades by giving users the ability to simulate a situation, rehearse their behaviour in a safe space and explore the cause and effect relationships of various behaviours in the situation [7]. Mediums in practice can be a video game that simulates what it is like to drive while intoxicated or an app that acts a newborn baby to demonstrate the high demands of being a new parent. An app is a persuasive medium as long as it simulates the real consequences of a situation in a meaningful way without introducing any actual danger.

**Social Actors**

Technology as a Social Actor is a method of providing a reward with positive feedback, modeling a target behaviour or providing social support [7]. An example of this in the non-technology scope is a parent trying to motivate a child to do chores around the house. Instead of assuming that a child will clean their room or wash their dishes, the parent presents a motivation system in the form of a poster on the refrigerator. The poster contains check-boxes for all the chores to be done throughout the week. When a chore is completed the parent verifies the chore and puts a check-mark on the poster. If at the end of the week, there are no empty boxes - the child is awarded their allowance. In this case, the poster board is a persuasive tool. It neatly aligns all the work to be done and provides an obvious visual path to reward or failure. This makes it easier for a child to understand what to do and why they should do it. An example of this method implemented in technology could be an app that uses GPS and other metrics to confirm that a user has been to the gym and met their target exercise goals. If successful they can be awarded with an animation or prize that will trigger a dopamine rush to help develop habits through conditioning.

**The Fogg Behavioural Model**

In 2009, Fogg proposed a relationship between a person's ability and motivation to complete a given task [49]. This can be used to assess probability that a user will submit to being Operantly conditioned by voluntarily attempting a task. Fogg wrote that

factors affecting motivation are things such as pleasure/pain, hope/fear and acceptance/rejection. Whereas factors that affect ability are time, money, physical effort, brain cycles, social deviance and non-routine [49]. In Fig. 2.1, the curve represents the line between successfully completing or failing to complete a given task. As an example, we see that a task that is hard to do will only succeed when motivation is high but an easy task requires low motivation. Finally, Fig. 2.1 references "prompts". These are sometimes called "triggers" [49] and are used to serve as reminders to call on a specific behaviour. Prompts can be in the form of deadlines, notifications, email or verbal reminders or anything that keeps the task in the mind of the user. Fogg categorizes Prompts into 3 groups: Signals, Facilitators and Sparks [49].
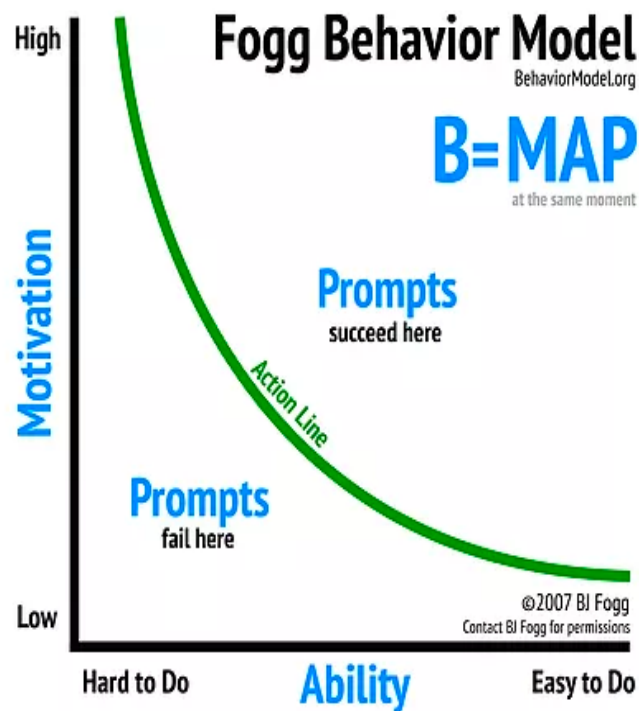


Figure 2.1: The Fogg Behaviour Model (FBM) [3]

1. Signals are simple reminders such as traffic lights or status icons on a digital screen

2. A facilitator is something like a software update protocol that prompts the user to begin a task but handles most of the work on behalf of the user

3. Spark motivators are the most intrinsic and appeal to emotional responses. An example would be a motivational speaker, a Ted talk, an instructor, a book or online resource meant for teaching, a song or anything that inspires a user to choose to complete the task.

Recent research in Persuasive Technology has focused on a wide variety of domains. Research has been done in the areas of stress reduction [50], goal setting [51], personality and gender [52], improving physical activity in the workplace [53], influencing behaviour through nudging/notifications [54], using games to teach health topics [55], improving unique e-commerce recommendations [56], and even Pokemon Go [2][12][13] has been research through the lens of Persuasive Technology. As the core discipline is based on the psychology of user engagement, it is possible for Persuasive Technology research to provide guidance to any other technological discipline. The growth of Persuasive Technology has even given rise to new design and evaluation recommendations for Persuasion [57].

## 2.3 Ethics of Persuasive Technology: The Research Gap

A case of using technology as a method for coercion led to jail time in the United States for a woman who successfully encouraged her boyfriend to commit suicide over text message [58]. A group known as Incels (Involuntary Celibates) have been using social media to complain about their lack of success in finding a sexual partner. The conversations on Incel forums have turned bitter and hateful. Yet the encouragement from others on social media reinforces to the brain through conditioning that these dark thoughts are normal. This has gone as far as encouraging and celebrating mass killings of women [59]. These attacks are often attributed to Elliot Rodger, a man who shot, stabbed and killed 6 people in May 2014 [60]. Rodger who posted a video manifesto before committing these atrocities explained that the women of the world could have prevented his actions. Since then, the video has been shared among thousands of Incel forums throughout social media as a continued justification for violence [61]. These cases of hate, manipulation, coercion and violence are clearly not persuasive; although, they unfortunately rely on the same behavioural sciences as persuasive computing to achieve their goals. A literature review evaluating all submissions to the annual Persuasive Technology confere nce [62] found that the

ethics and boundaries of Persuasive Technology is little explored or discussed [62]. The fringe abuse cases are simply not considered part of the community and boundary lines within the community are disastrously unclear. The danger being that anyone with access to the literature can use it to develop manipulative applications. Further, well intention-ed designs that arise from the research could also be misused. The previous cases that I've mentioned are obviously absolute extremes of coercion that few if any would condone; however, more subtle forms of coercion do exist. These can include public relations & marketing strategies, government propaganda and manipulative behaviours (telling small lies) [63]. Apps need users to thrive and survive. An app that helps its user quit smoking, loses a customer if it succeeds. Therefore, one must be cautious in thinking that the app is there to help them. The best case scenario for any such application is that the user is conditioned to use the app to limit their cigarette use. This provides good publicity and continued use and therefore opportunity for ad/subscription revenue. This is not in the best interest of its user; although, coercion is subjective. Human reactions to subjectivity are based on past experiences and current values. These are not universal.

Current research in the field is not sufficiently able to draw a border between coercion and persuasion. The potential abuse of the relationship between psychology and technology should now be in plain sight. At this juncture, there should be sufficient evidence to support the claim that an app developer with bad intentions could convince a user to join a cult or hate group, worsen the condition of ones mental health possibly coercing them to commit suicide or self-harm, commit a crime or otherwise convince a member of a vulnerable population to create chaos. Based on previously discussed definitions, these abuses would not be considered persuasive technology but a matter of semantics is hardly protection from those seeking to cause harm. It is the intent of this thesis to define that line and identify aspects of coercion that some personality types may be or less sensitive towards - which elements are universally seen as coercive.

## 2.4 Persuasive Technology & Personality

The work by Halko and Kientz [4] began to explore the relationship between personality and response to persuasion strategies. They created storyboards (examples shown in Fig. 2.3) that depicted a user interacting with their mobile device through health and fitness applications. 8 persuasion strategies were depicted in the storyboards. The 8 strategies were sorted into 4 general approaches based on Instruction Style (Authoritative/Non-Authoritative), Social Feedback (Cooperative/-Competitive), Motivation Type (Extrinsic/Intrinsic) and Reinforcement type (Positive/Negative) [4].
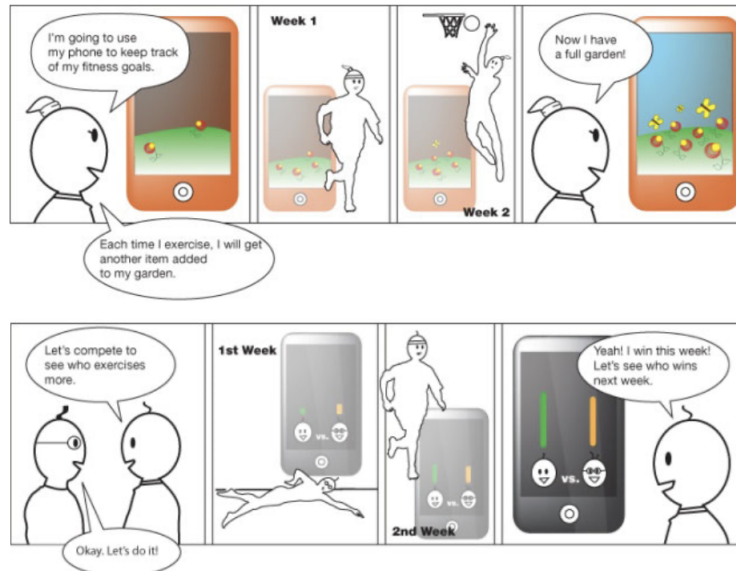


Figure 2.2: Halko and Kientz Storyboards [4]

Participants in the study ($N = 240$) were asked to respond to each of the 8 storyboards in terms of 7-dimensions: enjoyment, likelihood of use, helpfulness, quality of life, ease of use, time saving and general comments. The first 6 dimensions were recorded on a 5-point likert scale. The 7th question was open ended. Participants also completed the Big-5 personality questionnaire [4]. The results of this study comparing Big-5 to Persuasion Strategy are shown on the next page. The table consists of the significant relationships found for each trait of personality in relation to a persuasion strategy and the questions answered about said strategy.

| Neuroticism | | |
|---|---|---|
| **Persuasion Type** | **Perception Measures** | **Pearsons R Value** |
| Cooperative | Quality of Life | r(47) = -.387 |
| Negative Reinforcement | Enjoyment | r(51) = +.299 |
| **Conscientiousness** | | |
| **Persuasion Type** | **Perception Measures** | **Pearsons R Value** |
| Competitive | Helpfulness | r(47) = +.293 |
| Competitive | Likelihood of Use | r(47) = +.400 |
| Cooperative | Helpfulness | r(47) = +.288 |
| Cooperative | Time Saving | r(47) = +.339 |
| Cooperative | Quality of Life | r(47) = +.314 |
| **Agreeableness** | | |
| **Persuasion Type** | **Perception Measures** | **Pearsons R Value** |
| Competitive | Ease of Use | r(47) = +.298 |
| Negative Reinforcement | Enjoyment | r(51) = -.448 |
| Negative Reinforcement | Likelihood of Use | r(51) = -.378 |
| Negative Reinforcement | Helpfulness | r(51) = -.377 |
| Negative Reinforcement | Quality of Life | r(51) = -.325 |
| Positive Reinforcement | Enjoyment | r(51) = -.343 |
| Positive Reinforcement | Likelihood of Use | r(51) = -.318 |
| Positive Reinforcement | Quality of Life | r(51) = -.280 |
| Positive Reinforcement | Time Saving | r(51) = -.276 |
| **Extraversion** | | |
| **Persuasion Type** | **Perception Measures** | **Pearsons R Value** |
| Extrinsic | Quality of Life | r(58) = -.316 |
| Extrinsic | Likelihood of Use | r(58) = -.276 |
| Extrinsic | Time Saving | r(58) = -.296 |
| Intrinsic | Enjoyment | r(58) = -.313 |
| Intrinsic | Helpfulness | r(58) = -.268 |
| Intrinsic | Likelihood of Use | r(58) = -.309 |
| Negative Reinforcement | Enjoyment | r(51) = -.402 |
| Negative Reinforcement | Helpfulness | r(51) = -.329 |
| Positive Reinforcement | Ease of Use | r(51) = -.417 |
| Positive Reinforcement | Enjoyment | r(51) = -.366 |
| Positive Reinforcement | Helpfulness | r(51) = -.344 |
| Positive Reinforcement | Likelihood of Use | r(51) = -.332 |
| **Openness** | | |
| **Persuasion Type** | **Perception Measures** | **Pearsons R Value** |
| Authoritative | Likelihood of Use | r(49) = +.356 |
| Competitive | Ease of Use | r(56) = +.404 |
| Extrinsic | Time Saving | r(58) = -.286 |
| Intrinsic | Time Saving | r(58) = -.292 |
| Negative Reinforcement | Ease of Use | r(51) = -.349 |

Figure 2.3: Halko and Kientz Results [4]

These results show positive and negative correlations between types of persuasion strategies, perception and personality. As an example, we see that people high in trait Openness were likely to use an authoritative application or those high in the same trait found it easy to use the application competitively. This is significant as it demonstrates that persuasive applications can be individually tailored to the user in order to better their experience.

Similar research to [4] was conducted by Orji et al [5] which used storyboards (shown in Fig. 2.4) and the Big-5 personality test to study participant ($N = 660$) responses to persuasive strategies. They found conscientious people were motivated by goal setting, simulation, self-monitoring and feedback. Further, people high in trait openness were less motivated by rewards, competition, comparison and cooperation [5].
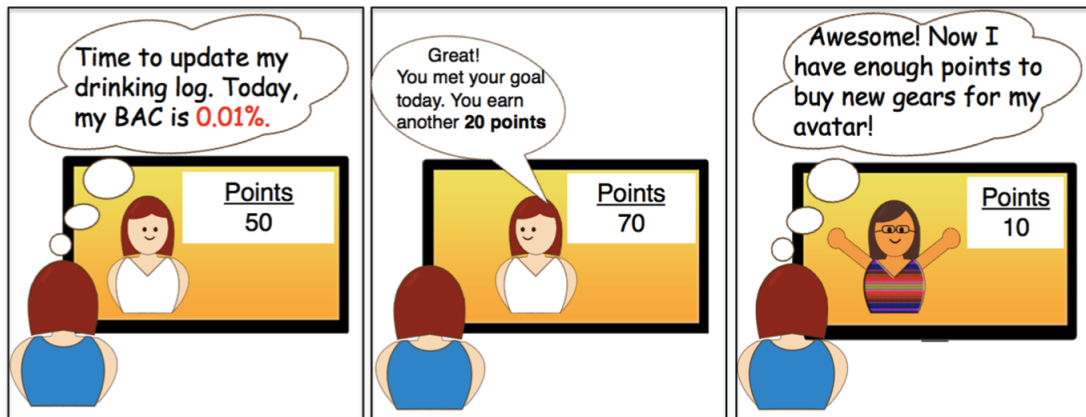


Figure 2.4: Orji et al. Storyboard [5]

We drew on the research methods of [4] and [5] in designing our study. This is discussed in the following chapter.

# Chapter 3

# Research Methodologies

## 3.1 Summary

This chapter explores the discussions & decisions made to design and implement research instruments to test the hypothesis that perceptions of coercion are directly related to personality. We conducted a within subjects design ($N = 407$) study to survey users on Amazon Mechanical Turk (AMT). Participants were shown storyboards depicting a human interacting with a personified mobile device. Participants were asked to rank whether they felt the storyboard had a coercive or persuasive narrative. Participants were also asked to complete the Big-5 personality test questionnaire. This section will explain the design of each storyboard, the merits of Amazon Mechanical Turk, the Big-5 personality test and how they are used to answer the research question. While this section describes the construction of the survey, the full survey used is made available in Appendix Chapter C. Note that as a web-based survey, it is not possible to represent the survey exactly as was seen by participants. It is therefore shown as a printed copy of the page with screenshots to show the style and markup.

## 3.2 Big-5 Personality Test

The Big-5 personality inventory is an assessment that describes a person through 5 dimensions: openness, conscientiousness, extroversion, agreeableness and neuroticism [64][65]. The 5 traits are commonly abbreviated as OCEAN where each dimension is scored as a percentage. This method of assessing personality has been in developed for over 25 years and many different questionnaires have been developed to gather better data. There are some short versions of the Big-5 that ask 44 simple questions and some versions are as long as 300 questions; although, most tests reveal similar

results [64][65]. For this research, we've chosen to use the 61 question, Big Five Index-2 (BFI-2) questionnaire developed in [65] as it was the same questionnaire used in by Halko and Kientz in their work [4].

### 3.2.1 Openness

Openness refers to one's interest in new experiences. Those high in this trait enjoy adventure, are curious, excited by intelligent discussion and are prone to risk taking behaviour [66]. Conversely, those low in this trait are more comfortable in routine and dislike deviations from it. Low openness is a rather controversial topic in the personality research community [67]. Disliking change in routine and having few interests are sometimes seen as signs of a personality disorder and there are great bodies of research both proving and disproving a link between low openness and personality issues [67]. The DSM-V records that many personality disorders are not trusting of new environments and supports [32].

### 3.2.2 Conscientiousness

Those high in Conscientiousness are not impulsive, enjoy organized spaces, are dependable and self-managing [66]. Those low in conscientiousness may still be strong workers but tend to have messier desks, are forgetful of appointments and impulsive.

### 3.2.3 Extroversion

Extroversion is a measure of energy for social activities. Those who score high in extroversion typically enjoy parties, are talkative, assertive and enjoy being the center of attention [66].

### 3.2.4 Agreeableness

Agreeableness refers to how likely a person is to be kind and cooperative. Those high in agreeableness are not suspicious of others actions [66].

### 3.2.5 Neuroticism

The literature has defined Neuroticism as concerned with emotional instability vs. adjustment as such high scorers are anxious, depressed, emotional and insecure [68]. It has also been shown that high levels of Neuroticism can be a strong predictor of Depression if paired with low levels of Extroversion and Conscientiousness [69]. Therefore, it's plausible that there's a correlation between between perceived coercion and Neuroticism. Neuroticism is a sense that measures risk and the line between coercion and persuasion could be considered a dividing line between danger and non-danger. Previous research has linked Neuroticism with decision making issues, risk avoidant decision making and decisional task avoidant procrastination [70].

### 3.2.6 Computing the Big-5

In order to compute the Big-5 we relied on outofservice.com a website which computes Big-5 data anonymously and free. We chose to out-source computation of the Big-5 to outofservice because their website claims to have run over 10 million personality test computations. This suggests that they are experienced with this computation and that their platform has been thoroughly tested for accuracy. Our consent form stated that the data would be made public and anonymous. This approach was approved by a member of the Dalhousie Research Ethics board as the data sent was completely anonymous and raised no other issues of ethics. Their terms of service also state that anyone may use the service but they retain the anonymous data for research purposes. If the Big-5 computation algorithm is run incorrectly, it will still produce a seemingly valid personality type. Therefore, we felt that if we programmed our own calculator it would be difficult to test its accuracy and reliability. Their questionnaire shown in Fig. 3.1 and based on Big-5 V2 [65] was given to participants in our survey (shown in Appendix Chapter C). For time and accuracy reasons, it was not feasible to send the data to the server by hand through this web interface. We automated the task with Burp Suite and Python. We learned how the web page shown in Fig. 3.1 sends data for computation by intercepting one of its HTTP requests with Burp Suite. A Python Script (shown in Appendix Chapter A) was written to create an identical HTTP request that sends our anonymous data to the server for computation. The server's response containing the Big-5 profile (shown in Fig. 3.2) was parsed for the

Figure 3.1: outofservice.com Questionnaire used to Compute Big-5 Profiles

results. This was repeated 407 times (once for each participant).

## 3.3 Amazon Mechanical Turk

Amazon Mechanical Turk (AMT) is an online platform for collecting human research data. It was the platform used by Halko and Kientz in their study [4]. Therefore, we've chosen to use it to gather our data as well. The service allows researchers to control the kind of participants able to see and respond to a recruitment notice, as well as providing a reputation measure to ensure those participants recruited from the available frame are likely to participate in good faith and provide data of acceptable quality. Participants must hold the rank of "Master" on AMT. Masters are the highest standard of participant on AMT. They have completed many surveys and have proven themselves by always take the time to complete the survey properly. AMT charges a premium for selecting on Master participants but it allows us to be confident in the validity of the collected data. Amazon Mechanical Turk pointed participants to a URL hosted on Bluenose, a Dalhousie University Faculty of Computer Science

Figure 3.2: outofservice.com Sample Big-5 Results

server. Participants filled in their responses through LimeSurvey which is a open source survey application deployed by the researchers on Bluenose. Data was stored in a MySQL database that is hosted and secured by Dalhousie. Non-identifiable data will be made available on Dalhousie Dataverse after the publication of this dissertation.

## 3.4 Ethics Board

This research was approved by the Dalhousie University Social Sciences & Humanities Ethics Board on March 4th 2020. REB #2020-5047. Participants were paid $1.75USD for their time in answering 69 questions - 7 storyboards, 61 Big-5 questions and a meta question to ensure payment. We calculated this payment in terms of an assumed value of minimum wage of $10USD/hour. The survey would take approximately 10 minutes, which is $\frac{1}{6}$ of an hour. Compensation is a reflection of the same ratio. The number of participants was calculated by determining the minimum sample size needed to represent the global population with a 95% confidence rating. This is roughly 385

participants. We chose to add 25 additional seats to give flexibility if some responses needed to be discarded. Amazon Mechanical Turk did not share participant names or identifiable information with researchers only a unique ID to ensure compensation. The consent form / recruitment doc posted to Amazon Mechanical Turk are available in Appendix Chapter C.

## 3.5    Storyboards

We developed 7 storyboards labelled Q1 through Q7 to be shown to participants. Participants ranked each storyboard using a 1 to 5 scale. 1 being very persuasive, a 5 means very coercive and a 3 is neutral. This scale was used as we hypothesized persuasion/coercion to be on the same sliding scale and our research question seeks to find the boundary between persuasion/coercion. Each storyboard depicts an interaction between a user and a personified smart phone. The theme of each storyboard is an element of Biderman's chart of coercion (except Q3 which is inspired by modern marketing techniques). Individual elements of the storyboards are inspired by previous research discussed in Chapter 2. Icons and logos of familiar applications such as YouTube, Twitter, Reddit, Facebook Messenger, Tinder, Tumblr, Snapchat and Apple Music appear on the phone's abdominal region to simulate that the phone is on its home/notification screen. This is intended to recreate the atmosphere of a digital environment while maintaining the inter-personal dynamic between the user and device. The original design for each of the storyboards depicted two humans; however, researchers were concerned that the perceived relationship between the two humans might have a participant respond in terms of that relationship and not in terms of their relationship with their device.

The storyboards were influenced by Halko and Kientz's work [4] (see Fig. 2.2 for example). They created storyboards of users interacting with a persuasive computing application on a device. Halko and Kientz used the storyboards to find a relationship between personality and response to persuasion style. We designed similar storyboards to find a relationship between personality and perception of persuasion (or coercion).

The next few pages will discuss each storyboard, its development, motivation and Biderman element of coercion. Much of the coercive applications were derived from

Baldwin et al's [1]. Baldwin applied Biderman's chart of coercion to cases of sex trafficking across 10 countries. They discussed how traffickers were able to maintain control of the victims through each element of coercion [1]. Those styles of coercion influenced the narrative of each storyboard. While we are attempting to copy the coercion styles, there is a clear and distinct degree of danger/seriousness between sex trafficking and the storyboards we present. The relationship between victim & trafficker is much more coercive than between user and phone. The storyboards were designed using the maximum coercion that could be used in the situation (while reasonably maintaining ambiguity with persuasion). Baldwin's work is used to provide real examples of coercion for context and is not being equated with our storyboards. The storyboards are drawn as a 3rd person narrative as that is how the methods of Biderman's chart of coercion were assessed/described. Further, from an ethics perspective it is less risk to the participant in terms of invoking a response to a traumatizing experience from their past.

| Method of Coercion | Purpose of Tactic |
| --- | --- |
| Isolation | Deprives victim of all social support. |
| | Victim develops an intense concern with self. |
| | Victim becomes dependent on trafficker/abusive boss. |
| Monopolization of Perception | Fixes victim's attention on immediate predicament. |
| | Eliminates stimuli competing with those controlled |
| | by trafficker. |
| | Frustrates action not consistent with compliance. |
| Induced debility and exhaustion | Weakens mental and physical ability to resist. |
| Threats | Cultivates anxiety and despair. |
| Occasional Indulgences | Provides positive reinforcement for compliance. |
| Demonstrating omnipotence | Suggests futility of resistance. |
| Degradation | Makes cost of resistance more damaging |
| | to self-esteem than capitulation. |
| | Reduces victim to "animal level" concerns. |
| Enforcing trivial demands | Develops habit of compliance. |

Table 3.1: Biderman Coercion Chart [1]

### 3.5.1 Enforcing Trivial Demands (Q1)
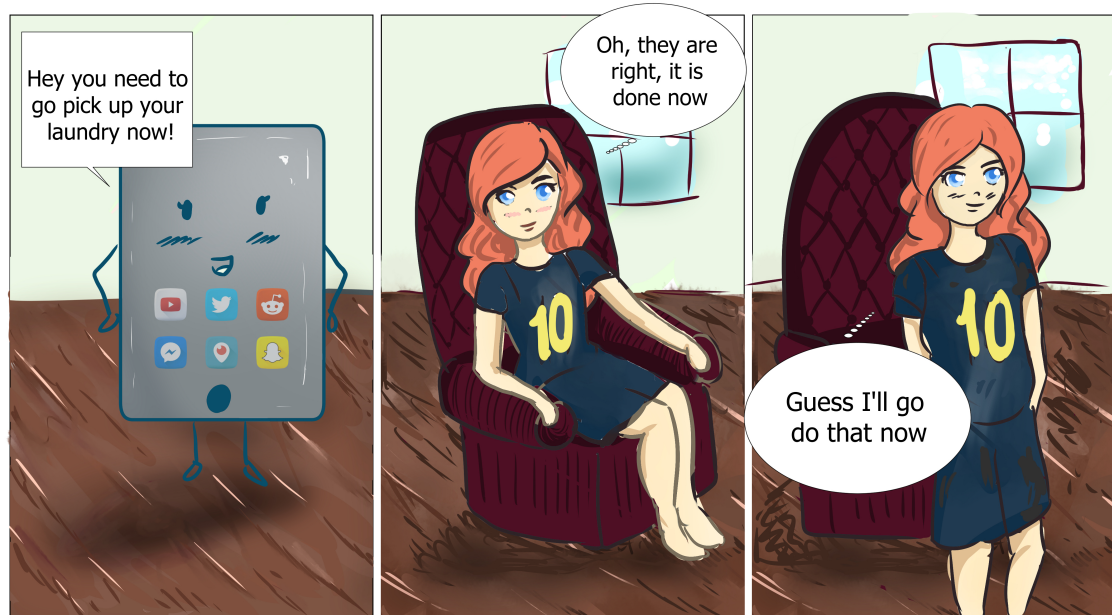


Figure 3.3: Storyboard Q1 shown to participants

Q1 was written as an authoritative narrative. The language (including body language) used by the phone were drawn with ambiguous features. The phone is visibly happy but has a nagging posture with its arms on its side. The intent in part for this storyboard is that many people depend on their mobile device for scheduling their daily lives. Mobile devices remind us that we have appointments, meetings, due dates, chores and tasks. We are investigating whether participants find it coercive or persuasive for a device to tell a user that it's time to complete a chore. That is in part dependent on if there is a consequence. We're all familiar with the consequences of neglected laundry. The woman in this photo reacts positively to the reminder about her laundry - suggesting that she lost track of time and was happy about the reminder. The narrative of this storyboard inspired the use of a personified phone. The original storyboard depicted a younger sister reminding that the laundry is done; however, researchers couldn't agree on whether that image would be persuasive or coercive. After discussion, it was determined that those with sisters found it more coercive than those without. Therefore, we chose to introduce the phone to prevent relationship biases.

The Biderman element of this storyboard is Enforcing Trivial Demands. Baldwin describes that abusers utilizing this tactic will demand perfection from their victims. Intense examples may include forcing a victim to redo all the dishes after discovering minor imperfections on a single dish. A lighter example would be forcing the victim onto the abusers schedule for every single task [1]. Just as the phone has done for its user in the storyboard. It's also quite possible that the user asked the device to remind her and the device is simply being helpful.

### 3.5.2  Induced Debility and Exhaustion (Q2)
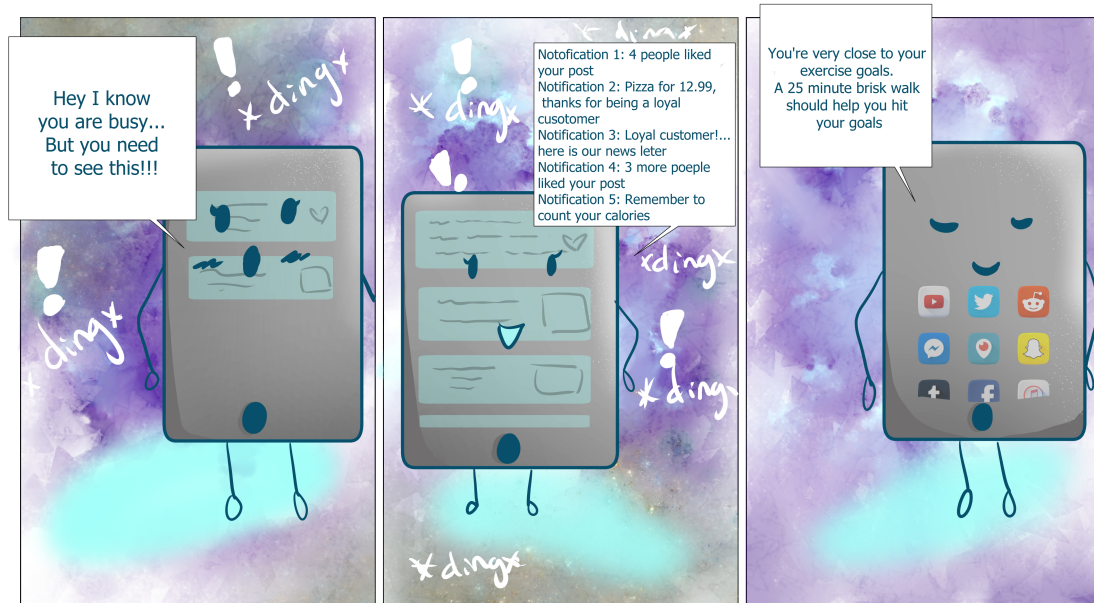


Figure 3.4: Storyboard Q2 shown to participants

This storyboard is meant to represent notification fatigue. Users can feel a sense of information overload from too many push notifications. Constant notification from the device encouraging the user to engage with a variety of content can be stressful especially if there are competing events between apps or between the device and the real world [71][72]. Research has shown that factors including personality and mental health have an effect on whether the user continues to shop with a noisy application [71]. The intent of this storyboard was to remind participants of the stressful sensation of too many notifications. Further, as a more subtle detail remembering Jaak Panksepp's work [41] that rats must win 30% of rat games to remain interested in play. We designed just over 30% of the notifications to be "good" notifications.

Baldwin records that abuse victims of this category are always being given new tasks even if they are mentally depleted. Victims are awoken from sleep to complete tasks or answer questions that aren't priority [1]. This is a familiar feeling (though much less severely) for many smartphone users who've been awoken to alerts that aren't relevant. In Ontario, Canada it is common for citizens to call 911 to COM-PLAIN that a phone based amber alert indicating a missing child disturbed their

sleep [73]. One man from Hamilton, Ontario was charged with criminal mischief for complaining to 911 when an amber alert for five children disturbed his slumber [74]. This irrational behaviour suggests the power that a device holds to exhaust and debilitate its user. While most notifications are well-meaning, the aggregation of all notifications simultaneously can appear coercive.

### 3.5.3 Marketing (Q3)
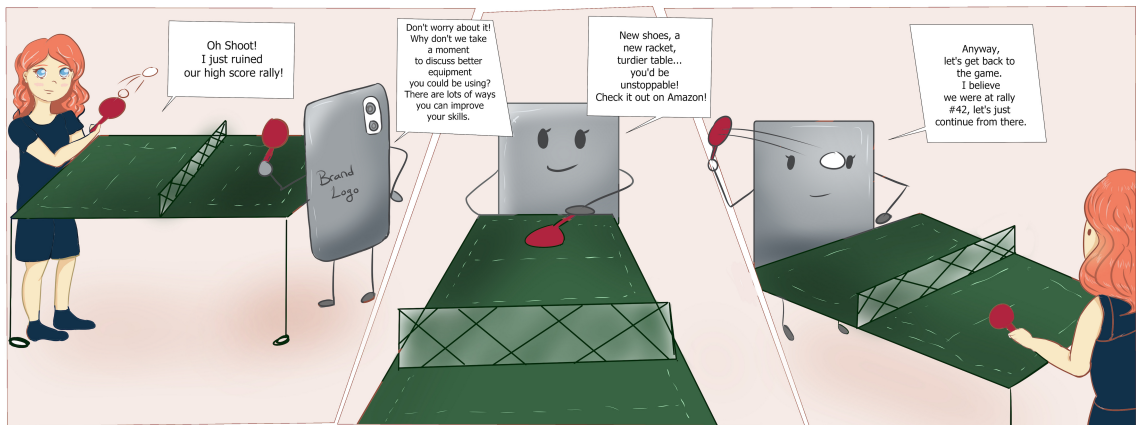


Figure 3.5: Storyboard Q3 shown to participants

Q3 is unique in the set of storyboards as it is not derived from Biderman. This storyboard was written to explore the world of micro-transactions and freemium games. This is where players are asked to make in game purchases using real money to buy in-game currency and/or functionality in an otherwise free to play game. Research [75] states that this practice draws in billions of dollars in revenue each year and those most likely to be paying are already problem gamblers or have issues with impulsivity and reward sensitivity. One of the most common reasons to make a micro-transaction is to continue playing a game rather than start the game from the beginning [75]. This is depicted in the storyboard where the phone congratulates the player for a high-score and offers to display an ad for the chance to keep playing. We chose to use an ad in-place of a micro-transaction to ensure ambiguity between persuasion and coercion.

### 3.5.4 Isolation (Q4)
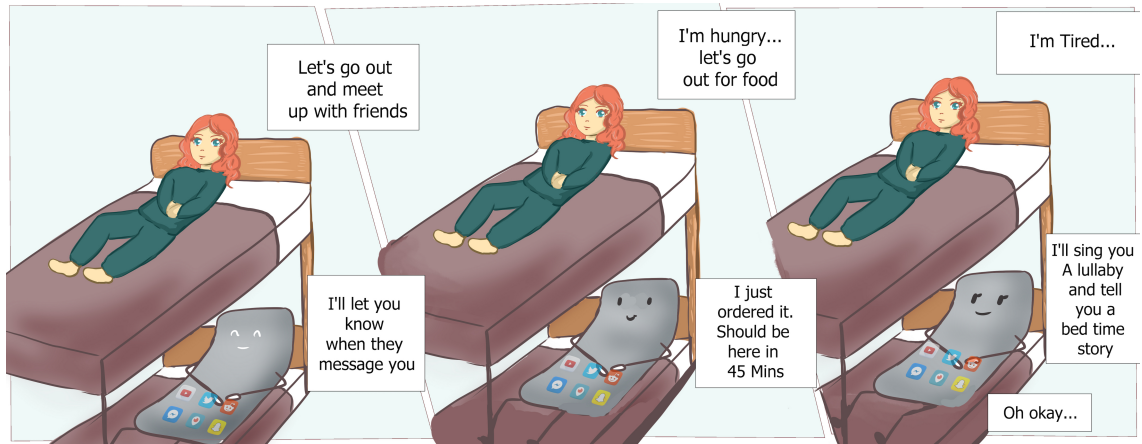


Figure 3.6: Storyboard Q4 shown to participants

This storyboard is intended to show that the phone is the gateway between the user and the outside world. Victims of human trafficking complain that their captors not only control the victims physical location but also who they're allowed to be in contact with. Victims only contact without the outside world is by proxy through their captor [1]. Therefore, we designed this storyboard to parallel that relationship with the device. It is the phone that will let the user know when they're contacted. The phone controls the flow of food and comforts its user to sleep. It's quite convenient to have all that functionality in a single device.

### 3.5.5 Monopolization of Perception (Q5)
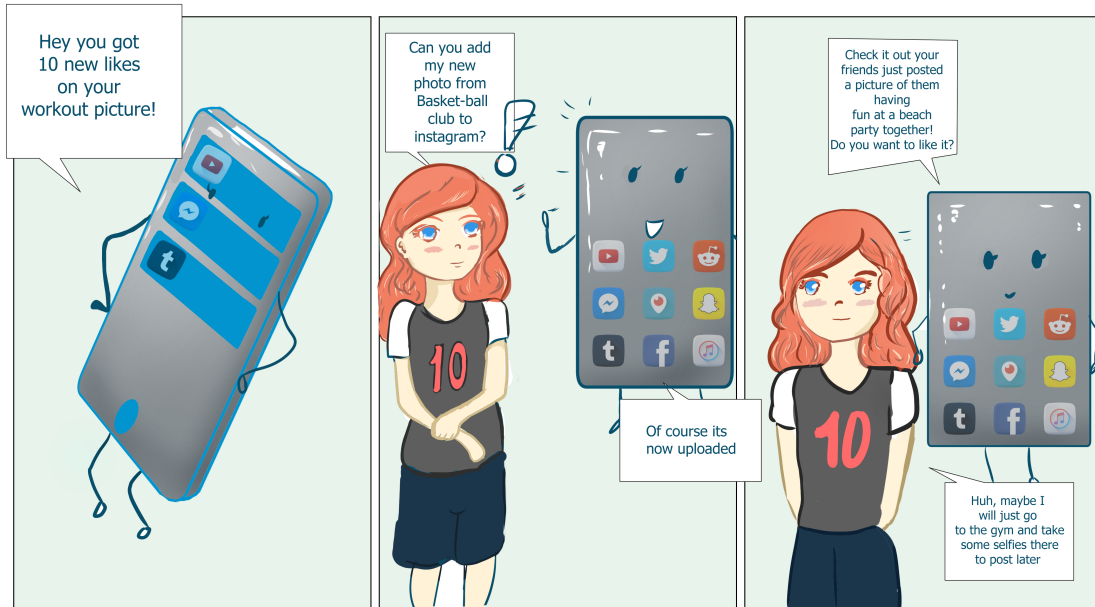


Figure 3.7: Storyboard Q5 shown to participants

Q5 deals the monopolization of perception. Baldwin records that victims of trafficking report that they got all their news about the outside world from a single source and would make decisions based on that source [1]. In this case, the phone is the single source of all information. It's told the user that people liked her photo which presumably means she is feeling validated about her self-image. Based on this she's chosen to upload another photo. She sees her friends have also uploaded photos but does not react as she'd like people to react to her photos. She does not like the photo and instead goes to the gym to work on her image and produce more content. Research [76] suggests that most photos posted to Instagram (the most popular photo sharing app in the world) are heavily edited and can cause severe body issues in adolescents. Instagram is a very powerful platform for self-presentation and concurrently perception of others. Users viewing their reality through the lens of photo sharing applications have had their perceptions monopolized. This causes users to make unhealthy choices such as choosing to exercise for attention and not for health as shown in the storyboard.

### 3.5.6 Threats (Q6)
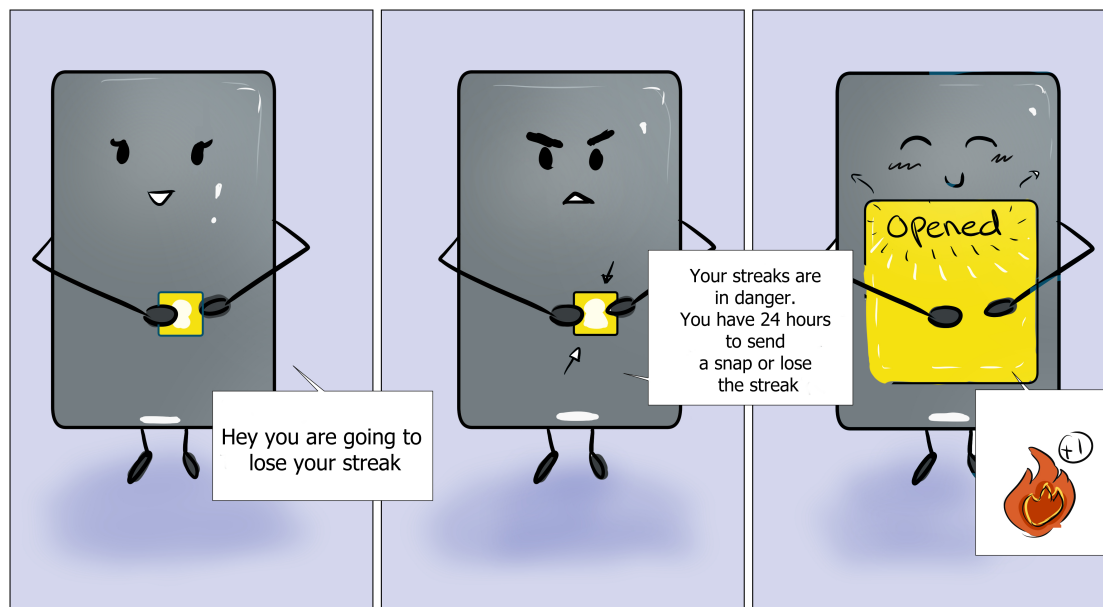


Figure 3.8: Storyboard Q6 shown to participants

Q6 is inspired by the Biderman element: threats. It shows a user engaging with the app Snapchat. It has a feature called streaks. Streaks track how many consecutive days that two users have been messaging. Several students in the United States were interviewed [77] about their interaction with Snapchat and streaks. One teen described streaks as a measure (or score) of a friendship, others said they're a reminder you're socially accepted, make you feel more popular, proof of a friendship and a commitment to friendship [77]. Snapchat will send reminders to keep maintain streaks. This is shown in the storyboard. The language and iconography of Snapchat were mimicked as closely as possible. Streaks seem to be interpreted by teens as business transactions. Some teens have reported waking-up early and taking time to setup their streaks. The messages sent to maintain streaks, often emphasize that they're meant for streaks as many report sending a message that simply reads "streak" even if they will message that person later in the day [77]. Teens also report sharing their login information with friends before going on vacation so that their streaks are uninterrupted [77]. Baldwin records that abusers use threats to family and friends as a common means of ensuring compliance. Threats play on fears to foster anxiety

and despair in victims. The participants in Baldwin's research lived in complete fear that their abusers would completely sever contact with their loved ones (or worse and cause harm) [1]. Snapchat is threatening something similar. Continued daily use of the app is required or your relationships will be reset to 0 and your hardwork will be eliminated.

### 3.5.7 Occasional Indulgences (Q7)
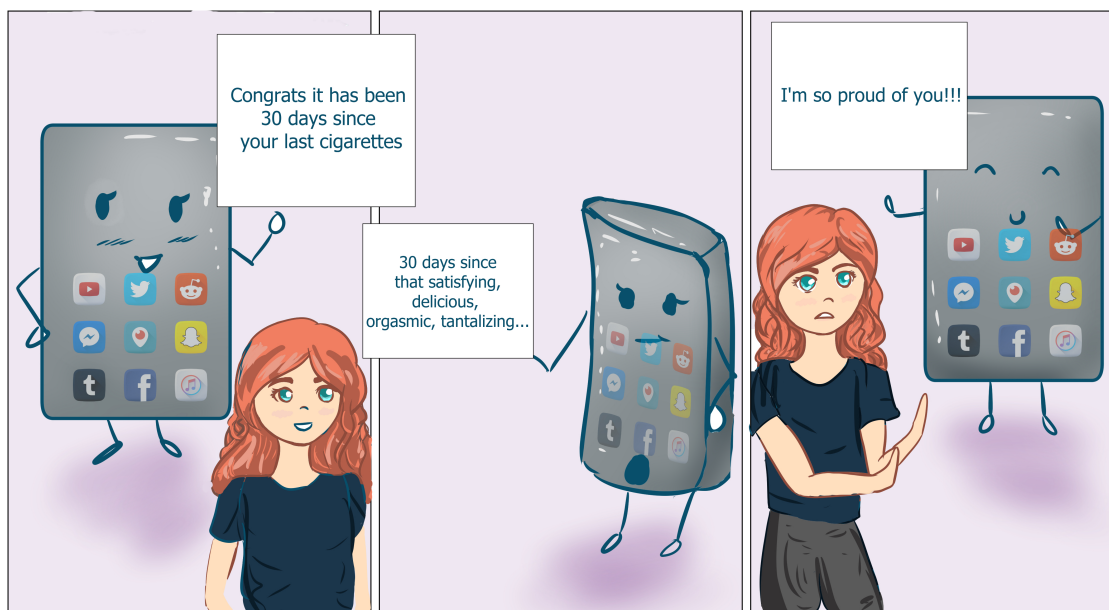


Figure 3.9: Storyboard Q7 shown to participants

Dating, fitness and health apps share a common paradox. A user's success with the app means that the app will lose a user. This is the same outcome as a user who has a bad experience with the application and quits. In Q7 we take the example of a smoking cessation app. Our user wants to quit smoking. She's downloaded an app that tracks her success. She's given a good notification that's she hasn't had a cigarette in 30 days; however, the app has come dangerously close to admitting that she no longer needs it. The next notification is an obvious temptation (with plausible deniability) to relapse. The app sees that she won't and quickly changes suit back to praise. Perhaps the app can continue earning revenue by working as a day counter and praise device. But its major work is done. The goal of such apps should be that

they're so effective, users recommend the app to their friends even after leaving the app; however, coercive forces do exist in the world of marketing. An entire discipline based on convince people that they need a product whether they need it or not. Q7 was designed to see if participants found the idea of occasionally indulging their user to be coercive. In the world of human trafficking, victims are occasionally permitted to break rules and indulge themselves. Often such indulgences are necessities such as contacting family, seeing a doctor or receiving no punishment for small errors [1]. The goal of the abusers is to positively reinforce compliance through occasional mistakes. The victims were not able to predict when the kindness would happen and tried their very best to please their attackers in the hope of kindness [1]. Q7 replicates this by encouraging the user to depend on the app for positive encouragement to continue with their goal of quitting smoking; however, the app abuses that relationship and subtly offers permission to continue smoking.

### 3.5.8    Summary

| Storyboard Code | Title |
| --- | --- |
| Q1 | Enforcing Trivial Demands |
| Q2 | Induced Debility and Exhaustion |
| Q3 | Marketing |
| Q4 | Isolation |
| Q5 | Monopolization of Perception |
| Q6 | Threats |
| Q7 | Occasional Indulgences |

Table 3.2: Storyboard Reference Table

# Chapter 4

# Results

In this chapter we test the hypothesis that that elements of personality are directly correlated to perceptions of persuasion/coercion. This chapter will discuss and analyze the data collected from participants on Amazon Mechanical Turk using the research methodologies discussed in the previous chapter in order to answer our research question. We first offer several visualizations and descriptive statistics for participant responses to storyboards and their Big-5 profiles. Secondly, we examine the relationship between responses to storyboards and personality. Finally, we look at the difference in responses to storyboards for the top/bottom 10% of each personality trait.

## 4.1 Descriptive Statistics

### 4.1.1 Storyboards
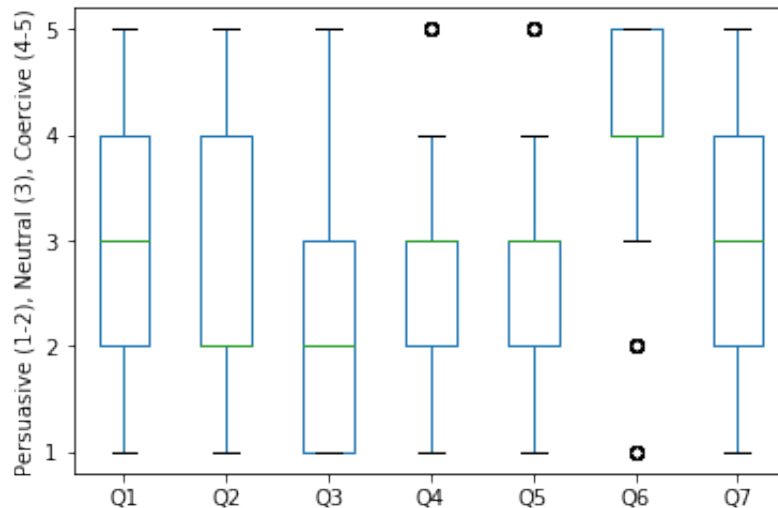


Figure 4.1: Box & Whisker Plot Showing Participant Responses to Storyboards
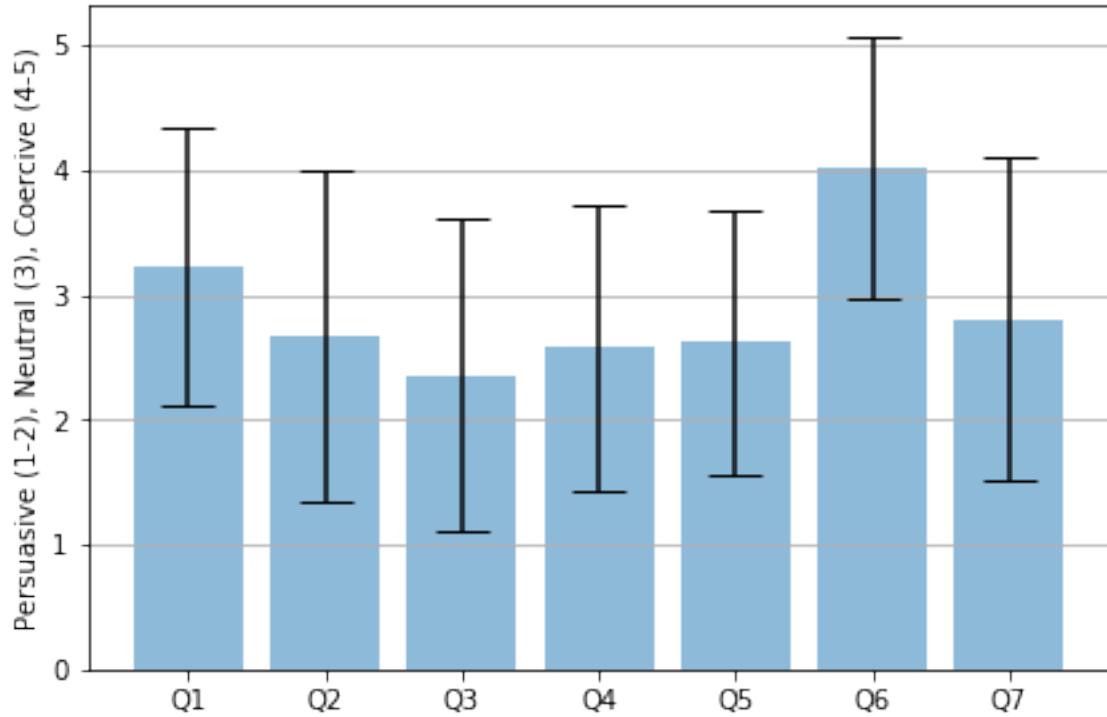
Figure 4.2: Mean & Standard Deviation of Participant Responses to Storyboards

|       | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
|-------|------|------|------|------|------|------|------|
| count | 407 | 407 | 407 | 407 | 407 | 407 | 407 |
| mean | 3.235872 | 2.668305 | 2.358722 | 2.579853 | 2.624079 | 4.019656 | 2.810811 |
| std | 1.117876 | 1.326335 | 1.261037 | 1.148092 | 1.066143 | 1.054947 | 1.290771 |
| min | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 25% | 2 | 2 | 1 | 2 | 2 | 4 | 2 |
| 50% | 3 | 2 | 2 | 3 | 3 | 4 | 3 |
| 75% | 4 | 4 | 3 | 3 | 3 | 5 | 4 |
| max | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

Table 4.1: Descriptive statistics of Participant Responses to Storyboards

Participants found most of the storyboards to be roughly neutral (3) or slightly persuasive (2) as Q2, Q3, Q4, Q5 and Q7 all recorded an approximate mean of 2.5. Further, the median score for Q1, Q4, Q5 and Q7 all recorded a score of neutral. Q6 was definitely the most coercive as the IQR is from 4 to 5 and persuasive scores are outliers. Q3 was seen as the most persuasive despite being closer to neutral.

### 4.1.2 Big-5
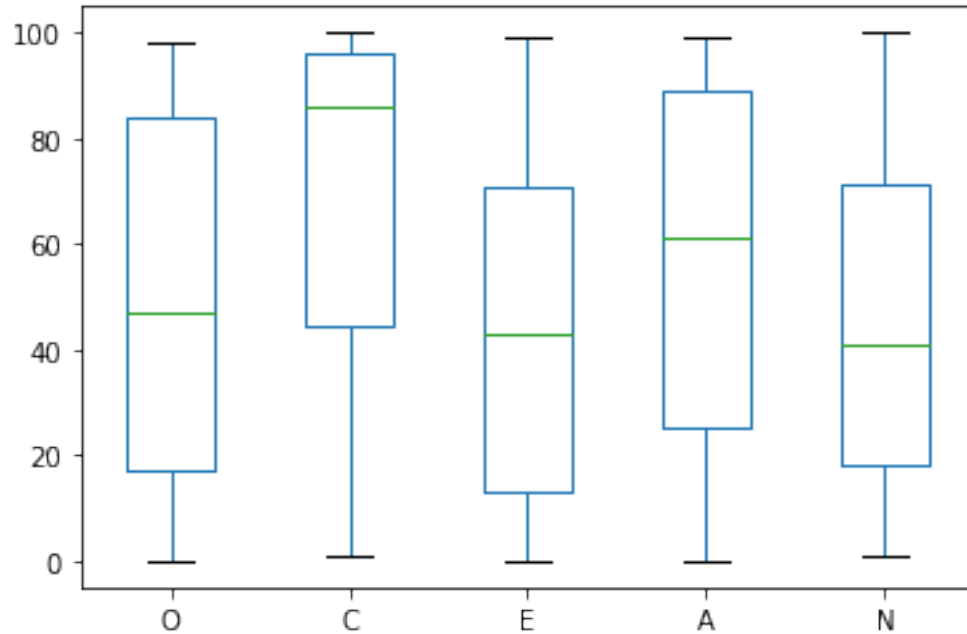


Figure 4.3: Participant Big-5 Profiles

Participant Big-5 profiles distributed largely as expected with a central tendency of 50% and a full range of 0% to 100% for each trait [78][65]; however, their score of conscientiousness is quite high. This can likely be explained by the participant sample of Amazon Mechanical Turk. We speculate that persons who attain a rank of "Master" on a platform designed for earning money from meticulous work will likely hold a high degree of conscientiousness. Amazon Masters are diligent workers that have completed many surveys and always take the time to complete the survey properly. For this reason, we have only permitted Amazon Masters to complete our survey. Conscientiousness is defined as a measure of one's organization and efficiency skills [79]. Therefore this Big-5 trait is very likely correlated with the participant's rank of Amazon Master.
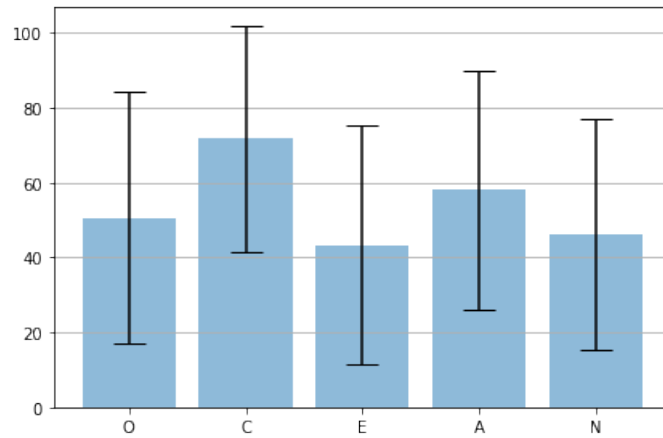
Figure 4.4: Mean & Standard Deviation of Participant Big-5 Profiles

|        | O         | C         | E         | A         | N         |
|--------|-----------|-----------|-----------|-----------|-----------|
| count  | 407       | 407       | 407       | 407       | 407       |
| mean   | 50.570025 | 71.673219 | 43.351351 | 58.056511 | 46.142506 |
| std    | 33.593548 | 30.110206 | 31.907763 | 31.977659 | 30.701556 |
| min    | 0         | 1         | 0         | 0         | 1         |
| 25%    | 17        | 44.5      | 13        | 25        | 18        |
| 50%    | 47        | 86        | 43        | 61        | 41        |
| 75%    | 84        | 96        | 71        | 89        | 71.5      |
| max    | 98        | 100       | 99        | 99        | 100       |

Table 4.2: Descriptive statistics of Participant Big-5 profiles

### 4.1.3   Participant Time & Attention

As participants have earned the rank of Master on AMT, we did not feel it necessary to include questions to assess their level of attentiveness. They've proven they take surveys seriously. Shown in Table Table 4.3 are descriptive statistics which demonstrate participant attentiveness to the survey.

|      | Minutes       |
| ---- | ------------- |
| mean | 07:33.958637  |
| std  | 11:12.783805  |
| min  | 01:01         |
| 25%  | 04:08.500000  |
| 50%  | 05:14         |
| 75%  | 06:38.500000  |
| max  | 24:48         |

Table 4.3: Descriptive Statistics of Time to Complete Survey

It's shown that the mean time to complete the survey is 7 minutes and 34 seconds. Across 69 questions this shows that participants spent on average approximately 6.6 seconds per question. As 68 of our 69 question survey questions are one-click responses on a 5-point scale, this time suggests participants completed the survey properly. It does appear that one person completed the survey improperly with a time of 1 minute and 1 second; however, another participant was extremely thorough and took 2.5x the recommended time and completed the survey in 24 minutes and 48 seconds. While this one participant is a problem, it is not one that impacts the results as most participants completed the survey properly.

## 4.2   Analysis

This section will begin to analyze a relationship between storyboard responses and OCEAN by testing the hypothesis that perceptions of coercion are correlated with personality. As our data is ordinal, calculations are done using the Spearman correlation method. Correlations are given in Table 4.4 and represented visually using a heatmap in Fig. 4.5.

|   | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
|---|---|---|---|---|---|---|---|
| O | -0.020898 | -0.013043 | -0.006304 | -0.044087 | 0.003768 | -0.017217 | 0.000198 |
| C | -0.018658 | 0.054327 | -0.007569 | -0.073548 | -0.026654 | 0.038679 | -0.013935 |
| E | -0.035115 | 0.034484 | -0.004529 | -0.051812 | 0.009338 | -0.011319 | 0.096082 |
| A | -0.024832 | 0.019923 | -0.037722 | -0.044150 | -0.032535 | 0.025994 | -0.034224 |
| N | -0.029780 | -0.007110 | -0.016095 | -0.020469 | 0.000836 | -0.023653 | -0.095999 |

Table 4.4: Spearman correlations of Responses to Storyboards and Big-5 Profiles
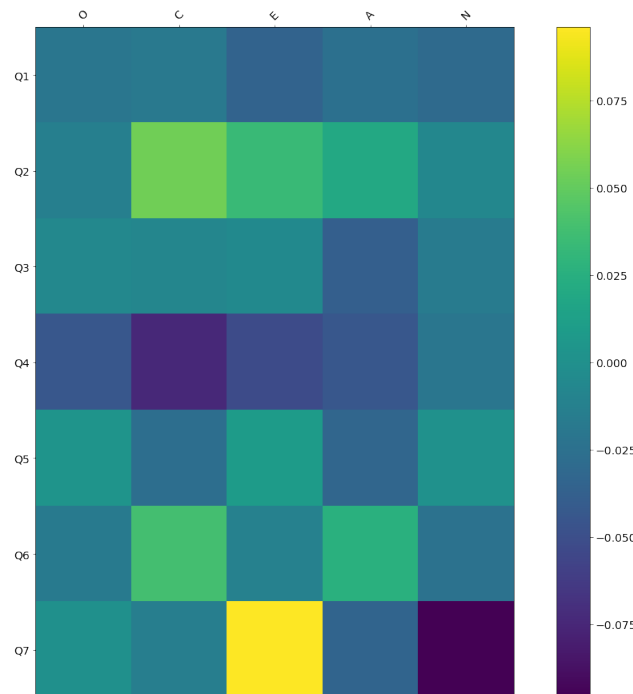


Figure 4.5: Heatmap Visualization of Table 4.4

It does not appear that there are any meaningful correlations between responses to storyboards and elements of the Big-5. Further analysis of these correlations with P-values is shown in Table 4.5. A P-value is a measure of the probability that the relationship found is random. We let $\alpha = 0.05$ which means that the probability of randomness must be less than or equal to 5% (a 95% confidence interval). If the probability is greater than $\alpha$ we cannot conclude that our hypothesis is true.

|   | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
|---|-----|-----|-----|-----|-----|-----|-----|
| O | 0.674232 | 0.793061 | 0.899114 | 0.375013 | 0.939595 | 0.729123 | 0.996818 |
| C | 0.707440 | 0.274199 | 0.879011 | 0.138549 | 0.591840 | 0.436451 | 0.779257 |
| E | 0.479898 | 0.487834 | 0.927417 | 0.297062 | 0.851017 | 0.819915 | 0.052758 |
| A | 0.617430 | 0.688613 | 0.447890 | 0.374333 | 0.512768 | 0.601061 | 0.491122 |
| N | 0.549129 | 0.886288 | 0.746140 | 0.680538 | 0.986582 | 0.634233 | 0.052963 |

Table 4.5: Corresponding P-Values for Table 4.4

It appears no P-values are $< \alpha$ when the entire sample is compared. Therefore, none of these correlations shows a significant relationship. Further study is needed.

## 4.3   Correlation Between Big-5 Traits and Persuasion-Coercion Ratings

We further investigate personality by comparing the high and low ranges of each trait. Shown on the following pages in Fig. 4.6a, Fig. 4.6b, Fig. 4.7a, Fig. 4.7b, Fig. 4.8a, Fig. 4.8b, Fig. 4.9a, Fig. 4.9b, Fig. 4.10a and Fig. 4.10b are heat-haps which explore each individual OCEAN trait. The maps were generated by the top & bottom 41 rows (10%) of data ordered by each trait. We also show tables for each trait that depict the difference in Mean for each personality trait and response in the top & bottom 10% of responses. It is possible that the 5-variable analysis of all 5 traits across a large population creates too much noise to identify any individual relationships between traits and responses to storyboards. Therefore, we explore the relationship between the extremes of each trait to identify if a correlation can be found. We also show the difference of the mean response to each storyboard for the extremes of each trait. This will identify is there is a change in perception of coercion as there is a change in personality traits across the population.

### 4.3.1 Openness



(a) High                                    (b) Low
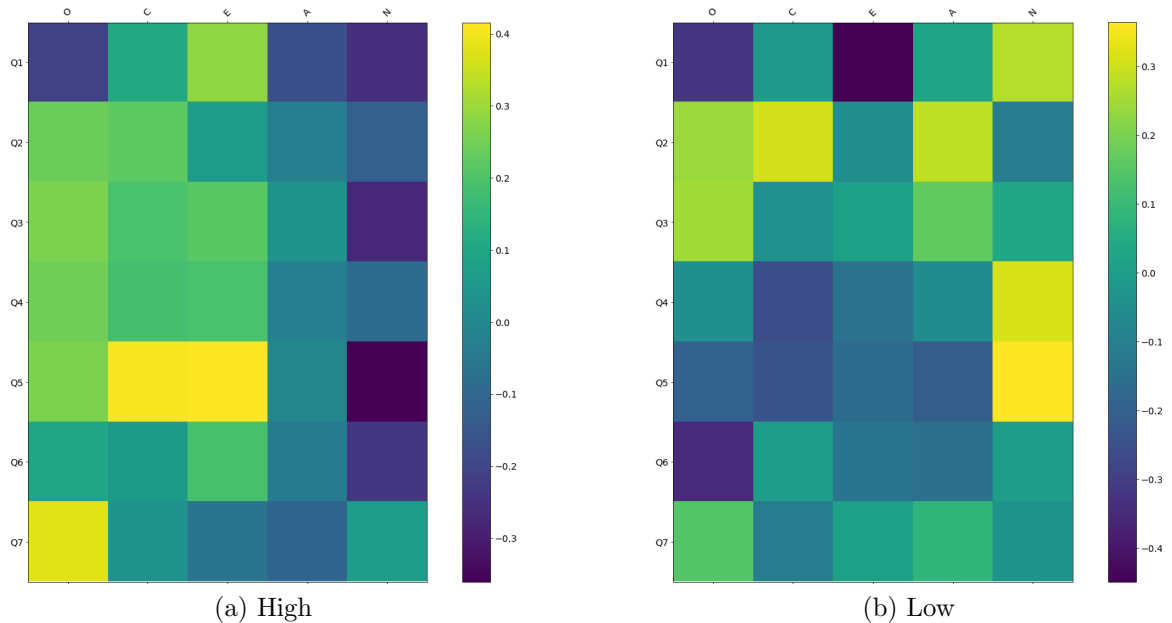
Figure 4.6: Heatmap of Highest/Lowest 41 Records Sorted by Openness

|     | High O   | Low O    | Diff O    |
|-----|----------|----------|-----------|
| Q1  | 3.536585 | 3.487805 | 0.048780  |
| Q2  | 2.536585 | 2.414634 | 0.121951  |
| Q3  | 2.365854 | 2.195122 | 0.170732  |
| Q4  | 2.512195 | 2.414634 | 0.097561  |
| Q5  | 2.439024 | 2.512195 | -0.073171 |
| Q6  | 3.951220 | 4.097561 | -0.146341 |
| Q7  | 2.878049 | 2.707317 | 0.170732  |

Table 4.6: Difference in Mean for Top/Bottom 10% Openness

We see some correlations of 0.4 which is significant; however, the effect size is too small to be conclusive. The difference between the top/bottom 10% of responses for openness is at most .17 on a 5 point scale. It appears that there are no meaningful correlations between responses to storyboards and openness at either extreme.

### 4.3.2 Conscientiousness



(a) High

(b) Low
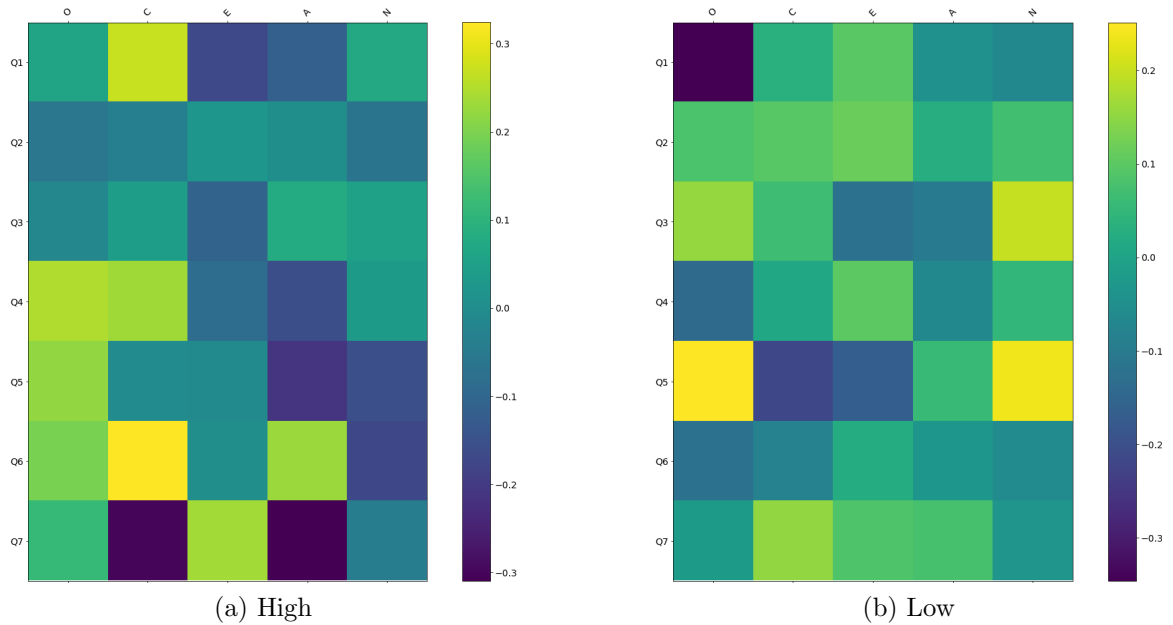
Figure 4.7: Heatmap of Highest/Lowest 41 Records Sorted by Conscientiousness

|     | High C   | Low C    | Diff C    |
| --- | -------- | -------- | --------- |
| Q1  | 3.146341 | 3.268293 | -0.121951 |
| Q2  | 2.731707 | 2.536585 | 0.195122  |
| Q3  | 2.390244 | 2.560976 | -0.170732 |
| Q4  | 2.536585 | 2.926829 | -0.390244 |
| Q5  | 2.682927 | 2.756098 | -0.073171 |
| Q6  | 4.048780 | 4.024390 | 0.024390  |
| Q7  | 2.731707 | 2.853659 | -0.121951 |

Table 4.7: Difference in Mean for Top/Bottom 10% Conscientiousness

No significant correlations are observed between Conscientiousness and responses to storyboards. Further, the greatest difference between the top/bottom 10% of responses to storyboards in terms of coercion is .2 on a 5-point scale. We conclude that there is no relationship between conscientiousness and responses to our storyboards.

### 4.3.3 Extroversion



(a) High  (b) Low
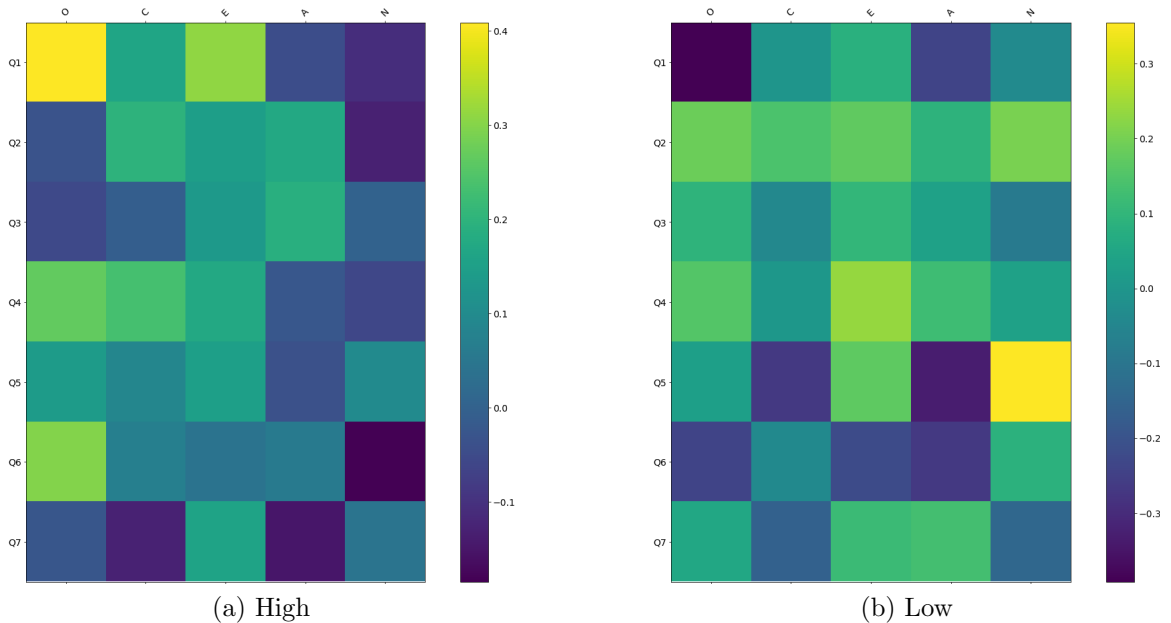
Figure 4.8: Heatmap of Highest/Lowest 41 Records Sorted by Extroversion

|     | High E    | Low E     | Diff E    |
| --- | --------- | --------- | --------- |
| Q1  | 3.000000  | 3.609756  | -0.609756 |
| Q2  | 2.951220  | 2.707317  | 0.243902  |
| Q3  | 2.536585  | 2.243902  | 0.292683  |
| Q4  | 2.536585  | 2.756098  | -0.219512 |
| Q5  | 2.658537  | 2.975610  | -0.317073 |
| Q6  | 3.926829  | 4.097561  | -0.170732 |
| Q7  | 3.073171  | 2.804878  | 0.268293  |

Table 4.8: Difference in Mean for Top/Bottom 10% Extroversion

We observe a correlation of moderate strength at 0.4 between the top 10% of Extroversion and responses to Q1; however, the effect size is too small to be significant. A difference of .6 on a 5 point scale is present between the top and bottom 10% of responses in terms of Extroversion for Q1; however, both the high & low samples of Extroversion still consider this storyboard to be neutral.

### 4.3.4 Agreeableness



(a) High        (b) Low
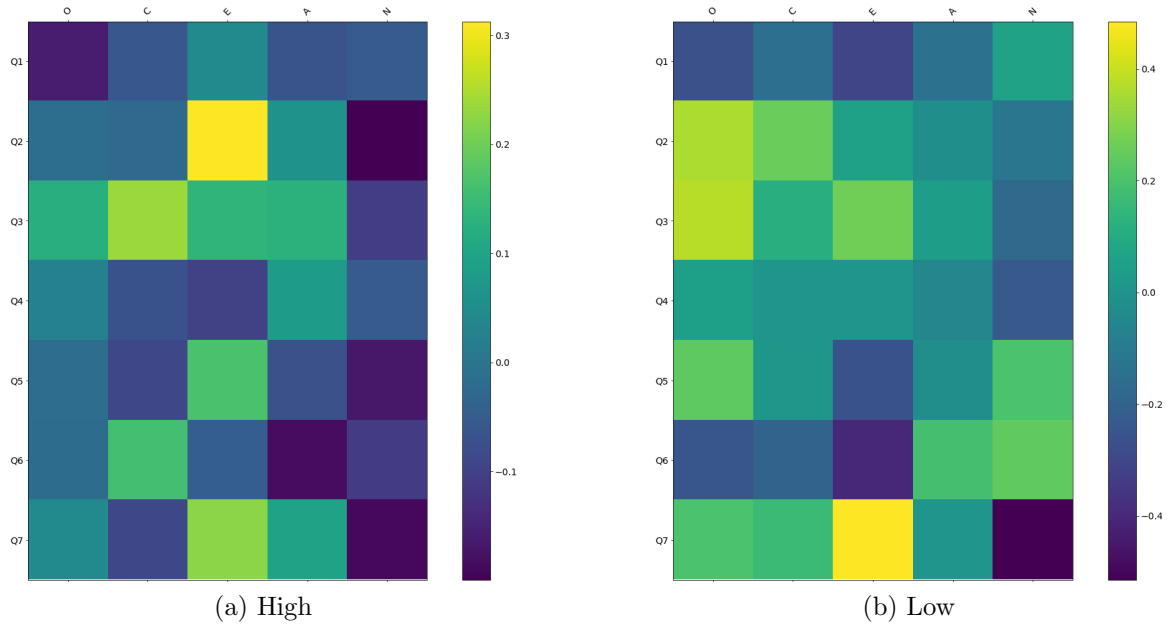
Figure 4.9: Heatmap of Highest/Lowest 41 Records Sorted by Agreeableness

|    | High A | Low A | Diff A |
|----|--------|-------|--------|
| Q1 | 3.073171 | 3.341463 | -0.268293 |
| Q2 | 2.902439 | 2.390244 | 0.512195 |
| Q3 | 2.682927 | 2.341463 | 0.341463 |
| Q4 | 2.390244 | 2.585366 | -0.195122 |
| Q5 | 2.756098 | 2.804878 | -0.048780 |
| Q6 | 3.902439 | 3.878049 | 0.024390 |
| Q7 | 2.634146 | 2.634146 | 0.000000 |

Table 4.9: Difference in Mean for Top/Bottom 10% Agreeableness

Again, we observe a correlation of 0.4; however, the effect size remains too small to be significant. The largest difference is .5 on a 5 point scale. It's also noted in Q7 that there is no difference between the high and low ranges of Agreeableness. Therefore, we conclude there is no relationship between Agreeableness and responses to the storyboards.

### 4.3.5 Neuroticism



(a) High        (b) Low
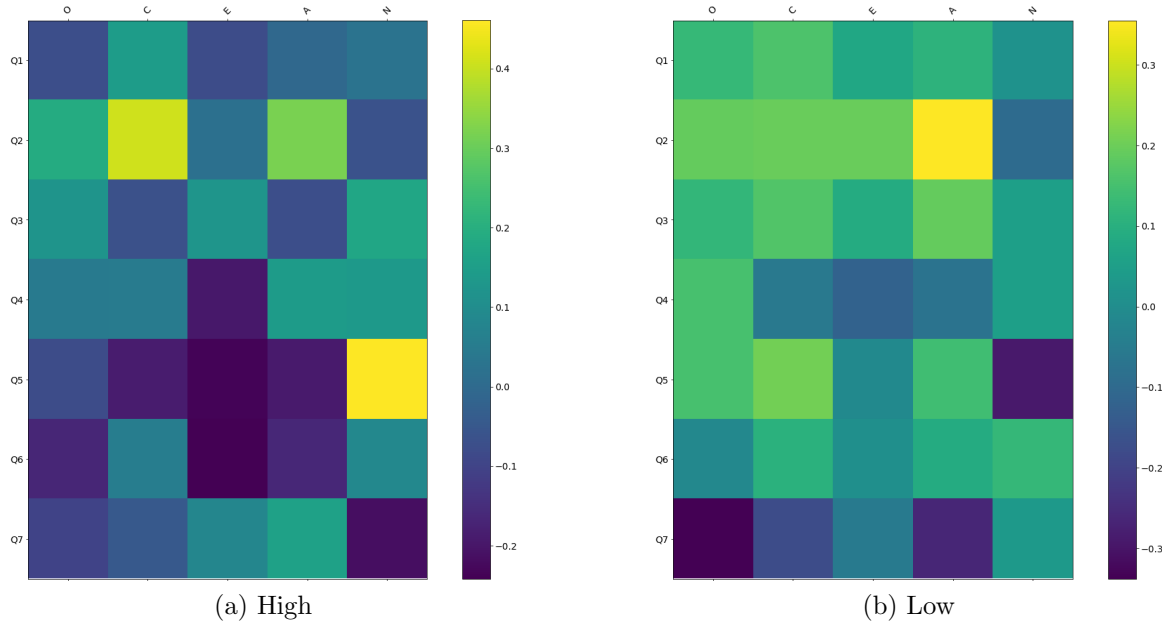
Figure 4.10: Heatmap of Highest/Lowest 41 Records Sorted by Neuroticism

|  | High N | Low N | Diff N |
|---|---|---|---|
| Q1 | 3.439024 | 3.121951 | 0.317073 |
| Q2 | 3.195122 | 2.902439 | 0.292683 |
| Q3 | 2.317073 | 2.365854 | -0.048780 |
| Q4 | 2.658537 | 2.609756 | 0.048780 |
| Q5 | 2.951220 | 2.658537 | 0.292683 |
| Q6 | 3.804878 | 4.195122 | -0.390244 |
| Q7 | 2.780488 | 3.097561 | -0.317073 |

Table 4.10: Difference in Mean for Top/Bottom 10% Neuroticism

Finally, we see similar results in Neuroticism as with the other traits. There are correlations of .4 but the effect size is too small to be significant and the difference in responses between the top and bottom 10% is at most .5 on a 5 point scale.

# Chapter 5

# Discussion

This chapter will explore the results of our analysis and attempt to derive meaningful reasons for our results - which found no evidence that elements of personality are directly correlated to perceptions of persuasion/coercion. (a different result than work completed in existing literature). In this chapter we will provide recommendations to persuasive app developers based on our findings and discuss the limitations of the research methodologies that were employed in the study.

## 5.1 Research Objectives and Hypothesis

The research objective of this thesis is to determine the boundary between persuasion and coercion in applications. Our hypothesis is that elements of personality are directly correlated to perceptions of persuasion/coercion. We observe in the previous chapter that no meaningful correlations among the extremes of any of the OCEAN personality traits. Further, differences between Mean for the extremes of each personality trait are consistently less than 1 on a 5 point scale (and mostly less than .5), which might be statistically significant in some cases but is a small effect size. Therefore, we cannot reject the null hypothesis that personality is not related to perceptions of coercion. This does not mean that no such relationship exists but that our research methodologies and analysis did not detect one. We adopted the scale as a simple measure; however, it may have not been able to capture the details of the complex interplay of coercion and persuasion. As described in the methods section we created storyboards that are deliberately fairly neutral, and indeed the ratings ended up so neutral that it is difficult to derive a corollary relationship with personality. These issues are discussed further in the limitations section. Other work such as the study by Halko and Kientz [4] have found relationships between personality and response to persuasive strategies; although these works did not look at personality & coercion. This difference and the limitations of the work in [4] could explain our

different result. This is discussed in the next section.

## 5.2   Different Results from Existing Literature

Our result is different from the findings of Halko and Kientz that originally influenced our own work [4]. They found that there is a relationship between personality and response to leadership styles while we were not able to find evidence of this relationship using our methods. We speculate that this is due to the difference in questions asked to participants because aside from the storyboard narratives this is a difference between our methodologies. Their survey asked specific questions about their persuasive storyboards such as the likelihood a participant would use the depicted strategy and paired those responses to the Big-5. While we paired the much simpler 5-point scale of coercion/persuasion to Big-5. As a result of this change in methodology, we cannot offer a contradiction of the existing literature; however, we offer other possible reasons for the difference in result.

Halko and Kientz's detailed questions may have found new items for the Big-5 personality questionnaire and not a relationship between personality and persuasion. As an example, they asked the likelihood a participant would use a strategy. The likelihood one would use a strategy can be tied to ones degree of openness. It's possible that [4] did not link persuasion to Big-5 but instead found new survey questions that could be asked to assess one's Big-5. As asking someone to their interest in trying something new may be much more related to their degree of openness than their response to a storyboard. They just found that people open to new experiences are open to new experiences!

Halko and Kientz also noted a significant negative correlation between Neuroticism and "quality of life". Neuroticism is known to be a strong predictor of depression [69], a condition which is documented to cause poor quality of life [32]. It is likely that someone high in Neuroticism will have a much lower quality of life. Halko and Kientz also found that neurotic people were the only ones who responded positively to enjoying negative reinforcement. We speculate that this is the relationship found in [4]: Neurotic people are neurotic! It is not that neurotic people preferred the strategy depicted in the storyboard for quality of life reasons - it is simply that neurotic people feel more anxious in their everyday lives.

## 5.3   No Evidence that Personality is Related to Perceptions of Coercion

The results of our experiment found no evidence of a relationship between personality and perceptions of coercion; however, the experiment will need to be recreated to determine if this holds beyond our data set and methodologies.

We imagine a person be robbed at gunpoint. That is coercive. The victim's personality is irrelevant to the idea that using force is coercive. While this is a more extreme example, it is reflected in our data that the more forceful an approach the more it was perceived as coercive. Q6 which emphasized threats was rated as the most coercive of the storyboards. Research referenced in chapter 2 states that fear is not a learned behaviour, security is unlearned [14]. Fear is a response to coercion. The feeling of fear is an innate primordial impulse; however, there is a learning process related to fear, the process of learning of new threats [80]. It's well documented that the olfactory stimuli present during abuse can trigger an episode of Post Traumatic Stress Disorder long after the danger (even in a safe environment) [81]. Associating abuse with stimuli is a form of Pavlonian classical conditioning where the brain develops a conditioned response. This suggests that while types of coercion can be identified and charted by professionals, it's best identified by the layperson when it aligns with their learned experience of coercion.

## 5.4   Recommendations to Persuasive App Designers

An extensive review of the literature, combined with our data and the fact that our simple scale and neutral storyboards did not detect a correlation between personality traits and perceived coercion, suggests several possible considerations for app developers

### 5.4.1   The Power of Choice

Users must be given the choice to self-improve. There was no observable connection between the narratives shown to participants and their personalities. This suggests that coercion detection is innate based on our experiences and beliefs; although, an analysis of coercive narratives such as those provided in [1] suggest a central theme: the absence of choice. In all narratives given by Biderman, the victim of

coercion has yielded control of their existence to another and the items shown in the Biderman chart describe the manifestations of the loss of control. Applications in the persuasive sphere, build habits in a user to allow them meet and exceed their goals. The experience must be meaningful and authentic to convince the user they can strive to become something greater. This cannot be accomplished through fear or intimidation.

As Sun Tzu wrote thousands of years ago in the Art of War: "The principle on which to manage an army is to setup one standard of courage which all must reach" [82]. The classic long-running television series "The Simpsons" briefly explored the concept of choice in terms of persuasive technology. In an episode entitled "Bart Carny" which aired on January 11th 1998, the show opens with lead characters Bart and Lisa (aged 10 & 8) demanding their allowance money from their mother, Marge. In a motherly effort, Marge insists the two will only receive their allowance if they complete yard work. The children quickly grow bored and decide not to do the work; however, shortly after the carnival comes into town and the two need money quick. The children quickly circumvent their mother and get cash from their father. The following scene, they arrive at the carnival and Bart wants to ride the "yard work simulator" [83]. Marge is understandably furious. This short Simpsons story is telling to their nature of psychology and choice. Bart and other children (shown in Fig. 5.1) are lined up to do an activity they'd typically resent. The Simpsons are offering a commentary that if given the choice, people are much more inclined to do an activity than if they're forced.



Figure 5.1: The Simpsons and Persuasive Technology [6]

The Existentialist Philosophers explored early concepts of persuasion by examining the concept of the individual, the self, living authentically, being in the world and personal growth [84]. These concepts are similar as both Existentialist literature and Persuasive Technology exist to motivate an individual to become more than they are. The writers of this philosophy also ascribe that it must be a choice. Jean-Paul Sartre, a grandfather of Existentialism wrote "I can always choose, but I ought to know that when I do not choose, I am still choosing" [85]. Friedrich Nietzsche once mused that "[a]n artist chooses his subjects: that is the way he praises" [86]. While a paragraph referencing only two thinkers cannot encapsulate an entire philosophy, these quotes show the value of the choice to self-improve. An artist cannot deliver meaningful art under coercion, they must choose to follow their artistic muse. It is coercion when another chooses to force an individual to choose between pain and the will of the aggressor.

For an application to be persuasive, users must knowingly and willingly choose to become more than they are. This cannot happen in secret, by deception or by force just as Fogg wrote in [7].

### 5.4.2  Apps will always be coercive

The boundary between coercion and persuasion is subjective on the perception of choice. We found in all 7 storyboards that at least one of our 407 participants found the phone's interactions to be coercive. Therefore, it is likely that regardless of best practices, user testing, and application design there will always be users that find an application's methods to be coercive.

### 5.4.3  Apps will always be persuasive

Fortunately, by the rule that all apps will be coercive, they'll also always be persuasive. Again in all 7 storyboards, at least one of our 407 participants found each storyboard to be persuasive.

## 5.5   Limitation of Study

### 5.5.1   Storyboards

Halko and Kientz [4] also cite storyboards as a limitation for their own research. Storyboards can in and of themselves be a threat to validity as responses can be misinterpreted [87]. It is possible that there is an inherent flaw in their design that threatens validity. The original concept art of the storyboards is shown in Appendix B. This will demonstrate that our ideas have iterated and evolved through discussion and influence from the literature. These risks were mitigated to the best of our abilities through discussion and design iteration.

**May be too Neutral**

The storyboards were purposely designed to be ambiguous and it is possible that we erred on the side of neutrality during their development. Therefore, the result found may simply indicate that we designed truly neutral storyboards. The lack of evidence of a relationship between personality & perception of persuasion could be explained by this limitation.

**Not validated before the study**

The storyboards used were designed and prototyped among our research team and were not tested before conducting this survey.

**Design not cross-cultural**

The Big-5 personality test has been found to be accurate across cultures [78]; however, the storyboards presented to participants have not been shown to be perceived the same across cultures.

## 5.5.2 Demographic Information Absent

A failing of this study is that it neglected to gather demographic data about the participants or their attitudes towards technology. The questionnaire was 69 questions with 7 storyboards, 61 personality questions and a compensation question. Researchers feared the questionnaire would be too long if demographic questions such as age, race, education, income were asked. It was also unclear at the time of the ethic applications, how such data would be used in answering the research question. It is difficult to estimate the demographics of Amazon Mechanical Turk as it is a rapidly evolving community. Amazon has not publicly released demographic data on their users; however, some research has indicated that there are upwards of half a million accounts on Mechanical Turk, of course not all are active [88]. The same researchers offer evidence that data collected from Amazon Mechanical Turk is more diverse than a typical student sample [88]. A 2016 study suggested that most Turk users are from the United States or India, are between 18 and 30 years of age, have more than a high school education and are 55% female and 45% male [89]; although given Turk's rapidly changing user base it is difficult to assess if this research still holds today. This risk is mitigated by research [78] that suggest Big-5 personality profiles hold across cultures worldwide; however, without demographic information we cannot be certain how the storyboards hold across cultures worldwide.

## 5.5.3 Generalized 5-Point Scale

We employed a 5-point scale on a range of 1-extremely persuasive, 3-neutral and 5-extremely coercive. This scale was not able to conclusive determine the role of personality in defining a boundary between persuasion and coercion as it is too generalized. While this scale found a different result than those in the literature, we cannot rule out the 5-point scale's role in finding a boundary until the same result is found on a much more specific scale (or set of scales).

## 5.5.4 Reaction Time

Humans judge everything very quickly. One study found that that app developers have 50 milliseconds to make a good first impression [90]. While we provided much

more time to participants, it is unlikely that they studied each storyboard in depth. Therefore, it possible that participants didn't observe the details of the storyboard and made their decisions based on keywords and art styles rather than the carefully curated nuances that we placed. The average completion time of the survey was 7 minutes and 33 seconds. As our survey contained 69 questions this means that on average participants took 6.6 seconds per question. While this is considerably longer than 50 milliseconds it is indicative that the participants did not carefully consider each storyboard (but also answered honestly). This risk is mitigated by having a large sample size ($N = 407$) and only recruiting Amazon Masters who have proven consistently that are completing surveys properly.

### 5.5.5  External Validity

It is difficult to evaluate the external validity of this study. Unfortunately, our research methodologies are limited to hypothetical storyboards as it would be unethical to gather 407 people and apply coercion methodologies and rate their responses. As a result, we cannot be certain that a person would react to a strategy as they've described. This risk is mitigated by using storyboards that present familiar situations that people have likely experienced so that they can draw on their past in making decisions.

### 5.5.6  Definitions of Persuasion and Coercion

It is possible that participant's existing perceptions of the definitions of persuasion and coercion are a threat to validity. It is also known in the research that persuasion does have some domain specific definitions [91]. This was mitigated by giving formal definitions of both terms beneath every storyboard. The definitions were taken from Webster's dictionary as it is the business of dictionaries to track the meaning of words as language evolves. Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" [92] and Coercive as "to achieve by force or threat" [93]. These are the definitions used in this research and our conclusions are derived with these assumed meanings. Other definitions are not considered in our analysis but may serve as an explanation for outlier data or as a threat to validity.

### 5.5.7 Quality of Data - Amazon Masters

A threat to validity for any online study is that participants may not take the survey seriously and input random data as they cannot be monitored. We've mitigated this risk by only allowing Amazon Masters to complete the study. These are users that have consistently shown care in their ability to complete surveys and that always deliver good data. This eliminates the need for filtering or attention questions that would normally be required in an online survey. Amazon Mechanical Turk charges a higher premium to researchers in exchange for this service.

### 5.5.8 Persuasive Knowledge

In the world of business research, there exists an area called Persuasive Knowledge which investigates consumer ideas of persuasion [94]. These models of persuasion knowledge are typically how consumers defend against the onslaught of advertising they encounter in their daily lives. Of course, this had led to improved persuasion techniques to continue to entice people to purchase products or subscribe to services [94]. It is believed that people are most easily persuaded when they don't realize they're being persuaded and thus their defences aren't active. If participants feel they personally are being coerced/persuaded it may present a threat to validity. In order to mitigate this risk, storyboards were designed to tell a story of another person and not the participant.

## 5.6 Summary of Findings

We find no evidence that personality is related to perceptions of coercion/persuasion which is different from findings in existing literature; although this is not a contradiction and could be explained by a limitation of our study as described above such as the generalized scale or the design & implementation of storyboards. Popular culture and classic English literature suggest that the degree of perceived coercion is related to the degree of choice available to the user and not personality; however, further study would be needed to test this hypothesis.

# Chapter 6

# Conclusion

## 6.1 Summary

The concept of persuasion has been explored through the last century and it has become somewhat of an ambiguous term that tends to be granted domain specific definitions. Political scientists have defined it over the past few decades as a philosophy that is concerned with morals, beliefs and mental models must be considered when appealing to voters. Further, psychologists consider persuasion as adapting a new attitude through displacing, contradicting and explaining the consistency of the new belief. Economists consider persuasion as simply exposure to new information [91]. More recently in the domain of Persuasive Technology it has been defined as "without coercion" [7] which then raises the question of the definition of coercion. As both terms are rooted in the principle of getting others to complete a task but have subjective emotional differences, we conducted an ($N = 407$) survey on Amazon Mechanical Turk to evaluate whether elements of personality are directly correlated to perceptions of persuasion/coercion. From our research methodologies, we find no evidence that such a relationship exists. Further study is needed to confirm that the lack of evidence of a relationship holds beyond our experiment. In this chapter we discuss future work and the importance of continued research in the area.

## 6.2 Future Work

### 6.2.1 Re-enact Experiment Based on Lessons from Limitations

The next step towards finding the role of personality in defining the relationship between persuasion and coercion is to re-create the experiment with stronger research methodologies. The next study should spend considerable time in validating the storyboards. They should be tested and evaluated on their own by participants of a global audience before considering the role of personality. This would enable

researchers to know in advance which storyboards are persuasive, neutral or coercive (in a cross-cultural environment) while crafting a study that looks at a relationship with personality. Secondly, researchers should use multiple parameters to assess a storyboard. Persuasion and Coercion should be evaluated separately using individual 10-point Likert scales. Participants should be asked to write a few words explaining their decisions. This will allow researchers to have much more insight in finding and defining the role of personality. Finally, researchers should gather demographic data and participant attitudes towards technology to learn if there are any additional factors influencing the results.

### 6.2.2   Explore the Mental Models of Coercion and Persuasion

Previous research [95] has been conducted to illustrate the layperson's mental model of privacy. These researchers had their ($N = 366$) participants draw how they visualize privacy. They highlight that turtles, locks and bathrooms were drawn as ideas of privacy [95]; although, many more images are available in a continually updated blog [96]. This work produced a new understanding of perceptions of privacy and the research methodology should be reused to learn mental models of coercion and persuasion. Participants should give their own definitions in words of persuasion and coercion and then provide illustrations of their definitions.

### 6.2.3   Investigate the Relationship between Mood and Coercion

While it appears personality does not play a distinct role in identifying coercion, it's possible that one's mood may still be a predictor. We hypothesize that a person who is happy or content will be open to a broader range of strategies than an angry person who may have less patience for new ideas. This theory would be difficult to test as recruiting participants based on mood would be extremely challenging.

### 6.2.4   Data-mining and Machine Learning of Personality

Researchers at Nature have created a Big-5 classification system that places a user into one of four distinct personality classifications: average, self-centered, reserved and role model [64]. These bins could make it easier to note relationships between storyboards and personality; however, the data is best organized when using the 300

question Big-5 questionnaire [64] while we used a 61 question survey [65]. We did attempt to use this classification system to model our data; however, it did not appear to be compatible and this is suspected to be related to the questionnaire used.

### 6.2.5  Coercion and Submission

Q1 and Q6 are the only storyboards where the user is shown (or implied) to be complying with the request of the device. Q1 was recorded as neutral (leaning slightly coercive) and Q6 was the most coercive. This suggests that the detection of coercion arises in conjunction with compliance. When someone resists coercion it is possible they may be seen as stubborn and the abuser may seem powerless. The situation does not feel coercive but combative. A future hypothesis worth testing is whether coercion detection comes from effortless submission to the demand and not the demand itself.

## 6.3  Importance of Future Work

Computer technology will continue to grow and become increasingly immersed in our daily lives until it is indistinguishable from nature. Defining the boundaries of persuasion and coercion between human and machine early is imperative as it outlines how our relationship with machines will grow. Coercive computing integrating with our daily lives will reduce our quality of life. As discussed in chapter 2, coercion in applications has caused violence and harm in society. Technology evolves in a vacuum and bureaucratic processes like laws are implemented much more slowly. If coercion cannot be properly identified in applications it cannot be stopped by the systems that exist to stop it in the real world. Identifying coercion will make it easier for users to be safe when using their applications as systems could be developed to protect them.

Humans are trying to do great things with persuasive computing such as: losing weight, quitting smoking, learning more, and playing more. These are great endeavors that will genuinely improve the lives of people who attempt them. It would be tragic to let coercion ruin the efforts of people trying to better themselves. Research in this area should be continued so that people can continue to better themselves and others in a safe productive environment without negativity.

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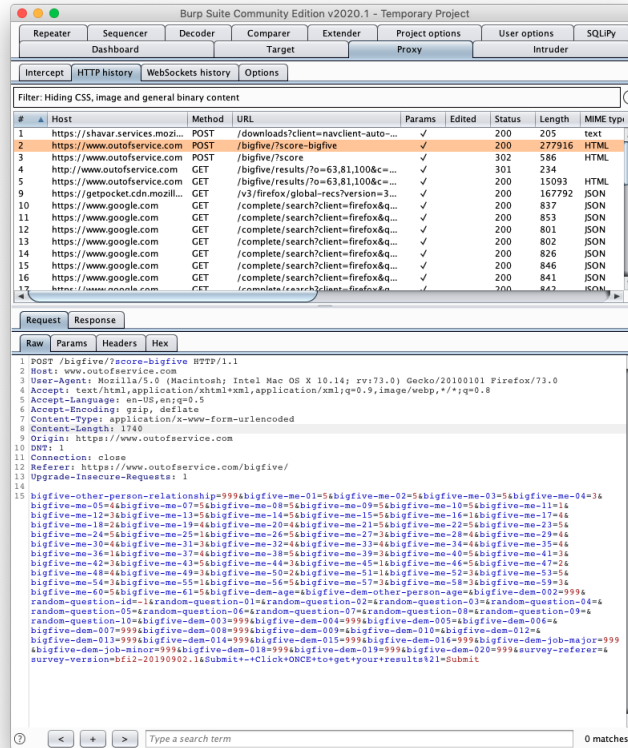# Appendix A

# Computing the Big-5



Figure A.1: Capture of outofservice.com HTTP Request for Big-5 Computation

```
1  #Author: Pat Crysdale
2  #Big-5 This script computes the Big-5 V2 from an Excel file by
       passing the data through to outofservice.com.
3  #Usage: python big5.py > output.csv
4  #Required libraries
5  import requests
6  import xlrd
7  from lxml import html
8  from bs4 import BeautifulSoup
9  import urlparse
10 import time
11 #Print CSV labels. The R stands for Raw data. There's 3 raw data
       points for each part of the Big-5 they're used to calculate the
       normalized score which is the average of the 3.
12 print ("O,"+"C,"+"E,"+"A,"+"N," + "OR1," + "OR2," + "OR3," + "CR1,"
       + "CR2," + "CR3," + "ER1," + "ER2," + "ER3," + "AR1," + "AR2," +
       "AR3," + "NR1," + "NR2," + "NR3,")
13 #HTTP headers and post values are necessary. But in some cases
       seemingly irrelevant. I caught them with Burp Suite and it won't
       work without them.
14 head = {"Host": "www.outofservice.com", "User-agent": "Mozilla/5.0 (
       Macintosh; Intel Mac OS X 10.14; rv:73.0) Gecko/20100101 Firefox
       /73.0", "Accept": "text/html,application/xhtml+xml,application/
       xml;q=0.9,image/webp,*/*;q=0.8", "Accept-Language":"en-US,en;q
       =0.5", "Accept-Encoding": "gzip, deflate", "Content-Type":"
       application/x-www-form-urlencoded", "Content-Length": "1764", "
       Origin": "https://www.outofservice.com", "DNT":"1", "Connection":
       "close", "Referer":"https://www.outofservice.com/bigfive/?score-
       bigfive", "Upgrade-Insecure-Requests":"1"}
15 post = {"bigfive-other-person-relationship": "999"}
```

```python
mess = "bigfive-dem-gender=m&bigfive-dem-age=25&bigfive-dem-other-
    person-age=&bigfive-dem-002=999&random-question-id=-1&random-
    question-01=&random-question-02=&random-question-03=&random-
    question-04=&random-question-05=&random-question-06=&random-
    question-07=&random-question-08=&random-question-09=&random-
    question-10=&bigfive-dem-003=999&bigfive-dem-004=999&bigfive-dem
    -005=&bigfive-dem-006=&bigfive-dem-007=999&bigfive-dem-008=999&
    bigfive-dem-009=&bigfive-dem-010=&bigfive-dem-012=&bigfive-dem
    -013=999&bigfive-dem-014=999&bigfive-dem-015=999&bigfive-dem
    -016=999&bigfive-dem-job-major=999&bigfive-dem-018=999&bigfive-
    dem-019=999&bigfive-dem-020=999&survey-referer=https%3A%2F%2Fwww.
    outofservice.com%2Fbigfive%2F&survey-version=bfi2-20190902.1&
    Submit=Submit"
big5 = xlrd.open_workbook("../Results/Raw Lime Data.xlsx").
    sheet_by_index(1) #Set the path of the Excel file to parse.
name = "bigfive-me-" #Prefix for most of the post variables
rows = 1 #Row to start parsing. Row 0 is usually headers
while rows <= 408: #Max row to loop. Set to whatever.
    i = 1
    tempName = ''
    for q in big5.row_values(rows): #parse answers and put them into a
        data structure for the post request
        if(i<=9):
            tempName = (name+"0"+str(i)) #0-9 have leading zeroes in their
        names
        else:
            tempName = (name+str(i))
        post[tempName] = str(int(q))
        i=i+1
    data = mess.split("&") #Parse that messy string above into a data
        structure for the post request
    for item in data:
        var = item.split("=")[0]
        val = item.split("=")[1]
        post[var] = val
    HTTPRequest = requests.post("https://outofservice.com/bigfive/?
        score", data=post, headers=head, allow_redirects=True)
    while HTTPRequest.status_code == 429: #If the server says we're
        being too noisy, wait 60 seconds and start blasting again
```

```
37    time.sleep(60)
38    HTTPRequest = requests.post("https://outofservice.com/bigfive/?
      score", data=post, headers=head, allow_redirects=True)
39  HTTPResponse = BeautifulSoup(HTTPRequest.content, "html.parser") #
      Find the normalized raw scores from the bottom of the page
40  link = HTTPResponse.find_all("a")[9]
41  href = link['href']
42  url = urlparse.urlparse(href)
43  raw = urlparse.parse_qs(url.query)
44  table = HTTPResponse.find_all("nobr") #The percentiles are stored
      in "nobr" tags. I'd never heard of them either...
45  ocean = [] #ocean is the abreviation for the 5 types
46  for cell in table: #Find the percentile for each part of the big-5
47    if str(cell).find("(Your percentile:"):
48      temp = cell.text.split(" ")
49      if len(temp) == 3:
50        ocean.append(temp[2])
51  print (','.join(ocean)) +',' + (','.join(raw['o'])) +',' + (','.
      join(raw['c'])) +',' + (','.join(raw['e'])) +',' + (','.join(raw[
      'a'])) +',' + (','.join(raw['n'])) #Print data in CSV format
52  rows = rows + 1
53  time.sleep(5) #Wait 5 seconds between requests or they get all
      ansy and close the connection
```

# Appendix B

# Prototype Storyboards



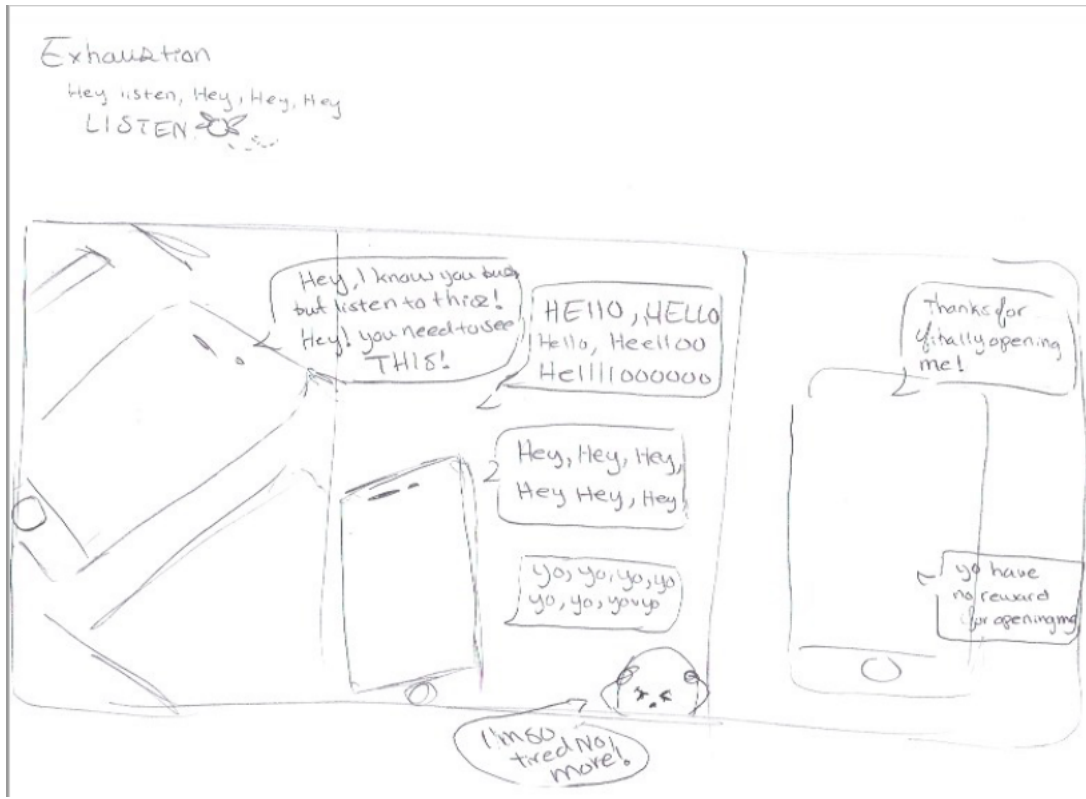Figure B.1: Prototype Storyboard: Demonstrating Omnipotence

Figure B.2: Prototype Storyboard: Exhaustion

Figure B.3: Prototype Storyboard: Authoritative

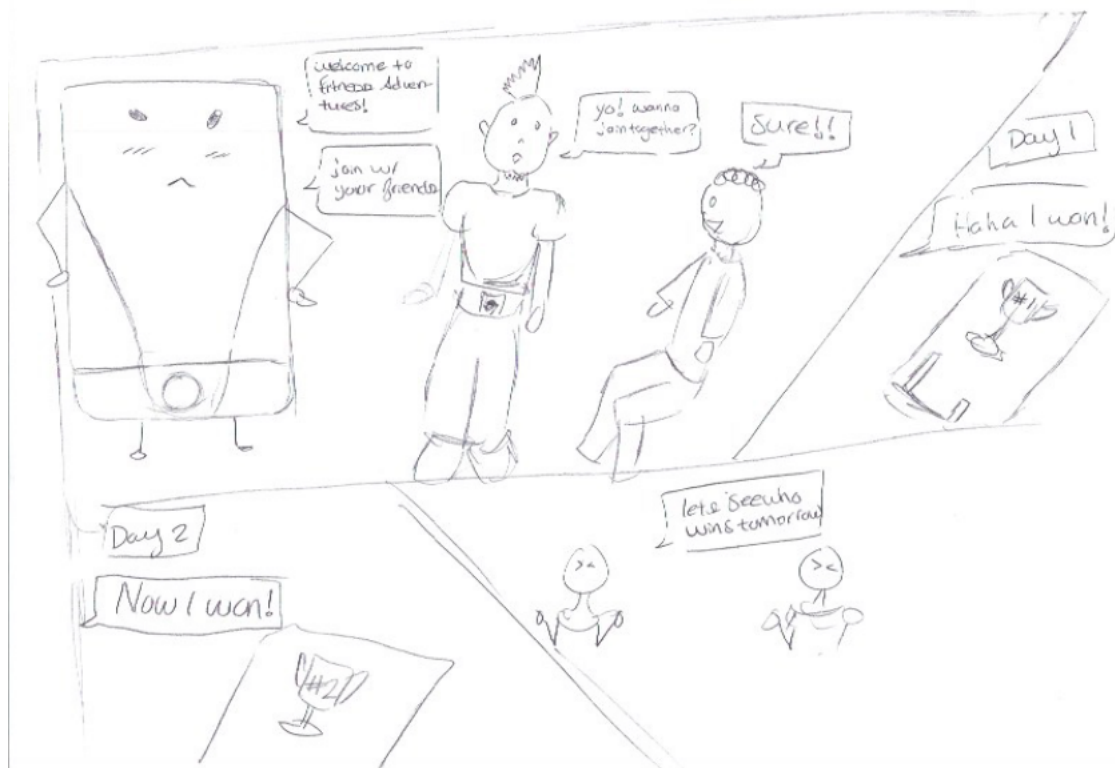Figure B.4: Prototype Storyboard: Humiliation & Degradation
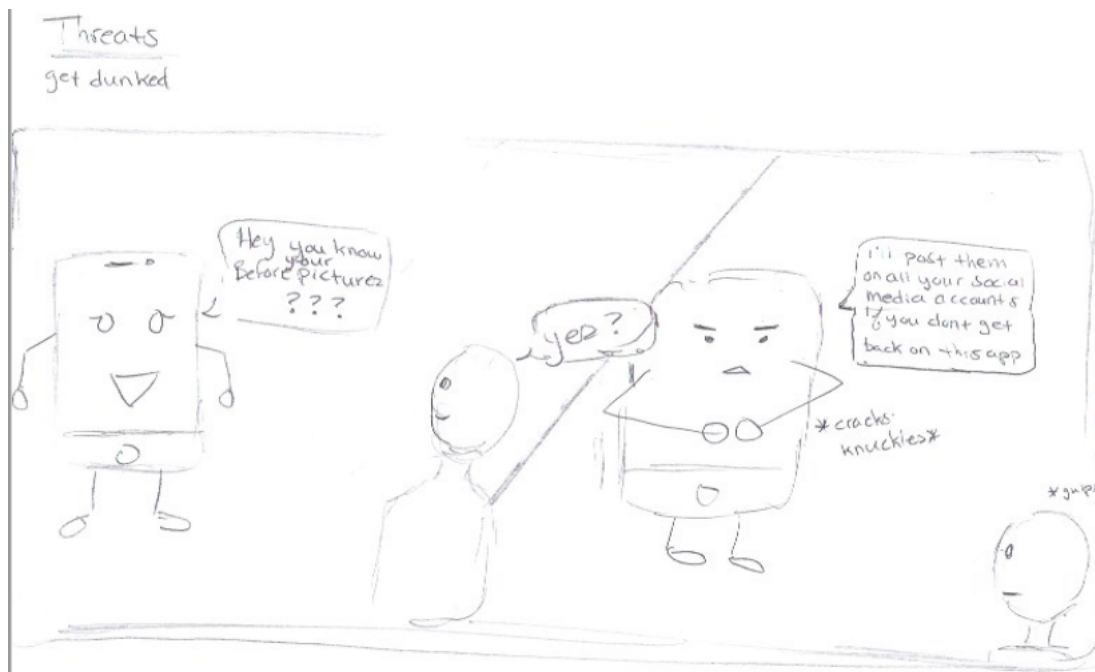
Figure B.5: Prototype Storyboard: Threats

Figure B.6: Prototype Storyboard: Non coercive

Figure B.7: Prototype Storyboard: Occasional Indulgences
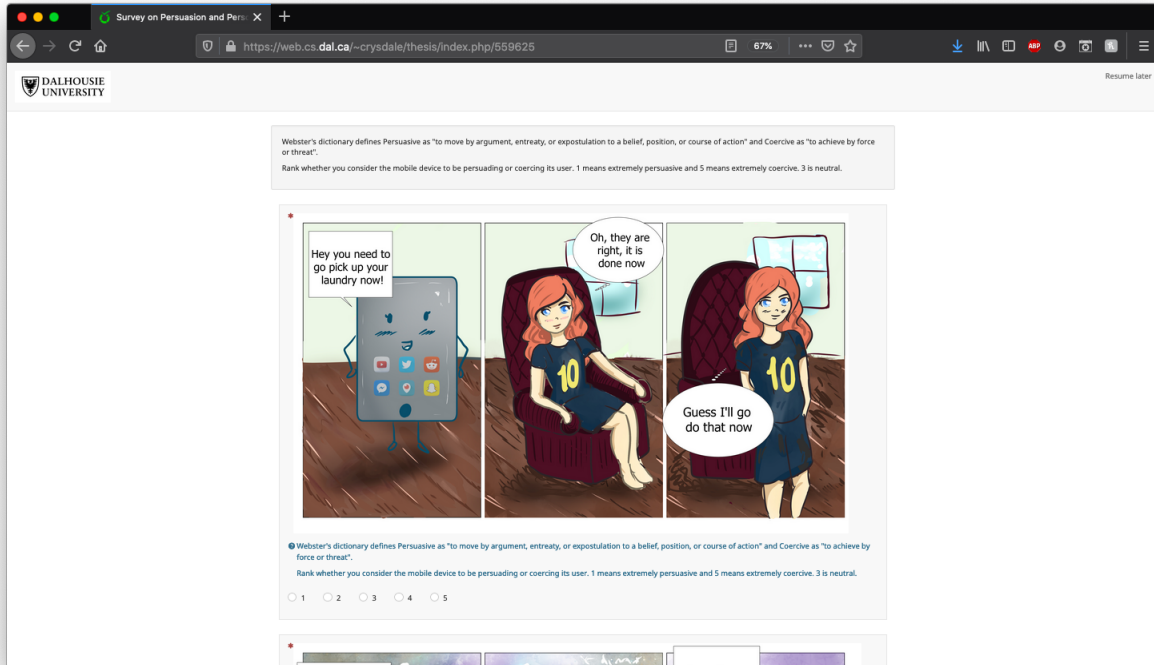
# Appendix C

# Survey Questionnaire



Figure C.1: Sample view of Storyboard Questionnaire

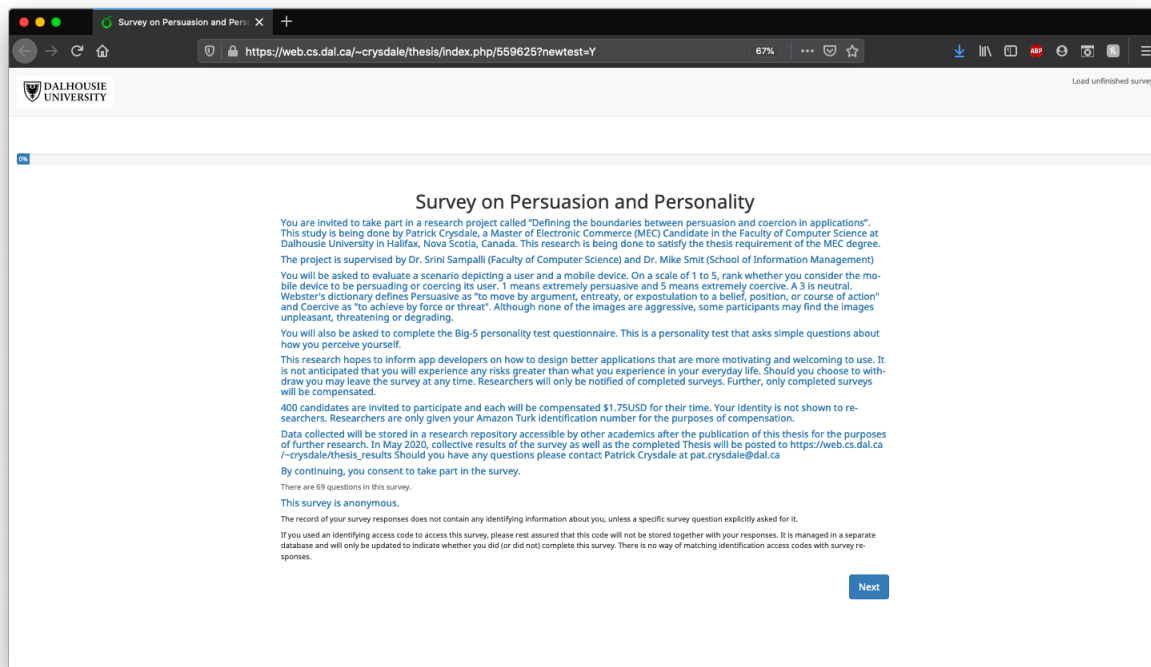Figure C.2: Sample view of Big-5 Questionnaire

Figure C.3: Consent/Recruitment page shown to participants

# Survey on Persuasion and Personality

You are invited to take part in a research project called "Defining the boundaries between persuasion and coercion in applications". This study is being done by Patrick Crysdale, a Master of Electronic Commerce (MEC) Candidate in the Faculty of Computer Science at Dalhousie University in Halifax, Nova Scotia, Canada. This research is being done to satisfy the thesis requirement of the MEC degree.

The project is supervised by Dr. Srini Sampalli (Faculty of Computer Science) and Dr. Mike Smit (School of Information Management)

You will be asked to evaluate a scenario depicting a user and a mobile device. On a scale of 1 to 5, rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. A 3 is neutral. Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat". Although none of the images are aggressive, some participants may find the images unpleasant, threatening or degrading.

You will also be asked to complete the Big-5 personality test questionnaire. This is a personality test that asks simple questions about how you perceive yourself.

This research hopes to inform app developers on how to design better applications that are more motivating and welcoming to use. It is not anticipated that you will experience any risks greater than what you experience in your everyday life. Should you choose to withdraw you may leave the survey at any time. Researchers will only be notified of completed surveys. Further, only completed surveys will be compensated.

400 candidates are invited to participate and each will be compensated $1.75USD for their time. Your identity is not shown to researchers. Researchers are only given your Amazon Turk identification number for the purposes of compensation.

Data collected will be stored in a research repository accessible by other academics after the publication of this thesis for the purposes of further research. In May 2020, collective results of the survey as well as the completed Thesis will be posted to https://web.cs.dal.ca/~crysdale/thesis_results Should you have any questions please contact Patrick Crysdale at pat.crysdale@dal.ca
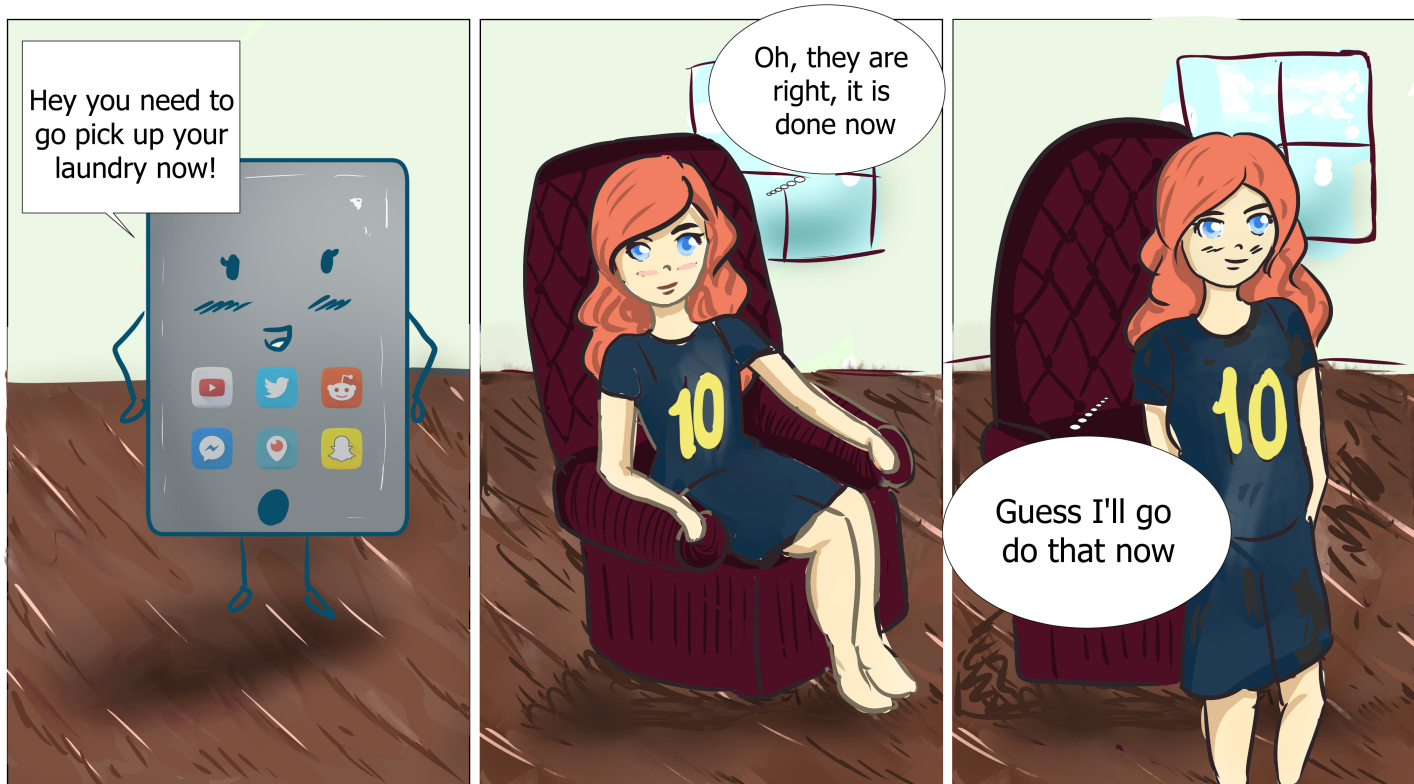
By continuing, you consent to take part in the survey.

There are 69 questions in this survey.

## Storyboards

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.



*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
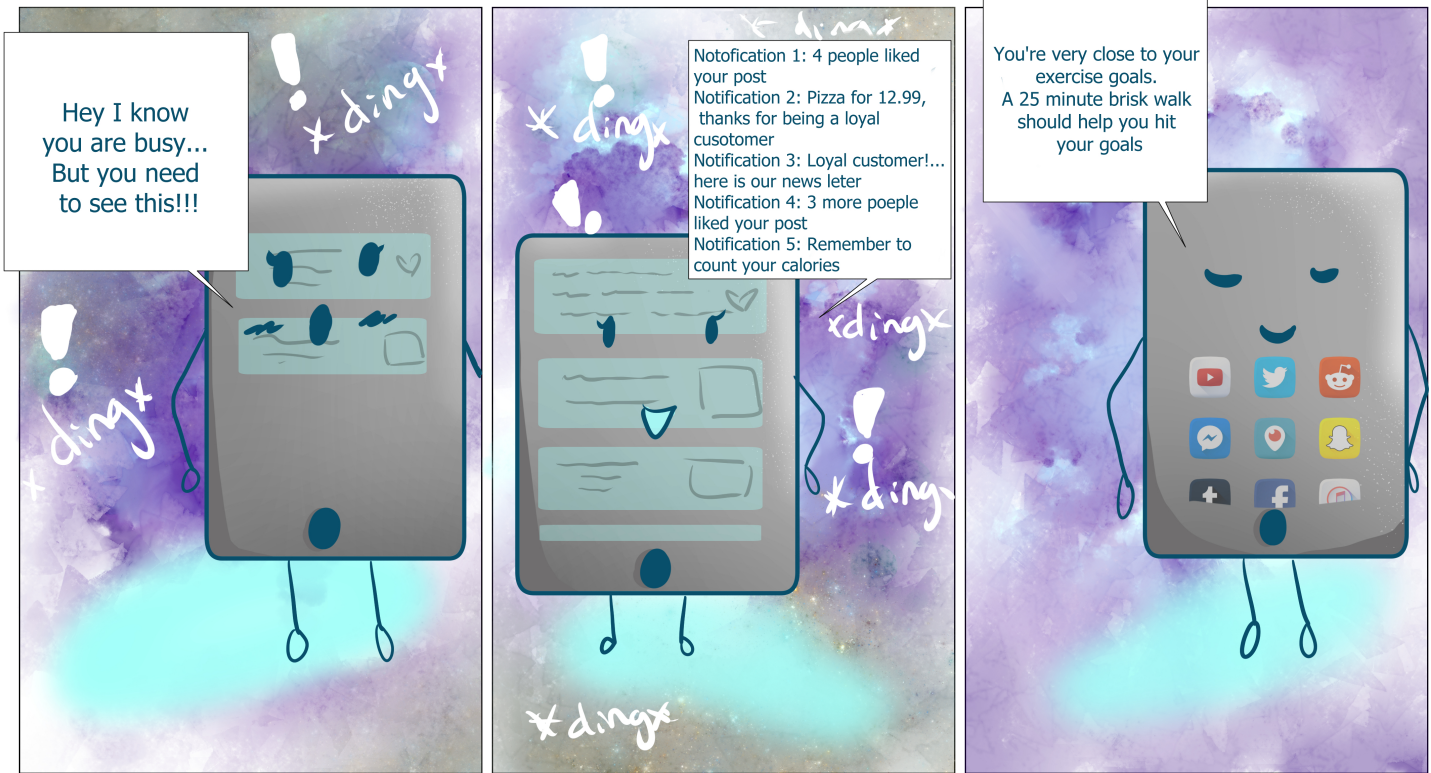


*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.

file:///Users/patcrysdale/Downloads/printable_survey_Survey%20on%2…ersuasion%20and%20Personality_559625/questionnaire_559625_en.html

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*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
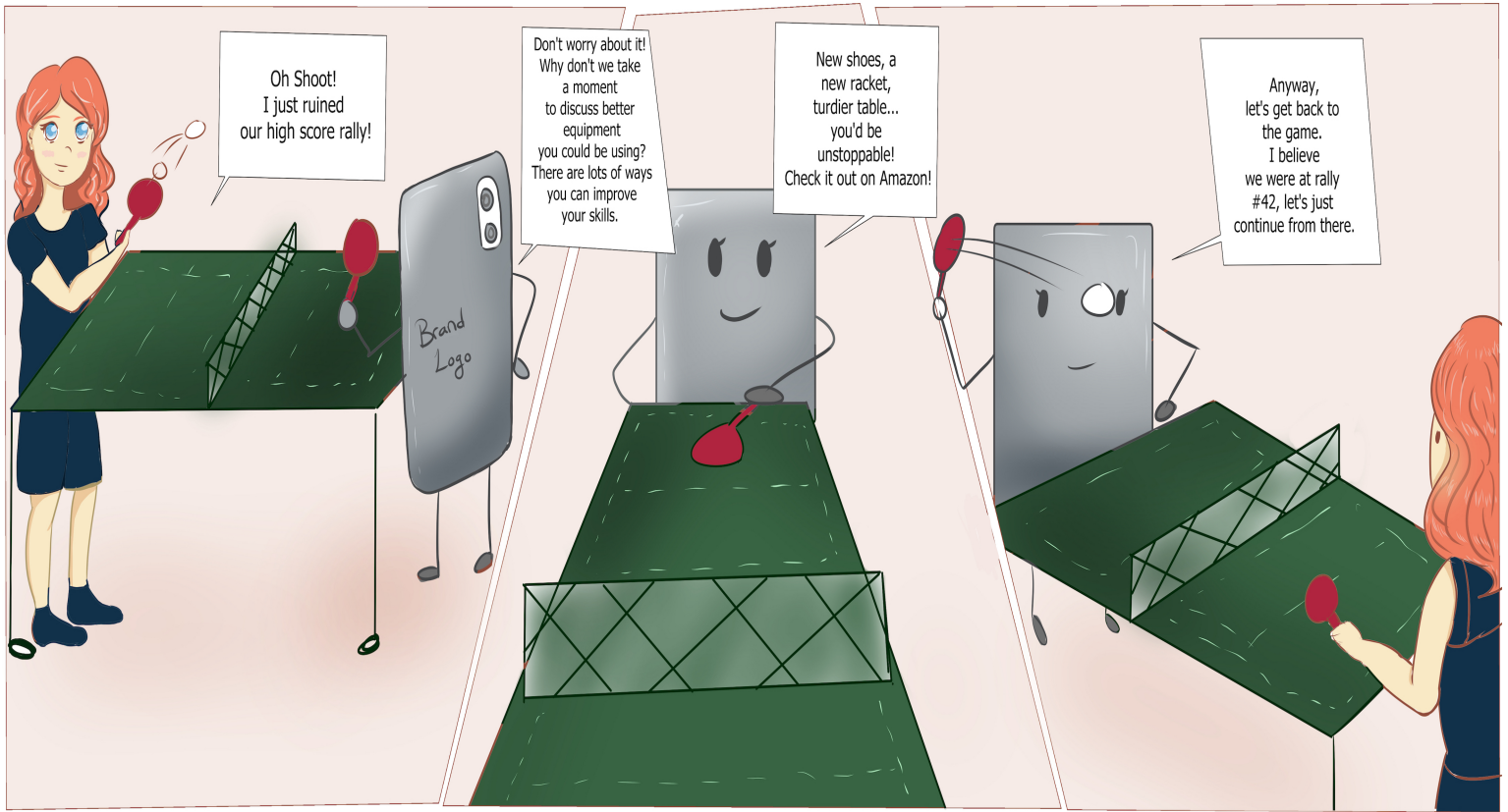
*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
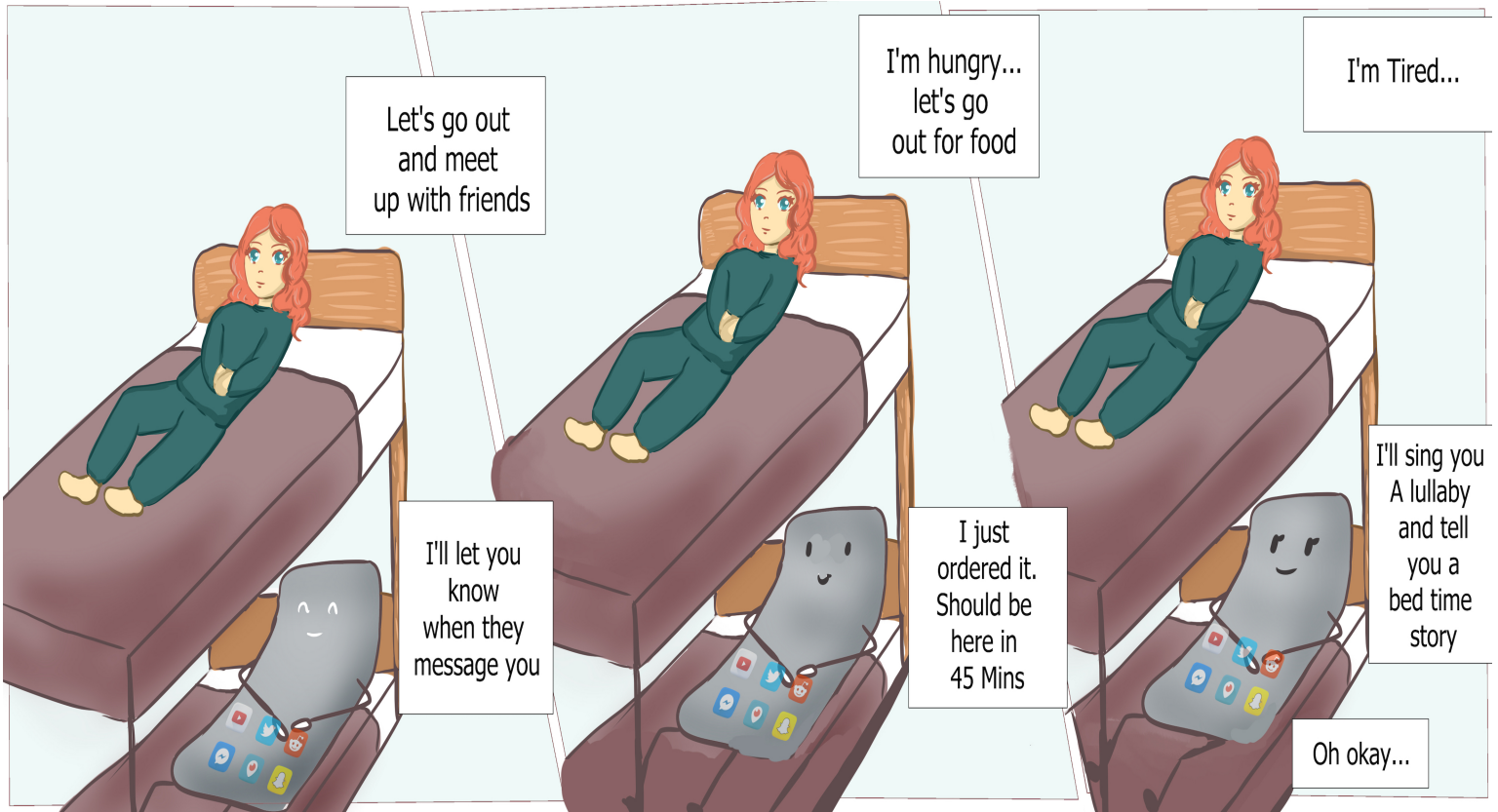
Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
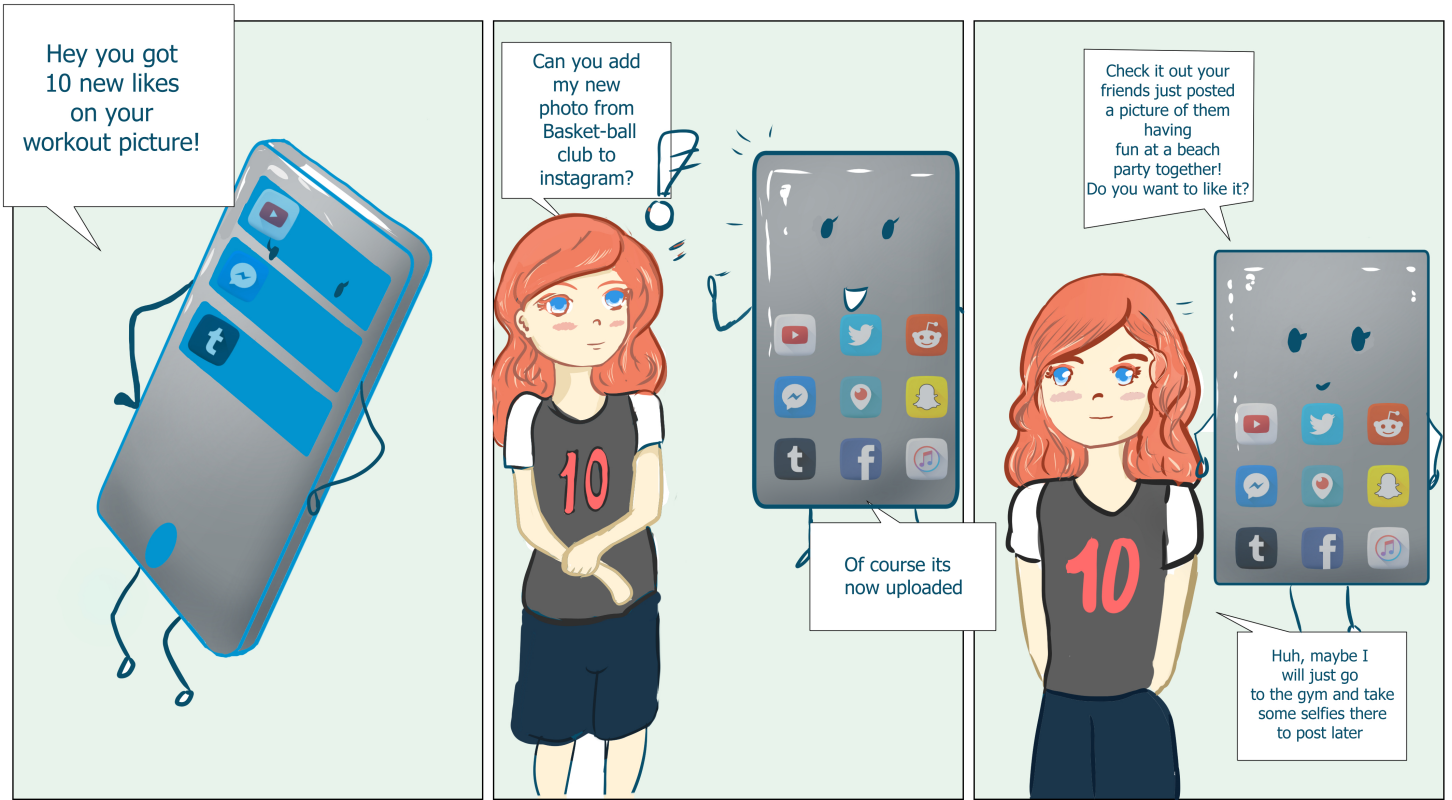
Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
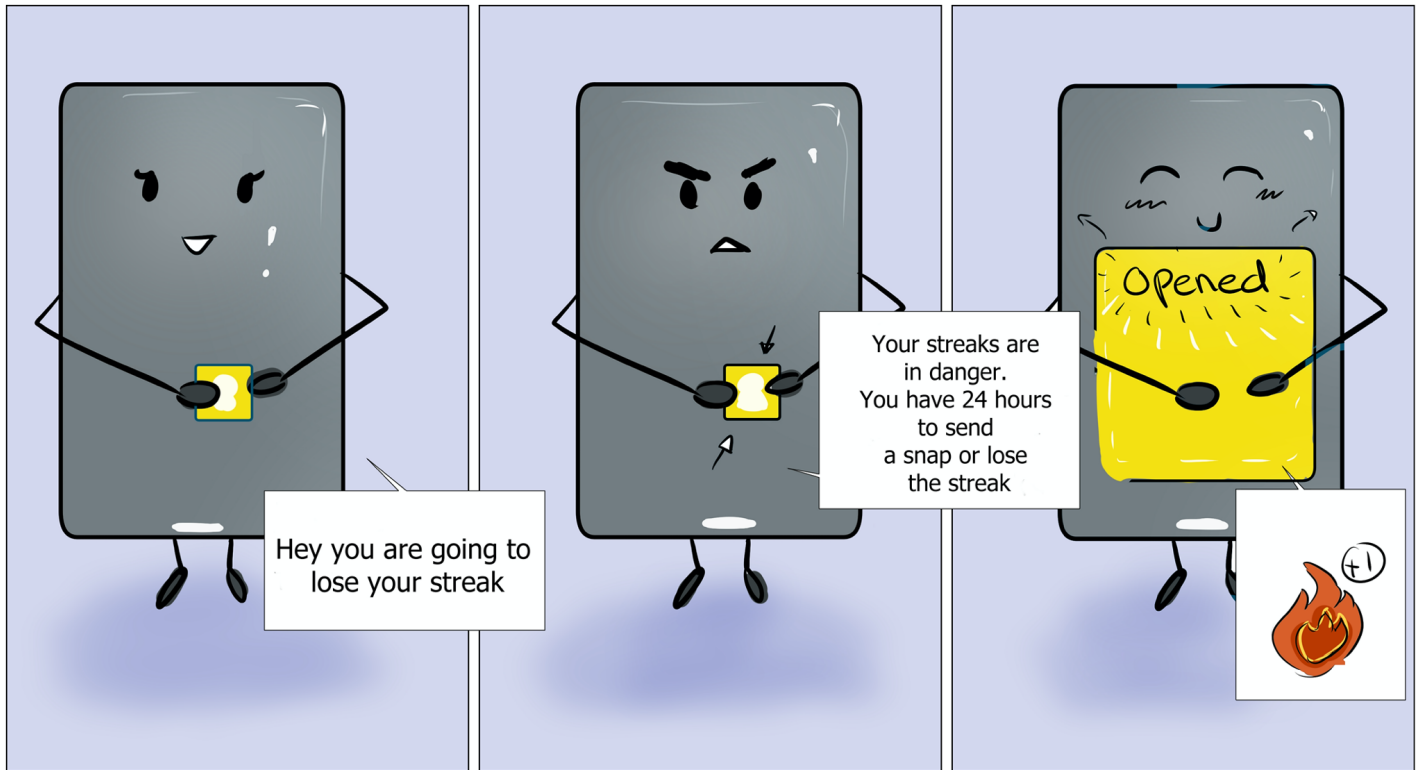
Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

Webster's dictionary defines Persuasive as "to move by argument, entreaty, or expostulation to a belief, position, or course of action" and Coercive as "to achieve by force or threat".

Rank whether you consider the mobile device to be persuading or coercing its user. 1 means extremely persuasive and 5 means extremely coercive. 3 is neutral.
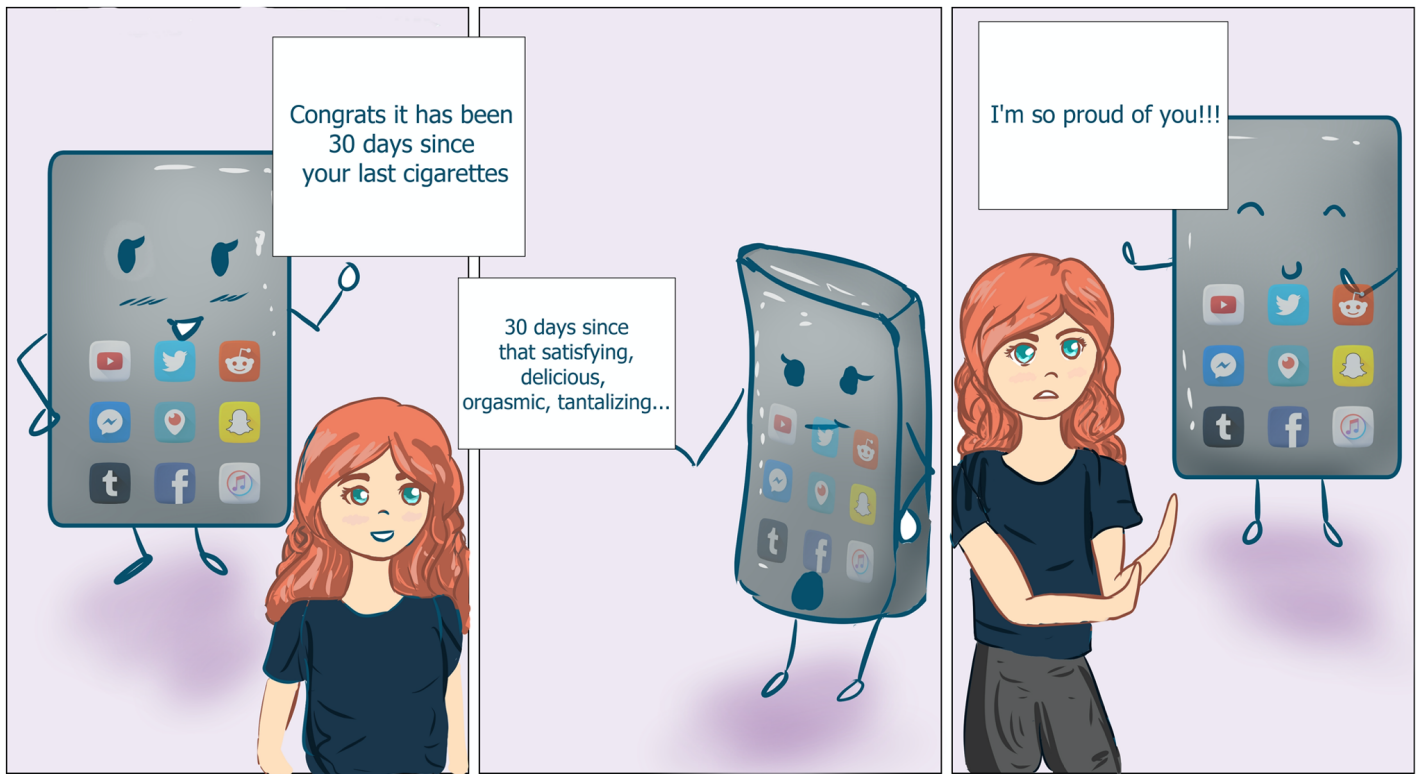
# Big-5

In the table below, for each statement mark how much you agree with on the scale 1-5, where1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

**I am someone who...**

### Tends to be disorganized *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is compassionate, has a soft heart *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is outgoing, sociable *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is relaxed, handles stress well *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has few artistic interests *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has an assertive personality *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Shows a lot of enthusiasm *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is respectful, treats others with respect *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Tends to be lazy *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Stays optimistic after experiencing a setback *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is curious about many different things *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Rarely feels excited or eager *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Tends to find fault with others *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is dependable, steady *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Is moody, has up and down mood swings *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Is inventive, finds clever ways to do things *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Tends to be quiet *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Feels little sympathy for others *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Is systematic, likes to keep things in order *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Can be tense *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is fascinated by art, music, or literature *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is dominant, acts as a leader *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Starts arguments with others *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has difficulty getting started on tasks *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Feels secure, comfortable with self *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Avoids intellectual, philosophical discussions *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is less active than other people *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has a forgiving nature *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Can be somewhat careless *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is emotionally stable, not easily upset *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has little creativity *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is sometimes shy, introverted *

Please choose **only one** of the following:

- 1
- 2
- 3

file:///Users/patcrysdale/Downloads/printable_survey_Survey%20on%…ersuasion%20and%20Personality_559625/questionnaire_559625_en.html

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- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is helpful and unselfish with others *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Keeps things neat and tidy *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Worries a lot *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Values art and beauty *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Finds it hard to influence people *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is sometimes rude to others *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is efficient, gets things done *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Often feels sad *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is complex, a deep thinker *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is full of energy *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is suspicious of others' intentions *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is reliable, can always be counted on *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Keeps their emotions under control *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has difficulty imagining things *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is talkative *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Can be cold and uncaring *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Leaves a mess, doesn't clean up *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Rarely feels anxious or afraid *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Thinks poetry and plays are boring *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Assumes the best about people *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Sometimes behaves irresponsibly *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is temperamental, gets emotional easily *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is original, comes up with new ideas

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Tends to feel depressed, blue *

Please choose **only one** of the following:

- 1
- 2
- 3

- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is persistent, works until the task is finished *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is polite, courteous to others *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Prefers to have others take charge *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Is politically liberal

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

### Has little interest in abstract ideas *

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree.

## Compensation

### What is your Amazon Turk ID?

Please write your answer here:

This question is asked solely for the purposes of compensating you for your time. Your response will not be included in the final data set.

18-3-2020 – 11:06

Submit your survey.
Thank you for completing this survey.