Personality & Influence

The Relationship Between Personality Aspects and Cialdini's Influence Styles

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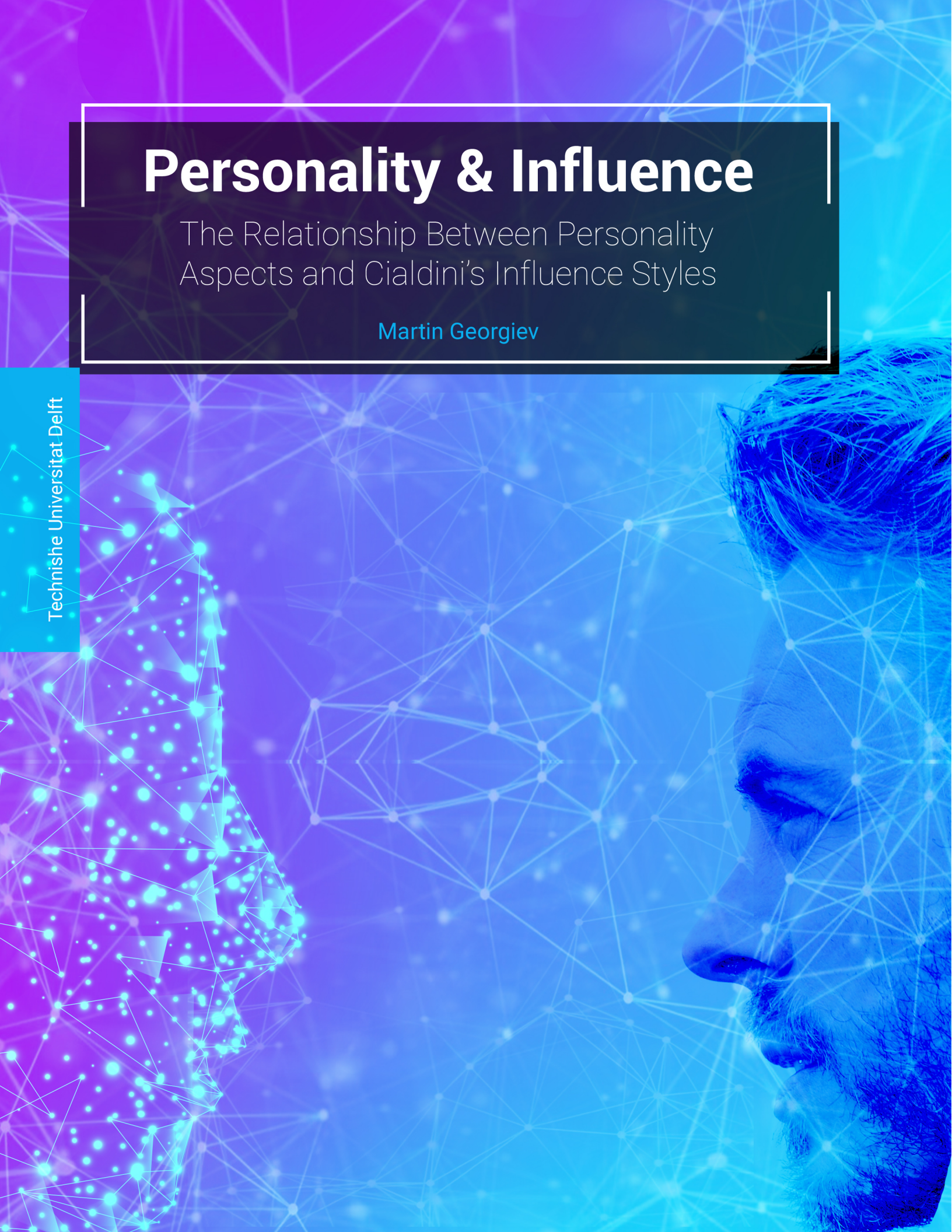

Personality and Influence

The Relationship Between Personality Aspects and Cialdini's Influence Styles

Master thesis submitted to Delft University of Technology
in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE
in **Management of Technology**

Faculty of Technology, Policy and Management

by

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To be defended in public on **May 15 2020**

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Abstract

Digital technologies have enabled uninterrupted mass persuasive communications everywhere and anytime, aiming at convincing people to change their beliefs, thoughts, and behaviors. Research has shown that persuasive technologies are most effective when the messages and means are tailored to people's recipients' unique characteristics, particularly personality. Previous studies have thus investigated the one-to-one relationship between the Big Five personality traits and influence styles—the engines behind any personalized persuasive technologies. Prior investigations yielded partially inconsistent results, potentially because the Big Five at the trait level is too broad an instrument in characterizing individual differences. This thesis drills down from personality trait to personality aspect – the next level of analysis in the personality hierarchy. The present study examines which personality aspect is most sensitive to which influence styles, generating a matrix of connections between personality and influence. Notably, aspects of Agreeableness and Conscientiousness were found to be most strongly related to influence styles. The findings refine existing theoretical knowledge of the relationships between personality and influence style. Future designers could utilize these nuanced associations between personality aspects to create more personalized, and powerful persuasive technologies. Ethical implications of the findings are discussed.

Preface

We live in changing times in which Artificial Intelligence (A.I.) will likely play an important role. Elon Musk believes that we will dramatically improve our understanding of human consciousness. In his opinion, a future in which we communicate with a digital super-intelligence (*like in the movie "Her"*), without being able to tell the difference whether we are talking with a computer or with a human, is not that far-fetched. I hope that my research will play a small part on the road of decoding the human psyche.

Little did I know when I arrived 10 years ago in Delft to pursue a Bachelor in Aerospace Engineering, that I will be finishing my Master's degree in TU Delft on a psychology-related topic. In hindsight, it is obvious. My favorite high-school subject was psychology, and I've always been wondering what influenced people to walk different paths in life. Why was my housemate interested in a Ph.D. in Computer Science? Why are some of the CEO of the biggest tech firms' introverts? Does our personality have an effect on how we are influenced to make decisions? I tried to explore the last question in my thesis.

I am very grateful to Dr. Laurens Rook for willing to guide me on this journey and for giving me the freedom and autonomy to research a topic that intrinsically interested me. I would like to thank Prof. Frances Brazier for her willingness to supervise our work and for her valuable advice.

Also, I want to personally thank my housemate Nirmal for all the inspiring conversations and for being part of this epic quest with its many ups and downs. Bogdan and Youyou, for their input which made this thesis possible. My sister Diana for always enlightening me on aspects of life that I never knew existed. My Bulgarian brothers (Svetlio, Ilian and Georgi) for providing me with shelter and safe-haven in my first months in Delft. And last but not least, my loving parents and grandparents who have been literally supporting me from day 1.

And to every future student who is interested in this field of work, please don't hesitate to contact me if you have any questions or just want my hard-earned two cents.

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Chapter 1. Introduction

1.1 Background

The ubiquity of digital connectivity has taken constant mass persuasive communications to an unprecedented level, enabling abundant opportunities of altering people's attitudes and behaviors in a wide range of contexts. Governments and health agencies use persuasive appeals to encourage healthy and prosocial behaviors. Political parties (aggressively) advertise across different media to mobilize potential voters. Companies and marketers design novel campaigns to promote sale of their products. None-profit organizations send heart-warming online messages to boost donations.

Behind the scenes of diverse, ever-changing sales tactics are established scientific principles of influence and persuasion (e.g. Fogg, 2003; Kellermann & Cole, 1994; Rhoads). These empirically tested theories from social psychology are bedrocks of mass persuasive communication strategies. Among the most notable are Cialdini's (2001) six principles of influence—Reciprocity, Scarcity, Authority, Consistency, Liking and Social Proof. It has been repeatedly shown that persuasive technology designed according to these influence principles elicit intended alteration in opinions and behaviors in a wide range of application domains (e.g. Bang et al., 2006; Consolvo et al., 2009; Kaptein & Eckles, 2012; Svane, 2007).

Since persuasive technologies operate on human psychological needs, it is only natural that people's psychological needs vary, and are not equally sensitive to all influence principles. For instance, what convinces a caring mother to change her mind might not work for an authoritative CEO.

Laboratory evidence corroborates that individuals react differently to the same persuasive strategies (Kaptein et al., 2010; Kaptein et al., 2009). Individual differences in people's personalities matter to their sensitivity towards persuasive technologies. Consequently, persuasive technologies, when customized according to recipients' personal characteristics, function better (Cesario et al., 2008; Hirsh et al., 2012; Moon, 2002; Wheeler et al., 2005). The underlying mechanism is a "matching" principle. When a person's personality makeup is congruent with the communicated stimulus, central processing of information is activated, which leads to persuasion (Dijkstra, 2008; Moon, 2002). Outside of laboratory settings, personalized persuasive technologies are omnipresent in everyday life. Major social media platforms like Facebook, Instagram and Twitter are well-known for their capacity of tailoring users' experiences to their distinct profiles.

How does one characterize and distinguish individuals' unique psychological needs for the purpose of tailoring persuading cues? An apparent answer is through assessing his or her personality. Personality reflects a person's relatively stable patterns of thoughts, feelings, and

behaviors (Funder, 1997). It therefore underlies the person's psychological needs, beliefs, and preferences. Hence, knowledge of personality traits and their connection to influence principles can inspire the design and implementation of powerful persuasive technologies (Alkış & Temizel, 2015).

Personality is a well-studied area, and its most prominent theory—The Five-Factor Model (i.e. the Big Five) (McCrae & Costa Jr, 2008) is an established framework that could be readily deployed to connect with influence principles. More importantly, personality traits, typically assessed through questionnaires and textual data sources, can now be instantly and accurately inferred in the digital environment through digital footprints (Kosinski et al., 2013; Youyou et al., 2015). This latest personality assessment approach has made any findings linking personality and influence principles ever more applicable and actionable in real life.

The present research lies in the area of personalized persuasive technology. The objective is to investigate the relationship between personality and influence principles. The study examines the personality—persuasion link broadly, without restricting to any specific application domain, in hopes that the findings could shed light on basic principles underlying personalized persuasion in all settings.

1.2 Knowledge Gap

Prior research on personality traits and influence principles is scarce. Halko and Kientz (2010) studied the association between personality traits and persuasive technologies but focused on a specific health-mobile application domain; Hirsh et al. (2012) tested the effectiveness of personality-tailored persuasive technologies using advertisements. Specifically, they created five advertisements, each targeting one of the Big Five personality traits, and found advertisements were rated more favorably when they align with recipients' dispositional characteristics. However, none of the two studies took into account Cialdini's (2001) six principles of influence.

Only two studies (Alkış & Temizel, 2015; Oyibo et al., 2017) specifically investigated the interaction between the Big Five personality traits and Cialdini's persuasive strategies. Both studies found significant associations, but derived inconsistent patterns on which personality trait is tied to which influence principles in different populations, likely due to cultural differences. Together, these studies demonstrate consensus about the existence of an overarching – higher-order – personality-persuasion link in general, but paint an ambiguous picture regarding how each trait interacts with individual influence principles.

This uncertainty could be a roadblock in the advancement of personalized persuasive technology applications. In order to custom-tailor messages according to individuals' characteristics, designers need a complete dictionary of parings between influence strategies and some structural

personal characteristics. It is possible that Big Five personality traits could be too broad a lens to operate on. Achieving the goal requires delving beyond the trait level and conducting more nuanced analyses. Personality psychologists has been organizing personality dimensions into hierarchies, with the umbrella traits—the Big Five—at the top. Underneath the Big Five personality traits lie narrower personality dimensions called "aspects". They represent more specific components of each broader personality trait (DeYoung et al., 2007).

1.3 Research Question

In response to the current state of research described above, the present work aims to drill down to specific *aspects* of personality—a level of analysis below the Big Five in the personality model. developed the theory and measurement of 10 personality aspects. The first research objective is to replicate the original findings of the Big Five Aspects Scale (BFAS). Once validated, the responses on the scale will be analyzed to answer the question:

Which of Cialdini's influence principles are most effective for which Big Five personality aspects?

Specifically, my research aims to derive reliable correlations between influence strategies and personality aspects. Future researchers and designers could practically capitalize on these associations to improve persuasive technologies.

1.4 Research Approach

The current research is an online survey-based correlational study. Participants are recruited through several online research participant platforms. Participants complete questionnaires through an online survey platform for free or in exchange for monetary compensation. A series of descriptive and correlational analyses will be performed to answer the research questions.

Online research using platforms like Murk has been increasingly adopted in psychological studies because of data collection efficiency and low costs (Buhrmester et al., 2018). Although the validity of online data has been questioned at times, considerable research has revealed that online samples are not fraught with fake respondents or false data, and are more representative than student samples typically obtained school laboratories (Behrend et al., 2011; Buhrmester et al., 2011; Casler et al., 2013; Goodman et al., 2013; Gosling et al., 2004; Kees et al., 2017). In addition, Internet samples are particularly suited for the purpose of this research. Given that an abundance of persuasive technologies is delivered digitally, findings based on online samples are immediately applicable to the same population.

1.5 Report Structure

The present report is structured as following. Chapter 1 is an introduction to the research topic of the thesis. It provides background information about personalized persuasive technologies and its scientific foundation—how influence principles could interact with personality to enable more effective persuasive technology. Readers will then recognize where the present research question situates in this line inquiry.

Chapter 2 then reviews prior literature related to persuasive technology, influence principles, and personality. After surveying the history and basic concepts in each domain, this chapter will discuss existing evidence on the relationship between personality and influence principles. Readers will learn about the limitations depicted in previous research and how the present research could address them.

Chapter 3 delineates the methodology used to answer the research question about personality and influence principles. It introduces in detail the procedure of the study, including the recruitment of participants, their demographics, the specific questionnaires used, and how surveys are administrated.

Subsequently, Chapter 4 reports results of the analysis, including both descriptive and inferential statistics. The chapter starts with several robustness checks and ends with core correlational results that present a nuanced picture of personality and influence principles.

Finally, Chapter 5 summarizes, interprets, and reflects upon the empirical results. This chapter discusses the scientific and practical relevance and implications of the results to personalized persuasive technologies, arguing how the findings could be applied to design more effective persuasive technologies. This chapter also considers limitations in the research design and suggests future research directions.

Chapter 2. Literature Review

This chapter will explore the literature surrounding persuasive technology and its relation to models of personality in order to establish the relevance of my research question:

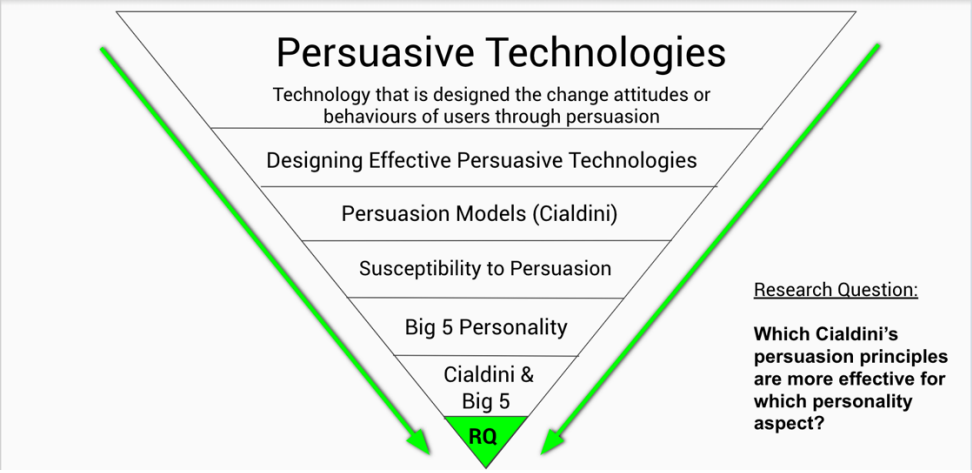
Which of Cialdini's influence principles are most effective for which Big Five personality aspects?

This chapter begins by defining persuasive technology, then outlining the types of existing persuasive technologies, and considering design features that make certain technologies effective. Cialdini's six principles of influence will be introduced as the prominent model of influence underlying persuasive technologies. The next sections explore the role of personalization in persuasive technologies—how customizing messages based on end-users' characteristics, like personality, increases persuasion effectiveness. A brief survey of the history of personality research is followed by a review of the prominent Big Five personality model. The final sections summarize prior literature on the interaction between Cialdini's principles of influence and the Big Five personality traits. Readers will learn that existing findings display challenges in cross-cultural generalizability, which the present study will address by examining fine-grained aspects of personality traits.

Figure 1 illustrates the funnel-like flow of Chapter 2, which starts with the broad description of persuasive technologies, and ultimately narrows down to the question, which this study aims to answer.

Figure 1

Map of Chapter 2. Literature Review



2.1 Persuasive Technologies

Persuasive communication refers to any message aimed at changing, strengthening, or shaping the belief(s), emotion(s), or response(s) of another person. Persuasive technologies are technologies that employ persuasive communications and are designed with the intention of changing attitudes or behaviors of users (Fogg, 1999). Almost two decades after the first research attempts of B.J. Fogg (Fogg, 2002) on turning persuasive communication into persuasive technology, a considerable number of studies have demonstrated the persuasive powers of these technologies across diverse fields, including marketing (Kaptein & Eckles, 2012), pro-health & pro-social activities (Consolvo et al., 2009; Consolvo et al., 2008; Lambert, 2001; Morris & Guilak, 2009), and energy consumption reduction (Bang et al., 2006; Dillahunt et al., 2008; Midden et al., 2008; Svane, 2007). Scholars argue that persuasive technologies have the potential to be highly successful in persuading people into certain behavioral directions. Some even claim that technology may even be more successful at persuasion than human beings (Fogg, 2007). People respond similarly to persuasive technologies than to human beings (Fogg & Nass, 1997a, 1997b; Nass et al., 1996). Persuasive technologies do not get tired and can be more persistent than people and "always-on" (Fogg, 2009; Preece, 2010). There are different types of persuasive technologies depending on the application and the goal.

Persuasive technologies are prominent applications in the field of Recommender Systems (RS). Recommender systems are software algorithms aimed at filtering information (Jannach et al., 2010). Their function is to recommend items or services using information on user preferences. The items or services are proposed according to preferences of other users that have similar preferences(Jannach et al., 2010). The ultimate goal of any recommender system is to accurately predict users' needs and preferences (Jannach et al., 2012). If the recommendation is not accurate, it can negatively impact the users' trust in the system (Jannach et al., 2016). Nevertheless, even if the recommendation is accurate, the system should not show it too often, as that can trigger annoyance in the users (Todri et al., 2019). Therefore, persuasive technologies should be designed to show the accurate message beyond the annoyance threshold of the users (Todri et al., 2019). However, accuracy of the recommendation is not the only aspect to be considered. Recent studies point out that certain aspects beyond accuracy—such as the diversity and novelty of the recommended items—are important to user satisfaction (Fleder & Hosanagar, 2007; McNee et al., 2006). Users often prefer a set of recommended items that are a dissimilar to one another and are unknown or unfamiliar to them previously. Recommender systems thus sometimes need to go beyond user's interest area to achieve maximum satisfaction.

Persuasive technologies can be employed in various domains. However, for them to produce the desired positive effect, those technologies need to be designed in a specific way. As can be seen, in the case of recommender systems, many factors need to be considered in order to create an effective, accurate, and not annoying persuasive technology. Therefore, the next section will

outline the basic psychological principles underlying persuasion, and link those to components required to produce effective persuasive technologies.

2.2 Designing Effective Persuasive Technologies

To be effective in producing desired behavior or attitude change, persuasive technologies need to be designed to deliver "the right message, at the right time, and in the right way" (Kaptein et al., 2015, p. 38). To address this in turn, first, persuasive technologies are to be designed with to deliver a specific message to the end user (Fogg, 1998). Second, the message needs to be delivered at an appropriate time. Not only does this prevent the occurrence of annoyance, also it increases the likelihood that the recipient will take the required action (Faber et al., 2011). Third, the persuasive message needs to be framed in an appropriate way. For example, a message aimed at encouraging students to study more could say: "75% of your classmates have delivered their assignments already" or "Your professor recommends you finishing your assignment today". In both sentences, the promoted behavior change is the same (i.e., finishing the assignment), but the argumentation is different. In the first, the influence principle of social proof is used, while in the second the influence principle of Authority is implemented. Those influence principles will be explained in greater detail later in this chapter. For now, it is important to emphasize that the way a persuasive message is framed depends on the type of influence principles that have been utilized. With this in mind, we will now turn to examine the various types of influence models that power persuasive technologies.

Persuasive technologies are underpinned by models of influence, an understanding of which aids an effective design process. When designing persuasive technology, practitioners and researchers often refer to social science literature, and primarily to social psychology theories (Bless et al., 1990; Crano & Prislin, 2006). Example theories relevant to persuasive technologies include the heuristic-systematic model (Chaiken, 1980; Chaiken & Eagly, 1989), operant conditioning (Skinner, 1976), social cognitive theory (Bandura, 1991), and the elaboration likelihood model (Petty & Cacioppo, 1986).

In the field of behavior change there is another important strategy called "nudging". A nudge is defined as "*any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any option or significantly changing their economic incentive*" (Thaler & Sunstein, 2009, p. 6). Even simple nudging is powerful in changing behaviors. For example, placing fruits instead of cakes in the impulse basket beside the cashier in supermarket would lead to increase in purchase of fruit and decrease in cake, despite both choices being available to customers (Thaler & Sunstein, 2009). In the last years, persuasive technology designers have used nudging for different behavior changes (Harbach et al., 2014; Lee et al., 2011). For instance, one study instilled nudging in app installation permission dialogues for the Google Play Store so that people are more mindful of privacy risks when giving permissions to apps (Harbach et al., 2014).

Another study designed a robot that encourages healthy snacking using findings on cognitive biases (Lee et al., 2011).

The examples above show that the ways to influence an attitude or someone's behavior are plentiful. There's a lot of discussion about the scope of different persuasive technologies. Cialdini Cialdini (2001) developed six highly influential principles of influence.

The following section will discuss each of Cialdini's six principles of influence in greater detail.

2.2.1 Cialdini's Principles of Influence

One of the most scientifically prominent models based on influence principles is that of Cialdini (Cialdini & Goldstein, 2004; Guadagno et al., 2001). Robert Cialdini developed six core principles of influence, which can be leveraged to alter people's opinions and behaviors in a wide range of settings and contexts, such as marketing, advertising, political campaigns, and fundraising (Cialdini, 1993, 2001; Cialdini & Goldstein, 2004; Kaptein et al., 2009). In order to better understand Cialdini's principles, and to better assess how they can be used for the framing of messages in persuasive technologies, these six principles will be reviewed next.

2.2.1.1 Commitment

Psychologists have known for decades that people prefer to both be and appear consistent in what they say, believe, and do (Cialdini, 2001). Once a choice has been made, people tend to convince themselves that they have made the right one, and feel better about it (Fazio et al., 1992). For instance, directly after casting a vote, voters have a stronger belief that their candidate will win the election (Regan & Kilduff, 1988). A famous experiment demonstrated the power of commitment when people were asked to look after personal items on a beach: Results showed that 19 out of 20 subjects who were asked complied with the request in comparison to only 4 out of 20 who were not asked (Moriarty, 1975). Following through with one's commitments is viewed to be socially valuable (Allgeier et al., 1979; Asch, 1946) and people tend to do better in society if their approach to life is consistent. A lack of commitment in one's life leads to difficulties and confusion (Sheldon et al., 1997).

2.2.1.2 Social Proof

Social proof refers to people's tendency to look to others in order to decide what is the best or the most proper way to act (Cialdini, 2001). A considerable amount of research has demonstrated the power of imitative effects amongst both children and adults in a variety of activities, including purchase decisions, eliminating undesirable behavior such as phobias (Bandura et al., 1967; Bandura & Menlove, 1968) and charity donations. The principle of social proof is obtained by asking someone to comply to a specific request, simply, because many other people also have

already complied with the request. The bigger the crowd that undertakes the requested action, the more compelled a person feels to follow the action (Milgram et al., 1969; Rook, 2006). The phenomenon of blindly following the crowd is also known as "herd behavior" (Banerjee, 1992). That is why marketers often attempt to indirectly influence their potential customers by stating that their product or service is the most sought after, the "fastest-selling" or the "best-seller" (Cialdini, 2001).

Social proof is most effective under certain conditions. The first of those is uncertainty: when the circumstances are ambiguous – i.e., when people are not sure what to do – they more likely consider "wisdom of the crowd" as the correct one (Cialdini, 2001). The second condition under which social proof works best is when the others are similar to us in some way, for example, of a similar age or ethnicity (Festinger, 1954). One study demonstrated that a dropped wallet was more than twice as likely to be returned, if the person who dropped it was from the same social group as the one who found it (Hornstein et al., 1968). This principle is often used in social marketing campaigns: Health researchers for instance found that antismoking campaigns in school were most effective, when led by same-age peer-leaders (Murray et al., 1984). Philips demonstrated the powerful effects of similarity in suicide statistics. After a highly publicized suicide story, other psychologically-troubled individuals similar to the suicide-story victim, often replicated the gruesome action and killing themselves (Phillips, 1980). The most notorious case of the power of social proof probably is that of Reverent Jon Jones, who used uncertainty and similarity in order to facilitate the largest mass suicide incident to date. Due to his highly persuasive communication techniques, 910 people died in an orderly, willful fashion (Cialdini, 2001).

2.2.1.3 Liking

People like to say "yes" to individuals they are familiar with and fond of (Cialdini, 2001). Several features increase somebody's likeability: One of those features is a person's physical attractiveness (Budesheim & DePaola, 1994; Efran & Patterson, 1976; Mack & Rainey, 1990). Research has shown that we unconsciously attribute talent, kindness, honesty and intelligence to good-looking people (Eagly et al., 1991). Physically attractive people earn more at work (Hamermesh & Biddle, 1993), and get away with more lenient charges at court (Downs & Lyons, 1991; Moore, 1990). Another feature that can increase liking is similarity (Cialdini, 2001) - we like people who are similar to us (Festinger, 1954). The way of dressing is a good example. Studies (Emswiller et al., 1971; Suedfeld et al., 1971) have shown that people are more likely to help those who dress like them. The similarity effect also applies in the areas of attitudes and values, personality traits, demographics and lifestyle (Cialdini, 2001). Even small similarities like similar sport-interests, birthplaces, age, religion, politics, and smoking-habits appear effective influence factors (Brewer, 1979; Evans, 1963). Given the effectiveness of similarity effects in each of those dimensions (Chartrand & Bargh, 1999; Locke & Horowitz, 1990; Woodside & Davenport Jr, 1974), many sales professionals use the "mirror & matching" of the customer's body language, tonality, and

choice of words as a method of increasing sales (Cialdini, 2001). A third way to increase liking is the use of compliments, even when those compliments are insincere (Drachman et al., 1978). Generally, we tend to trust that the praises are genuine (even when they are not) and develop affection for people who praise us (Byrne et al., 1974). Knowing that somebody likes us is a powerful extrinsic motivator for us to return the liking and increase our willingness to comply with requests (Berscheid, 1985; Howard et al., 1995; Howard et al., 1997). If we see a person or a thing that we like more often, we tend to like that individual person or object even more (Cialdini, 2001). The fourth and final factor that increases liking is an association with positive external things such as news, people, etc (Lott & Lott, 1965). It is also known as the halo effect (Nisbett & Wilson, 1977). Therefore, advertisers, politicians, and merchandisers do their best to associate their brand or cause with celebrities to increase a positive association with their products, services, and campaigns (Cialdini, 2001).

2.2.1.4 Authority

Many studies show that adults would go to extreme lengths to obey the command of an authority figure. A well-known set of experiments from 1964 (Milgram & Gudehus, 1978), show that many normal, psychologically healthy people were willing to administer shocking and hazardous levels of pain to another subject, simply because they were given the order to do so by a figure in authority. Milgram's experiments were later repeated in Holland, Germany, Spain, and Italy (Meeus & Raaijmakers, 1986). The origin of this proclivity (to obey individuals in power) stems from a societal upbringing, where "obedience to proper authority is right, and disobedience is wrong" (Cialdini, 2001, p. 185). According to research, three types of authority symbols induce 'blind' obedience. The first symbol is a title, such as the title of a doctor, an engineer, or a professor. In one study, researchers posed as doctors, and instructed 22 nurses over the phone to administer a dangerously excessive dose of an unauthorized drug to a patient. Although violating all nurses have been trained to do, ninety-five percent of them followed the orders (Hofling et al., 1966). Another study (Bartko, 1982) showcased the powers of titles in the realm of scholarly publications. Already published articles from credible authors from prestigious universities were re-submitted under a different name and institution to the same journals. Results were that nine of twelve passed the review process undetected, whereas eight out of nine were rejected. This was remarkable, for not long ago, all were deemed publishable, albeit under higher different author/institution credibility. The second authority symbol is clothing (Guadagno et al., 2001). Regardless of the type of request, more people tend to follow requests from an individual dressed in a guard's costume than from a uniformed requester (Bickman, 1974). People also tend to follow the lead of a person dressed in a shiny suit and tie, rather than somebody dressed in a shirt and pants (Lefkowitz et al., 1955). The third symbol of authority is external trappings, such as jewelry and cars (Cialdini, 2001). For instance, one study showed that owning a prestigious car increases the respect people have for the owner (Doob & Gross, 1968).

2.2.1.5 Reciprocity

According to scientists from backgrounds as diverse as sociology (Gouldner, 1960), archeology (Leakey & Lewin, 1979), and cultural anthropology (Ridley, 1997; Tiger & Fox, 1997), reciprocation is one of the most common and powerful human basic norms. The rule of reciprocation states that one person will return a favor to the one who has provided it (Cialdini, 2001). The rule creates a feeling of indebtedness, irrespective of whether one likes or dislikes the requester who has previously done the small favor (Regan & Kilduff, 1988). It even works irrespective of whether the initial favor was asked for or not (Paese & Gilin, 2000). The act of reciprocity has been employed by many organizations for effective fundraising. Simply providing people with a cost-effective gift such as a flower, and then asking for a donation, for instance was profitable for the Krishna society (Cialdini, 2001). Likewise, providing a candy or a mint with the bill at a restaurant significantly increases tip giving (Lynn & McCall, 2016). Business owners realize that, after accepting a gift, customers purchase items that they would have otherwise declined (Gruner, 1996). People will often try to avoid asking for a needed favor so that they won't be in the position to repay it (Fisher, 1983; Greenberg & Shapiro, 1971; Riley & Eckenrode, 1986). In contrast, in family relationships, services and favors are often provided on an as-needed basis (Clark et al., 1989). In a family setting, which is a form of a "communal relationship" (Clark & Mills, 1979; Mills & Clark, 1982), it is not necessary to calculate who has given more or less, but rather whether all parties are living up to the more general rule of reciprocating (Clark, 1984; Clark et al., 1986; Clark & Waddell, 1985). The "foot-in-the-door" technique is another powerful influence technique. It works by asking people for a small favor to elicit consent, before asking them for a bigger one (Freedman & Fraser, 1966). A final way in which the reciprocity rule can increase compliance is by first asking for a big favor that is sure to be rejected and once that it is declined to ask for a small favor (Cialdini et al., 1975; Thompson, 1990). This technique is known as the "rejection-then-retreat" or the "door-in-the-face" (Cialdini, 2001, p. 38).

2.2.1.6 Scarcity

People value items, products, or opportunities when they are scarce or simply appear to be scarce (Cialdini, 2001). The scarcity principle is effective for two reasons: firstly, things difficult to get are perceived as being more valuable (Knishinsky, 1983; Lynn, 1989). Secondly, as things become scarcer (less accessible), people lose certain freedoms (Cialdini, 2001). Reactance theory (Brehm, 1966; Brehm & Brehm, 2013) dictates that when one feels that his or her freedom of choice is threatened, the need to hold on to that freedom (and hence obtaining the goods and services) becomes vital. When information is restricted due to censorship and thus is less available, it becomes more desired and even more believable then if it is freely available (Ashmore et al., 1971; Worchel, Arnold, et al., 1975; Worchel & Arnold, 1973). The scarcity principle works best under two conditions (Cialdini, 2001). First, newly scarce items are perceived to be of higher value. In

other words, items, which were restricted all along, are perceived to be less valuable to items that have just become less available (Worchel, Lee, et al., 1975). Second, people are most attracted to scarce resources when they compete with others to get them (Cialdini, 2001; Worchel, Lee, et al., 1975).

2.2.2 Individual Differences in Response to Influence Principles

Cialdini's influence principles (Commitment, Social-Proof, Liking, Authority, Reciprocity, and Scarcity) have been proven effective. Nevertheless, a growing number of researchers claim that some of them are more effective for certain people; see, for instance Guadagno et al. (2001) and Kaptein et al. (2009). In general, some individuals seem to be more sensitive to persuasion than others (Kaptein et al., 2010), often due to individual differences in personality traits (Kaptein et al., 2015). This observation enables the possibility of improving persuasive technologies effectiveness by personalization based on the recipients' personality traits. The next section will provide an overview of personality psychology and its most prominent theory—the Five-Factor Model.

2.3 Personality Psychology

In the previous section, we discussed ways in which persuasive technologies can be designed in order to be more effective. One design approach that was shown to be effective was the personalizing of the persuasive technologies according to the users' personalities. In this section, we will examine what personality is, how personality theory developed, and also look in closer detail at one of the most prominent personality models: The Big Five.

2.3.1 Background of Personality Research

Personality is defined as the "consistent patterns of thoughts, feelings, and actions" in individuals (McCrae & Costa Jr, 1995, p. 235). Decades of studies on personality have led to a number of personality theoretical frameworks and various scales to measure them being produced (Goldberg, 1971). From the many personality models, the Big Five has excelled and dominated both academic research and industry applications (McCrae & Costa Jr, 2008).

Psychological scholars have been concerned about having a reliable way of assessing personality (Goldberg, 1990). At the beginning of research on personality, McDougall (McDougall, 1932) has been attributed as being the one who methodically created a classification of personality (Barrick & Mount, 1991). "Personality may broadly be analyzed into five distinguishable but separate factors, namely intellect, character, temperament, disposition, and temper..." (McDougall, 1932, p. 3). That finding was followed by another significant finding (Norman, 1963) in which the personality labels (Extraversion, Emotional Stability (the opposite of neuroticism), Agreeableness,

Conscientiousness, and Culture (Openness)) were identified – i.e., the ones commonly used nowadays in the personality literature and have been referred to, subsequently, as the "Five Factor Model" or simply as "The Big Five". Namely, Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, collectively abbreviated as OCEAN (Goldberg, 1990).

The robustness of the Five Factor Model has been attested through decades of research, across different theoretical frameworks (Goldberg, 1981) and a variety of instruments (Costa Jr et al., 1988; McCrae, 1989; McCrae & Costa Jr, 1987, 1989)((Costa Jr & McCrae, 1985). It accounts for differences among humans from many cultural and lingual backgrounds (Bond et al., 1975; Noller et al., 1987) and thus is considered to be a universal representation of the basic human personality dimensions (McCrae et al., 1999). Moreover, many studies have demonstrated the strong predictive power of the Big Five in various fields (Barrick & Mount, 1991; Costa Jr et al., 1984). Therefore, the Big Five model of personality has become the go-to standard in personality theory.

2.3.2 The Big Five Traits

The five factors of this personality model will now be reviewed in-depth in the following sections.

2.3.2.1 Openness to Experience

Openness to experience is defined as the extent to which a person is imaginative, artistic, insightful, curious, original, and creative (McCrae & Costa Jr, 2008). People who score high on openness can be noted as thinking "outside-of-the-box" due to their "unusual thought process" (Costa Jr et al., 1986). They have the necessary thought flexibility to challenge authority. They are drawn towards novel and fresh experiences, as opposed to traditional routines (McCrae & Costa Jr, 2008). Individuals with higher scores on this personality trait have a wider spectrum of feelings, thoughts, ideas, and perspectives, and also adapt with more ease to circumstances (McCrae & Costa Jr, 1997).

2.3.2.2 Extraversion

People who score high on the Extraversion trait (Extroverts) like to engage a lot in conversations and to go to social gatherings (i.e., parties); They tend to be cheerful, easily excited, positive, and outgoing (McCrae & Costa Jr, 1995). They are willing to engage in social interactions and often seek them (McCrae & John, 1992). In contrast, individuals low in extraversion (Introverts) can be described as quiet, reserved, deliberate, and shy (John, 1990). They enjoy spending time alone and often avoid social interactions (Goldberg, 1990). In work settings, extraverts excel in jobs with social elements, such as marketing, sales, or managerial positions (Barrick & Mount, 1991).

2.3.2.3 Conscientiousness

Individuals high on conscientiousness are efficient, dependable, organized, thorough, and goal-oriented (McCrae & John, 1992). Conscientiousness has been found to involve volitional elements like hardworking and excellence-driven (Digman, 1990). Previous research has accounted for these characteristics (McCrae & Costa Jr, 1989; Peabody & Goldberg, 1989). In addition, conscientiousness tends to predict which occupational groups an individual falls into (Barrick & Mount, 1991). Individuals high on conscientiousness engage in planned as opposed to spontaneous behavior (Costa Jr & McCrae, 1992). In contrast, people low on conscientiousness tend to break norms and regulations. They could be easily distracted and lack the discipline to follow through (Ni, 2014).

2.3.2.4 Agreeableness

Individuals high on Agreeableness tend to be cooperative, trusting, forgiving, accommodating and tolerant (McCrae & John, 1992). Agreeable people are motivated by social harmony and seek to avoid conflicts (Goldberg, 1990). In situations of conflicts, Agreeable people have difficulties standing up for their own interests. Agreeableness is positively associated with humane traits including altruism, care-taking, and soft-heartedness; It is negatively associated with hostility, jealously, indifference, and self-centeredness (Digman, 1990). Disagreeable people prioritize self-interests over being liked by others. They are unconcerned about others' interests and are less likely to offer support to others (Bartneck et al., 2007).

2.3.2.5 Neuroticism

Neuroticism reflects individual's varying emotional responses to a threat, frustration, or loss (Costa Jr & McCrae, 1992; Goldberg, 1993). Individuals scoring high on neuroticism experience negative emotions more frequently in these circumstances (McCrae & Costa Jr, 2003). They are more likely to be self-critical and are more sensitive to the criticism of others (Watson et al., 1994). The emotional instability is often connected with irrational thinking, lack of self-esteem, and impulses and cravings (McCrae & Costa Jr, 1987). Note that individuals low on neuroticism are not necessarily in positive mental health state. They simply have higher emotional stability.

2.3.3 Measuring the Big Five Traits and Aspects

The Big Five traits can be measured in several different ways. They can be either explicitly (via questionnaires) or implicitly (via computer algorithms) measured (Tkalcic & Chen, 2015). The explicit measurements, although time-consuming, offer the most accurate assessments of personalities, and are useful for the "ground truth" data for later automatic extraction.

This study is primarily focused on finding the fundamental relationships between personality aspects and influence principles. That is why, only explicit Big Five measurements via questionnaires will be considered. The findings could later be used by the designers of persuasive technologies that might use the insights to develop an implicit way of measuring the users' personalities. This section will serve as a historical guideline of the different Big Five explicit measurements and their specific characteristics. The questionnaires vary in length and the type of items being utilized; some use short adjectives while others implement questions. Moreover, some of the measurements are free to use, while others need to be paid for.

In the early 1980s, the NEO Personality Inventory (NEO-PI), was developed (Costa Jr & McCrae, 1985). Arguably, it is now the most widely used scale for assessing the Big Five personality traits (Coulacoglou & Saklofske, 2017). It was initially designed to measure just three dimensions of the current Big Five, namely: Neuroticism, Extraversion, and Openness to experience. Later, the dimensions of Agreeableness and Conscientiousness were added (Costa Jr, 1989).

A few years later, the Revised NEO Personality Inventory (NEO-PI-R) was published (Costa Jr & McCrae, 1992). The NEO-PI-R uses a 240-item questionnaire to assesses thirty specific facets, six for each of the Big Five trait: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C). Respondents rate themselves on each item using a 5-point Likert scale, ranging from strongly disagree to strongly agree (Costa Jr & McCrae, 1992). The NEO Five-Factor Inventory (NEO-FFI) is a shorter 60-item version of the 240-item NEO-PI-R (Costa Jr & McCrae, 1992), designed to assess only the five dimensions without the six facets (Costa Jr, 1989). Confusing items were eliminated to increase readability, which then resulted in the NEO-PI-3 (McCrae & Costa Jr, 2010).

To address the need for a quick measurement of the personality traits, the Big Five Inventory (BFI-44) was developed (John, Donahue, et al., 1991). It consists of 44-items, which are composed of short phrases based on trait adjectives (John, Donahue, et al., 1991). In 2007, an abbreviated 10-item version (BFI-10) of the BFI was introduced (Rammstedt & John, 2007). Only two items were used to assess each Big Five trait, one framed in the positive direction and the other in the negative direction. This short scale can be completed within a minute, and is thus popular in large-scale data collection with time constraints and limited resources (Rammstedt & John, 2007).

In other to make personality measurement as much of an open-source resource as possible, the International Personality Item Pool (IPIP) was formed (Hendriks, 1997). This project was based on the "the lexical hypothesis", which states that important variations between people's dispositional characteristics must be embedded in natural language (Goldberg, 1981). This project, which originally started in the Netherlands, aimed to create a list of facet level trait adjectives around the dimensions of the Big-Five Model; i.e., "Radiates Joy", "Get along well with others" and personality-descriptive verbs like "Insults people" or "Cheers people up". The current version

of IPIP includes over 3,000 items. Over 400 different IPIP scales measuring constructs similar to those in the inventories have been developed and are freely available (IPIP, n.d.-b). Thus far, more than 600 scientific papers have used one or more of IPIP's scales (IPIP, n.d.-c). The IPIP is particularly appealing to graduate students conducting research projects with little research budget to purchase the commercial personality scales (IPIP, n.d.-a). In order to assess one's personality with a copyright-free personality Big Five Model questionnaire from IPIP, there is the IPIP-NEO (International Personality Item Pool - Neuroticism, Extraversion & Openness). The IPIP-NEO inventory has 300 items and takes thirty to forty minutes to complete. A shortened version of IPIP-NEO with 120 items, and even a shorter version of only 20 items (MINI-IPIP), also exist (Donnellan et al., 2006). Gosling et al. (2003) developed another measure even shorter than the MINI-IPIP called the Ten-Item Personality Inventory (TIPI). This scale is typically used when personality is not the most important domain in the research.

Personality can be defined to encompass varying degrees of conceptual bandwidth. Broadly defined traits like the Big Five traits have the advantage of summarizing a large amount of information (John et al., 2008; Ozer & Benet-Martinez, 2006). Narrowly defined traits like facets of the Big Five are of high fidelity and are more precise in the behavioral information they contain (Ashton et al., 1995; Paunonen & Ashton, 2001). This contrast between the pros and cons of broad versus narrow definition of traits is understood as the bandwidth-fidelity trade-off (Cronbach & Gleser, 1957; John, Hampson, et al., 1991). This bandwidth-fidelity trade-off can be negotiated using a hierarchical assessment, with each broad Big Five dimension encompassing several specific facets. A single instrument can then measure personality at both levels simultaneously (McCrae & Costa Jr, 1995).

The breadth and higher bandwidth of broad traits is given by domain-level scales, while the precision and fidelity of narrow traits are supplemented by facet-level subscales. This hierarchical approach has been increasingly adopted by personality researchers. Costa and McCrae (McCrae & Costa Jr, 1995) developed 30 facets (six for each of the Big Five trait) through theoretical and psychometric analyses. Hofstee et al. (1992) developed an even larger set of 45 facets (nine for each of the Big Five trait).

2.4 The Big Five and Cialdini Influence Principles

2.4.1 Existing Research

Existing research on individual differences in persuasive strategies developed in two forms. One line of work focuses on directly assessing interpersonal differences in response to persuasion (Kaptein et al., 2015), developing both explicit and implicit measures. Explicit measurement relies on questionnaires to survey users' traits, preferences, beliefs, and behaviors related to persuasion. For instance, the Susceptibility to Persuasive Strategies (STPS) Scale instructs participants to rate

statements like "I am very inclined to listen to authority figures". This explicitly measures individual sensitivity to each of Cialdini's six principles of influence (Kaptein et al., 2012). In contrast, implicit measurement relies on unobtrusive observations of actual behavior responses to persuasion attempts (Kaptein et al., 2015). For example, in the context of promoting assignment completion, students would receive persuasive messages framed according to Cialdini's social proof principle (e.g. "90% of the students have completed the assignment already"). Their behavioral reaction (i.e. assignment completion rate) would be recorded to implicitly measure sensitivity to this particular strategy. Importantly, the STPS Scale has been validated against behavioral responses, demonstrating the link between explicit and implicit measures.

Another line of work uses personality traits to characterize general individual differences and explores their relationship with influence strategies. Two studies have found associations between personality types and different influence approaches (Halko & Kientz, 2010; Hirsh et al., 2012). However, neither focused on Cialdini's principles of influence. Later, two studies (Alkış & Temizel, 2015; Oyibo et al., 2017) specifically investigated the interaction between the Big Five personality traits and Cialdini's persuasive strategies. Both show that personality traits like Conscientiousness, Agreeableness, and Openness consistently predict sensitivity of Cialdini's persuasive strategies (Alkış & Temizel, 2015; Oyibo et al., 2017). However, the patterns were also partially inconsistent (summarized in Table 1), potentially due to cultural differences between the two samples—Turkish participants in Alkış and Temizel (2015) and Canadian participants in Oyibo et al. (2017). These first attempts at exploring the interplay between the Big Five and Cialdini's influence principles, albeit encouraging, present limitations of cross-culture generalizability.

Table 1

Existing evidence of association between Cialdini's persuasive strategies and the Big Five personality traits among Canadian (Oyibo et al., 2017) and Turkish population (Alkış & Temizel, 2015). Patterns consistent in the two studies are highlighted in grey.

	Authority		**Commitment**		**Social Proof**		**Liking**		**Reciprocity**		**Scarcity**	
	Can	Tur	Can	Tur	Can	Tur	Can	Tur	Can	Tur	Can	Tur
O	YES	YES		YES	YES	YES	YES	YES				
C		YES	YES	YES			YES	YES	YES	YES		
E								YES		YES		YES
A	YES	YES	YES	YES		YES	YES	YES		YES		
N					YES					YES		YES

Note:

1. Adapted from Table 3 in Oyibo et al. (2017)
2. O: Openness to experiences; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.
3. Can: Canadian sample; Tur: Turkish sample

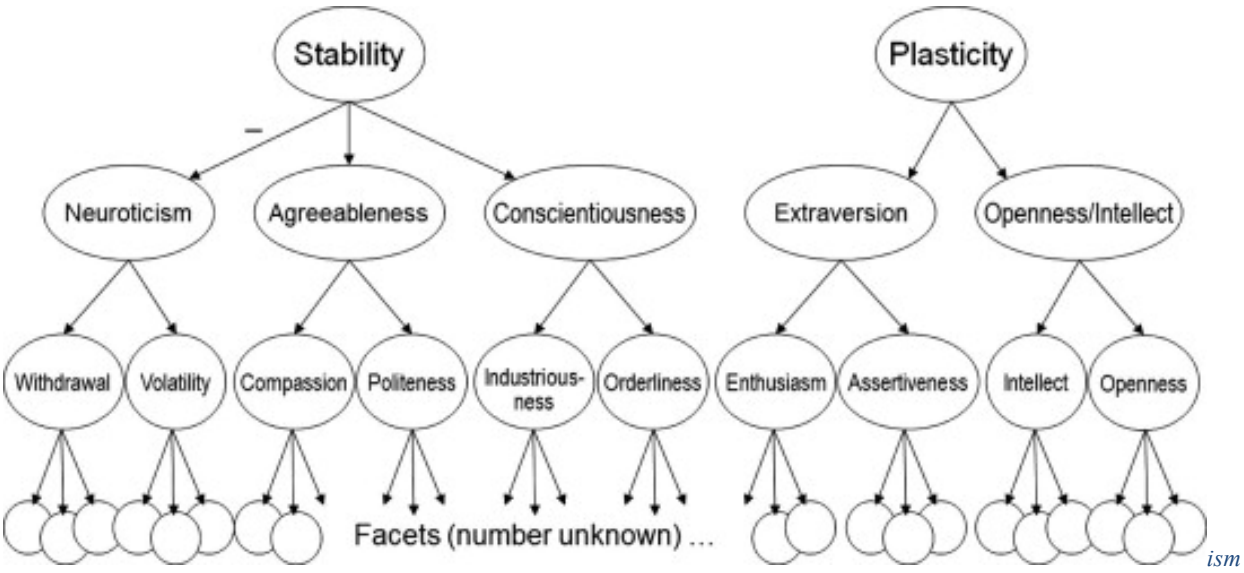
4.2.2. Level of Personality Analysis: Traits vs Aspects

Prior partially inconsistent patterns among different cultural samples suggest that the Big Five might be too generic a lens to examine the personality-persuasion link. To overcome the generalizability challenges might require drilling down to specific aspects of the five personality dimensions, and how they each relate to influence strategies.

For an extended period after the Five-Factor Model was developed, the five traits were assumed to be orthogonal to one another, which implies that they are the highest level in a hierarchical organization of personality (see Figure 2). However, evidence of interdependence among the five traits has amounted such that two higher-order traits (or metatraits) labeled Stability and Plasticity has emerged (DeYoung, 2006, 2015; Digman, 1997). These metatraits are currently considered the highest level of the personality hierarchy, with no single factor of personality above summarizing them (Revelle & Wilt, 2013).

Figure 2

The Personality trait hierarchy. First (top) level: metatraits. Second level: Big Five domains. Third level: aspects. Fourth level: facets. The minus sign indicates that Neurotic is negatively related to Stability.



Following down the hierarchy, the facet level has typically been regarded as the one immediately below the Big Five Traits. Recently, however, twin research has suggested the existence of an intermediate level, called *aspects* of the Big Five (Jang et al., 2002).

Factor analysis of a larger number of facets for each Big Five personality domain unveils the nature of the ten aspects of the Big Five (DeYoung et al., 2007). These aspects synthesize overlaps among the 75 total facets proposed by Costa and McCrae McCrae and Costa Jr (1995) and Hofstee et al.

(1992). At the same time, DeYoung and Peterson developed the Big Five Aspects Scale (BFAS) using items from the IPIP (DeYoung et al., 2007). The aspects of each of the domains are as follows:

Table 2

Big Five Domains (Traits) and Ten Aspects (DeYoung et al., 2007)

Domain (Traits)	Aspects
Extraversion	Enthusiasm
	Assertiveness
Openness to Experience	Openness
	Intellect
Neuroticism	Withdrawal
	Volatility
Agreeableness	Compassion
	Politeness
Conscientiousness	Industriousness
	Orderliness

The only studies (Alkış & Temizel, 2015; Oyibo et al., 2017) that examined the connection between personality traits and Cialdini's persuasive strategies were conducted solely on the trait level of personality. This design omits potential interactions between the individual facets of those traits and the influence principles. Analyzing personality on a "deeper" aspect level, where every one of the five traits is composed of two aspects could provide more granular information and therefore not only high bandwidth but also higher fidelity of the findings (DeYoung et al., 2007).

To the author's knowledge, currently, there are no studies that examine the relationships between Cialdini's influence principles and the ten aspects of The Big Five. Such a kind of deeper personality analysis on an aspect level could contribute to better understanding the relationships between Cialdini's influence principles and human personality. That knowledge could then benefit the designers to design more effective persuasive technologies.

2.5 Summary

This chapter started by discussing what persuasive technologies are, why they are relevant, what types exist, and how they can be designed to be employed effectively when certain actions or behavior changes are desired across a variety of domains (i.e., recommender systems, nudging techniques, persuasive educational technologies). One of the important components of effective persuasive technology was determined to be the underlying persuasive model that is being used. There are many influence theories, but one of the most overarching and prominent ones is that of Robert Cialdini, and this was detailed in depth. One of the interesting findings is that different people have different sensitivity to different influence principles. There are also a few (implicit and explicit) ways the sensitivity to influence tactics could be measured.

The other way in which persuasive technologies can be designed to be more successful in producing their intended result is by personalizing them based on the users' characteristics (i.e., their personality). Therefore, we explored the history of personality psychology and the establishment of the most prominent personality model: The Big Five Model, including the ways people can measure their personality through questionnaires. Last but not least, we looked into the existing research between influence principles and personality traits, as both of those are important components of effective persuasive technology. If a persuasive technology designer knows with certainty for which personality certain influence principle works best, then the persuasive technologies can be designed to be more effective in achieving the desired behavioral change (i.e., studying more, or any other constructive behavioral outcome).

The current research between personality and Cialdini's influence principles has been conducted on only two population samples (Canadian and Turkish). Therefore, a different population sample would be beneficial for extending the generalizability of the findings. Another potential shortcoming of the existing studies is the level of personality analysis they utilized. They both looked at personality on only a personality trait level. However, a deeper level analysis on a personality aspect level, where each trait is composed of two separate aspects, has the potential to show a more granular and detailed way that personality and influence principle correlate. This brings us to the proposed research question of this study:

Which of Cialdini's influence principles are most effective for which Big Five personality aspects?

In the next chapter, the methodology employed to answer the above research question will be described in detail.

Chapter 3. Methodology

The following chapter addresses the procedures of sampling and survey administration, describes the characteristics of the sample that was collected and presents initial results on analyses of the used scales. The chapter provides detailed information about the process of selection of the participants, and exclusion of the potentially problematic cases. The chapter concludes with comparing the psychometric characteristics of the scales administered in this sample and values obtained in their original validation studies.

3.1 Procedure

An online survey research strategy was used for this study. A survey is a system for collecting information from or about people to describe, compare, or explain their knowledge, attitudes, and behavior (Fink, 2003). In the present research, the online survey was administrated once. The survey was composed of self-administrated questionnaires that the respondent completed on his or her own time via a phone, a tablet, or a computer. The survey consisted of several electronic questionnaires hosted on Qualtrics, which is a survey design system that facilitates the preparation and administration of the questionnaires. Participants were greeted with the following message explaining the purpose of the research:

> "*This study will explore the relationship between personality traits and the ways people prefer to be influenced. You will be presented with information relevant to the study and asked to answer some questions about it. Please be assured that your responses will be kept completely confidential. This study is being conducted by Martin Georgiev, a Master student from Delft University of Technology, The Netherlands.*
>
> *The study consists of 3 parts and should take you around 15-20 minutes to complete, and depending on the platform from which you arrived you shall receive reward for your participation.*"

3.2 Ethics Approval

The study and the protocol were approved by the Human Research and Ethics Committee (HREC) of TU Delft.

3.3 Participants

3.3.1 Participation networks

Participants (*N*=736; 256 men, 454 women, and 26 unknown; largest groups: 230 of age 18 – 24; 247 graduated their bachelors; 238 from the UK) were recruited on a voluntary basis, and they had to give their web-based informed consent to having their data collected for the research purposes right after reading the information sheet of the study. Only after giving their explicit informed consent, the participants were asked to fill in the questionnaires. This was stated as follows:

> "*Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail m.c.georgiev@student.tudelft.nl*
>
> *By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.*
>
> - *I consent, begin the study*
> - *I would like more information about the study"*

Furthermore, they were provided with the option to opt-out of the research during as well as at the end after filling in the survey. Moreover, participants were informed that the generated data would be used for academic purposes – i.e., to generate statistical results in anonymized and aggregated form.

For recruitment, several online research participants platforms were used: Survey Circle (*N*=304), Prolific (*N*=234), and Survey Swap (*N*=165). Also, a small group of "trusted participants" was drawn from the researcher's personal and non-personal network (see below). Prolific is a platform that allows researchers to recruit participants for their studies in exchange for small monetary payments. Survey Swap and Survey Circle are platforms that enable researchers to recruit participants for their studies on an exchange basis. The principle underlying these two platforms is that one can get more participants for his/her research by having generated a higher number of filled out surveys. Participation on Prolific was compensated $1.25 per survey, while the other participation was on a voluntary basis. The combination of the abovementioned participant sources was used to collect a more representative sample. The demographics of the chosen target population in this study were defined only by their ability to comprehend the questionnaires in the English language. Participants were not further bounded by their gender, or other criteria. This was intended to include as broad participants' profile as possible.

3.3.2 Boundary conditions

A few boundary conditions (B.C.) had to be satisfied for the data to be further used in the research:

Table 3

Boundary Conditions for Participants Selection

Boundary Condition	**Definition**
1. Informed consent	Participants have provided their informed consent (by opting-in in beginning and **not** opting-out at the end of the questionnaire)
2. Completion rate	Participants have 100% completion of the questionnaire
3. No missing values	Participants have **NO** missing values in any of the questions
4. Time limits	Participants completion time is within 2 standard deviation of the mean of a trusted sample

To estimate the appropriate time it took for the average participant to fill out the survey, a small "trusted" sample (*N*=10) of fluent English speakers was collected. This allowed for calculation of the mean time (i.e., duration) it took a participant to fully complete the questionnaire. The mean time was 968 seconds (16 minutes and 7 seconds), and the standard deviation was 267 seconds (4 minutes and 27 seconds).

Because some participants were incentivized either financially to fill as many surveys as possible or to get participation credits for their own research, they probably hurried through the questionnaire, without carefully reading the questions or without thinking about their answers (Teitcher et al., 2015). On the other hand, some participants took a lot of time for completing the survey, maybe due to their lower level of English, or because they had to pause the survey for a particular reason like answering a phone call, having a coffee and later returning to it. They may be considered as a group of potential underperformers. Therefore, it was decided that everybody who filled out the survey faster or slower than two standard deviations above or below the mean of the "trusted sample" would have to be removed. In other words, all participants who filled out the survey below 434 seconds (7 min and 14 seconds) or above 1520 seconds (25 minutes and 2 seconds) had to be removed.

Table 4 shows a summary of the participants that did not meet the boundary conditions. In total, 217 (29.48%) participants did not meet our boundary conditions. Their data were thereafter excluded from the analysis reported in the remainder of this thesis report.

Table 4

Participants Removal Summary

Boundary Condition	**Why the boundary condition was not met**	**To be removed**

1. Informed consent	1 Participant did not opt-in at the start and 6 opted-out at the end	**7**
2. Completion rate	26 Participants have 100% completion rate	**26**
3. No missing values	11 Participants had missing values	**11**
4. Time limits	111 Participants did not meet the lower threshold of 7 min 14 sec and 60 didn't meet the higher threshold of 25 min 2 sec	**173**
	Total	**217**

3.3.3 Demographics

Removal of the participants that did not meet the imposed boundary conditions left a sample of *N* = 519 (345 female, 174 male) participants, which was used for our research. The Tables 5-8 (below) display the platform, nationality, highest completed education level, and age demographics:

Table 5

Platform demographics

Platform	Frequency:	Percentage
Survey Circle	216	41.6
Survey Swap	200	38.5
Prolific	103	19.8

Table 6

Nationality Demographics

Nationality	Frequency:	Percentage
United Kingdom	238	45.9
United States	104	20
Netherlands	71	13.7
Belgium	16	3.1
Australia	13	2.5
Others	77	14.8

Table 7

Education Level Demographics

Education	Frequency	Percentage
High School	145	27.9
Bachelor's degree	247	47.6
Master's degree	98	18.9
Doctoral Degree (PhD)	11	2.1
Other	18	3.5

Table 8

Age Demographics

Age	Frequency	Percentage
Under 18	6	1.2
18 - 24	230	44.3
25 - 34	134	25.8
35 - 44	73	14.1
45 - 54	39	7.5
55 - 64	29	5.6
Above 65	8	1.5

3.4 Measures

The survey consisted of three measurement sections: the first measures the participants' personality traits and aspects; the second measures the participants' sensitivity to influence techniques; the last assessed their demographic profile. The two self-report measures are discussed in greater detail below.

3.4.1 Big Five Personality Aspects Scales

To measure the participants' personality traits and aspects, the Big Five Personality Aspects Scales (BFAS) (DeYoung et al., 2007) were used. The BFAS were explicitly designed to assess the ten aspects underlying the Big Five Model. Ten items are used to assess each of the ten aspects (see Appendix A1-5). Participants rate their agreement with how well each statement describes them using a five-point Likert scale (ranging from *Strongly Disagree* to *Strongly Agree*). Scores for each aspect are computed by taking the mean of the corresponding items. Scores for each domain are computed by taking the mean of the two aspect scores. The aspects of each of the domains are summarized in

Table 9. The original scales as reported by DeYoung and colleagues are all highly reliable (all alphas > 0.73) and have good test-retest reliability, all $r > 0.72$ (DeYoung et al., 2007).

Table 9 provides the descriptive statistics and Cronbach alphas for the original BFAS as documented in De Young et al. ($M = 0.83$, $SD = 0.03$), and the statistics and reliability of the sample in the present research ($M = 0.85$, $SD = 0.06$). The results show that the reliability of each factor was even higher than in the original DeYoung et al. (2007) sample.

Table 9

Descriptive Statistics for the BFAS in Two Samples

	De Young et. al.			Present research		
Factor	***M***	***SD***	**Alpha**	***M***	***SD***	**Alpha**
Neuroticism	2.46	0.63	.89	3.07	0.78	.93
Volatility	2.48	0.70	.85	2.94	0.89	.90
Withdrawal	2.45	0.71	.84	3.19	0.82	.88
Agreeableness	4.11	0.45	.84	3.99	0.5	.85
Compassion	4.11	0.54	.84	4.05	0.65	.88
Politeness	4.10	0.53	.75	3.94	0.55	.72
Conscientiousness	3.76	0.51	.84	3.44	0.55	.85
Industriousness	3.80	0.61	.81	3.29	0.72	.86
Orderliness	3.73	0.62	.80	3.60	0.64	.79
Extraversion	3.48	0.60	.85	3.29	0.66	.90
Enthusiasm	3.59	0.72	.81	3.38	0.75	.87
Assertiveness	3.36	0.70	.85	3.19	0.77	.88

Openness/Intellect	3.72	0.53	.85	3.79	0.50	.82
Intellect	3.70	0.68	.84	3.78	0.65	.83
Openness	3.74	0.61	.78	3.81	0.57	.72

3.4.2 Sensitivity to Influence Strategies

To measure how sensitivity people are to Cialdini's influence principles, the validated 27-items Susceptibility to Persuasive Strategies (STPS) scale (Kaptein et al., 2012) was used. The questionnaire is displayed in Appendix A8. The items include Authority (4 items), Commitment (6 items), Social Proof (4 items), Liking (3 items), Reciprocity (6 items), and Scarcity (4 items). The STPSS was measured on a seven-point Likert scale, ranging from *Completely Disagree* (1) to *Completely Agree* (7).

Table 10 provides the descriptive statistics for the STPS, including the Cronbach alphas for Kaptein et. al. ($M = 0.69$, $SD = 0.09$), and for the present research ($M = 0.64$, $SD = 0.14$).

Table 10

Descriptive for STPS Scale for two samples

	Kaptein et al			**Present research**		
Factor	***M***	***SD***	**Alpha**	***M***	***SD***	**Alpha**
Reciprocity	5.3	0.83	.75	5.5	0.79	0.79
Scarcity	4.7	0.98	.63	4.6	0.96	0.59
Authority	4.3	1.10	.75	4.4	1.06	0.74
Commitment	5.1	0.97	.81	5.5	0.83	0.70
Social Proof	4.1	0.98	.60	4.4	0.97	0.58
Liking	5.1	0.91	.61	5.3	0.81	0.41

The internal consistency of the self-report measures – as found in research – can be problematically different from the internal consistencies reported by the researches who developed those scales. This is, why, in the next chapter, we will explore this issue in greater detail by looking into the exploratory and confirmatory factor loadings of the present research data.

Chapter 4. Results

A total of 519 participants with complete data were included in the analyses, providing for a sound basis for drawing stable and generalizable conclusions. The sample characteristics have been already discussed earlier, where a rationale was provided why the sample can be deemed representative. Analyses reported below were performed using the IBM SPSS 25 and JASP 0.11.1.0. software packages. Additionally, Microsoft Office Excel was used for data management.

4.1 Descriptive Measures of The Used Scales while most of them scored high

Table 11, Table 12, and Table 13 below present the descriptive statistical measures used in the study. The theoretical minimum and maximum, along with the empirical values of minimum and maximum can prove useful in determining the level of discriminativeness of a scale. The theoretical range indicates the highest and lowest possible values that could have been obtained by the participants, while the empirical range demonstrates how well participants 'spread out' along the scale. The concentration of participants (or lack thereof) in the middle of the scale indicates poor discriminativeness. Additionally, measures of central tendency and dispersion can aid in this process (Field, 2013).

The skewness and kurtosis measures provide information about the shape of the distribution. Although nominal skewness and kurtosis values as such can be used to gauge the shape of the distribution (Field, 2013), the standardized value [z] can be used to test whether the shape of the distribution significantly departs from normal (Ghasemi & Zahediasl, 2012). With large samples, such as the present one, the distribution can be considered normal if values of both skewness and kurtosis stay within the limits of ±2.58. If skewness steps out of the desired interval, it indicates that the distribution of values is not symmetrical around the mean; if kurtosis steps out of the mentioned interval, it indicates that the distribution is deviating from the normal along the vertical axis – i.e., its 'tails' contain either too little or too many values (Ghasemi & Zahediasl, 2012).

By looking at the measurements provided in the tables below, it is clear that all used scales are sufficiently discriminative – judged by the overlap between the empirical range of values and the ones that could have been expected based on theory. Indices describing the shape of the distribution, however, show that none of the influence scores are normally distributed. All styles and the total score show a negative skew and a positive kurtosis value, indicating that participants tend to group on the far right of the distribution (i.e., most respondents obtain high scores). Summative scores for the personality aspects show a normal distribution in most of the cases, with exceptions for the Compassion, Enthusiasm, Assertiveness, Openness, and Industriousness scores. While Compassion, Enthusiasm, Assertiveness and Openness show deviations from normality on

the vertical axis of the distribution (indicated by kurtosis larger than +2.58), the Industriousness aspect is strongly skewed towards the right, indicating that only a few participants obtained low scores, while most of them scored high

Table 11

Descriptive measures of the persuasiveness scale

	Theoretical		Empirical				Skewness			Kurtosis		
Scale	Min	Max	Min	Max	*M*	*SD*	Value	*S.E.*	*z*	Value	*S.E.*	*z*
Reciprocity	5	35	10	35	27.69	3.95	-.68	.11	-6.39	.95	.21	4.44
Scarcity	5	35	5	35	23.17	4.80	-.61	.11	-5.70	.58	.21	2.73
Authority	4	28	4	28	17.65	4.23	-.41	.11	-3.80	.08	.21	.38
Commitment	5	35	10	35	27.43	4.13	-.82	.11	-7.68	1.39	.21	6.49
Consensus	4	28	4	27	17.78	3.89	-.57	.11	-5.34	.55	.21	2.55
Liking	3	21	8	21	16.03	2.43	-.49	.11	-4.55	.04	.21	.16
Total	26	182	48	170	129.75	14.55	-.51	.11	-4.79	1.60	21	7.47

Table 12

Descriptive measures of the personality aspects

	Theoretical		Empirical		*M*	*SD*	Skewness			Kurtosis		
Scale	Min	Max	Min	Max			Value	*S.E.*	*z*	Value	*S.E.*	*z*
Volatility	10	50	15	41	30.49	4.07	-.25	.11	.59	.18	.21	.85
Withdrawal	10	50	19	41	31.26	3.92	-.13	.11	-.33	-.33	.21	-1.53
Compassion	10	50	22	41	30.39	2.67	.51	.11	.11	.96	.21	4.48
Politeness	10	50	14	41	27.49	4.11	.45	.11	.35	.31	.21	1.44
Industriousness	10	50	21	43	32.34	3.67	-.21	.11	-10.30	-.01	.21	-.05
Orderliness	10	50	24	40	32.55	3.14	-.24	.11	-.67	-.16	.21	-.75
Enthusiasm	10	50	22	43	32.56	3.29	.15	.11	.19	.57	.21	2.67
Assertiveness	10	50	22	44	31.23	3.20	.12	.11	.18	.58	.21	2.72
Intellect	10	50	23	42	32.33	3.21	.05	.11	.44	.24	.21	1.13
Openness	10	50	22	47	33.96	3.52	.32	.11	.15	.70	.21	3.26

Table 13

Descriptive measures of the personality traits

	Theoretical		Empirical		*M*	*SD*	Skewness			Kurtosis		
Scale	Min	Max	Min	Max			Value	*S.E.*	*z*	Value	*S.E.*	*z*
Neuroticism	20	100	39	80	61.75	6.89	-.14	.11	-.45	-.24	.21	-1.12
Agreeableness	20	100	40	81	57.87	5.76	.55	.11	.14	.75	.21	3.50
Conscientiousness	20	100	47	81	64.89	5.18	-.09	.11	.64	.17	.21	.79
Extraversion	20	100	47	83	63.80	5.20	.34	.11	.10	1.12	.21	5.21
Openness	20	100	50	83	66.28	5.18	.27	.11	.32	.34	.21	1.58

4.2 Homogeneity and Sampling Frequency

As previously discussed in Chapter 3, all scales demonstrated ample reliability values (estimated through Cronbach's alpha procedure; (Cronbach, 1951)). Before subjecting the scales to the factor analysis, it is considered a good practice to check scales' homogeneity and sampling adequacy as well (Field, 2013). Homogeneity of a scale indicates the extent to which all items on a given scale or subscale give rise to a similar pattern of responses. In this study, homogeneity was calculated as an average inter-item correlation. Its values are optimal somewhere in the interval between .30 and .50. Values as low as .20 are considered acceptable (Field, 2013).

Sampling adequacy measures how well the items used in a scale represent all items that possibly could have been included. It is a measure developed to assess the adequacy of running an exploratory factor analysis on a set of items (Kaiser & Rice, 1974). Values above .50 indicate that the analyzed set of items can be subjected to factor analysis. Although the minimum acceptable value is .50, it is usually expected that sampling adequacy surpasses values of .80 or even .90. In the present research, sampling adequacy was estimated using the Kaiser-Meyer-Olkin [KMO] formula (Kaiser & Rice, 1974). Table 14 below displays the values for all subscales and scales used in the study. As visible in the presented results, all scales and subscales produced excellent measures of sampling adequacy, and acceptable levels of homogeneity.

Table 14

Measures of homogeneity and sampling adequacy for all scales and subscales used in the study

Source	Homogeneity[a]	Sampling adequacy [KMO]
Influence	.44	.82
Reciprocity	.23	.81
Scarcity	.43	.64
Authority	.37	.74
Commitment	.29	.79
Consensus	.21	.64
Liking	.16	.59
Neuroticism	.40	.94
Volatility	.50	.91
Withdrawal	.43	.91
Agreeableness	.23	.88
Compassion	.42	.90
Politeness	.21	.76
Conscientiousness	.22	.87
Industriousness	.38	.90
Orderliness	.28	.82
Extraversion	.31	.91
Enthusiasm	.39	.88
Assertiveness	.42	.91
Openness	.19	.89
Intellect	.34	.89
Openness	.21	.76

Notes. [a] Calculated after recoding all items to correlate positively.

4.3 Exploratory Factor Analysis of the Personality Scale

As established earlier, the validation of the Big Five Personality Aspects Scale (BFAS) (DeYoung et al., 2007) is one of the goals of this study. To accomplish this, factor analytical procedures conducted and reported by the original authors were replicated here to obtain comparable results. Like the creators of the scale (DeYoung et al., 2007), principal axis factor extraction was used along with a direct Oblimin rotation to obtain the factor solution. The delta parameter of the rotation (Δ) was set to 0.

For the factor analyses within each domain, the number of factors to extract was determined using Velicer's minimum average partial (MAP) test (O'Connor, 2000; Velicer et al., 2000) similarly to the original paper (DeYoung et al., 2007). The MAP test indicated that two factors (the underlying aspects) had to be extracted in each domain (see Table 15) – with one exception, Extraversion, for which three factors were suggested.

Table 15

Factor eigenvalues from De Young et al. and the current study

	De Young et al.					Current study				
Eigenvalue number	N	A	C	E	O	N	A	C	E	O
1	7.70	6.65	7.57	6.59	6.57	8.67	5.70	5.49	7.02	4.80
2	**1.44**	**1.81**	**1.27**	1.84	**1.97**	**2.02**	**2.29**	**2.82**	2.49	**2.53**
3	1.10	1.20	1.20	**1.44**	1.15	1.17	1.52	1.25	**1.34**	1.57
4	.87	1.01	.83	1.09	.96	.89	1.04	1.10	1.16	1.18
5	.80	.61	.71	.91	.68	.76	1.01	.94	.85	.98

Notes. Bolded eigenvalues are the last ones to be retained using MAP criterion in both studies. In the present study, both original and revised criteria suggest retention of the same number of factors

The 'rouge' third factor on the Extraversion trait was observed and discussed by original authors as well (DeYoung et al., 2007, p. 882). The authors concluded that there was no sufficient theoretical foundation for retention of three factors. They thus decided to forcefully extract two factors on each of the traits. The 'problematic' aspect of the Extraversion trait was interpreted by the authors to refer to impulsivity, an aspect that has already been disputed (DeYoung et al., 2007). During the construction of the present factor analysis, the same argumentation and procedure was followed here.

The factors demonstrate similar loading to the ones presented in the original study. A summary of the differences between factor loadings and inter-aspect correlations in (DeYoung et al., 2007) and the present study are presented in Table 16 below. Tables with individual item loadings for each item, aspect, and a trait can be found in Appendix A, Table A1 to Table A5. As can be seen from Table 6, the results of the original factor analysis and the one conducted on new data are strikingly

similar, especially when it is taken into consideration that the EFA is a relatively unstable procedure that may produce very different results in different datasets (Osborne, 2015).

The absolute inter-aspect correlation difference was calculated by taking the absolute value of the difference between the correlations of two aspects of a trait obtained in the original, and those obtained in the present study. The mean absolute loading difference was obtained by calculating the absolute value of the difference of loadings for a single item, achieved in the original and the present study, and averaging those values within a single aspect.

From Table 16, it can be easily concluded that both solutions are very similar, with the greatest observed difference being only .12, and with only three differences surpassing the value of .10.

Table 16

Differences between EFA solutions from the original and present study

Scale	Absolute inter-aspect correlation difference	Mean absolute loading difference	Number of cross-loadings[a] (mean absolute value)
Neuroticism	.07		
Volatility		.12	2 (.34)
Withdrawal		.11	0 (0)
Agreeableness	.02		
Compassion		.09	0 (0)
Politeness		.07	2 (.12)
Conscientiousness	.06		
Industriousness		.08	0 (0)
Orderliness		.05	1 (.41)
Extraversion	.01		
Enthusiasm		.07	0 (0)
Assertiveness		.01	0 (0)
Openness	< .01		
Intellect		.08	1 (.36)
Openness		.10	0 (0)

Notes. Cross-loadings indicate loadings onto the other aspect of the same trait. Each aspect has ten items supposed to have highest loading onto it.

4.4 Factor Analysis of the Cialdini Influence Scale

Following the procedure used by the original authors, the scale was analyzed using a principal components analysis [PCA] along with rotating six factors using direct Oblimin rotation ($\Delta = 0$). Unfortunately, this solution produced some unexpected cross-loadings of items and failed to conform to the theoretical model. The full table with all factor loadings is available in the Appendix, Table A6. To improve performance of the scale, several items were removed: two from the subscale of Scarcity (no. 2 and no. 4), one from the subscale of Authority (no. 2), one from Commitment (no. 3), one from Social Proof (no. 1) and one from the subscale of Liking (no. 3). Results of the factor analysis after removal of the problematic items are reported in Table 17 below:

Table 17

Factor loadings of items from the Cialdini influence scale [modified]

Original scale	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Reciprocity 1	**.69**					
Reciprocity 2	**.66**					
Reciprocity 3	**.79**					
Reciprocity 4	**.72**					
Reciprocity 5	**.71**					
Scarcity 1		**-.75**				
Scarcity 3		**-.66**				
Scarcity 5		**-.86**				
Authority 1			**.79**			
Authority 2			**.73**			
Authority 3			**.84**			
Commitment 1				**.84**		
Commitment 2				**.73**		
Commitment 4				**.84**		
Commitment 5				**.61**		
Social Proof 2					**.79**	
Social Proof 3					**.69**	
Social Proof 4					**.69**	
Liking 1						**.63**
Liking 2						**.80**

Notes. PCA extraction with direct Oblimin rotation (Δ = 0). Loadings lower than .30 suppressed to improve readability.

As the EFA procedure had shown some deviations from the original model, it was decided to run additional Confirmatory Factor Analysis (CFA) analyses to investigate whether the proposed modifications to the scale resulted in a better overall fit.

One can rely on various indices when interpreting a CFA. It was decided to report the same indices used by Church and Burke (1994) for the analysis of their personality data. Cut-off criteria for each of the indexes reported in the present study were taken from Brown's (2015) guidelines on interpreting CFA analyses. Table 18 summarizes the indices used and their cut-off criteria:

Table 18

Cut-off criteria for CFA indexes

χ^2	*df*	χ^2/ *df*	GFI	RMSEA	TLI	NFI	CFI
N/A	N/A	2 – 5	≥ .95	≤ .08	≥ .95	≥ .95	≥ .90

Results of both models (the one with all items, and the one with 6 problematic items excluded) are presented in Table 19. As can be seen, both models demonstrate a fair fit, if not a good one. However, there is a noticeable change in the indices of the modified model, indicating a more stable structure. Nonnegligible change can be observed for all three relative indices, while a somewhat smaller improvement can be seen for the absolute indices. Albeit small, this change is considered empirically significant.

Table 19

The goodness of fit statistics for evaluated CFA models

	Absolute indices					Relative indices		
Model	χ^2	*df*	χ^2/df	GFI	RMSEA	TLI	NFI	CFI
Original	714.19	284	2.52	.872	.054	.854	.807	.872
Modified	355.06	155	2.29	0.93	.050	.914	.883	.930

Note: Items Scarcity 2, Scarcity 4, Authority 4, Commitment 3, Social Proof 1, Liking3 removed from the original scale for the modified model.

4.5 Correlations

After it was established that all scales used in this study are of satisfying quality, the correlation analyses were approached. Coefficients are presented in Table 20 below, calculated based on the modified Cialdini scale. Correlations with the original version of the scale are available in Appendix, Table A7.

With a large sample such as collected in this study, small correlations with no practical value can be detected as significant. In such circumstances, it is not advisable to interpret correlations below the value of .20, regardless of their significance. Correlations with a value larger than .30 can be considered stable and likely to be replicated in a subsequent study (Field, 2013). In the context of this research, however, is somewhat different with measures association already reported in the literature (Alkış & Temizel, 2015; Oyibo et al., 2017) being fairly low. Having that in mind, correlations that fail to surpass the .20 mark have been labeled 'suspiciously low'. Although significant, interpretations of these relations should be taken with special care until they are replicated or empirically supported in some other way by future research.

Table 20

Correlations between personality aspects and traits with influence styles – modified influence scale

Scale	Reciprocity	Scarcity	Authority	Commitment	Social proof	Liking
Neuroticism	.026	.119**	.126**	-.232***	.345***	.028
Volatility	-.008	.102*	.079	-.218***	.232***	-.007
Withdrawal	.058	.114**	.153***	-.203***	.402***	.061
Agreeableness	.327***	-.019	.155***	.24***	.185***	.21***
Compassion	.26***	-.015	.064	.162***	.162***	.231***
Politeness	.291***	-.017	.207***	.248***	.148**	.111*
Conscientiousness	.239***	.006	.18***	.51***	-.076	.033
Industriousness	.137**	-.064	-.017	.463***	-.27***	-.01
Orderliness	.259***	.082	.331***	.36***	.174***	.068
Extraversion	.089*	0	-.05	.117**	-.109*	.122**
Enthusiasm	.147**	.038	.073	.101*	.092*	.185***
Assertiveness	.009	-.037	-.157***	.102*	-.275***	.027
Openness	.063	-.024	-.24***	.134**	-.259***	.048
Intellect	.01	-.078	-.236***	.20***	-.332***	.050
Openness	.10*	.047	-.15**	.006	-.074	.026

Notes. * indicates significant result at $p < .05$; ** indicates significant result at $p < .01$; *** indicates significant result at $p < .001$. Calculated on $N = 519$.

Since the scores for each of the Big Five trait are calculated by taking the average of its two aspects, it may be asked, why the correlations with influence styles are *not* the average of the correlations between two aspects and the influence styles? In other words, should the top row in Table 20 be the average of row 2 and row 3? The following original mathematical deduction explains why it should *not* be the case.

A_1 and A_2 are defined as two aspects of the same Big Five trait T, and scores of T are the average of the sum of two aspects:

$$T = \frac{A_1 + A_2}{2}. \quad \textbf{[Eq. 1]}$$

The Pearson product-moment correlations between the two Personality aspects and an influence style
Y can be expressed as:

$$Corr(A_1, Y) = \frac{COV(A_1, Y)}{\sqrt{VAR(A_1) \times VAR(Y)}} \quad \textbf{[Eq. 2]}$$

and as:

$$Corr(A_2, Y) = \frac{COV(A_2, Y)}{\sqrt{VAR(A_2) \times VAR(Y)}} \quad \textbf{[Eq. 3]}$$

Similarly, the correlation between the Big Five trait T and the influence style Y can be expressed as:

$$Corr(T, Y) = \frac{COV(T, Y)}{\sqrt{VAR(T) \times VAR(Y)}} \quad \textbf{[Eq. 4]}$$

By substituting **Eq. 1** into **Eq. 4**, the above correlation can be expressed as:

$$Corr(T, Y) = \frac{COV(\frac{A_1 + A_2}{2}, Y)}{\sqrt{VAR(\frac{A_1 + A_2}{2}) \times VAR(Y)}} \quad \textbf{[Eq. 5]}$$

Because:

$$VAR(aX) = a^2 \times VAR(X) \quad \textbf{[Eq. 6]}$$

The denominator of **Eq. 5** can be rearranged, and the correlation can be expressed as:

$$Corr(T,Y) = \frac{COV(\frac{A_1 + A_2}{2}, Y)}{\frac{1}{2}\sqrt{VAR(A_1 + A_2) \times VAR(Y)}} \quad \textbf{[Eq. 7]}$$

In addition, because:

$$COV(aX, Y) = a \times COV(X, Y) \quad \textbf{[Eq. 8]}$$

The numerator of **Eq. 7** can be rearranged, and the above correlation can be further expressed as:

$$Corr(T,Y) = \frac{\frac{1}{2}COV(A_1 + A_2, Y)}{\frac{1}{2}\sqrt{VAR(A_1 + A_2) \times VAR(Y)}} \quad \textbf{[Eq. 9]}$$

Note that the $\frac{1}{2}$ in the numerator and denominator cancel each other out. Furthermore, because:

$$VAR(A_1 + A_2) = VAR(A_1) + VAR(A_2) + 2COV(A_1, X_2) \quad \textbf{[Eq. 10]}$$

The denominator of **Eq. 9** can be rearranged:

$$Corr(T,Y) = \frac{COV(A_1 + A_2, Y)}{\sqrt{(VAR(A_1) + VAR(A_2) + 2COV(A_1, X_2)) \times VAR(Y)}} \quad \textbf{[Eq. 11]}$$

In addition, since:

$$COV(A_1 + A_2, Y) = COV(A_1, Y) + COV(A_2, Y) + 2COV(A_1, A_2) \quad \textbf{[Eq. 12]}$$

The denominator of **Eq. 11** can be rearranged:

$$Corr(T,Y) = \frac{COV(A_1, Y) + COV(A_2, Y) + 2COV(A_1, A_2)}{\sqrt{(VAR(A_1) + VAR(A_2) + 2COV(A_1, X_2)) \times VAR(Y)}} \quad \textbf{[Eq. 13]}$$

Theoretically, scores of the two aspects are independent of each other. Therefore, the covariance between them should be zero. In other words, $COV(A_1, X_2) = 0$. **Eq. 13** then becomes:

$$Corr(T,Y) = \frac{COV(A_1, Y) + COV(A_2, Y)}{\sqrt{(VAR(A_1) + VAR(A_2)) \times VAR(Y)}} \quad \textbf{[Eq. 14]}$$

Moreover, the scores of the two aspects should theoretically have the same distribution and hence the same variance. In other words, $VAR(A_1) = VAR(A_2)$. **Eq. 14** can then be expressed as:

$$Corr(T,Y) = \frac{COV(A_1,Y) + COV(A_2,Y)}{\sqrt{2 \times VAR(A_1) \times VAR(Y)}} \quad \textbf{[Eq. 15]}$$

Next, **Eq. 15**, representing the correlation between the Big Five trait T and the influence style Y, will be compared with the average of the correlations between the two aspects A_1 and A_2 as well as with influence style Y, represented by **Eq. 2** and **Eq. 3** respectively.

First, the average of **Eq. 2** and **Eq. 3** is expressed as the following:

$$\frac{Corr(A_1,Y) + Corr(A_2,Y))}{2} = \frac{1}{2}\left(\frac{COV(A_1,Y)}{\sqrt{VAR(A_1) \times VAR(Y)}} + \frac{COV(A_2,Y)}{\sqrt{VAR(A_2) \times VAR(Y)}}\right) \quad \textbf{[Eq. 16]}$$

As mentioned before, $VAR(A_1) = VAR(A_2)$. The two denominators in the right-hand side of **Eq. 16** become the same**,** and **Eq. 16** can be further expressed as:

$$\frac{1}{2}(Corr(A_1,Y) + Corr(A_2,Y)) = \frac{COV(A_1,Y) + COV(A_2,Y)}{2\sqrt{VAR(A_1) \times VAR(Y)}}) \quad \textbf{[Eq. 17]}$$

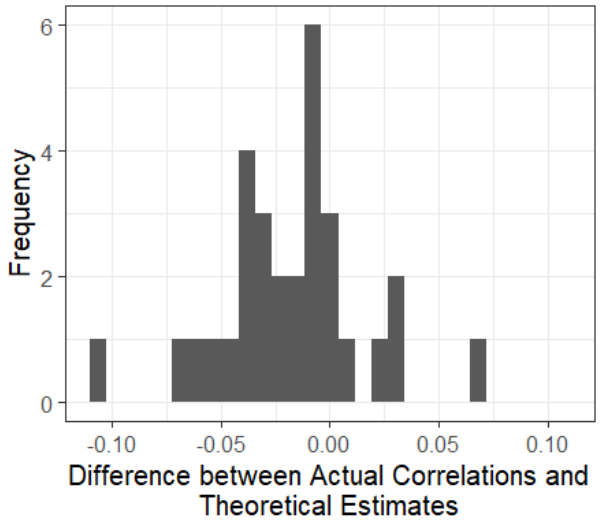
Comparing **Eq. 17** and **Eq. 15**, the relationship between the two correlations can be derived:

$$Corr(T,Y) = \frac{2}{\sqrt{2}} \times \frac{Corr(A_1,Y) + Corr(A_2,Y))}{2} \quad \textbf{[Eq. 18]}$$

To summarize, under assumption of complete independent distributions of two sets of aspect scores of the same trait, **Eq. 18** shows that $Corr(T,Y)$, instead of being the average of $Corr(A_1,Y)$ and $Corr(A_2,Y)$, in fact differs from the average by a factor of $\frac{2}{\sqrt{2}}$. However, complete independence tends not to be observed in empirical data. In other words, $COV(A_1,A_2)$ in **Eq. 13** does not equal to zero in actual data. However, the *covariances* between two aspects of the same trait in our data do approach zero. Consequently, the actual correlations between the Big Five traits and influence styles deviate only slightly from the theoretical estimates provided in **Eq. 18.** As shown in Figure 3, the discrepancies in 30 sets of correlations range from -.10 to 0.07 (M = 0.02, SD = 0.03).

Figure 3

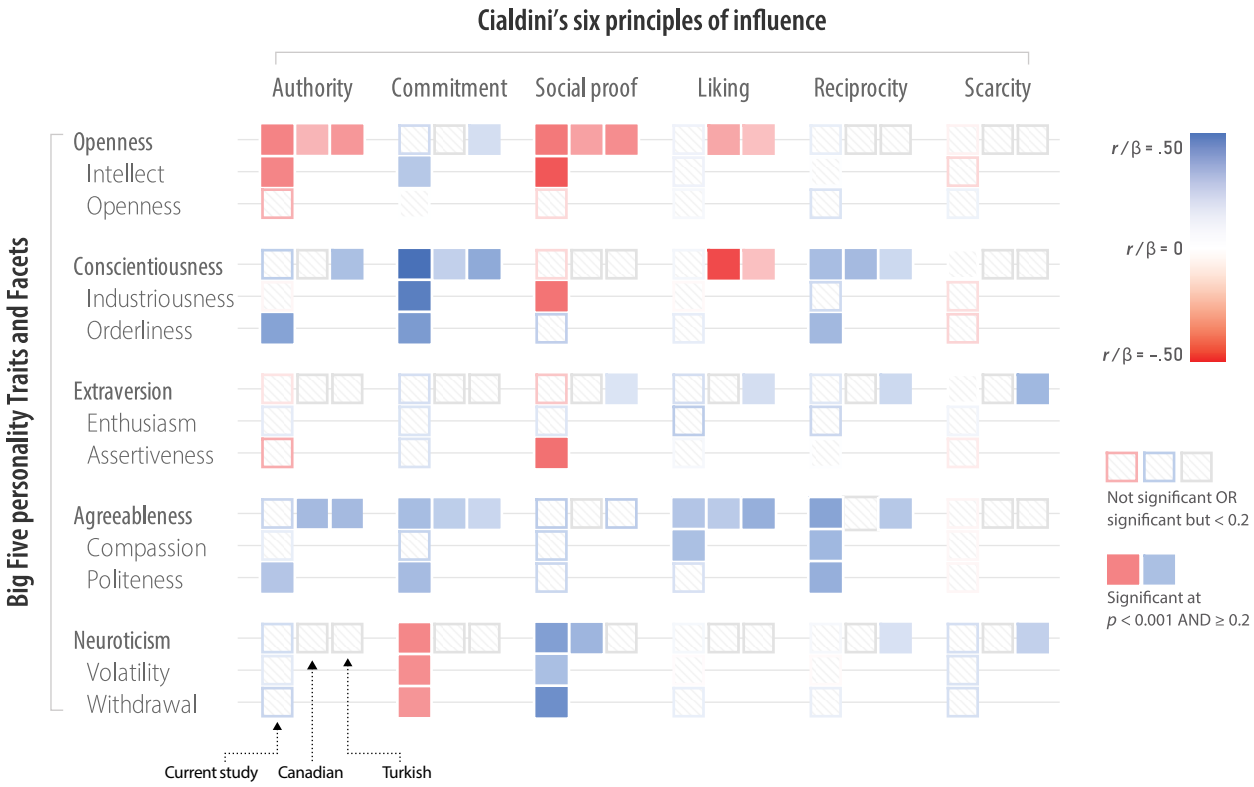
*Histogram showing the difference between: 1) theoretical correlations between influence the Big Five and influence style estimated using the formula in **Eq. 18**, and 2) actual correlations based on empirical data.*



Although detailed, Table 20 is difficult to follow when interpreting the results due to large size. In order to put results of the present study into a wider context, they were compared to those from the previous two studies – i.e., those conducted by Alkış and Temizel (2015) and Oyibo et al. (2017). Comparisons are presented in Figure 4 below. In order to make the figure more legible, original values were omitted, and replaced with color blocks. In the Figure, red indicates a negative association between the variables, while blue stands for the positive one. The saturation of the color is indicative of the strength of relationships – higher values have been represented with more saturated colors. The blocks represent correlations for the present study, and the path coefficients in structural equation models (SEM) for the previous studies, respectively. Based on discussion of effect sizes above, correlations less than 0.02 are replaced by hollow color blocks, to make larger effect sizes stand out.

Figure 4

Comparisons of present results with data from previous studies: Canadian sample from Oyibo et al. (2017) and Turkish sample from Alkış and Temizel (2015).



Notes. The color blocks indicate direction and strength of relationships between personality and influence style for the present study (left column), the Canadian sample (middle column), and the Turkish sample (right column). For the present study, the block represents correlations; for the other two samples, the block represents path coefficients in structural equation models (SEM). Solid blocks are relationships significant at $p < 0.001$ and with effect size greater than 0.20; Hollow blocks are relationships either not significant or with effect size smaller than 0.20. The above correlational results will be interpreted in detail in the next Chapter, in comparison with previous findings. Implications of the findings to persuasive technology will also be discussed.

Chapter 5. Discussion

The present research explored the psychometric behavior of the Big Five Personality Aspects (BFAS) scale (DeYoung et al., 2007), and was capable of confirming, and to a large extent replicate, the results of the original study. Secondly, this research also investigated the psychometric quality of the persuasion scale developed by Kaptein et al. (2012), and was able to make and document improvements to the scale structure. Last, and most importantly, this research examined the relationships between personality and sensitivity to different influence approaches, replicating the results of previous studies (Alkış & Temizel, 2015; Oyibo et al., 2017), and providing additional depth to the already established findings. Although some research linking the two domains already existed (Oyibo et al., 2017), the present study is the first to bring very precise and specific information about the relations between aspects of the Big Five personality and sensitivity to different influence approaches. With personality aspects being the mid-level of structure between broad traits and specific facets, it helped improve on the standard findings in the field. As a finer – more granular – look is taken at the said relationships, it can be seen that some of the straightforward interpretations offered do not hold with introduction of additional details.

There are several strengths of this study that should be noted. Firstly, as previously discussed this study allowed for a more detailed insight into relationship between the screened variables, thus making its results relevant both scientifically and practically. Apart from that, this research devoted time to demonstrating the validity of all the measures employed in the study, providing support for their future use.

One of the main strengths of this research is the size and the diversity of the collected sample. As other authors have noted (Oyibo et al., 2017), homogeneous samples can lead to inflation of relationship estimates. Apart from that, larger samples allow for more stable estimation of factor structure. This is, because factorization is a procedure known to result in misestimation in small samples (Osborne, 2015). The size of the sample reported in the study was obtained after elimination of all potentially problematic participants – such as those not paying attention to the research materials, or those only skimming through them. Results obtained here are expected to be reliable and generalizable – which remains to be confirmed in future replications.

5.1 The Aspects Scale

As was noted before, one of the goals of the present research was to attempt to replicate the results reported by DeYoung et al. (2007) in the original validation study of their Big Five Aspects Scale. Although there have been many cases of the uncritical usage of this BFAS scale by other researchers (see Weisberg et al. (2011), for an example), to my knowledge there had never been any comprehensive attempt at re-validating this BFAS scale. The present research did so, and replicates the original findings (DeYoung et al., 2007) to a large extent. This demonstrated that the Aspects Scale is psychometrically sound, and has the same structure as reported by original

authors. To some extent, the theoretical discussion of DeYoung et al. (2007) about suppression between aspects of a single trait as an indicator of discriminative validity has also been replicated. A similar pattern of relationships as originally described by the authors ((DeYoung et al., 2007, p. 889) was observed in present study with regard of correlations between the Aspects Scale and – in this case – an influence scale (Kaptein et al., 2012). For example, De Young and colleagues have identified suppressing relationships between aspects by noting that there are situations in which one of the aspects correlates with an external measure, while the other does not. In such situations, traits usually correlate with the external measure in the same direction as the aspect (DeYoung et al., 2007, p. 889). The very same pattern could be seen in the correlations between the Aspects Scale and the influence scale of Kaptein et al. (2012). Overall, the validation study of the aspects scale can be considered replicated in the present research. The BFAS scale performed slightly better than the original authors have reported, and we were able to fully replicate its factor structure, with only miniscule differences in numerical values of loadings of some of the items.

5.2 The Influence Scale

Similar to the previously discussed scale, this research also attempted to replicate the original validation study of the Influence Scale developed by Kaptein et al. (2012). This, however, led to some conflicting results. Although six factors were retained as was originally reported by Kaptein et al. (2012), it was found that the psychometric justification of this decision is dubious. Hardly any psychometric support for it could be found. Returning back to the original paper (Kaptein et al., 2012), it can be argued that the decision to retain six factors was somewhat arbitrary, with the authors failing to demonstrate convincing and sufficient support for it. In the present research, attempts at replication of the six factors with rotations reported in the original paper were unsuccessful. No simple and theoretically sound structure was obtained. After removal of the several items, the desired structure was obtained, but an open question of validity of this scale remains. Alkış and Temizel (2015) also conducted a factor analysis to validate the Turkish-translated version of the scale, and half of the currently removed items overlap with theirs.

It is possible that a six-factor solution is not the most appropriate one for this particular instrument. Although there is a strong theoretical foundation (Cialdini, 2001) for such a solution, it is possible that the scale in its entirety is not discriminative enough to capture all the nuances between the proposed influence styles, or that the underlying theory is too sophisticated to be measured with a scale of this length and detail. Either of the two being the case, the measurement instrument should be improved so as to adequately tap into the assessment of a person's sensitivity to influence principles. The findings from this study can be seen as a first step in that direction.

5.3 Relationships Between Aspects and Influence Styles

Arguably the most important part of this research is the aim of understanding the relationships between mid-level personality manifestations and influence styles. As argued before, this insight could allow for better management in the bandwidth-to-fidelity trade off. Trait-level analysis usually employed in personality research conveys information quickly (high bandwidth); the facet-level analysis relates a lot of details, but is very slow (high fidelity). By analyzing the level between the two, namely the personality aspect level, one can convey information both quickly and with an ample level of detail. It is important to reiterate that the present study worked with a fairly large sample, which allowed even for weak correlations to be deemed statistically significant. It has been pointed out elsewhere in the psychometric literature that such weak correlations often are not practically significant, and that it could be misleading to ascribe too much meaning to them (Field, 2013).

Next, we will explore the five factors and the underlying aspects correlations with the influence styles one by one.

5.3.1. Agreeableness

Agreeableness in this research demonstrated the highest relationships with influence styles appealing to Reciprocity, Commitment and Liking. This is somewhat in line with previous findings that indicate that appeals to Authority are viable paths to reach highly agreeable individuals (Alkış & Temizel, 2015). While both aspects show the same pattern as the overall trait of Agreeableness for the Reciprocity style, the same cannot be said for other styles. Although the overall correlation of Agreeableness with Authority is small, it is important to note that this relationship is not uniformly distributed to the aspects: Compassion is not important when appealing to Authority, while Politeness shows an important correlation. The conclusion of Oyibo et al. (2017) that people high in Agreeableness are more compliant, thus showing preference for this type of influence, should be understood more precisely, in greater resolution – individuals high in Politeness show greater sensitivity to this type of influence, while Compassion plays no role whatsoever. For the influence style of Liking, the situation is reversed – Politeness bears little influence, while the greatest importance is of the Compassion aspect. This expands on the further knowledge, pointing to the notion that different aspects of a single trait can have very different relations to a third variable.

5.3.2. Conscientiousness

Conscientiousness is the trait that demonstrates the best consistency in the literature. It has been recognized as significant in all three studies. As Oyibo et al. (2017) put it, when explaining the relationship between Reciprocity, Commitment and Conscientiousness: "*[highly] conscientious individuals are more self-disciplined, dependable and responsible […] as such, they have higher inclination to keep their commitment and return favor*" (Oyibo et al., 2017, p. 16). The findings in the present study do, indeed, also support such reasoning. But, interestingly, this work also provides additional – more specific – insights. While the Orderliness aspect accounts for the

majority of the connection between Conscientiousness and one's sensitivity towards a Reciprocity style of influence, this situation is reversed for Commitment; Industriousness is more important for the sensitivity towards the Commitment influence style. This insight enables a more refined understanding of adaptive persuasive technologies (Kaptein et al., 2015), as it shows that two distinct dispositions are at play when deciding on sensitivity of an individual to a certain influence style. By examining relationships of this trait, it can be seen that there is additional knowledge, not available until now about the distinct links the lower levels of the conscientiousness trait can for with Commitment and Reciprocity.

5.3.3. Extraversion

Extraversion, in the present research, performed similar to findings in previous studies. In fact, it showed little importance for the prediction of influence styles in general (Alkış & Temizel, 2015; Oyibo et al., 2017). At least partially, this lack of effects at the trait level can be explained out of low fidelity of a trait-level analysis. Neither of the previous papers had reported a significant link between Social Proof and Extraversion measures (Alkış & Temizel, 2015; Oyibo et al., 2017). This is confirmed in the present study as well. When looking at the aspect level, however, a strong negative correlation between Assertiveness and Social Proof was observed. Those who are less orientated towards domination in a group seem to be more sensitive to its norms, which is an interpretation in line with previous literature on the topic (DeYoung et al., 2007). Results discussed here show that there are no particular benefits of introduction of the aspects as a more granular measure; the relationships do not show important differences when evaluated at a trait level compared to aspect level.

5.3.4. Openness-to-Experience

Openness-to-Experience is a trait that has shown important and significant correlations in previous research with influence styles appealing to Authority, Social Proof and Liking (Alkış & Temizel, 2015; Oyibo et al., 2017). The findings reported in the present study replicate these insights to an extent, but, at the same time, fail to demonstrate any correlation between Openness-to-Experience (or any of its underlying aspects) and Liking. The other two relationships were successfully replicated. Interestingly, the more specific Intellect aspect proves to be much more important than the overarching Openness dimension for predicting one's sensitivity to both appeals on Authority and Social Proof.

5.3.5. Neuroticism

Neuroticism and its two aspects Volatility and Withdrawal are positively related to Social Proof, but negatively related to Commitment. The positive association with Social Proof replicates Oyibo and colleague's (2017) findings among Canadian population, but not Alkış and Temizel's Alkış

and Temizel (2015) results for Turkish population. According to Oyibo and colleague, people high in Neuroticsm may be more inclined to agree with others due to their yearning to "not do things wrong", and in such a way driving their preference for Social Proof strategy (2017, p. 16). The negative relationship with Commitment, however, was not found in previous studies, and hence await further investigation before being adopted in practice.

5.3 Cultural Differences in The Correlational Results

The present sample consists mostly of participants from individualistic Western cultures (primarily British and American). This composition makes an intriguing comparison between the previous two studies on the same subject (Alkış & Temizel, 2015; Oyibo et al., 2017). The Canadian sample (Oyibo et al., 2017) is culturally similar to the present sample, while distinct from the Turkish sample (Alkış & Temizel, 2015; Oyibo et al., 2017).

Together, the present study successfully replicated seven out of nine (78%, including one partial replication) significant relationships found in previous studies (Alkış & Temizel, 2015; Oyibo et al., 2017), suggesting universality of these relationships across cultures. The current study also expectedly replicated the one relationship (100%) between Neuroticism and Social Proof found only in the Canadian sample but not in the Turkish sample.

Nevertheless, for the nine effects found only in the Turkish sample, the current study replicated only three of them (33%, including two partial replications). Notably, four out of the six non-replicated relationships involve Extraversion. For one positive relationship between Extraversion and Social Proof the present study found even the opposite, negative effect. A possible explanation may be that Extraversion is a socially desirable trait among Westerners (Beck & Cartwright, 1982), and more prevalent among Western cultures (Terracciano et al., 2005). Extraverts might not be as distinct as in Turkish culture and responsive to Social proof, Liking, Reciprocity, and Scarcity.

5.4 Contribution of The Present Research

The research presented here has contributed in the two main aspects: (1) the scientific inquiry into the relationship between personality and preference for certain influence approaches benefited from the additional details provided by this study; the results of this study can be utilized to improve efficiency of automated persuasive technology. As noted, more details reported by this study open the door for future research to implement even more granular measurements or to employ a whole different approach to the operationalization of personality and / or influence. On the practical side, (2) automated persuasive technology can benefit from this insight by providing a 'head start'. Although most recommendation algorithms today are based on iterative change of parameters based on the user's response in one form or the other, we believe that these results can help improve efficacy of such applications by giving them a 'head start' instead. The system could use relationships reported here to estimate a starting point of presentation that is different from a

random starting point, thus potentially lowering time and resources needed to find the optimal influence strategy for a given user.

5.5 Limitations and Recommendations

The strength of the present study lies in its methodologically sound execution of factor analyses with a sufficiently large sample. However, it also had several limitations. First, and importantly, this study did not allocate enough time and resources to attempt to fully validate either of the used scales. A full validation would require demonstration of ample convergent and divergent validity, as well as good predictive validity of both of the scales (Field, 2013). If resources allow, a full validation study would report on test-retest reliability of used scales and investigate their correlations with or predictions of other similar measurements. Second, the study used only the explicit measurement of influence styles (i.e. the participants' self-report). It is unclear how readily the explicit self-reports will translate to implicit behavioral responses to persuasive attempts. Third, the current results, when compared with previous studies using Canadian versus Turkish sample, suggest cultural differences in personality and influence style. Although the current sample size is large, it is not a targeted sample. It primarily consisted of participants from the US and the UK, and thus was not diverse enough to statistically test the cross-cultural differences that the results hint at. Conducting such cross-cultural comparison in the future would require proactively expand data collection on participants from collectivist cultures.

5.6 Ethical Considerations

The association between personality and influence style can be readily incorporated into the design of persuasive technologies. On the one hand, this type of personalized persuasive technologies can often lead to better outcomes for individuals and the society as a whole. For example, people genuinely enjoy advertisements that are tailored to their personality than those that are not (Matz et al., 2017). Promoting healthy behaviors through personalization leads to greater effectiveness and lower burden on public health expenditures (Noar et al., 2007). On the other hand, the technologies can also pose ethical risks. The implementation of such persuasive technologies requires obtaining users' personalities, which can now be inferred from individuals' digital footprints (Kosinski et al., 2013; Youyou et al., 2015). Users might not want to consent to the release of such personal and private information, or they might not fully understand the full scope of how their data are used for personalized persuasive technologies. Legislative bodies around the world should strive to design specific guidance to govern how personal data are used for persuasive technologies.

Chapter 6. Conclusion

The field of mass persuasive technologies sees growing competition to strive for accuracy and efficiency in influence. One shown and proven way of achieving better performance is through personalization of persuasive messages. Scientifically, personalized persuasive technologies work, because individuals' unique, personal characteristics determine that they react differently to various influence styles carried in the persuasion messages. Researchers therefore seek to disentangle the underlying mechanisms and find the one-to-one correspondence between personality traits—an important type of individual differences—and influence styles. Past research has mapped the correspondence, but yielded partially conflicting results, likely because the personality at the *trait* level is an instrument not nuanced enough in capturing individual differences as they relate to influence styles.

In response to the current situation, this thesis went down a level in the personality hierarchy and examined personality *aspects* in the context of personalized persuasive technologies. The main goal of the study was to answer the question "*Which of Cialdini's influence styles are most effective for which Big Five personality aspects?*" To answer the question, a correlational study was conducted with a sample recruited from online research platforms. These were appropriate participant pools for the current research purposes, because these participants are Internet users, and personalized persuasive technologies are mostly adopted digitally. Although the Five-Factor Model is a well-established personality framework, personality aspects, as measured by the Big Five Aspects Scale (BFAS) had not been properly validated since its original development. A secondary goal of the project thus was to validate the scale. Once validated, each personality aspect, and its corresponding trait, was correlated with each of the six influence styles.

The present study replicated a majority of associations between influence style and personality at the trait level found in previous research with similar objectives. Agreeableness emerges as most responsive to persuasive strategies at the trait level. More importantly, the results on personality aspect refined previous understanding. The association between Authority and Agreeableness, for instance, was restricted to the Politeness aspect and did not extend to the Compassion aspect. These higher-resolution findings, as thoroughly outlined in Chapter 4, will help future designers of personalized persuasive technologies to achieve better performance. The findings also have a cultural implication. The present study, based on sample of Western participants, aligned better with a previous study based on Canadian sample than the one based on Turkish sample, suggesting the interplay between culture and personality-influence style link.

6.1 Future Research

The outcomes of the current research open up several potential research avenues in the domain of personality and influence.

Firstly, following the recommendations of Kaptein et al. (2015), one could also seek to demonstrate that the explicit measure of influence approach measurement (scale), as used in the present study, is predictive of an implicit measure (behavior). Researchers could also examine whether implicit, behavioral measures of influence style display similar association with personality aspects as revealed in this thesis.

Secondly, the present study's treatment of items in the influence scale differs from previous two studies, according to results from factor analysis evaluating the data structure. It would be interesting for future researchers to attempt to revise the Kaptein et al. (2012) influence scale, such that its empirically derived factor structure would better reflect the one hypothesized theoretically. The rationale behind the development of the BFAS from existing Big Five instruments could be used and applied to the influence scale as well. It is possible that there are some higher-order factors that should be explicitly operationalized. It could also be the case that Ciadini's (2001) theory is simply too detailed for the actual influence scale, and that a new measure should take this high level of detail more seriously.

Thirdly, since the present findings in combination with previous results hint at the role of culture, researchers could conduct a more systematic cross-cultural study to examine it more thoroughly. Researchers could proactively replicate the current study on several groups of participants from different cultures and observe whether the results align with one another by cultural boundaries (Poortinga & Vijver, 2002).

Lastly, applied researchers could already begin converting the found relationship between personality aspect and influence style into prototype products to test the ecological validity of the findings. For example, researchers could provide polite people (an aspect of agreeableness) with authority-driven ads to see whether the ads are more effectively than if they are shown to agreeable people in general.

Taken together, current study shows that when looking beyond the *traits* into the realm of *aspects*, distinctive mappings between personality and persuasion style unveil themselves.

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Appendix

Table A1

Neuroticism Factor loadings from De Young et al. and current study

		De Young et al.		Current study	
	Source	Withdrawal	Volatility	Withdrawal	Volatility
	Volatility				
1	Get angry easily	*	.75	+	.84
2	Get upset easily	*	.75	.33	.54
3	Change my mood a lot	*	.63	+	.55
4	Am a person whose moods go up and down easily	*	.71	.35	.51
5	Get easily agitated	*	.75	+	.69
6	Can be stirred up easily	*	.70	+	.73
7	Rarely get irritated (R)	*	.64	+	.73
8	Keep my emotions under control (R)	*	.51	+	.52
9	Rarely lose my composure (R)	*	.39	+	.59
10	Am not easily annoyed (R)	*	.57	+	.75
	Withdrawal				
1	Am filled with doubts about things	.65	*	.79	+
2	Feel threatened easily	.62	*	.49	+
3	Worry about things	.58	*	.76	+
4	Am easily discouraged	.65	*	.60	+
5	Become overwhelmed by events	.57	*	.52	+
6	Am afraid of many things	.63	*	.66	+
7	Seldom feel blue (R)	.41	*	.48	+
8	Feel comfortable with myself (R)	.47	*	.66	+
9	Rarely feel depressed (R)	.51	*	.63	+
10	Am not embarrassed easily (R)	.42	*	.60	+
	Correlation between factors:	.59		.66	

Notes.

Loadings achieved on the 'university' sample in the DeYoung et. al.'s paper reported here.

* loadings not reported in the original paper.

+ loadings lower than .30 suppressed to improve readability.

(R) indicates that item was reversely coded.

Table A2

Agreeableness factor loadings from De Young et al. and current study

	Source:	De Young et al.		Current study	
		Compassion	Politeness	Compassion	Politeness
Compassion					
1	Feels others emotion	.60	*	.71	+
2	Inquire about others' well-being	.64	*	.71	+
3	Sympathize with others' feelings	.72	*	.82	+
4	Take an interest in other people's lives	.70	*	.68	+
5	Like to do things for others	.60	*	.54	+
6	Am not interested in other people's problems (R)	.50	*	.67	+
7	Can't be bothered with other's needs (R)	.65	*	.58	+
8	Am indifferent to the feelings of others (R)	.51	*	.64	+
9	Take no time for others (R)	.59	*	.55	+
10	Don't have a soft side (R)	.47	*	.36	+
Politeness					
1	Respect authority	*	.33	.12	.13
2	Hate to seem pushy	*	.30	.11	.21
3	Avoid imposing my will on others	*	.42	+	.41
4	Rarely put people under pressure	*	.48	+	.44
5	Insult people (R)	*	.58	+	.50
6	Believe that I am better than others (R)	*	.51	+	.47
7	Take advantage of others (R)	*	.69	+	.69
8	Seek conflict (R)	*	.52	+	.60
9	Love a good fight (R)	*	.54	+	.51
10	Am out for my own personal gain (R)	*	.50	+	.39
	Correlation between factors:	.45		.43	

Notes. Loadings achieved on the 'university' sample in the DeYoung paper reported here.

* loadings not reported in the original paper.

+ loadings lower than .30 suppressed to improve readability; an exception was made for two politeness items that had weak loadings.

(R) indicates that item was reversely coded.

Table A3

Conscientiousness factor loadings from De Young et al. and current study

	Source	De Young et al.		Current study	
		Industriousness	Orderliness	Industriousness	Orderliness
Industriousness					
1	Carry out my plans	.54	*	.64	+
2	Finish what I start	.54	*	.66	+
3	Get things done quickly	.46	*	.54	+
4	Always know what I am doing	.49	*	.53	+
5	Waste my time (R)	.62	*	.75	+
6	Find it difficult to get down to work (R)	.64	*	.74	+
7	Mess things up (R)	.54	*	.54	+
8	Don't put my mind on the task at hand (R)	.45	*	.52	+
9	Postpone decisions (R)	.51	*	.63	+
10	Am easily distracted (R)	.53	*	.59	+
Orderliness					
1	Like order	*	.56	+	.59
2	Keep things tidy	*	.60	+	.58
3	Follow a schedule	*	.54	.41	.40
4	Want everything to be "just right"	*	.56	+	.55
5	See that rules are observed	*	.45	+	.40
6	Want every detail taken care of	*	.52	+	.46
7	Leave my belongings around (R)	*	.47	+	.42
8	Am not bothered by messy people (R)	*	.26	+	.61
9	Am not bothered by disorder (R)	*	.31	+	.63
10	Dislike routine (R)	*	.41	+	.46
Correlation between factors:		.38		.32	

Notes. Loadings achieved on the 'university' sample in the DeYoung's reported here.

***** loadings not reported in the original paper.

+ loadings lower than .30 suppressed to improve readability;

(R) indicates that item was reversely coded.

Table A4

Extraversion factor loadings from De Young et al. and current study

		De Young et al.		Current study	
	Source	Assertiveness	Enthusiasm	Assertiveness	Enthusiasm
Enthusiasm					
1	Make friends easily	*	.60	+	.57
2	Warm up quickly to others	*	.66	+	.62
3	Show my feelings when I'm happy	*	.46	+	.62
4	Have a lot of fun	*	.63	+	.60
5	Laugh a lot	*	.62	+	.57
6	Am hard to get to know (R)	*	.61	+	.74
7	Keep others at a distance (R)	*	.61	+	.71
8	Reveal little about myself (R)	*	.46	+	.62
9	Rarely get caught up in the excitement (R)	*	.44	+	.46
10	Am not a very enthusiastic person (R)	*	.56	+	.58
Assertiveness					
1	Take charge	.71	*	.83	+
2	Have a strong personality	.69	*	.58	+
3	Know how to captivate people	.53	*	.49	+
4	See myself as a good leader	.69	*	.75	+
5	Can talk others into doing things	.47	*	.50	+
6	Am the first to act	.63	*	.58	+
7	Do not have an assertive personality (R)	.57	*	.68	+
8	Lack the talent for influencing people (R)	.62	*	.60	+
9	Wait for others to lead the way (R)	.52	*	.72	+
10	Hold back my opinions (R)	.61	*	.40	+
Correlation between factors:		.52		.51	

Notes. Loadings achieved on the 'university' sample in De Young et al. paper reported here

* loadings not reported in the original paper.

+ loadings lower than .30 suppressed to improve readability.

(R) indicates that item was reversely coded.

Table A5

Openness factor loadings from De Young et al. and current study

		De Young et al.		Current study	
	Source	Intellect	Openness	Intellect	Openness
Intellect					
1	Am quick to understand things	.65	*	.7	+
2	Can handle a lot of information	.65	*	.71	+
3	Like to solve complex problems	.51	*	.51	+
4	Have a rich vocabulary	.48	*	.40	+
5	Think quickly	.65	*	.64	+
6	Formulate ideas clearly	.60	*	.52	+
7	Have difficulty understanding abstract ideas (R)	.55	*	.49	+
8	Avoid philosophical discussions (R)	.45	*	.25	.36
9	Avoid difficult reading material (R)	.39	*	.45	+
10	Learn things slowly (R)	.55	*	.79	+
Openness					
1	Enjoy the beauty of nature	*	.47	+	.43
2	Believe in the importance of art	*	.64	+	.72
3	Love to reflect on things	*	.48	+	.29
4	Get deeply immersed in music	*	.44	+	.38
5	See beauty in things that others might not notice	*	.47	+	.56
6	Need a creative outlet	*	.40	+	.51
7	Do not like poetry (R)	*	.51	+	.55
8	Seldom get lost in thought (R)	*	.40	+	.26
9	Seldom daydream (R)	*	.35	+	.22
10	Seldom notice the emotional aspects of paintings and pictures (R)	*	.47	+	.61
Correlation between factors:		.33		.33	

Notes. Loadings achieved on the 'university' sample in the DeYoung's paper reported here.

* loadings not reported in the original paper.

+ loadings lower than .20 suppressed to improve readability;

(R) indicates that item was reversely coded.

Table A6

Factor loadings of items from the Ciadini influence scale [original]

Original scale	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Reciprocity 1	.69					
Reciprocity 2	.68					
Reciprocity 3	.79					
Reciprocity 4	.72					
Reciprocity 5	.71					
Scarcity 1		-.71				
Scarcity 2						.50
Scarcity 3		-.65				
Scarcity 4						.68
Scarcity 5		-.82				
Authority 1			.73			
Authority 2			.71			
Authority 3			.77			
Authority 4			.51			
Commitment 1				-.79		
Commitment 2				-.75		
Commitment 3						.51
Commitment 4				-.83		
Commitment 5				-.62		
Social Proof 1						.51
Social Proof 2					.65	
Social Proof 3					.56	
Social Proof 4					.45	
Liking 1					.46	
Liking 2					.47	
Liking 3					.69	

Notes. PCA extraction with direct oblimin rotation ($\Delta = 0$). Loadings lower than .30 suppressed to improve readability.

Table A7

Correlations between personality aspects and traits with influence styles – original influence scale

Scale	Reciprocity	Scarcity	Authority	Commitment	Social proof	Liking
Neuroticism	.026	.076	.122**	-.169***	.278***	.109*
Volatility	-.008	.057	.069	-.148**	.175***	.057
Withdrawal	.058	.081	.156***	-.16***	.335***	.145**
Agreeableness	.327***	.065	.13**	.247***	.226***	.183***
Compassion	.26***	.062	.036	.208***	.214***	.198***
Politeness	.291***	.046	.195***	.206***	.162***	.102*
Conscientiousness	.239***	.028	.177***	.515***	-.019	.015
Industriousness	.137**	-.043	-.018	.451***	-.183***	-.065
Orderliness	.259***	.097*	.327***	.383***	.174***	.099*
Extraversion	.089*	.043	-.052	.173***	-.033	.083
Enthusiasm	.147**	.089*	.057	.139**	.156***	.171***
Assertiveness	.009	-.013	-.144**	.16***	-.208***	-.026
Openness	.063	.031	-.236***	.164***	-.144**	-.018
Intellect	.01	-.062	-.22***	.199***	-.229***	-.057
Openness	.1*	.126**	-.163***	.059	.011	.035

Notes. * indicates significant result at $p < .05$; ** indicates significant result at $p < .01$; *** indicates significant result at $p < .00$

Table A8

The original Susceptibility to Persuasive Strategies (STPS) Scale

Influence style	Items
Reciprocity	When a family member does me a favor, I am very inclined to return this favor. I always pay back a favor. If someone does something for me, I try to do something of similar valuetorepay thefavor. When I receive a gift, I feel obliged to return a gift. When someone helps me with my work, I try to pay them back.
Scarcity	I believe rare products (scarce) are more valuable than mass products. When my favorite shop is about to close, I would visit it since it is my last chance. I would feel good if I was the last person to be able to buy something. When my favorite shampoo is almost out of stock I buy two bottles. Products that are hard to get represent a special value.
Authenticity	I am very inclined to listen to authority figures. I always obey directions from my superiors. I am more inclined to listen to an authority figure than a peer. I am more likely to do something if told, than when asked.
Commitment	Whenever I commit to an appointment I always follow through. I try to do everything I have promised to do. When I make plans I commit to them by writing them down. Once I have committed to do something I will surely do it. If I miss an appointment, I always make it up.
Consensus	If someone from my social network notifies me about a good book, I tend to read it. When I am in a new situation I look at others to see what I should do. I often rely on other people to know what I should do. It is important to me to fit in.
Liking	When I like someone, I am more inclined to believe him or her. I will do a favor for people that I like. The opinions of friends are more important than the opinions of others.