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Personality & Negotiation:
a study with a new approach

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"We know what we are, but know not what we may be"

Ophelia *in* Shakespeare's Hamlet (IV.v.43-44)

Abstract

After a hiatus in the research of individual differences within negotiation, there's been a surge of renewed interest for the past years followed by several new findings. With an increasing trend of interdependence and strategic alliances governing the current corporate reality, negotiation is rapidly becoming a paramount element in managers daily working lives, and now more than ever there is a need to understand how these particular moments of interpersonal dynamics can be leveraged towards better outcomes for both sides, whether in terms of economic gain or relationship development.

The present study is aimed at exploring the effects that personality, as structured by the Five-Factor Model, has over negotiation behavior and decision-making in order to not only compare any possible findings to previous theoretical constructs as well as past research, but also to prescribe advice to future negotiators. For this purpose, data from a sample of volunteering participants was collected in regard to their personality and behavior during two computerized negotiation simulations, one with the potential for joint gains and the other following a more traditional bargaining scenario.

Significant results for both settings were found, with the personality dimensions of Agreeableness, Conscientiousness and Extraversion frequently reoccurring as the most statistically relevant, although exhibiting different roles according to the type of negotiation and measure being registered. Findings thus suggest a multidimensional relationship between personality and situational variables given how specific traits can either become liabilities or assets depending on whether the potential for value creation is present or not.

Resumo

No seguimento de várias novas descobertas e ângulos de investigação, o estudo das diferenças individuais no âmbito da negociação tem vindo a ser objeto de um recente e renovado interesse. A par com uma crescente interdependência e alianças estratégicas na realidade empresarial atual, a negociação está rapidamente a tornar-se um elemento fundamental no dia-a-dia dos gestores, assumindo cada vez maior relevância no alcançar de objetivos cada vez mais elevados, seja em termos de rendimento económico ou de relacionamento interpessoal.

O presente estudo pretende explorar os efeitos que a personalidade conforme estruturada pelo modelo dos cinco fatores possa ter sobre o comportamento e tomada de decisão durante o processo de negociação. Não apenas para se poder comparar quaisquer resultados encontrados com construções teóricas e investigações anteriores, mas também com vista à prescrição de conselhos para gestores. Neste sentido, foram recolhidos dados de uma amostra composta por participantes voluntários, relativamente à sua personalidade e comportamento durante duas simulações informáticas de negociação, uma com a possibilidade de se chegar a ganhos conjuntos e outra seguindo uma estrutura mais tradicional de compra e venda.

Foram encontrados resultados significativos para ambos cenários, sendo que as dimensões de Afabilidade, Conscienciosidade e Extroversão apareceram como as de maior interesse, embora com diferentes papéis e pesos consoante o tipo de negociação e medida registada. Deste modo, as conclusões sugerem a existência de uma relação multidimensional entre personalidade e variáveis situacionais, pois diferentes traços podem assumir tanto uma influência positiva como negativa, dependendo se existe potencial de criação de valor ou apenas conquista.

Palavras-chave: Personalidade, negociação, cinco fatores, dilema do prisioneiro
Classificação JEL: M10, M12

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List of Abbreviations

AP   Aspirational Value

RP   Reservation Price

ZD   Zero-determinant

FFM   Five-Factor Model

IPD   Iterated Prisoner's Dilemma

TFT   Tit-for-Tat

UOT   Unreasonable Offer Threshold

GTFT Generous Tit-for-Tat

MBTI Myers-Briggs Type Indicator

ZOPA Zone of Possible Agreement

BATNA Best Alternative to Possible Agreement

NEO-FFI NEO Five-Factor Inventory

Introduction

A frequently cited experiment by Rosenthal and Ambady (1992) first introduced the term of *thin slice*, often defined as an intuitive processing able to detect patterns and form judgments based on a short window of time and experience (Gladwell, 2007; Albrechtsen et al., 2009). In the original design, they found out that students could successfully predict ($r > .70$) an instructor's ratings at the end of the year just by watching thirty seconds of a silent movie depicting that teacher lecturing a class. These results were further replicated with videos as short as six seconds and similarly observed in other contexts such as employment selection interviews (Webster and Anderson, 1967; Wright, 1969), a setting likened to a conflict situation by Webster (1982) and argued to be present during negotiations (Rosenthal, 1988). Recent findings (e.g., Curhan and Pentland, 2007) confirm this effect and reinforce the long theorized question of how interpersonal interaction and conflict may be more than a linear task of explicit information-processing. The answer, however, may lie on the first of the five basic axioms of human communication proposed by Paul Watzlawick (1967), that of which *One Cannot Not Communicate*. Every action, posture, movement, gesture, speech manner, paralinguistic element and facial expression constitutes what is known as expressive behavior and contributes to the impressions formed about others during the everyday life (Riggio and Friedman, 1986). Allport (1937) believed expressive behavior to be a proxy of personality, and indeed, research has provided robust links between self-reported ratings with those done by strangers (Albright et al., 1988; Funder and Colvin, 1988; Watson, 1989; Borkenau and Liebler, 1993; Lippa and Dietz, 2000), demonstrating a correspondence between what is expressed and what is intrinsic from one's own point of view. A requirement for interpersonal interactions is thus that of attribution, also observed to be present during negotiations and argued to play a central role on the objective outcomes and strategic decisions (Schelling, 1960; Orvis et al., 1976; Baron, 1990). Furthermore, as an ubiquitous phenomenon and a model for interpersonal relations and conflict (Kelley and Thibaut, 1954), negotiation is a valuable context which allows to explore the effects of the observed dispositional consistencies within individuals that are present across conflict situations (Sternberg and Soriano, 1984; Sternberg and Dobson, 1987).

From this follows the pressing relevance of studying personality as part of negotiation. Not only may it have the fundamental and expected role in one's decision-making and attribution processes, goal setting, social and conversational dynamics, all ultimately affecting outcomes, but also as a driver behind what is expressed and what is inferred by others, similarly shown to predict and influence the denouement. The insights to be withdrawn from such study would be beneficial not just from a theoretical standpoint

through the exploration of the intrinsic mechanism behind negotiation behavior, but also practical by increasing the awareness over one's characteristic traits and their potential impact on most bargaining settings as well as an additional dimension in terms of the interpersonal and environmental interpretation itself.

This project's focus is the attempt to shed new light in the turbulent field of individual differences within negotiation, hinging on the aforementioned relevance as departure point. However, contrary to the usual dyadic interactions often used in laboratory settings to study negotiation behavior, this project will resort to a fresh approach involving a computerized platform where individuals will face both distributive and integrative negotiation simulations. This research method should be able to provide a new lens and layer of findings, but more importantly, to distill the effects of personality over certain objective negotiation outcomes by reducing the amount of social noise and increasing standardization. Interpersonal interaction and conflict is a complex phenomenon with a multitude of information input sources, both external and internal. If decisions and behavior are the natural consequence of a constellation of data processing, it appears to make sense to dissect and manipulate this data in smaller parts in order to infer relationships. As a result, it is argued that in the absence of elements such as the counterpart's expressive behavior, a priori judgments and thin-slicing which invariably lead to expectancy effects and cognitive biases, the role of more independent internal dispositions such as personality traits may emerge in clearer definition.

1.1 Research questions and hypotheses

The problem statement or research question for this project contemplates to what extent fluctuations in the personality dimensions encompassed by the Five-Factor taxonomy – Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness – are related and can predict objective outcomes in both distributive and integrative negotiations. More specifically, can differences in personality traits influence the value of the first offer, agreement deal and overall process (initiative, competitiveness) in bargaining situations? What about when the possibility for joint gains are present, do all participants embrace it equally? Are there significant differences between those who prefer to cooperate rather than compete? Or among those who are able to forgive an exploitative sucker punch during a negotiation streak otherwise marked by cooperation? These are some of the questions that this study will attempt to answer.

For these purposes, participants will be asked to fill out the NEO-FFI personality inventory followed by two computerized negotiation simulations, the first consisting on the purchase of a used car where the participant will assume the role of buyer – distributive negotiation – and the second on an Iterated Prisoner's Dilemma framework used as a proxy for a negotiation scenario where value creation (joint gains) is possible – integrative

negotiation. Different measures will be registered in both simulations such as the value of the agreement deal for the first and the degree of cooperativeness for the second. In addition, participants will also be asked to answer a short survey after each simulation and report their levels of satisfaction, self-perceived competitiveness and so on.

In terms of hypotheses and predictions involving the *Big Five* personality traits as explanatory variables, Agreeableness has been found to be related with cooperativeness, generosity and prosocial conflict resolution behavioral preferences which in turn result in fewer demands and more concessions (Barrick and Mount, 1991; McCrae and John, 1992; De Dreu and Van Lange, 1995; Jensen-Campbell et al., 1996). Consequently, Agreeableness is predicted to be a liability in the measures for the distributive negotiation but an asset for when joint outcomes are present in the integrative negotiation. Conscientiousness, as a dimension often linked with planning and task-oriented behavior (Aronoff and Wilson, 1985; McCrae and John, 1992), is expected to help high scoring individuals to achieve better objective results in both negotiations. Conversely, Extraversion and Neuroticism are predicted to play a less predominant role with mixed effects, even though while the former has been described to be accompanied by a greater concern for social ties (Barry and Friedman, 1998), some facets (e.g., Assertiveness - see Elfenbein et al., 2008) can have an offsetting effect. Openness to Experience is estimated to have the weakest effect over the experiment measures.

This dissertation loosely follows the IMRaD structure, the most prominently used norm for research articles published in scientific journals. As such, it is mainly divided in the introduction, literature review, method, results, discussion and conclusion. In this introduction, the relevance of this project's subject and goals as well as the research questions and hypotheses were covered. In the following section of the literature review, a brief history, explanation and research state of personality, especially the Five-Factor model, and negotiation, including prisoner's dilemma and individual differences, is summarized and defines the constructs underlying the subsequent empirical phases. The method section will detail the study procedure and measures for the data collection, while the statistical analysis process and outputs will comprise the results section. The discussion will connect back to this introduction and articulate the hypotheses here proposed with the results obtained, existing theory and research. In the last section before the conclusion, possible limitations and suggestions for the future are also mentioned. In addition, the attached annexes help clarify the methodology employed so as to facilitate any potential replication.

Literature Review

2.1 Personality

In the south of Italy, more specifically at the Naples National Archaeological Museum, a vase dating back to Ancient Greece – 410 BC – seems to be one of the first pieces of evidence depicting the use of masks during theatrical plays. These masks, then called *prosōpon*, were a fundamental icon of classical Greek theater as it allowed actors to configure their outward appearance according to the role they played. Some years later one of such masks would be known as *persona* in the Latin language, which in turn became the etymological precursor to the word we nowadays know as personality.

It is thus worth observing that from this particular standpoint personality has often been linked to the external and observable characteristics one shows to others, having been consequently defined as what can be seen from the outside (Schultz and Schultz, 2004). However, personality in its contemporary and multidimensional form encompasses much more than what merely lies at the surface and digs into the construct that Adams (1954) describes when the word *I* is used to define someone's individuality and the constellation of attributes, characteristics and qualities that, overt or not, contribute to the specific configuration that distinguishes one individual from another.

Although many definitions to personality have been proposed, most researchers agree on a couple of elements that frame personality as an organized, dynamic and consistent pattern of traits and unique characteristics which shape individual behavior (Phares and Chaplin, 1997; Ryckman, 2008; Feist and Feist, 2008). Furthermore, three key components and fundamental questions are traditionally raised and underlie any approach to the definition and study of personality (Cloninger, 2012):

1. How can personality be described? Does it have a structure?

2. How is personality expressed? What mechanisms direct behavior?

3. How is personality formed? Can it change over time?

These three questions drive the formulation of different theories in personality psychology whose main schools of thought often feature either a psychoanalytic, humanistic, dispositional, behavioral or a cognitive perspective. For the past years most of the attention in the scientific community has been directed towards two theories: the trait theories, embedded in the dispositional perspective, and the type theories, mainly originating from the neopsychoanalytic work of Carl Jung in the mid-twenties of the past century (Sharp, 1987).

A type approach to personality involves a qualitative classification of individuals, i.e., a finite number of categories that describe individuals with similar characteristics. One of the earliest records regarding a type theory trace back to Hippocrates' four humors model where he describes four basic types of temperament: sanguine, melancholic, choleric and phlegmatic. More recently, cardiologists Friedman and Rosenman (1959) were responsible for proposing the type A/B personality theory, in which type A personalities were more likely to suffer from coronary diseases. However, both theories have been found lacking empirical support (Pilia et al., 2006). Even though type theories have been deemed by most researchers as being second to trait theories when it comes to explaining the diversity and richness of human personality (Asendorpf, 2003), much of their ongoing momentum can be attributed to the Myers-Briggs Type Indicator (MBTI), a personality questionnaire published in 1962 that builds upon the cognitive and typological theories postulated by Jung and which is still widely used in educational and corporate contexts. While the four dichotomies used by MBTI have some degree of correlation with the dimensions of the dominant model in personality research (Costa and McCrae, 1989), it still has been subject of strong criticism (Pittenger, 1993, 2004; Bess and Harvey, 2002). A drawback often cited stems from using cut-off points instead of dimensional scales, i.e., one individual can have η points and fall into one dichotomy subset but if he has $\eta + 1$ then he can fall into the other, bearing the same result as two opposite extreme scores would.

On the other hand, trait theories recognize that there is a number of isolated and relatively stable characteristics – traits – which differ between individuals and influence behavior. Moreover, they possess the important property of being bipolar which paves the way for intermediate levels in a continuum, resulting in a more dimensional approach when compared to type theories (Allport, 1937; Funder, 1991; Feist and Feist, 2008). However, even though an individual's personality can then be more precisely described by a configuration of traits, it has been observed that more than one thousand traits may exist (Allport and Odbert, 1936). Galton (1884) was most likely the first researcher to come up with a solution to address this problem by observing the possibility of obtaining a comprehensive taxonomy of traits through language analysis and sampling, an hypothesis now known as the lexical approach and which can be condensed in two key postulates (Angleitner et al., 1988; Caprara and Cervone, 2000):

1. Any personality or character trait that is seen as important in peoples' lives will eventually become embedded in their language.

2. Any personality or character trait that is seen as important and already part of the language will most likely become encoded in a single word.

Taking the lexical approach as starting point, Allport and Odbert (1936) started one of the most influential studies in trait psychology by sampling the Webster's New International Dictionary for words that described human personality and behavior, finally

arriving to a list comprised of 17,953 terms which they subsequently divided into four columns, the first one consisting on 4,504 words that described personality traits (Caprara and Cervone, 2000). This list became of paramount importance as it allowed researchers to conduct several factor analysis in order to find any existing correlations between the listed traits and group them accordingly into a small number of broad factors. As a result, Cattell et al. (1970) proposed a two-tiered personality structure involving sixteen primary and five secondary factors as well as the *Sixteen Personality Factors Questionnaire* based on his own factor analysis. On the other hand, Eysenck (1947) formulated a personality model with only the two dimensions of Extraversion and Neuroticism, later adding Psychoticism (Eysenck and Eysenck, 1977). The different results obtained from these two iconic researchers in personality psychology has been attributed to one using oblique rotation in the factor analysis while the other opted for orthogonal rotation (Feist and Feist, 2008); however, both models proved to be critically important building blocks as five recurring factors or dimensions began to be consistently identified, ultimately becoming the foundation for the Five-Factor Model (FFM), the most widely accepted model at the time of this writing and assumed to represent the basic structure behind personality (John and Srivastava, 1999; O'Connor, 2002).

2.1.1 *Big Five* personality traits

The first reference to a five-factor solution traces back to Fiske (1949) whose research was aimed at trying to replicate the early studies of Cattell (1943, 1946, 1947) but found no need for the complexity of the two-tiered personality structure, a thought shared at the time by Banks (1948). A similar finding of the five broad dimensions was reported by Tupes and Christal (1961), and later replicated by Norman (1963), Borgatta (1964), Smith (1967) and Digman and Takemoto-Chock (1981), after which a brief hiatus on personality research followed (Digman, 1990). Goldberg (1981) through his own lexical analysis rediscovered the same five factors and coined them the nickname of *Big Five* (pp. 159), a term still used nowadays. Indeed, different set of investigators have independently arrived to the same five dimensions and even though their definitions may vary, evidence has shown a high degree of inter-correlation and factor-analytical alignment between them (Amelang and Borkenau, 1982; Birenbaum and Montag, 1986; Cattell, 1996; Grucza and Goldberg, 2007).

A different set of researchers, however, had departed from the lexical tradition and were studying personality using questionnaires, which despite being numerous and diverse, had little convergence except for Eysenck's (1947; 1977; 1991) dimensions of Extraversion and Neuroticism, or *Big Two* as Wiggins (1968) called them, both present in one way or another in most inventories at the time (John and Srivastava, 1999). The path towards a more unified scientific discipline was brought by a series of studies by Paul T. Costa

MBTI scales	NEO-PI-R dimension				
	N	E	O	A	C
EI (Introversion)	.16**	-.74**	.03	-.03	.08
SN (Intuition)	-.06	.10	.72**	.04	-.15**
TF (Feeling)	.06	.19**	.02	.44**	-.15**
JP (Perception)	.11	.15**	.30**	-.06	-.49**

Table 1: Correlations of self-reported NEO-PI-R dimensions with MBTI scales in men (Costa and McCrae, 1989). ** $p < .05$.

and Robert R. McCrae that started with a cluster analysis of the *16PF Questionnaire* (Cattell et al., 1970) where they once again identified the dimensions of Neuroticism and Extraversion but also a third one which they named Openness to experience (Costa and McCrae, 1976). These findings ignited the development of the NEO Personality Inventory (NEO-PI), published in 1985 (Costa and McCrae, 1985b), but after realizing their instrument closely resembled two of the *Big Five* traits, an extended revision to the inventory (NEO-PI-R) shortly followed in order to include the remaining dimensions of Agreeableness, Conscientiousness and also the measurement of six specific facets per factor (Costa and McCrae, 1995). An abbreviated version – NEO-FFI – was later developed consisting on the 12 items of each dimension that scored highest on validity (Costa and McCrae, 2004).

Ensuing research would come to demonstrate the ubiquity of the five-factor taxonomy (Terracciano et al., 2011), whether in terms of cross-cultural and linguistic validity (Costa et al., 1999; McCrae, 2001; Terracciano et al., 2001; McCrae, 2002; McCrae and Allik, 2002), longitudinal stability (Terracciano et al., 2006; Costa and McCrae, 2012) or presence in other instruments such as the Myers-Briggs Type Indicator (see table 1, pp. 7) and the Eysenck Personality Inventory (Costa and McCrae, 1987, 1989, 1985a). Further studies have also revealed links with academic performance (Komarraju et al., 2011; De Feyter et al., 2012), professional success (Mount and Barrick, 1998; Hunter et al., 1990; Mehta, 2012; Judge et al., 2012), clinical disorders (Saulsman and Page, 2004; Bagby et al., 2008) and neuroanatomical structures (DeYoung et al., 2010; Taki et al., 2012).

However, the *Big Five* taxonomy isn't without criticism. A fault often pointed out is the atheoretical nature of the traits and how there's no underlying theory to explain human personality (Eysenck, 1992; Block, 1995, 2010). While Costa and McCrae (1992) have attempted to provide a theoretical framework, which they called Five-Factor Model (FFM), it didn't seem to pique the interest of researchers and the *Big Five* still remains mainly a data-driven empirical finding. Further criticism relates to a limited scope, i.e., not being able to explain all of human personality (Paunonen et al., 2003; McAdams, 1995; Paunonen and Jackson, 2000), and some observed redundancy between the different

dimensions (Musek, 2007; van der Linden et al., 2010).

Neuroticism

Neuroticism, or Emotional Stability as it is sometimes called when reversed, is the predisposition to be troubled by negative emotions such as anxiety, insecurity, anger or envy (Costa and McCrae, 1987). Individuals who score high in this dimension are frequently more labile and reactive, responding poorly to aversive stimuli and stressors whose threat level is often amplified. They also experience more persisting negative emotions. Those in the opposite end of the spectrum tend to be even-tempered and to possess higher tolerance for stress (Thompson, 2008).

Research on this dimension has demonstrated significant differences in terms of global well-being and life satisfaction (Schmutte and Ryff, 1997; DeNeve and Cooper, 1998; Staudinger et al., 1999; Hills and Argyle, 2001), self-esteem (Costa et al., 1991), relationship and marriage difficulties (Karney and Bradbury, 1995; Kurdek, 1997), skin conductance reactivity (Norris et al., 2007), clinical disorders (Saulsman and Page, 2004; Malouff et al., 2005) and even changes in brain volume (Knutson et al., 2001; Jackson et al., 2011).

Extraversion

Extraversion, another key dimension to have been included in the first NEO inventory, relates to the degree of social engagement and perceived energy levels that individuals possess (Costa and McCrae, 1987; Thompson, 2008). Those who score high on Extraversion are often regarded as action-oriented, outgoing, talkative and full of energy, whereas those who have low scores tend to be associated as being more reserved, analytical and having decreased levels of social engagement (Olakitan, 2011). A key difference that distinguishes Extraversion in contemporary trait theories from the more traditional types perspective lies in the possibility that individuals can be considered ambiverted (Cohen and Schmidt, 1979). Laney (2002) also suggests an interesting metaphor illustrating the difference on energy creation between extroverts and introverts:

> Introverts are like a rechargeable battery. They need to stop expending energy and rest in order to recharge. Extroverts are like solar panels that need the sun to recharge. Extroverts need to be out and about to refuel.

Some researchers have proposed a negative correlation of Extraversion with Neuroticism (Malouff et al., 2005), possibly because some significant links have also been found in self-reported happiness and well-being (Furnham and Brewin, 1990; Pavot et al., 1990; Costa and McCrae, 1991; Diener et al., 1999) as well as self-esteem (Cheng and Furnham, 2003; Swickert et al., 2004), but in the opposite direction of Neuroticism, which may be explained by recent findings that show how individuals who score high on this dimension

have a stronger positive-affect reactivity than their counterparts thus tending to be more optimistic and emotionally aroused by rewards (Zelenski and Larsen, 1999; Depue and Collins, 1999).

Openness to Experience

Named as the most difficult factor to describe by McCrae (1990), it is also the one with the more modest relationship with subject well-being (Steel et al., 2008). Individuals who score high are often perceived as more intellectually curious, creative, insightful and sensible to art, whereas low scorers are associated with a preference over the familiar and conventional rather than the novel and complex (Costa and McCrae, 1987; Sneed et al., 1998).

Openness to Experience has been tied to creativity (King et al., 1996; Feist, 1998), intelligence and general knowledge (Moutafi et al., 2006; Chamorro-Premuzic et al., 2006, 2008), socio-political views (McCrae, 1996; Sibley and Duckitt, 2008), and religion (Saroglou, 2002). A positive correlation with the Extraversion dimension has also been described (Aluja et al., 2002).

Agreeableness

One of the two factors later added to the first version of the NEO inventory, Agreeableness reflects the propensity of an individual to be more cooperative and compliant rather than suspicious and competitive. High scorers are often regarded as trustworthy and honest, in contrast to those low in Agreeableness, who appear more manipulative and less concerned with others (Costa and McCrae, 1987; Thompson, 2008).

Agreeableness seems to be an important variable pertaining to conflict management as research has shown that agreeable individuals generally have a lower frequency of interpersonal conflicts (Pietromonaco et al., 1997, 1998; Asendorpf and Wilpers, 1998) and approach them by avoiding to assert power over others (Jensen-Campbell et al., 1996, 2001). An additional and interesting study also revealed Agreeableness to be positively correlated with team-work but negatively with leadership (Lim and Ployhart, 2004).

Conscientiousness

The last of the *Big Five*, Conscientiousness is a factor that describes individual differences in terms of self-discipline, orderliness and need for achievement. Conscientious individuals are perceived as organized, hard-working and ambitious, whereas those found to score lower are often more laid-back and accepting of the spontaneous over the planned (Costa and McCrae, 1992; Thompson, 2008).

A considerable amount of research has been devoted to this dimension and several studies have uncovered significant correlations between conscientious behavior and academic

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performance (Digman, 1989; Higgins et al., 2007; Noftle and Robins, 2007), subjective well-being (Steel et al., 2008), self-perceived behavioral and situational control (Courneya et al., 1999; Gerhardt et al., 2007; Besser and Shackelford, 2007), job satisfaction, income and workplace performance (Salgado, 1997; Mount et al., 1998; Judge et al., 1999).

2.2   Negotiation

Pruitt (1981) defined negotiation as a discussion between interdependent parties with divergent interests and the aim of reaching an agreement. Other researchers (e.g., Park et al., 2012) when defining negotiation highlight the underlying dynamic process, the existence of non-identical interests rather than solely divergent, and an increased emphasis on the need to work together in order to reach a mutual agreement. Fisher and Ury's (1981) approach takes on a broader view by observing that individuals differ, perhaps increasingly so, and negotiation is a way of handling their differences. Furthermore, these authors conclude that negotiation is present in our everyday life as basic means to get from others what we want. Consequently, everyone is a negotiator.

The empirical study of negotiation received its first surge of interest by 1960-70 when social psychologists started to analyze the role that individual differences and situational characteristics had on negotiation behavior (Rubin et al., 1975). However, even though some research in this domain contributed to a better understanding of negotiation and its elements such as deadlines (Pruitt and Drews, 1969), number of people in each side or presence of third-parties (Marwell and Schmitt, 1972; Johnson and Pruitt, 1972), incentives and payoffs (Axelrod and May, 1968), the findings were still found to be of limited use for being beyond the control of the negotiator (Bazerman et al., 2000). In addition, prescriptive research up until now had been mainly game-theoretic in nature, which despite many useful contributions to negotiation behavior, revealed the critical shortcoming of assuming that players were perfectly rational and had symmetric information (Sebenius, 1992; Bazerman and Tsay, 2009). A paradigm shift and renewed interest in negotiation followed Raiffa's (1982) seminal work where a decision-analytic approach to negotiation is proposed, one that unites prescriptive and descriptive research efforts by acknowledging negotiators' rationality to be bounded and permeable to biases, thus justifying the need for developing practical insights and prescribing strategies given a description of how others will likely behave (see Simon, 1957, for the concept of bounded reality). This approach, which grew into what is nowadays called behavioral decision research and, to some extent, negotiation analysis, expanded some views from Schelling (1960, 1966) and was further developed by Lax and Sebenius (1986), after which became a frequent object of study by some researchers who attempted to examine some of the questions raised by this new perspective (Thompson, 1990, 2005; Bazerman and Neale, 1992; Bazerman and Moore, 2008). Sebenius (1992) outlined four key elements that characterize the subse-

quent emerging field of negotiation analysis from the previous normative models:

1. Asymmetrical prescriptive/descriptive orientation

2. Subjective perspective

3. Sensitivity to unexplored value or joint gains

4. Focus on ZOPA[1] instead of equilibrium analysis

Behavioral decision explored these elements by studying how negotiators rely on cognitive heuristics and deviate from optimality/rationality, leading to inefficient outcomes and predictable mistakes (Kahneman and Tversky, 1973, 1974, 1979; Bazerman and Moore, 2008). The significant body of research that followed the possibilities this new analytic lens opened has led some academics to name negotiation as the fastest growing field in organizational research (Kramer and Messick, 1995; Hough and Furnham, 2003). With the focus on understanding in order to prescribe advice, researchers found that, for example, negotiators tend to be affected by framing and anchoring effects (Kahneman and Tversky, 1974; Bazerman et al., 1985; Neale and Northcraft, 1987; Bazerman and Neale, 1985; Bottom and Studt, 1993; Lim and Carnevale, 1995; Kristensen and Gärling, 1997b; Sebenius, 1997), availability bias (Neale, 1984; Pinkley et al., 1995), overconfidence distortions (Bazerman and Neale, 1982, 1985; Bazerman et al., 1999; Kramer et al., 1993; Lim, 1997), false assumptions of fixed-pie and non-overlapping interests (Bazerman et al., 1985; Thompson and Hastie, 1990; Thompson and DeHarpport, 1994; Thompson and Hrebec, 1996), counter-productive devaluations of the other party's perspectives (Bazerman and Samuelson, 1985; Bazerman et al., 1988, 1998), number of concessions made (Ross and Stittinger, 1991; Neale et al., 2004), and appraisal of the need to switch strategy (Bazerman, 1983; Bazerman et al., 1996).

However, despite largely responsible for reigniting research in this field, some authors pointed out how some negotiation components were being neglected, especially social factors which were similarly important for achieving an effective negotiation (Barley, 1991; Greenhalgh and Chapman, 1995). The criticism seemed to take effect, which may help to explain the ongoing momentum, as academics recently began considering new variables in their research such as the role of emotion (e.g., Forgas, 1998), social relationships (e.g., Bazerman et al., 1998), egocentrism (e.g., Thompson and Loewenstein, 1992), motivated illusions (e.g., Messick et al., 1985) and attribution processes (e.g., Ross and Ward, 1996).

Meanwhile some authors have also enriched negotiation theory with observations such as the existence of different types of negotiators (Fisher and Ury, 1981), ties with conflict resolution styles (Shell, 2006), in particular the dual-concern model (Forsyth, 2009), and different tactics whose effectiveness hinges on a number of contextual factors (Lewicki

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[1]Zone of Possible Agreement (see pp. 12)

et al., 2001). One of the most widely recognized contributions and also adopted by scholars spearheading negotiation analysis was a distinction first made by Walton and McKersie (1965), and popularized by Raiffa (1982), which divides negotiation processes into distributive and integrative, closely resembling and often associated with the fixed-sum and nonzero-sum games in game theory, similarly having a significant impact on subsequent research (Kersten, 2001).

2.2.1 Distributive negotiation

Two primary goals described in negotiations are those of creating or claiming value (Sebenius, 1992), each possessing different elements. When both parties perceive the available resources to be distributed as limited, they are compelled to become competitive and attempt to maximize their own gains at the expense of others - a win-lose situation, or as it is more commonly known – distributive negotiation (Lewicki et al., 1999). Thompson (2005) considers this situation to be of pure conflict, where each party's goals and interests are mutually exclusive, i.e., an objective that a party wants to realize at the highest possible level, the other party wants to achieve at the lowest possible level, which is often present in fixed-sum bargaining or haggling (Barry and Friedman, 1998; Kersten, 2001). Additionally, any eventual agreed outcome is Pareto optimal as it is not possible to increase a party's gains without inflicting losses on the other party, a perception that invariably leads to a focus on the differences (Thompson et al., 1996).

Walton and McKersie (1965) early pointed out how in distributive negotiations the result is frequently influenced by the strategies and tactics employed. Indeed, a significant amount of research and literature have been dedicated towards this subject, seeking to offer prescriptive advice on how to improve one's bargaining skills; for instance, the hard-ball negotiation tactics commonly seen in movies (e.g., bluff or the good/bad guy) can be found in most books about distributive negotiation. However, researchers agree that negotiation outcomes are affected by certain reference points which can be external such as market forces, previously paid prices and arbitrary anchors (Kahneman, 1992; Ritov, 1996), or internal (Blount et al., 1996). Raiffa's (1982) reservation price is an example of an internal reference point – a projected value where the negotiator is economically indifferent to reach or not an agreement (van Poucke and Buelens, 2002). In a buyer-seller scenario, it translates into the minimum (max) acceptable price the seller (buyer) is willing to accept. It is also the quantitative measure of a negotiator's Best Alternative to a Negotiated Agreement (BATNA; Fisher and Ury, 1981), the course of action to be taken in case of non-agreement. The space delimited by both negotiators' reservation price has been called of Zone of Possible Agreement (ZOPA; Raiffa, 1982) and like the name hints at, it represents the negotiation working space where a settlement is possible. Other important internal reference points are the aspirational price (Kristensen and Gärling,

1997a), i.e., the negotiator's projected ideal outcome that can he reasonably expect to be accepted, and the first offer which has been heavily studied and considered an important predictor of the outcome, especially due to an anchoring effect in decision-making (Yukl, 1974; Galinsky and Mussweiler, 2001). More recently, van Poucke and Buelens (2002) have found the area between the first offer and the aspirational price – offer zone, as termed by them – to have also a strong influence on the negotiated outcome.

Despite all the research, few objective conclusive findings have been obtained. Pruitt and Carnevale (1993) have argued for the importance of being *firm* – setting up high goals, making large initial demands and few concessions – in order to get better results (Donohue, 1981). Similarly, other studies reveal a correlation between higher reservation and aspirational prices, and the value of the first offer, resulting in better pay-offs (Huber and Neale, 1986, 1987; White and Neale, 1994).

2.2.2 Integrative negotiation

Two sisters were once arguing over an orange – one wanted to make juice while the other needed the peel to bake a cake. They decided to compromise and split the orange in half, a distributive solution. However, what they missed was the potential for an integrative outcome – giving all the juice to one sister and all the peel to the other. This tale from Follett (1942) is a classic illustration of value creation during a negotiation where one's individual gains don't necessarily translate into the other's losses, i.e., a mutual process of identifying common interests which enables creative solutions that increase the total sum of resources available and the possibility for joint gains (Thompson et al., 1996; Foo et al., 2004).

Kersten (2001) based on the highlights from different authors (e.g. Fisher and Ury, 1981; Lax and Sebenius, 1986; Bazerman and Moore, 2008) outlines four key characteristics that distinguish integrative negotiations from distributive:

1. Value creation

2. Focus on interests, not positions

3. Openness and exchange of relevant information

4. Learning and problem restructuring

Integrative agreements, frequently perceived as win-win given that all parties' interests are realized to the maximum interest (Beersma and de Dreu, 2002), have been observed to be followed by several benefits such as stronger relationships with higher satisfaction and lower conflict (Rubin et al., 1994; De Dreu et al., 2000). However, while reaching somewhat similar findings, some researchers (e.g. Mannix et al., 1988, 1989; Mannix, 1993) also observed how reaching joint gains solutions are more cognitively taxing and

complex given the necessity to reveal and understand information. Indeed, exchange of information has been demonstrated to be a negotiation approach that enhances joint profit, even when asymmetry is present as one-way information sharing increases the likelihood of reaching an integrative solution through a reciprocation effect (Pruitt and Lewis, 1975; Thompson, 1991). On the other hand, the disclosure of information may also render the negotiator vulnerable to exploitation or be perceived as a weakness, undermining the distributive elements (Rubin et al., 1994). Consequently, in terms of behavioral output, the competitive orientation required in fixed-sum bargaining seems to be cognitively dissonant with the attitudes conducive to a cooperative process towards integrative solutions (Scharpf, 1994). This tension between creating or distributing value has been termed as the *Negotiator's Dilemma* by Lax and Sebenius (1986), whose formulation closely follows that of the Prisoner's Dilemma which will now be covered in more depth.

Nevertheless, most negotiations are not purely integrative or distributive as they possess aspects from both types (Walton and McKersie, 1965). Complex business relationships involve a multitude of issues with a multidimensionality that rarely translates into a pie of fixed resources. However, even after expanding the pie, it needs to be divided among the parties (Bazerman et al., 1988; Falcão, 2013). Thompson (2005), for instance, avoids making the distinction between distributive and integrative, considering instead negotiations to be of pure conflict, pure cooperation or mixed-motive. Some authors have thus argued for dimensionality rather than disjunction (Amanatullah et al., 2008).

The Prisoner's Dilemma

The genesis of altruism and cooperation is still one of the greatest challenges for evolutionary sociology, especially considering how these behaviors can happen among non-relatives (Hamilton, 1964; Fehr and Fischbacher, 2003). Increasing environmental dynamism has been driving corporations towards flexibility and hybrid organizational forms comprised of strategic alliances, partnerships or coalitions where trust and cooperation are paramount for success (Teece, 1992; Ring and van de Ven, 1992). On the other hand, Western management culture is still rooted in maximizing self interests and perceiving the corporate reality as zero-sum (Frank et al., 1993). Considering these two opposing forces, Merrill Flood and Melvin Dresher would come to develop a game in 1950 which allowed to model and analyze competitive versus cooperative behaviors and became extremely popular in both economics and psychology research as the Prisoner's Dilemma, a name given by Alan Tucker after the formulation comprising prison rewards (Pruitt and Kimmel, 1977).

In the 2-player Prisoner's Dilemma, the most widely used class of the game, two individuals can each either choose to cooperate or defect (compete), rendering the payoff matrix in table 2. When player B cooperates, from the perspective of A there is the chance to either obtain a reward from mutual cooperation (R) or a temptation to defect

	Player B	
Player A	Cooperation	Defection
Cooperation	R,R	S,T
Defection	T,S	P,P

Table 2: Payoff matrix for the generalized form of the 2-player Prisoner's Dilemma.

(T). But when player B defects, A can face the sucker's payoff (S) or the punishment for mutual defection (P). However, an important condition is necessary to be satisfied in order to validate the game as a Prisoner's dilemma (Kuhlman and Marshello, 1975): $T > R > P > S$.

As a result, when player B cooperates it's better for A to defect since T > R, and if B defects then it's still better for A to defect as P > S. So regardless of the other player choices, from an individual point of view the choice to cooperate is not rational. However, mutual defection yields a lower result than if both players cooperate, or in other words, the best possible outcome for all players involved hinges on their abstention from maximizing self-interest, thus representing a social dilemma (Dawes, 1980; Axelrod and Hamilton, 1981; Boone et al., 1999). In terms of standard game theory, the dominant strategy is defection, and the Nash equilibrium – a state where each player doesn't gain anything by unilaterally changing their position – is mutual defection (Rasmusen, 2006).

With far-reaching applications and ever-growing real-life examples (Leibenstein, 1987; Bierman and Fernández, 1998; Falcão, 2013), the Prisoner's Dilemma game has been extensively studied. Another version of the game which sparked as much interest as the one-shot formulation is the Iterated Prisoner's Dilemma that assumes N-rounds, where N can be known or not, played in succession and where players retain the memory of previous actions. Adding to the aforementioned inequality, one further condition needs to be satisfied: $R + R > T + S$, so that mutual cooperation is more rewarding than alternating between T and S (Kuhlman and Marshello, 1975). The iterated version opens a new universe of possibilities and strategies as in the words of Dawkins (2006):

> The successive rounds of the game give us the opportunity to build up trust or mistrust, to reciprocate or placate, forgive or avenge.

Unlike the classic Prisoner's Dilemma, the defection strategy is counter-intuitive when iteration is present, especially if N is unknown or random, while cooperative outcomes are favored and sustainable (Aumann, 1959). Indeed, IPD has been extensively used to study reciprocity and cooperative behavior among selfish individuals, with Axelrod's (1984) tournament playing a determinant role by showing that a strategy that favors cooperation emerged as victorious (Axelrod and Hamilton, 1981). Currently, two strategies are considered the best performers in IPD:

Generous Tit-for-Tat – Tit-for-Tat was the winner of the first tournament held by Axelrod. This strategy designed by Anatol Rapoport was the simplest of every participant that entered the tournament and consists on cooperating in the first round and then mimicking the opponent's last move. However, a drawback with this strategy is the possibility to engage in a long streak of mutual retaliation. In a second tournament, an honorable mention goes to Tit-for-Two-Tats, submitted by John Maynard Smith, which sought to address this problem by only retaliating after two consecutive defections even though it still finished after Tit-for-Tat which isn't as much forgiving (Dawkins, 2006). One other variant that addressed the same problem and that has been shown to outperform Tit-for-Tat is the Generous Tit-for-Tat, a strategy similar to its parent but which only retaliates on a 2/3 probably (Nowak and Sigmund, 1992).

Pavlov – Based on the widespread behavioral mechanism of *win-stay, lose-shift*, Pavlov is a strategy that considers not only the opponent's actions but also its own, immediately reacting to the payoff and responding by repeating the moves rewarded with R or T points or changing in face of P or S points. Although it will perform poorly against all-out defectors, it has two benefits in comparison with TFT/GTFT: it can correct mistakes (e.g., when playing against another Pavlov, one round of mutual defection will be followed by joint cooperation) and it has the potential to exploit a pure cooperator when a mutation occurs (Nowak and Sigmund, 1993).

Axelrod (1980a,b, 1984) analyzed the top scoring strategies in his first two big tournaments and observed three recurring properties that set them apart from the rest:

1. *Nice* – These strategies are never the first to defect and always start by cooperating. Moreover, they frequently exhibit a non-envious sub-property as they don't strive for a payoff greater than the other player's.

2. *Forgiving* – Short to medium-term propensity to cooperate after the other player defects.

3. *Provocable* – Short-term propensity to not forgive (retaliate) a defection uncalled for.

Tit-for-Tat is a strategy that starts by cooperating and doesn't try to obtain a better outcome than its counterpart, thus featuring the nice property; it also promptly retaliates after an uncalled defection, while being able to forgive if the other player resumes cooperation, which manifests the provocable and forgiving properties. It has also been observed how top scoring strategies are often clear, easily understandable and with a contingent cause-consequence (Falcão, 2013).
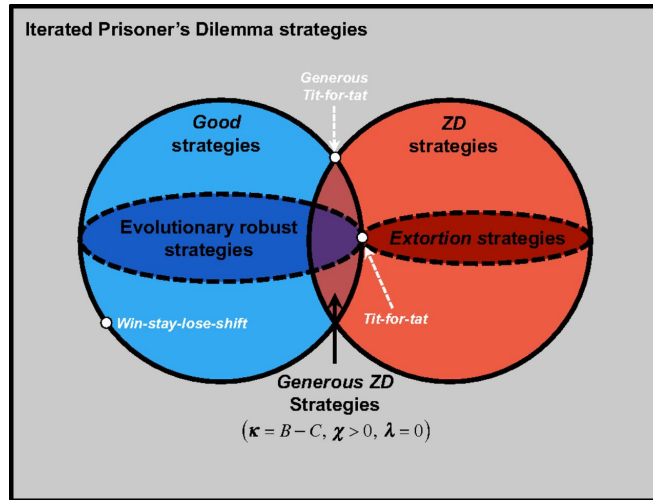
Figure 1: New conceptualization of classic IPD strategies (Stewart and Plotkin, 2013).

In a study conducted by Wedekind and Milinski (1996), 30% of the subjects sample adopted the Generous Tit-for-Tat strategy whereas 70% used Pavlov. Although both were successful, Pavlov suffered less from defectors and more readily exploited cooperators. More recently, Press and Dyson (2012) have identified a class of strategies called zero-determinant (ZD) which, they argue, are able to enforce a fixed linear relationship between one's own payoff and that of the other player (Hilbe et al., 2013). In one of the subsequent studies that further developed this view, Stewart and Plotkin (2013) presented a new characterization of the classic IPD strategies which is illustrated in figure 1. Good strategies, according to these authors, are those who stabilize cooperative behavior, a key element for the subset for robustness that can also include generosity, i.e., any deviation from mutual cooperation causes the generous players payoff to decline more than that of the other. Consequently, Pavlov is a good strategy but not generous or robust, whereas TFT and GTFT are both good and generous but only TFT is robust.

2.2.3 Individual differences in negotiation

Past research on personality and negotiation has been inconsistent, inconclusive and with few positive findings (Terhune, 1970; Druckman, 1971; Hermann and Kogan, 1977; Pruitt and Carnevale, 1993), leading some authors to wonder if individual differences have a relevant role in determining negotiation behavior (Thompson, 1990; Lewicki et al., 1994). As a result, researchers focus on personality and other differences have decreased over the years (Neale and Northcraft, 1991), wherein Hammer (1980) argues that current research methods are unable to capture the subtleties which different negotiation styles and approaches have. Nevertheless, some recent and encouraging findings have reignited the interest (e.g., Forgas, 1998; Barry and Friedman, 1998; Forgas, 1998; De Dreu et al., 1999; Bowles et al., 2005; Sullivan et al., 2006; Carnevale and De Dreu, 2006), providing

hope and reasons why the search should be continued (Foo et al., 2004; Elfenbein et al., 2008).

Barry and Friedman (1998) have been responsible for one of the main studies analyzing the effect of personality, as conceptualized by the Five-Factor Model, on integrative and distributive negotiation. Starting with Extraversion, which has been proved to be a predictor for job performance where social interaction is present (Barrick and Mount, 1991), findings suggest that this particular trait may be simultaneously a liability or an asset depending whether the negotiation is mainly distributive or integrative in nature given how information exchange and concern for social ties affect negotiation performance differently in each type (Barry and Friedman, 1998). On the other hand, it has also been argued how the subcomponent of Assertiveness within Extraversion can be an asset for both types (Elfenbein et al., 2008). Agreeableness is suggested to be the most relevant dimension regarding interpersonal relations and it has been observed how agreeable individuals prefer non-assertive tactics (Jensen-Campbell et al., 1996; Cable and Judge, 2003). While some links have been detected between high Agreeableness and lower distributive outcomes due to greater social concerns, no significant evidence has been found connecting this dimension with integrative bargaining (Barry and Friedman, 1998; Morris et al., 1999; Amanatullah et al., 2008). Furthermore, Barry and Friedman (1998) have posited how agreeable and extrovert individuals would be more vulnerable to the anchoring bias but opposing arguments (e.g., Galinsky and Mussweiler, 2001) also exist given how the facet of high perspective-taking is resilient against this bias. For these reasons, and because other studies also showed high-perspective taking to increase distributive outcomes (Bazerman and Neale, 1982), Amanatullah et al. (2008) argue that Agreeableness may encompass offsetting subcomponents that have different effects on bargaining behavior and performance. Conscientiousness, as the dimension with the strongest relationship to job performance in the meta-analytic review by Barrick and Mount (1991), could be expected to have an important role since negotiation performance has often been associated with preparation and the structured mindset that conscious individuals exhibit but no concrete evidence has been found yet (Barry and Friedman, 1998). While for Neuroticism it has been reported an increased reactivity and frequency of negative experiences which may lead to a higher number of impasses (White et al., 2004; Elfenbein et al., 2008), the impact on performance have yet to reveal a significant relationship. Similar results, or lack of, characterize the research on Openness to Experience, a dimension whose high scoring individuals feature divergent patterns of thinking that could be potentially beneficial in integrative settings (Barry and Friedman, 1998).

Individual differences have also been described in terms of enduring mood dispositions, more specifically the frequency of positive and negative affect experiences (Watson et al., 1988). Research in negotiation has revealed ties with mood states, as for instance those who experience positive affect tend to cooperate more often, achieve higher individ-

ual outcomes and mutual gains, engage in efficient information exchange, develop trust and working relationships more successfully and be perceived as confident, cooperative, ambitious and with high goals (Carnevale and Isen, 1986; Barry and Oliver, 1996; Forgas, 1998; Carnevale and De Dreu, 2006; Anderson and Thompson, 2004; Carnevale and De Dreu, 2006). In contrast, individuals high on negative affect will more frequently opt for contentious and competitive strategies, be more retaliative and neglectful of common interests, and undervalue received offers (Brown, 1968; Pillutla and Murnighan, 1996; Allred et al., 1997; Carnevale and De Dreu, 2006). Self-esteem and self-efficacy also seem to be related to negotiation as for the case of individuals with high self-esteem they may become more competitive in distributive bargaining while in integrative negotiations they become more rash and prone to self-enhancing bias (Hermann and Kogan, 1977; Kramer et al., 1993). Similarly, negotiation self-efficacy as an individual belief over one's chances of successfully employing particular tactics and achieving outcomes is also a factor that guides the negotiation process and upshot (Sullivan et al., 2006).

As part of the construct of social value orientation (SVO), researchers have found that prosocial individuals (concern for joint gains) achieve higher mutually beneficial outcomes and act cooperatively more often than egoistic (concern for own gains while indifferent to others) and competitive individuals (concern for the difference of gains), although they turn to non-cooperation if the other party fails to reciprocate (Hermann and Kogan, 1977; De Dreu and McCusker, 1997; Van Lange, 1999; Giebels et al., 2000; Carnevale and De Dreu, 2006). Further, they also made fewer demands and more concessions, leading academics to conclude that social motives can indeed be rooted in individual differences (De Dreu and Van Lange, 1995). Gelfand et al. (2006) have also provided links between relational orientations and negotiation processes, with some evidence pointing at how it can predict soft or firm bargaining (Clark and Chrisman, 1994). Helgeson and Fritz's (1998) concept of unmitigated communion (UC) which describes individuals with low self-concern coupled with high concern for relationships, have provided new findings in which those high in UC attribute a higher cost in terms of relationships in exchange for firm bargaining or asserting themselves, resulting in lower value claiming (Amanatullah et al., 2008). When both parties possess a high concern for the existing relationship it can result in what Curhan et al. (2008) termed as relational accommodation, or in other words, a mutual yielding that impacts negatively joint economic performance but with positive effects on the relational outcome, which has been found to exist in non-hierarchical cultural contexts as well as negotiation processes among couples (Fry et al., 1983; Curhan et al., 2008).

Other differences have also been reported for gender (Curhan et al., 2008; Bowles et al., 2005), formal experience with negotiation (Elfenbein et al., 2008) and different measures of intelligence such as cognitive (Sharma et al., 2013), emotional (Barry et al., 2004; Foo et al., 2004), and cultural (Imai and Gelfand, 2010), as well as creativity (Kurtzberg,

1998) – see Olekalns and Adair (2013) for a comprehensive review.

Research on individual differences hasn't been without critiques however. Some authors argue for the failure to capture relational dynamics that are dominant in the real world but often unaccounted for in traditional negotiation research (Greenhalgh and Gilkey, 1993; Greenhalgh and Chapman, 1998; Gelfand et al., 2006). Other reasons that may lead to an overestimation of the importance of individual differences include the fundamental attribution error pointed out by Ross (1977), a judgmental heuristic that tends to link and explain behavior as stemming mainly from internal or personal factors rather than situational, which is possible to happen during negotiations (Nisbett and Ross, 1980; Jones, 1990; Morris et al., 1999). Further, negotiators have been found to often misperceive in excess characteristics such as insincerity and anxiety on their counterparts (Baron, 1984, 1988). For these reasons some authors such as Thompson (2005) have claimed that in bargaining situations, behavior and decisions seem to be more influenced by economic variables than individual differences. Regardless, research in this area is facing renewed interest with a recent surge of positive findings and research agendas for the next decades invariably include individual differences as one point of focus (e.g., Olekalns and Adair, 2013).

Method

3.1   Participants

255 volunteers participated in the study. From these, 19 were excluded for providing unusable data, leaving 236 participants (54,5% female) whose age ranged from 18 to 67 ($\mu = 30.40$; $\sigma = 10.87$). All participants had the Portuguese nationality.

3.2   Procedure

For the purpose of this study a personality questionnaire and two negotiation simulations, one distributive and the other integrative, were administered to the participants through a web platform[1] developed specifically for this project.

The platform was first subjected to a pilot test with a small sample between late January and mid-February (2014) where feedback was collected and considered in order to fine-tune parameters, patch existing bugs and make small improvements in terms of linearity and content clarity. The final version was published online at the 12th of February and data collection lasted from this date until the 21st.

Distributive negotiation

In this simulation participants were first briefly instructed on the nature of the task and that there was no time limit. They were then faced with the following scenario based on a real-life event which they had to read and consider before proceeding to the negotiation itself (translated from Portuguese):

> Assume that you've recently changed jobs for one better in every aspect compared to the previous one. However, the location of your new workplace is 50 kilometers away from where you live with your family. You'll have to travel there every morning and come back at the end of the day. After some calculations you've concluded that you could save a significant amount of money if you had a diesel car with a high energetic efficiency.
>
> Following some research, you've found the perfect car model: appearance, consumption and comfort. Exactly what you were looking for, you couldn't be more sure this was the correct car. However, since you have a limited budget

---

[1]The platform back end, including the decision algorithm (annex 8.3, pp. 80) used in the simulations, was programmed in Python while using SQLite RDBMS. The front end was delivered through the Flask microframework and a HTML/CSS template based on Google Forms.

you can only afford a used car. For the past weeks you've been probing the market but everything you found was either in a bad condition or with several kilometers already made.

A few days ago you've come across the car of this seller and you immediately contacted him so you could schedule a meeting to check out the car. You were satisfied to find out that the car corresponded to the advertised, that is to say, in good condition. The price attached to the price and asked by the seller is of 9000€. Your friends who are familiar with this market agreed that it was a price within a fair and reasonable region for this model.

During your first encounter with the seller you also came to know he's looking to sell a scooter as his daughter went to study abroad and barely used it. It turns out that you were also looking to give to your daughter a used scooter for her next birthday in a month. However, you still haven't researched about prices and features for this scooter model. Your objective doesn't involve including the scooter in the car deal but it's entirely up to you whether to value this for the future or not.

You'll now meet with the seller to negotiate the price of the car. Remember that you shouldn't offer more than 9000€, and while you should protect your interests, you can also risk angering the seller if you make unreasonable offers.

The language used in the above negotiation context aims to provide a number of arguments (e.g., personal need; matched criteria; social approval) that set a clear need to purchase the car. To add a higher degree of complexity and counter-balance the previous competitive-oriented framing strengthened by the limited budget, a relationship element (scooter) was also included and whose interpretation, although stated it wasn't going to be present in this negotiation, was left open in terms whether the participant should value it or not for the future.

The first interactive action required relates to taking the initiative and submit a proposal or ask the seller for the price he's looking for. If participants chose the latter, they would get a reply that the price is the same as the one announced: 9000€.

The logic of the following interactions was subject of some experimentation, pilot testing and built upon the real feedback of experienced car salesmen for an increased degree of realism without compromising too much the benefit of a targeted focus. The decision algorithm in the final version was based on the parameters present in table 3 and a simplified illustrative decision tree can be found on annex 2 (pp. 79) which should be consulted along the more specific explanations in the coming paragraphs.

Participants' interface at this point consisted on three possible actions: make a new proposal, accept the last one made by the seller or abandon the negotiation without reaching a deal. In terms of input for the first offer they were impeded to submit offers

Reference points	
Aspirational Price (AP)	9000€
Reservation Price (RP)	8100€ (90% of AP)
Unreasonable Offer Threshold (UOT)	6750€ (75% of AP)

Table 3: Reference points and their quantitative measure for the distributive negotiation simulation.

below the UOT, receiving a message from the seller stating that they should only make him serious proposals if they're indeed interested. Participants couldn't also submit a new offer with a lower value than the one before.

Counter-offers deemed valid and entered in the simulator's decision tree were then checked if they matched or surpassed the RP or not. The only exception to this check pertains to the very first participants' offer to which the reply is the same regardless of the value:

> The seller seems reluctant to lower the price of 9000€. He states that he'd rather include parking sensors in the deal and that he'll install them today if you're interested.

Subsequent offers would thus obey the aforementioned check and be forwarded to different pathways in the decision tree accordingly. For offers whose value (X) falls within the interval $[RP, AP]$, the first step taken is to calculate the probability (P_1) of that offer being accepted through the following formula which assumes the probability of 37% when the value matches the RP and 100% at the AP:

$$P_1 = X * .07 - 530 \tag{3.1}$$

If the offer isn't accepted then a second probability (P_2) related to an extra incentive is calculated, this time ranging from 45% (RP) to 0% (AP):

$$P_2 = X * -.05 + 450 \tag{3.2}$$

At this stage the computer would either respond by offering this extra incentive without lowering the price, or make a counter-offer that slightly cuts down the last value proposed by the seller.

An exception to this decision tree is triggered when a new offer is the same as the previous one. In such case, the participant faces a special event where the seller responds by stating he feels that they're close to a deal but not there yet. The user interface in this situation allows for resuming the negotiation or turning the offer into a "take it or leave

it". Opting for the latter will be accepted automatically by the simulator as it exceeds the RP.

If, on the other hand, the first check scans a value lower than the RP, the response tree is more straightforward as the seller will attempt to bring the offer up and past the RP. To a maximum of three counter-proposals following this circumstance, the first response is to slightly cut down the requested price and state how it's the best he (the seller) can do. A second response will automatically trigger the extra incentive without lowering the price. A third and last response is a "take it or leave it" counter-offer where the seller further cuts down the price.

An illustrative example of how the negotiation dance could unfold in this simulation can be given by a 24 years old female ("Ophelia") who participated in the study and was part of the statistical sample:

1. Ophelia asks the seller for the price. He replies 9000€ as announced.

2. Ophelia makes a new offer of 7500€. The seller reveals to be hesitant in reducing the price so he'd rather just include parking sensors in the deal.

3. Ophelia makes a new offer of 7750€. The seller states that he's not willing to sell the car for so little and what he can do is lower the price to 8800€.

4. Ophelia increases her last offer and proposes 8000€, although still below the seller's reservation price to which he replies by including one more incentive - the alarm system.

5. Ophelia responds by raising her offer to 8200€, already within the zone of possible agreement. However, the seller instead counter-offers 8600€.

6. Ophelia rejects the 8600€ and offers 8400€. Seller accepts.

After the simulation itself, participants were told if they had reached an agreement, and for how much, or if they didn't. With this information in mind, a brief survey was presented where participants had to rate how satisfied they were with their performance, how competitive they were, how important it was for them to avoid developing a bad relationship, and so on. This will be covered in more detail during the measures section.

Integrative negotiation

As with the distributive simulation, participants were first presented with a scenario and the role they would be going to play (translated from Portuguese):

> Suppose that, being an experienced professional at your company and with the right background for this task, you were chosen to represent your company during a negotiation relative to a new joint project with another company.

Most of the contract has already been laid out and decided, with only a few parameters remaining that still need to be negotiated and agreed upon. Each parameter will be approached separately and you've been given the full trust of the board to take any decisions necessary.

However, you've never negotiated with this company before or with any of its representatives as you'll meet them for the first time. In the documents you were handed to help you prepare for this negotiation, the following bit caught your attention:

"Our financial department believes you can tackle each parameter in one of two ways: reveal and be transparent about the information we retain as a way to work collaboratively with the representatives of the other company in order to reach a good deal for both; or hide as much information as we can and use any information provided by them as leverage and obtain a great result for us. However, it is also possible that by being transparent the representatives of the other company will in fact use the information given by us as leverage themselves which will result in a bad agreement for our company. Similarly, in the same way we can decide to conceal any information we have, they might do the same and we'll both end up with a so-so agreement. We estimate, in average, the following gains for our company in each scenario and for each parameter to be negotiated:

	Their company	
Our company	Cooperate	Compete
Cooperate	Revenues +4%	Revenues +1%
Compete	Revenues +6%	Revenues +2%

* Cooperation implying transparency

Considering this data please defend the interests of our company the best you see fit."

Each parameter will be considered a negotiation round and you'll have access to every decisions previously taken. It is also wise to expect a reward if you perform well and successfully represent our company in this task.

The formulated case above is basically an Iterated Prisoner's Dilemma where the number of rounds is unknown to the participants. Besides once again not being constrained by a time limit, they are also told about the *tabula rasa* condition with the other party, i.e., there was no past record of any negotiation with them before. The closing lines relative to expecting a reward if they perform well aim at inciting a strategic orientation and rational decision-making.

When participants felt ready they could initiate the simulation and start playing against the Tit-for-Tat *IPD* strategy (see pp. 15). However, after ten rounds the simulator would override TFT's mechanism of action by first doing a check to detect if the participant's last three moves were all cooperative. If affirmative then that round's computer action is a surprise defection and the following two rounds are played as cooperative regardless of the participant's choices[2]. This device is designed to be employed only once, after which the Tit-for-Tat will resume its typical behavior. In the last but one round participants are let known that they have exactly two rounds left[3].

An example of this simulation can be given by a 25 years old male ("Hamlet") who participated in the study and was part of the statistical sample. Hamlet started by cooperating and continued doing so for the first five rounds until he chose to compete (defect), winning that round as the computer played cooperate. However, facing the computer retaliation in the following round, he quickly returned to cooperative behavior, although he kept testing the computer with an uncalled defection every now and then. In round 14 the computer suddenly defects and Hamlet responds in the next round by retaliating whereas the computer goes back to cooperation. In the following round, Hamlet reveals to be unforgiving and replays defection. Even though he eventually returned to cooperative behavior, he finished the simulation by defecting in the last round, possibly because he wouldn't have to face retaliation. All things considered, Hamlet played cooperation in 16 rounds out of 25 and achieved an average score of 852. Considering the strategic properties described in pp. 16, Hamlet demonstrated to be nice, retaliating, non-forgiving and envious.

Following the same line of the distributive simulation, participants had to fill a short survey on how they felt about their performance, degree of competitiveness, and other questions which are going to be covered in the next section.

3.3 Measures

Personality

In the first part of the web platform participants completed the NEO-FFI instrument, a reduced version of the NEO-PI-R aimed at providing quick, reliable and valid measures of personality dimensions (Costa and McCrae, 1985b, 1992). Comprised of 60 items on a 5-point Likert scale and grouped into 5 subscales, each having 12 items in correspondence to the underlying dimensions of the Five-Factor Model, respondents had to assess their

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[2]While the objective for this surprise defection is to test whether the participant will retaliate in the following round, the reason why the computer always plays cooperatively afterwards is to test whether the participant will forgive the surprise defection after retaliating.

[3]Revealing when the last round is not only changes the rational choice from cooperation to defection but also allows to assess whether participants would use this to their benefit and attempt to outsmart the computer.

degree of agreement with the self-descriptive statements from "Strongly Disagree" to "Strongly Agree". The administered version was translated and adapted to the Portuguese population (Lima and Simões, 1995, 2000, 2006), with a copy of the questionnaire being available on annex 8.1 (pp. 77). Levels of the Cronbach's α assessing internal consistency reliability were .86 for Neuroticism, .80 for Extraversion, .69 for Openness to Experience, .63 to Agreeableness and .85 to Conscientiousness.

Distributive negotiation

This project's component includes continuum, ordinal and dichotomous measures grouped in two parts, one pertaining to the simulation itself and the other to the post-task survey.

Initiative Binary variable registering whether the participant opted to take initiative and submit an offer or preferred to ask the seller for how much he was looking for to sell the car.

First offer The value of the first offer is measured against the seller's aspirational value which was the announced price (9000€). For example, if the first offer submitted by the participant was 7000€ then this measure would be codified as $9000 - 7000 = 2000$.

Deal value Whenever an agreement was reached the value was measured once again against the seller's aspirational value (9000€). An agreement of 8000€ would be registered in this measure as $9000 - 8000 = 1000$.

Negotiation range The amplitude of measures between first offers and agreement values. For example, if the first offer was 7000€ and the agreement value 8000€ then the negotiation range was $8000 - 7000 = 1000$.

Number of rounds The number of rounds played by participants.

F **factor** An experimental measure developed for this project assessing the flexibility (or lack of resistance) of participants by equating the range between the first offer, agreement value and the number of rounds through the following formula[4]:

$$F = \frac{Range}{Rounds} * \frac{1}{Range_{max}} \qquad (3.3)$$

For instance, if the range was 1000€ and the number of rounds was 3, while the max range achieved by any participant being 2000, then $F = (1000/3) * (1/2000) \approx 0.17$.

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[4]The constant $1/\text{Range}_{max}$ places the F between 0 and 1 and is thus able to provide information about the degree of individual resistance among the given sample.

The implications for this F stem from the assumption that higher resistance is translated into a lower range and an increased number of rounds. Consequently, a participant with the same range (1000€) but over the course of 4 rounds instead of 3 will have a lower F (more resistance): $F = (1000/4) * (1/2000) \approx 0.13$. Conversely, another participant having a range of 1500€ over the same 3 rounds will have a higher F (less resistance): $F = (1500/3) * (1/2000) = 0.25$. Indeed, an increasing number of rounds has an offsetting effect over a growing range.

Survey After the simulation participants responded to 6 questions in a 5-point scale, ranking their experience according to each topic asked:

1. How would you rank your satisfaction with the result obtained?
2. How would you rank your satisfaction with your performance?
3. How would you rank your performance in terms of competitiveness?
4. How important for you was developing a good relationship with the seller?
5. How would you rank the seller's satisfaction with the result obtained?
6. How would you rank the seller's willingness to negotiate with you again?

Integrative negotiation

As with the distributive negotiation, this component also includes continuum, ordinal and binary measures grouped in two parts, one pertaining to the simulation itself and the other to the post-task survey.

Score The sum of each round's quantitative result using the scenario's data given to participants: T=6%, R=4%, P=2% and S=1%. Each was multiplied by 10^3 before being summed. For example, an all-out cooperator would achieve 24 R out of the 25 rounds and 1 S against the modified Tit-for-Tat (refer back to table 2, pp. 15). This would be translated in a score of $(24 * 40) + (1 * 20) = 980$.

Cooperativeness The number of rounds wherein participants played cooperatively.

Strategic properties This group of dichotomous variables register a number of different properties that are key elements in defining an IPD strategy. Tit-for-Tat and Pavlov excel because they feature the strongest combination of these in general terms.

- *Nice*: Playing cooperatively in the first round.
- *Non-envious*: Playing cooperatively in the last round.
- *Retaliating*: Playing competitively after the surprise defection.

- *Forgiving*: Playing cooperatively two rounds after the surprise defection, having previously played competitively (retaliated).

Survey After the simulation participants responded to 6 questions in a 5-point scale, ranking their experience according to each topic asked:

1. How would you rank your satisfaction with the decisions you took?

2. How would you rank your performance in terms of cooperativeness?

3. How would you rank your performance in terms of competitiveness?

4. How important for you was developing a good relationship with the other party?

5. How would you rank the other party's willingness to negotiate with you again?

6. If you could go back what would you do differently?

For the last unusual question the answers ranged from "More competitive" to "More cooperative", while the middle point was "Nothing".

Results

SPSS 20 and EViews 7 were used to run the statistical analysis. While SPSS 20 has a powerful control over variable manipulation, descriptives, nonparametric tests and multicolinearity analysis, it lacks some advanced diagnostic features present in EViews as well as corrective procedures. Consequently, they were used interchangeably throughout this analysis to ensure the different tests assumptions were met.

4.1 Personality inventory

Descriptives for the different NEO-FFI dimension scores are displayed in table 4. *Neuroticism* was the variable with the lowest mean ($\mu = 24.75$), highest standard deviation ($\sigma = 8.06$) and largest amplitude of scores. Although outside the scope of this project, gender differences were also significantly present for all dimensions except *Extraversion*.

To assess the strength and direction of the relationships between the different dimensions measured by the NEO-FFI, a Pearson's product-moment correlation analysis was carried out. Preliminary tests revealed an approximately linear relationship between the variables and no significant outliers were found. However, not all NEO-FFI dimensions were normally distributed as assessed by the Shapiro-Wilk's test ($p < .05$) which suggests that a Spearman's rank-order correlation may be a more adequate choice. Nevertheless, since Pearson's provided the same results in terms of statistical significance as Spearman's for these variables, then Pearson's coefficient was used and is displayed in table 5. *Neuroticism* once again takes the spotlight by being significantly and negatively correlated to all other dimensions, especially *Extraversion* ($r = -.52$) as it is able to explain 27% of its variability ($r^2 = .27$). *Openness to Experience* was the only variable that didn't possess any statistically significant relationship with the others. One more interesting result, even though not part of this project's focus, was a negative association between

Dimension	Descriptive statistics			
	μ	σ	Min	Max
Neuroticism	24.75	8.06	5	44
Extraversion	28.94	6.14	12	43
Openness to Experience	29.17	5.82	12	43
Agreeableness	31.82	4.86	17	45
Conscientiousness	33.44	6.78	12	47

Table 4: Descriptives for each NEO-FFI personality dimension (N=235).

	Intercorrelations (Pearson's r)				
Dimension	N	E	O	A	C
Neuroticism	1	–	–	–	–
Extraversion	-.52**	1	–	–	–
Openness to Experience	-.15**	.13	1	–	–
Agreeableness	-.33**	.24**	.1	1	–
Conscientiousness	-.33**	.28**	-.07	.29**	1

Table 5: Results for intercorrelations between the different NEO-FFI personality dimensions (N=235). ** *statistically significant at $\alpha = .05$.*

	Descriptives				
Variable	μ	σ	Min	Max	Median
First offer ^{a}	1054.95	430.44	250	2000	–
Deal value ^{a}	411.68	224.94	0	900	–
Negotiation range	643.27	443.69	0	1900	–
Number of rounds	–	–	1	5	3
F factor	.13	.34	0	.79	–

Table 6: Descriptive statistics for the measures in the distributive simulation (N=182). ^{a} *Encoded as the difference to the aspirational value (9000).*

age and *Neuroticism*, whose linear regression revealed significant predictive power.

4.2 Distributive simulation

From the 235 participants, 53 were excluded for analysis pertaining to this simulation as they either didn't reach an agreement with the car seller or they did but by immediately accepting without bargaining. The descriptives for the remaining 182 participants are displayed in table 6. Additionally, only $13,2\%$ of these chose to take initiative but no relationship between personality and this particular moment of decision was found.

An important remark related to this set of analyses is about the measure of the *Number of rounds*. By being comprised of discrete numerical data, it could either be treated as continuous or ordinal, a frequent debate that divides experts. However, given its similar structure to a 5-point Likert scale which is generally recommended to be treated as ordinal, the same will be done with this measure (Glass et al., 1972; Jamieson, 2004; Lubke and Muthén, 2004).

Multiple Linear Regression analyses were ran for the measures of *First offer*, *Deal value*, *Negotiation range* and F *factor*. During preliminary diagnostics to ensure assumptions were not violated, all variables passed the Ramsey's RESET stability test

(1969; $p \geq .05$), White heteroscedasticity test (1980; $p \geq .05$) and collinearity statistics ($Tolerance \geq .10$). Significant outliers, leverage values and influential points (Cook's D) weren't found for any variable except two outliers with residuals over $\pm$ 3 standard deviations in the F *factor*, but these disappeared after the variable transformation soon described. By plotting the studentized residuals against the unstandardized predicted values, seemingly linear relationships were observed as well as confirmation for apparent equal error variances. However, some violations pertaining to the residuals' independence and normality assumptions occurred and corrective procedures will now be described for each variable. *First offer* failed the Jarque-Bera normality test (1987) by revealing a weak positive skew, promptly corrected by altering its functional form to its own square root. The Durbin-Watson statistic (1950) for *Deal value*, which ideally should be ≈ 2, fell inside the inconclusive region so the Breusch-Godfrey Serial Correlation LM test (1978; 1979) was ran and a significant first-order autocorrelation was detected ($F_{(5,175)} = 4.06, p < .05$). To correct the presence of autocorrelation, the Cochrane-Orcutt iterative procedure (1949) was applied and an autoregressive term of one time lag was added to the estimation equation. *Negotiation range* faced both violations of normality and autocorrelation but both corrective heuristics described above for each case were successfully applied. However, at the second run of preliminary diagnostics using the new estimation equation, it failed the RESET test which underpins a model specification error ($F_{(5,173)} = 4.38, p < .05$). One possible solution is to remove non-significant variables and retest, which indeed proved to be effective, but since the strength and order of the significant dimensions were the same then the goodness-of-fit statistics and estimated coefficients displayed in the forthcoming tables belong to the complete model. F *factor* shared the same problems as *Negotiation range* but with a stronger positive skew and autocorrelation. To correct the residuals' normality, a transformation of the variable to its own logarithm was applied, which was enough to pass the Jarque-Bera test but at the cost of the homoscedasticity assumption. For this reason, the model was run using Newey-West HAC estimators (1986). As with the *Negotiation range*, this new estimation method also originated a specification error during the RESET test ($F_{(5,172)} = 5.43, p < .05$) but the removal of non-significant variables from the model, although effective, changed the order of significance belonging to the remaining dimensions. Taking this into consideration, the values displayed in goodness-of-fit statistics and coefficients for this variable are relative to the model with only two predictors. It should also be noted that procedures that correct autocorrelation (Cochrane-Orcutt, HAC estimators) caused automatic adjustments in the sample size.

Results for goodness-of-fit statistics are displayed in table 7. *Deal value*, *Negotiation range* and F *factor* can be seen to statistically significantly predicted by the personality dimensions assessed by the NEO-FFI ($F_{(5,175)} = 6.88, p < .05$; $F_{(5,175)} = 3.76, p < .05$; $F_{(5,173)} = 6.33, p < .05$). The $Adj.R^2$ for these models reveal that the independent variables can explain respectively 16%, 8% and 6% of the variance within the dependent

		Regression goodness-of-fit statistics			
Regressand	N	R	Adj. R^2	Std. Error	F-ratio
First offer [a]	182	.12	-.01	6.68	.53
Deal value	181	.44	.16	204.32	6.88**
Negotiation range [a]	181	.34	.08	8.68	3.76**
F factor [b]	179	.26	.06	.83	6.33**

Table 7: Regression model goodness-of-fit statistics for the distributive simulation measures. [a] quadratic, [b] logarithmic functional form transformation; ** statistically significant at $\alpha = .05$.

		Regressors' coefficients			
Regressand	N	E	O	A	C
First offer [a]	-.07	-.12	.03	.08	.02
Deal value	-5.55**	5.46*	3.41	-12.89**	4.27*
Negotiation range [a]	.03	-.29**	-.01	.45**	-.08
F factor [b]	–	-.04**	–	.03**	–

Table 8: Estimated model unstandardized coefficients for every predictor in each multiple linear regression analysis. [a] quadratic, [b] logarithmic functional form transformation; * associated t-test statistically significant at $\alpha = .10$, ** $\alpha = .05$.

variable (regressand).

Table 8 displays the estimated unstandardized coefficients for each model although only the *Deal value*, *Negotiation range* and *F factor* were found to have at least one statistically significant predictor. All personality dimensions except *Openness to Experience* added significantly, to some extent, to the prediction for the variable of *Deal value*, with the strongest relationship pertaining to *Agreeableness* ($t = -3.77, p < .05$), followed by *Neuroticism* ($t = -2.24, p < .05$), and with $.10 > p > .05$, *Extraversion* ($t = 1.79, p < .10$) and *Conscientiousness* ($t = 1.75, p < .10$). *Agreeableness* and *Neuroticism* were also the only ones to have a negative relationship, i.e., as the scores within these dimensions increase, the *Deal value* tends to decrease (get closer to the seller's aspirational value of 9000€).

Extraversion and *Agreeableness* were also found to be able to significantly predict the *Negotiation range* and *F factor*, the former through a negative relationship and the latter with a positive one. However, while *Agreeableness* was the dimension with the strongest statistical significance ($t = 3.11, p < .05$) followed by *Extraversion* ($t = -2.22, p < .05$) in the case of *Negotiation range*, these roles were reversed for the *F factor* where *Extraversion* takes the lead ($t = -2.98, p < .05$) while *Agreeableness* falls to second place ($t = 2.31, p < .05$).

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		Descriptive statistics				
Variable	N	μ	σ	Min	Max	Freq. [a]
Score	208	850.48	88.54	590	990	–
Cooperativeness	208	14.24	5.55	2	24	–
Nice property	208	–	–	–	–	43%
Non-envious property	208	–	–	–	–	34%
Retaliating property	145	–	–	–	–	52%
Forgiving property	69	–	–	–	–	84%

Table 9: Descriptive and frequency statistics for the different measures in the integrative simulation. [a] *frequency of $Y_j = 1$, i.e., featuring that behavior.*

For analyzing the *Number of rounds*, a Spearman's correlation analysis was ran but yielded no significant results.

4.3 Integrative simulation

From the 235 participants, 27 who engaged in all-out cooperation or defection were removed for the analyses pertaining to this simulation's measures of *Score*, *Cooperativeness*, *Nice* and *Non-envious* properties. From the remaining 208, 63 were further excluded for not having been subjected to the simulator's surprise defection which is a requirement for analyses relative to the *Retaliating* and *Forgiving* strategic properties, with the latter being further reduced to 69 as only those who retaliated are eligible to be classified as forgiving or not. Descriptives and frequencies for these variables are displayed in table 9.

It should also be noted that the measures of *Score* and *Cooperativeness*, very much like the *Number of rounds* in the distributive simulation, can also be treated as ordinal or continuous. However, unlike *Number of rounds*, their range and amount of discrete categories is much more substantial and not as equally populated. For these reasons they were treated as continuous which is usually accepted for such cases.

Multiple Linear Regression analyses were first ran for the measures of *Score* and *Cooperativeness*. During preliminary diagnostics to ensure assumptions were not violated, all variables passed the Ramsey's RESET stability test ($p \geq .05$), White heteroscedasticity test ($p \geq .05$) and collinearity statistics ($Tolerance \geq .10$). No outliers, leverage values or influential points (Cook's distance) were found for any variable. By plotting the studentized residuals against the unstandardized predicted values, seemingly linear relationships were observed as well as confirmation for apparent equal error variances. The residuals for each variable revealed independence as assessed by the Durbin-Watson statistic ($D - W \approx 2$) but *Cooperativeness* failed the Jarque-Bera test whose null hypothesis assumes the residuals to follow a normal distribution ($p < .05$). However, a simple

		Regression goodness-of-fit statistics			
Variable	N	R	Adj. R^2	Std. Error	F-ratio
Score	207	.13	-.01	87.24	.65
Cooperativeness [a]	207	.10	-.01	.75	.44

Table 10: Regression model goodness-of-fit statistics for the integrative simulation measures. [a] *quadratic functional form transformation.*

transformation to the variable's own square root was enough to overcome this assumption violation.

Results for goodness-of-fit statistics are displayed in table 10. *Score* and *Cooperativeness* were not found to be significantly predicted by the personality dimensions assessed by the NEO-FFI ($F_{(5,201)} = .65, p \geq .10$; $F_{(5,201)} = .44, p \geq .10$). For these reasons, there's no use in depicting a table with the results of the estimated coefficients as they're all far from being statistically significant.

In terms of the measures for the strategic properties, several independent-samples t-test were ran to detect any significant differences between the personality dimensions within the two groups for each property. Some outliers were identified by inspection of boxplots and subsequently removed (parallel analyses with and without outliers revealed a moderate effect over the results). Only one category within *Conscientiousness* failed the Shapiro-Wilk test ($p < .05$) but since non-normality does not affect Type I error rate substantially (Maxwell and Delaney, 2004), and the nonparametric alternative of Mann-Whitney U test was used as control to keep the results for this dimension in check, all the displayed values in table 11 belong to the independent-samples t-test. The assumption for equality of variances, as assessed by Levene's test, was held for all variables in each property except *Extraversion* in the analysis of *Retaliating* and *Forgiving* properties. However, the SPSS output for the independent-samples t-test provides a row with adjusted results when this assumption is violated.

Results for the independent-samples t-test are displayed in table 11. Significant differences in *Extraversion*, *Agreeableness* and *Openness to Experience* were found for the groups relative to the *Nice* property. More specifically, participants who featured this behavior had, in average, and respectively, an *Extraversion* and *Agreeableness* score $2.47 \pm .89$ and $1.52 \pm .68$ (mean $\pm$ standard error differences) higher than those who didn't. Conversely, they had an *Openness to Experience* score $1.59 \pm .83$ lower than those who didn't cooperate in the first round.

Extraversion also appears with significant differences detected in *Retaliating property*, where participants who played competitively after the simulator's surprise defection had, in average, a score $2.34 \pm .98$ lower for this dimension than those who didn't retaliate. At an $\alpha = .10$, *Agreeableness* follows the same path as *Extraversion* since retaliating players

		Personality dimensions (t-value)				
Strategic properties	N	N	E	O	A	C
Nice	192	1.36	-2.78**	1.92**	-2.26**	.32
Non-envious	197	.41	-.46	.87	.83	-.14
Retaliating	133	.13	2.44**	.17	1.71*	-1.27
Forgiving	69	-1.14	3.42**	-.08	.84	.70

Table 11: Group differences in personality dimensions for the categories within each strategic property. * *statistically significant at* $\alpha = .10$, ** $\alpha = .05$.

scored, in average, $1.40 \pm .82$ lower than those who cooperated in this moment.

For the *Forgiving* strategic property, *Extraversion* presents a somewhat interesting result where those who forgave the uncalled defection scored $3.13 \pm .92$ lower in this personality dimension than those who didn't.

Binary Logistic Regressions were ran for all the strategic properties variables. While in terms of assumptions this model is less demanding than the Multiple Linear Regression, some still apply. Only one outlier whose studentized residual's absolute was higher than 2.5 standard deviations was removed in the analysis pertaining to the *Nice* property. As for the assumption of multicolinearity, while there are no diagnostics embedded in the analysis as there is with the Multiple Linear Regression, the rule of thumb of Pearson's $r \geq 0.7$ was used (table 5). The slightly more complex assumption of the existence of a linear relationship between the continuous independent variables and the logit transformation of the dependent variable was checked through the Box-Tidwell procedure (1962), where a new interaction term comprised of each personality dimension and its own natural log transformation was added to the analysis. Results were considered with a Bonferroni correction and all predictors were found linearly related to the logit of the regressand.

Results for the different model goodness-of-fit statistics are displayed in table 12. The main measure of how well the model predicts the categories in comparison with no independent variables (Omnibus Test of Model Coefficient) reveals a statistical significance for the *Nice* and *Retaliating* properties, i.e., at least one personality dimension is able to significantly predict the probability of featuring or not the behavior associated with the property. The results for the Hosmer-Lemeshow test (2004) which is used to assess how inadequate the model is returned only a significant result for the *Forgiving* property which suggests that aside the model for this measure, all others are at least a partial fit. This is congruent with the results for Nagelkerke *pseudo* R^2 (1991) where the personality dimensions are able to explain 12% and 10% of the variation in the *Nice* and *Retaliating* properties, respectively, with *Non-envious* following behind with 1%. Although the Nagelkerke *pseudo* R^2 for *Forgiving* is 11%, the other non-significant goodness-of-fit statistics raise the question whether this coefficient is reliable and can be trusted.

		Regression goodness-of-fit statistics		
Variable	N	Model sig. [a]	H-L	Nagelkerke R^2
Nice property	206	19.8**	4.14	.12
Non-envious property	207	.98	4.99	.01
Retaliating property	145	11.5**	13.34	.10
Forgiving property	69	4.76	17.04**	.11

Table 12: Logistic regression goodness-of-fit statistics for the integrative simulation dichotomous measures. [a] *as part of the Omnibus Tests of Model Coefficients; ** statistically significant at* $\alpha = .05$.

Table 13 displays the odds ratios Exp(B) for the predictors in each model although only the models relative to the *Nice* and *Retaliating* properties were statistically significant.

Playing cooperatively in the first round, or having the *Nice* strategic property, can be significantly predicted by *Extraversion*, *Openness to Experience* and *Conscientiousness*, with the strongest relationship belonging to the former ($Wald = 8.05, p < .05; B = .09$), also the only regressor to have a positive influence, i.e., an increase of one unit in these dimensions will also increase the odds that the outcome is the presence of that property ($Y_j = 1$) – in this case, the odds of playing cooperatively in the first round for each unit increase in *Extraversion* is 1.09 greater (odds ratio, see table 11). Conversely, *Openness to Experience* ($Wald = 7.04, p < .05; B = -.07$) and *Conscientiousness* ($Wald = 5.86, p < .05; B = -.06$) exert a negative pressure on the regressand. If assuming a higher significance level of $\alpha \approx .10$ then *Agreeableness* also becomes a statistically relevant predictor ($Wald = 2.60, p < .10; B = .05$) with a positive relationship over the *Nice* property.

The only other significant result appears for the *Retaliating* property where each unit increase in *Conscientiousness* will increase the odds of playing competitively after the simulator's surprise defection in 1.06 ($Wald = 3.88, p < .05; B = .06$). Furthermore, *Neuroticism* ($Wald = 2.77, p < .10; B = -.05$), *Extraversion* ($Wald = 3.53, p < .10; B = -0.07$) and *Agreeableness* ($Wald = 3.03, p < .10; B = -.07$) were significant for $p < .10$, and unlike *Conscientiousness*, they are negatively related to the regressand.

Extraversion also presents significant predictive power for the *Forgiving* property at $\alpha = .10$ ($Wald = 3.16, p < .10; B = -.16$). However, this result should not be interpreted as reliable given the Hosmer-Lemeshow and model significance statistics for this model.

4.4 Post-task surveys

The answers to the surveys administered after the distributive and integrative negotiation simulations (questions: pp. 28-29) were treated as ordinal variables and subjected

	Logit regression odds ratio				
Variable	N	E	O	A	C
Nice property	1.01	1.09**	.93**	1.05*	.94**
Non-envious property	.98	1.00	.99	.98	.99
Retaliating property	.96*	.94*	.99	.93*	1.06**
Forgiving property	.98	.85*	1.03	.97	.97

Table 13: Logistic regression estimated odds ratios – Exp(B) – for every predictor in each analysis. * associated Wald test statistically significant at $\alpha = .10$, ** $\alpha = .05$.

to a Spearman's rank-order correlation analysis against NEO-FFI's personality dimensions, whose results are displayed in table 14. Answers with the prefix A belong to the distributive simulation survey whereas prefix B relates to the integrative.

Although questions A-3, A-4, B-2, B-3 and B-4 are arguably those more interesting and worth to analyze, significant correlations with personality dimensions were detected not only for these five but also A-1, A-5, A-6 and B-6. *Neuroticism* appears significantly ($p < .05$) and negatively correlated with A-3 (competitiveness self-evaluation) while positively correlated with A-5 and A-6 (estimation of the other party's satisfaction and willingness to negotiate again).

Extraversion is interestingly strongly correlated ($p < .05$) with both A-3, B-3 (both competitiveness self-evaluation) and A-4 (care for relationship) in the same direction, i.e., as the scores in this personality dimension increase, so does the magnitude of the answer in terms of competitiveness and concern to develop a healthy relationship with the other party. On the other hand, it is negatively correlated with B-2 (cooperativeness self-evaluation).

Openness to Experience also relates significantly ($p < .05$) to B-3 and B-6 in positive fashion, translating into increasing scores in this dimension being followed by higher self-report of competitiveness and desire to be more cooperative in the future. It also correlates positively to B-4 (relationship) but to a lesser extent ($p < .10$).

Agreeableness is, as expected, positively correlated to B-2 and B-4 but negatively to A-3 ($p < .05$). Not as significantly ($p < .10$), increasing scores in *Agreeableness* were also observed along with decreasing satisfaction with the outcome in the distributive simulation (A-1).

Conscientiousness only appears to be positively correlated with B-3 ($p < .05$).

	Personality dimensions (Spearman's ρ)				
Questions	N	E	O	A	C
Survey A-1 (satisfaction)	-.00	.00	-.01	-.11*	.05
Survey A-2 (satisfaction)	-.10	.06	-.02	-.09	.10
Survey A-3 (competitiveness)	-.15**	.22**	-.45	-.15**	.10
Survey A-4 (relationship)	.05	.13**	.02	.03	.09
Survey A-5 (estimation)	.13**	-.02	.06	.10	-.04
Survey A-6 (estimation)	.13**	.00	.08	.06	.02
Survey B-1 (satisfaction)	-.03	-.06	.08	.07	.02
Survey B-2 (cooperativeness)	.05	-.20**	.00	.13**	-.03
Survey B-3 (competitiveness)	-.10	.16**	.14**	-.05	.15**
Survey B-4 (relationship)	-.03	-.05	.11*	.16**	.05
Survey B-5 (estimation)	-.09	-.08	.06	.04	.00
Survey B-6 (future)	-.06	.04	.19**	-.05	.09

Table 14: Correlations between survey answers and personality dimensions in NEO-FFI.
*statistically significant at $\alpha = .10$, ** $\alpha = .05$.*

Discussion

Distributive negotiation

Within the measures for the distributive negotiation simulation, the dichotomous action of taking or not initiative was the first variable to be registered. Here the results revealed that only a minority of $\approx 13\%$ (pp. 31) decided to submit an offer rather than asking the seller how much he wanted for the car. Two possible reasons that may affect this particular moment of decision could lie on how the information regarding the price was already present in the introductory text and participants would feel to be redundant asking again, or they could desire to seize control of the negotiation, possibly through an anchoring effect. While the latter strategic rational would fit with conscientious individuals, no significant difference was found between the two groups. However, despite being generally tied with better outcomes (Galinsky and Mussweiler, 2001), the extra risks of taking initiative such as overshooting or strategic leaks may help to understand how the majority preferred a more cautious and conservative approach (Falcão, 2013).

Values for the first offer (table 6, pp. 31) ranged from 7000€ to 8750€, with the average being ≈ 7950€, that is, 1050€ below the seller's aspirational value (9000€) and 150€ below the reservation price (8100€). It has been reported that relatively extreme first offers are often effective and bring better results (Pruitt, 1981), and that resistance to the anchoring bias is higher within individuals who are more competitive (Deutsch, 1977). For these reasons, it could be expected that Agreeableness played a negative role. However, no significant association with personality for this particular measure was found ($F_{(5,176)} = .53, p > .05$; table 7, pp. 33), with Agreeableness and Extraversion being the dimensions with the strongest relationship, the latter in the opposite direction which is an interesting and recurring result which will be approached shortly.

The deal value fluctuated between the aspirational value (9000€) and the reservation price (8100€), with most agreements closing around 8600€ (table 6, pp. 31). Contrary to the first offer, four personality dimensions appear to be significantly related, with a total predictive power of $\approx 16\%$ (Adj. R^2; table 7, pp. 33). As predicted, and supported by the results in table 8 (pp. 33), individuals with high scores on Agreeableness obtained an inferior result in comparison with their low scoring peers, confirming the hypothesized inclination towards concessions observed by De Dreu and Van Lange (1995). Similarly predicted was the positive influence from Conscientiousness, likely due to the planfulness and analytical characteristics of conscientious individuals (Barry and Friedman, 1998), and a negative relationship with Neuroticism whose high scorers are often considered impulsive and labile (Thompson, 2008). The divergent results for these two last dimensions may be

in fact the opposite consequences of the same underlying phenomenon: pre-planning is a helpful mental tool that plays a supportive and guiding role when adversities are faced such as in a bargaining situation, whereas reactivity can have a disrupting effect and undermine decision-making during these same adversities. Interestingly, as what happened with the first offer but now at a significant level considering $\alpha = .10$, Extraversion which has been theorized to be a liability in distributive settings (e.g., Barry and Friedman, 1998) actually had a positive influence over the outcome, with extrovert participants being able to score a better deal than their more introspective counterparts. A possible explanation for this result is the existence of a higher competitiveness thanks in part to the Extraversion facet of Assertiveness, an offsetting effect that had already been posited by Elfenbein et al. (2008).

Regarding the range of offers as well as the F factor both Extraversion and Agreeableness were found to have a statistically significant predictive power over these measures. Participants high on Extraversion displayed a decreased range of offers and a lower F than those leaning towards the other end of the spectrum, while the inverse relationship was present for the Agreeableness dimension (table 8, pp. 33). Range, as a component of F, can also be interpreted as a measure which assesses the degree to which individuals were willing to concede in terms of the amplitude of the offers exchanged. As expected and already observed in the anterior case, Agreeableness is, from a quantitative perspective, positively correlated with such amplitude, meaning that participants who scored high in this dimension were less anchored to their previous offers and demonstrated a higher tendency to converge to the seller's asked price. On the other hand, extrovert individuals appear once again as competitive and more resistant to increase their offers, ultimately achieving better outcomes. The number of rounds played, also an element of F, could similarly hint at this degree of flexibility but no significant differences were detected.

The interesting role of Extraversion in the aforementioned measures can be further explained by the post-task survey (table 14, pp. 39) where it significantly correlated with the perceived importance of developing a healthy relationship (A4) along with increased competitiveness (A3), congruent not only with the assumption of a greater concern for social ties as mentioned by Barry and Friedman (1998) but also with the rather effective and successful agreement outcomes that require negotiators to be the *firm* that Pruitt and Carnevale (1993) described, which resembles the description of Extraversion's facet of Assertiveness. Conversely, Neuroticism and Agreeableness appear negatively correlated with the competitiveness self-report, with the former similarly featuring a negative relationship with outcome satisfaction (A1) while the latter appears positively correlated with the estimations regarding the other party's satisfaction and willingness to negotiation again (A5-A6). The low self-reported competitiveness from individuals who scored high in Neuroticism is congruent with their poor results and with the slight correlation ($|r| \approx .10$; table 14, pp. 39) of reduced performance satisfaction. A possible explanation

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Personality dimension	Impact on outcome [a]	Predicted/expected?
Agreeableness	Negative	Yes
Conscientiousness	Positive	Yes
Extraversion	Positive	No
Neuroticism	Negative	Yes

Table 15: Table of summarized significant results for the distributive negotiation. [a] *the impact on outcome assumes ascending scores for these dimensions.*

is that such individuals can be too insecure to bargain successfully and to feel confident about their own choices, resulting also in the inflated scores about the other party's satisfaction. Similarly, agreeable individuals, also possibly due to their high perspective-taking characteristic (Galinsky and Mussweiler, 2001), can be aware of their low-key firmness and the subsequent link with weaker outcomes.

In their original experiment, Barry and Friedman (1998) predicted Extraversion and Agreeableness to be liabilities in distributive settings while Conscientiousness would be an asset. In their findings they would come to confirm the theoretical negative influence of Agreeableness and Extraversion but they didn't find any evidence for the beneficial role of Conscientiousness. This project's results withdraws the same conclusion for Agreeableness and confirms the positive effects of Conscientiousness for the reasons already discussed above. However, Extraversion played a very different role in this study as it reflected in more successful bargains and self-reported competitiveness, although retaining the alleged concern for relationship. A possible explanation lies within the subcomponent of Assertiveness (Costa and McCrae, 1985b), which according to Elfenbein et al. (2008) helps negotiators to stand their ground, an observation in fact supported in the resistance measures of range and F. But then a relevant question arises: why did Barry and Friedman (1998) find a negative relationship whereas a positive one was present in this study? One answer may pertain to the research methodology used. In the absence of real-life interaction, the interpersonal dynamics of Extraversion and subsequent effects could have been left in a more dormant state than more intrinsic and independent features such as the Assertiveness facet which, taking over, revealed the potential to exert a positive pressure on the bargaining process resulting in better outcomes. This advantage in dyadic settings may, however, not be enough to offset the negative effect of social concerns when face-to-face negotiation are carried out. Further implications for these results will be discussed in the next section (pp. 47) and table 15 (pp. 42) summarizes the overall results.

Integrative negotiation

The measures for this simulation are divided in two groups: the continuous variables of score and cooperativeness and the dichotomous variables of strategic properties which
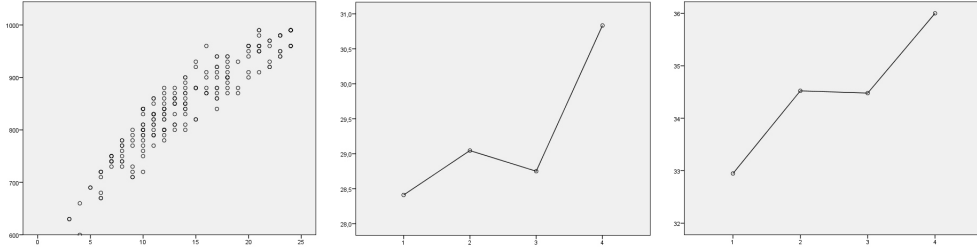
Figure 2: Left: Scatter plot evincing the strong relationship ($r > .90$) between Score and Cooperativeness. Middle/Right: Means plot of Extraversion/Conscientiousness scores (Y axis) in the different ascending Cooperativeness groups (X axis; 1 to 4).

can only assume one of two values according to whether the participant did or did not feature the behavior being measured. Starting with the scores, these ranged from 590 to 990, the average being 850 (table 9, pp. 34). It should be noted that having the same score doesn't necessarily mean the same decision path or number of cooperative/competitive moves. However, a strong positive correlation ($r > .90$; figure 2, pp. 43) was present between the score and cooperativeness (number of times the participant cooperated), the latter assuming values between 2 and 24, with a mean of 14 (table 9, pp. 34). This supports the idea that whenever value creation or beneficial joint outcomes are present, such as in the *IPD* games, cooperative behavior is favorable and results in better individual outcomes (Aumann, 1959). Despite Agreeableness, Extraversion and Conscientiousness having been predicted to influence these measures, no significant result was found for both cooperativeness and score ($F_{(5,201)} = .65, p > .05$; $F_{(5,201)} = .44, p > .05$; table 10, pp. 35). Nevertheless, post-hoc analyses in which the *Cooperativeness* variable was transformed in four groups in accordance to its quartiles, although still not yielding statistically significant results at $\alpha = .05$, managed to reveal an upwards pattern for the means plots regarding the dimensions of Extraversion and Conscientiousness (figure 2, pp. 43). These patterns featuring an increase of means along the different groups of ascending cooperativeness strength would confirm the hypothesized role of Extraversion as favoring a tendency towards cooperative behavior out of an interpersonal and social drive, as well as Conscientiousness since cooperation is the most rational choice when the number of rounds is unknown (Barry and Friedman, 1998).

The nice and non-envious strategic properties were concerned with whether the participant started and finished the negotiation with cooperative behavior, respectively. 43% of the sample started by cooperating whereas only 34% finished by doing the same, both below the 50% mark (table 9, pp. 34). While for the non-envious property no significant difference among the personality dimensions was found, and its low positive frequency ($Y_j = 1$) can be explained by a lack of fear in repercussions given being the last round, the nice property yielded significant differences between means scores within Extraversion, Openness to Experience and Agreeableness (table 11, pp. 36). In terms of predictive

power, the three above plus Conscientiousness were found to be statistically significant, being able to account for 12% (Nagelkerke R^2) of the variance in this property (table 12 and 13, pp. 37-38). Extraversion and Agreeableness, as expected, were positively related, meaning that individuals who score high in these dimensions will have a higher propensity to cooperate in the first round given their natural relationship-oriented mindset and the preference for non-assertive tactics included in Agreeableness (Jensen-Campbell et al., 1996). Conversely, Conscientiousness and Openness to Experience appear with a negative relationship, two somewhat unexpected results. A possible explanation for the case of Openness to Experience may lie on the observation that low scorers in this dimension often prefer the familiar to the complex (Sneed et al., 1998), and by recognizing a competitive start as an omen for a tough remaining negotiation may have preferred to play cooperatively right from the start. Conscientious individuals choice of starting by playing competitively may be linked to their carefulness and desire to "test the waters" first (Thompson, 2008), as in the overall negotiation they seem to have been more cooperative than competitive (figure 2, pp. 43).

After the simulator's surprise defection, the participant's behavioral reaction was measured for the following two rounds, the first registered as the retaliating property and the second as the forgiving, although this last one was only valid for observations where players retaliated. Starting with retaliating, around half of the participants who got the uncalled defection decided to retaliate, while the other half chose to cooperate (table 9, pp. 34). There were significant group differences among the means of Extraversion and Agreeableness (table 11, pp. 36), with higher scores in these dimensions translating into a lower probability of retaliating (playing competitively), which is congruent with the aforementioned characteristics of Extraversion's concern for keeping a healthy relationship and Agreeableness's non-dominant traits. The logistic regression confirmed the predictive power for these variables at $\alpha = .10$ but also for Neuroticism, with a similarly negative relationship (table 13, pp. 38). A possible explanation for this particular result is how individuals with decreased emotional stability often respond poorly to aversive stimuli and may fail to recognize that retaliating at uncalled defections is in fact beneficial from several perspectives, starting with self-protection (Thompson, 2008). Conversely, a strong predictive power appeared for Conscientiousness which, unlike the previous predictors, reflected a propensity to retaliate as scores in this dimension increase, with the reason contrasting the one hypothesized for the effect of Neuroticism. On the other hand, of those who retaliated, 84% chose to forgive afterwards (table 9, pp. 34). This means that the vast majority of the participants accepted to go back to cooperative behavior where joint gains were possible. Furthermore, significant group differences were detected for Extraversion, with the means scores for this dimension to be lower in those who forgave, which is an intriguing result (table 11, pp. 36). Even though Extraversion was also found to be able to predict to some extent the forgiving behavior, this result shouldn't be given

too much emphasis as the surrounding goodness-of-fit statistics in table 12 (pp. 37) raise some doubts about the estimating coefficient's reliability. Nevertheless, the difference in means is by itself encouraging enough to wonder if this result follows in the same vein as what happened in the dist-ributive simulation, namely the role of the Assertiveness facet. It may be the case that in such situation, either the participant felt betrayed for the concern he was ascribing to the relationship given its high Extraversion which resulted in a more severe and lasting retaliative behavior, or a sudden surge in assertive behavior was triggered by the uncalled defection, with the subject feeling he should demonstrate that he's in control.

In the post-task survey (table 14, pp. 39), Extraversion takes the spotlight by being negatively correlated to the self-report of cooperativeness (B2) and positively to compet-itiveness (B3), which seems to support the finding of reduced forgiving among the high scoring individuals for this dimension. Similar to the distributive simulation, it is posited that the lack of a face-to-face interaction uncovers the more competitive components of Extraversion, the ones that also feed the Assertiveness facet. However, in such case, it raises the question of why this didn't manifest in the nice and retaliating properties where extroverts had a higher probability of opting for the cooperative choice. The answer may reside on polarized reactions among extroverts, with one big group avoiding to retaliate after the uncalled defection whereas the smaller group that did retaliate didn't forgive so easily. Agreeableness once again revealed concern for seeking a good relationship with the other party (B4) and a high self-reported cooperativeness (B2), as expected. Conscien-tiousness, like Extraversion, also correlated positively with self-ratings of competitiveness (B3), and so did Openness to Experience. Interestingly, this last dimension was also the only one to be significantly correlated to the question about future behavior in which individuals who scored high responded that they would try to be more cooperative the next time.

Barry and Friedman (1998) found no evidence in their study for their predictions of supportive roles of Agreeableness, Extraversion and Conscientiousness in integrative set-tings. In this project, no significant results were found for the measures of score and cooperativeness, although the latter revealed an ascending pattern in the means plot of the last two aforementioned dimensions which in turn correlated with higher scores. Conscientiousness could also significantly predict the nice and retaliating properties, both behaviors deemed healthy and evolutionary robust as shown by Axelrod (1980a,b). Agree-ableness, also as expected, was found to be negatively related with competitive behavior regarding the nice and retaliating properties. Extraversion once again presents paradoxi-cal results, playing the same role as Agreeableness for the same two properties mentioned, but exactly the opposite for the forgiving measure. The explanatory hypothesis is a possi-ble polarization of reactions in this specific event, as already described. In the end, some results were able to confirm the predictions made in the introductory part of this project

Personality dimension	Impact on outcome [a]	Predicted/expected?
Agreeableness	Mixed	Yes
Conscientiousness	Mixed	Partially
Extraversion	Mixed	Partially
Openness to Experience	Negative	No

Table 16: Table of summarized significant results for the integrative negotiation. [a] *the impact on outcome assumes ascending scores for these dimensions.*

report and by Barry and Friedman (1998). Table 16 (pp. 46) presents a summary of the results and further implications will be discussed shortly.

Possible limitations

One of this project's greatest strengths is possibly one of its main weaknesses - the computerized simulation approach. In the introduction some likely benefits were identified, such as a new lens of research in a field in need of fresh perspectives, increased standardization and the potential to distill the effects of personality over specific and objective measures of negotiation behavior by reducing the amount of subjective interpersonal noise such as thin-slicing expressive behavior. However, face-to-face negotiation is itself a social phenomenon where such dynamics are a part of the process and influence outcomes. Consequently, the results obtained in this study, while relevant both theoretically and in practice, should be understood as a laboratory dissection aimed at shedding light onto the relationship between personality and measures within negotiation. Face-to-face negotiation, especially outside an artificial research focus, will involve much more input sources and have the potential to reshape the direction and strength of the influences found throughout this project. Even though many of the theorized predictions were confirmed, also congruent with those in studies of dyadic interaction, these results should still be interpreted by what they are: linking fragments of a multidimensional whole. Regardless, it is argued that research will always benefit from multi-layered approach, starting with small additions and working the way up towards the big equation. This project, as many others involving different specific inputs such as cognitive ability, thin-slicing or emotions, was thus aimed at analyzing the effects of personality and making sure other things stayed out of the equation by employing the computerized simulation methodology.

Nevertheless, it is difficult to control the effect that economic variables have. For instance, would two individuals in different socioeconomic status negotiate in the same way for a car priced 9000€? What if it was four or five times that value? The perception and impact of such quantitative elements in negotiation behavior and decision-making has been argued to be significant (e.g., Thompson, 2005) but to what extent this overshadows

intrinsic characteristics remains somewhat unknown. While with further research using a within-subjects design it would be possible to have an idea of this interaction, a potential effect within this study shouldn't be ruled out as non-existing.

One other possible limitation intrinsic to the logic used lies within the decision algorithm for the distributive simulation where some responses hinged partially on randomness. For instance, whenever the offer value exceeded the RP, there was a probability of the seller accepting that offer associated to the value proposed. To decide whether or not it would be accepted, a random number between 0 and 100 was generated and if it was lower or equal to the probability, then a deal was reached. The introduction of this system was to simulate a minimized interpersonal variance and criteria from seller to seller, and to allow participants more expressive maneuver instead of tunneling down their actions which may have returned little variance in the measures registered. However, this mechanism, although most likely canceled with sample increase, could still affect standardization and should thus be mentioned in this section.

A final consideration related to the sample pertains to its nonprobability sampling method which was used in this project and may hinder the extrapolation process of the conclusions withdrawn from the sample to the population. A solution would have been to make sure every unit in the population had an equal chance of being selected to participate in the data collection which, although requiring an increased level of resources, would have resulted, at least in theory, in more unbiased population estimates.

5.1   Implications and outlook

The findings for the distributive negotiation revealed a positive influence by Extraversion and Conscientiousness and a negative one by Agreeableness. However, it is hypothesized that the competitive role brought along by Extraversion derives from its facet of Assertiveness and in settings with face-to-face negotiation this component would possibly be overshadowed by interpersonal dynamics that favor the concern for social ties, resulting in a effect somewhat similar to Agreeableness. From herein, implications can be found both at theoretical and practical level. First, it replicates previous findings regarding the roles of Agreeableness and Conscientiousness as well as providing empirical evidence for the Assertiveness advantage theorized by, among others, Elfenbein et al. (2008). Furthermore, the new measure called *F factor* (pp. 27) developed for this project revealed significant links with Extraversion and Agreeableness, congruent with the remaining findings, and would benefit from further research in order to assess its reliability as a scale for individual bargaining resistance within a given sample. The practical implication to be withdrawn is that negotiators, by knowing their own personality, especially under the *Big Five* taxonomy, can not only be aware of their strengths and weaknesses for negotiations ruled by value claiming, but also to make a conscious effort in order to obtain

better results. The optimal profile for these kind of negotiations, under the lens of this study findings, is to incorporate an approach of low Agreeableness (more competitiveness, few concessions), high Conscientiousness (pre-planning of aspirational/reservation values), low Neuroticism (avoid being impulsive or reactive) and balanced Extraversion by minimizing concerns for social relationships and maximizing assertiveness. Based on the post-task survey for this simulation, low Agreeableness and Neuroticism will also help negotiators to feel better about the outcome and have a more modest estimation of the other party's feelings.

Conclusions for the integrative negotiation follow, in general terms, the same lines as for the distributive simulation, with Conscientiousness being mostly an asset, and more ambiguous roles for Agreeableness and Extraversion. From a theoretical standpoint, this in part confirms the expected roles advocated by researchers (e.g., Barry and Friedman, 1998), although Extraversion comes once again as more competitive to the point of undermining the forgiving strategic property. It may be possible that the explanation is the same posited before (Assertiveness effects) but it should be noted that in the special event of the uncalled defection, responses from extrovert individuals appear to be polarized, either avoiding to retaliate, or to punish the defection by retaliating and keeping such behavior even after the computer played cooperation in search of forgiveness. This specific observation should perhaps be object of further inquiry as it could involve an important subset of relationship interaction (reaction to betrayal) that has important repercussions in negotiation. Practical implications is that negotiators should seek joint outcomes which correlates with cooperativeness and adopt an evolutionary robust strategy such as Tit-for-Tat, that is, starting by cooperating, avoid trying to outsmart and make more than the other party, retaliate after given a reason (e.g., lack of transparency or attempt to leverage a better deal) but being able to forgive. In particular, high scorers in Openness to Experience shouldn't view such types of negotiation as a challenge to outsmart the other party, while extrovert and agreeable individuals should be aware that acting counter-intuitively to their schemas and retaliating at the right time not only invariably leads to better outcomes but also has the potential to correct any sidetracked cooperative effort. However, extroverts who retaliate should be aware that they may have a propensity to hold a grudge which is unhealthy if the other party resumes or shows the intention to return to value creation. In conclusion, whenever potential joint gains are present, negotiators should feature a profile of low Neuroticism, high Conscientiousness and adaptable Agreeableness/Extraversion (higher during value creation).

Figure 3 summarizes the overall advice prescribed to future negotiators in terms of the optimal personality profile under the FFM taxonomy and in light of this project's findings. For further explanation of each dimension please refer back to page 8.

Ultimately, research should be continued (Foo et al., 2004; Elfenbein et al., 2008). Many recent studies with positive findings are reigniting the interest of analyzing the
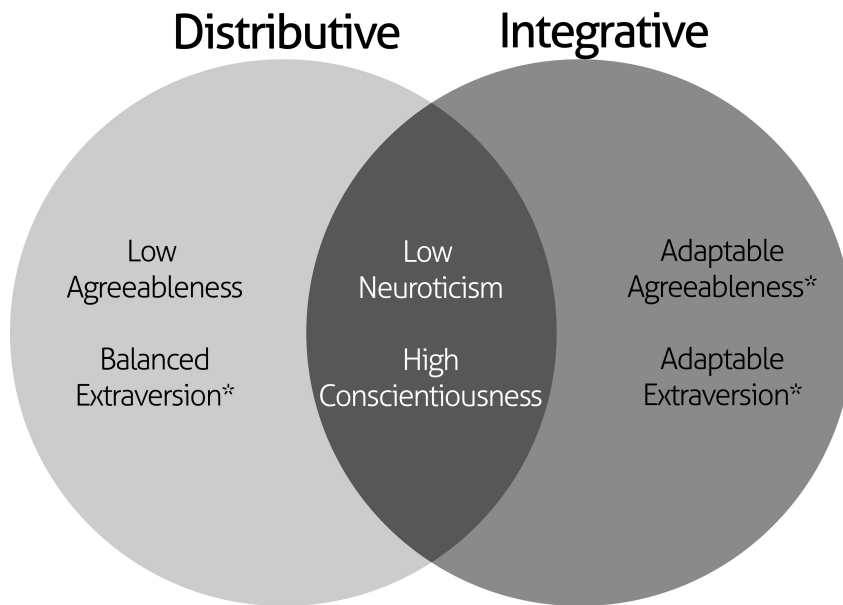
Figure 3: Prescriptive advice to future negotiators in terms of the FFM. *refer to the text for additional information as oftentimes one dimension may have offsetting elements.*

role of individual differences within negotiation, especially with empiric advances on new concepts such as emotional intelligence (EQ) and thin-slicing. By exploring the role all these and other variables have in negotiation behavior, a bigger picture can start to be drawn and studied. In terms of personality, many theoretical constructs and predictions were confirmed in this project, as well as the replication of some previous findings, and new interesting observations came to light, suggesting that more research should be conducted. Furthermore, the practical implications shouldn't be neglected as any finding can increase negotiators' awareness and performance.

Conclusion

Coming back to the introduction and the main objective of exploring the relationship between personality and negotiation, this study started by looking at the element of personality through the Five-Factor Model, that is, a large part of the variance within individual characteristics covered by the definition of personality can be organized and explained by one of five dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness.

As the name suggests, Neuroticism relates to a predisposition for being significantly affected by negative emotions and situations, compromising decision-making and adaptation. Extraversion, a dimension frequently associated with professional success whenever a strong interpersonal component is present, involves the perceived levels of energy and social engagement attributed to an individual. Openness to Experience reflects intellectual curiosity, creativity and attraction to new experiences. Agreeableness is the constellation of characteristics that among the FFM has been more strongly linked with negotiation and conflict management. High scores in this dimension are frequently related to individuals considered honest, trustworthy and little competitive or manipulative. The last dimension of Conscientiousness describes differences in terms of self-discipline, mental organization, ambition and presents significant correlations with overall academic as well as professional success.

To analyze the role of each one of these dimensions in the behavior and decision-making during a negotiation process, two types of negotiations were distinguished: distributive negotiation, or value claiming, and integrative negotiation, or value creation. The first depicts the traditional bargaining format of a buyer-seller situation where all results are *pareto* efficient, i.e., it's not possible to improve one agent's position without harming his/her counterpart. On the other hand, a negotiation where value creation is present paves the way for potential joint gains through mutual cooperation. A framework heavily studied in game theory and socioeconomics that represents this last negotiation model is the Iterated Prisoner's Dilemma, where each negotiator can either choose to cooperate or compete over the course of a number of rounds.

The data collection methodology for this study consisted on the administration of a personality inventory (NEO-FFI) followed by two computerized negotiation simulations, one where participants had to negotiate the purchase of a used car (value claiming), and another that followed the IPD framework and allowed for value creation. In addition, participants also had to fill out a short survey after each simulation reporting their levels of satisfaction and self-perceived competitiveness, among others. In terms of research hypotheses, it was predicted that Agreeableness would exert a negative pressure in dis-

tributive settings, contrasting with a positive influence over the integrative negotiation. It was also expected that high scores in Conscientiousness would translate in better outcomes for both types of negotiation. The remaining dimensions were predicted to have a more modest role, especially Openness to Experience.

Result analyses on the data collected confirmed some of the predictions, namely a beneficial role of Conscientiousness in bargaining, most likely due to the planfulness and objectivity that characterizes conscientious individuals. In contrast, Agreeableness was found to feature a negative relationship with distributive outcomes which could be expected given how high scorers are often considered non-dominant and may lack the firmness necessary to achieve good results. Extraversion presented an unexpected significant role by being positively related with performance in settings of both value claiming and value creation. The proposed explanation is that Extraversion's connection with cooperative behavior isn't linear and may be a consequence of social concerns which, added to the offsetting effect of its Assertiveness facet, may result in a mixed and fluctuating influence. Conscientiousness retained its overall positive influence in the integrative simulation measures and Agreeableness provided mixed findings, being simultaneously a liability and a virtue. Neuroticism and Openness to Experience had a significant presence for some measures but the overall effect was modest. From these results it can be concluded that a negotiation process where value creation is possible may require a different personality profile than for traditional bargaining.

While the findings were generally congruent with previous research and the theoretical constructs present in the literature review, one other important objective for this dissertation was to prescribe advice to future negotiators. As such, by being aware of their own personality, and taking the results herein as departure point, negotiators should seek to be planful, assertive and not overly concerned with social ties when approaching a distributive negotiation scenario. On the other hand, when there's the potential for joint outcomes a higher flexibility seems to be needed and the general advice given is to be cooperative during value creation, while not afraid of retaliating, but to fall back to a firm posture during value claiming.

As a closing note, an appeal for further research is made as to keep the renewed interest of individual differences within conflict management and interpersonal dynamics, and to continue exploring the multidimensional reality of negotiation in order to not only contribute to the existing body of theory but also improve negotiator's performance by increasing their awareness, control and information over the process.

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Annexes

8.1   NEO Five-Factor Inventory (Portuguese)

NEO-FFI
Lima & Simões (2000)

Leia cuidadosamente cada uma das afirmações que se seguem e assinale com uma cruz o que melhor representa a sua opinião. Responda a todas as questões.

Discordo Fortemente 0	Discordo 1	Neutro 2	Concordo 3	Concordo Fortemente 4

	0	1	2	3	4
1. Não sou uma pessoa preocupada.					
2. Gosto de ter muita gente à minha volta.					
3. Não gosto de perder tempo a sonhar acordado(a).					
4. Tento ser delicado com todas as pessoas que encontro.					
5. Mantenho as minhas coisas limpas e em ordem.					
6. Sinto-me muitas vezes inferior às outras pessoas.					
7. Rio facilmente.					
8. Quando encontro uma maneira correcta de fazer qualquer coisa não mudo mais.					
9. Frequentemente arranjo discussões com a minha família e colegas de trabalho.					
10. Sou bastante capaz de organizar o meu tempo de maneira a fazer as coisas dentro do prazo.					
11. Quando estou numa grande tensão sinto-me, às vezes, como se me estivessem a fazer em pedaços.					
12. Não me considero uma pessoa alegre.					
13. Fico admirado(a) com os modelos que encontro na arte e na natureza.					
14. Algumas pessoas pensam que sou invejoso(a) e egoísta.					
15. Não sou uma pessoa muito metódica (ordenada).					
16. Raramente me sinto só ou abatido(a).					
17. Gosto muito de falar com as outras pessoas.					
18. Acredito que deixar os alunos ouvir pessoas, com ideias discutíveis, só os pode confundir e desorientar.					
19. Preferia colaborar com as outras pessoas do que competir com elas.					
20. Tento realizar, conscienciosamente, todas as minhas obrigações.					
21. Muitas vezes sinto-me tenso(a) e enervado(a).					
22. Gosto de estar onde está a acção.					
23. A poesia pouco ou nada me diz.					
24. Tendo a ser descrente ou a duvidar das boas intenções dos outros.					
25. Tenho objectivos claros e faço por atingi-los de uma forma ordenada.					
26. Às vezes sinto-me completamente inútil.					
27. Normalmente prefiro fazer as coisas sozinho(a).					
28. Frequentemente experimento comidas novas e desconhecidas.					
29. Penso que a maior parte das pessoas abusa de nós, se as deixarmos.					
30. Perco muito tempo antes de me concentrar no trabalho.					
31. Raramente me sinto amedrontado(a) ou ansioso(a).					
32. Muitas vezes, sinto-me a rebentar de energia.					

Discordo Fortemente 0	Discordo 1	Neutro 2	Concordo 3	Concordo Fortemente 4

	0	1	2	3	4
33. Poucas vezes me dou conta da influência que diferentes ambientes produzem nas pessoas.					
34. A maioria das pessoas que conheço gosta de mim.					
35. Trabalho muito para conseguir o que quero.					
36. Muitas vezes aborrece-me a maneira como as pessoas me tratam.					
37. Sou uma pessoa alegre e bem-disposta.					
38. Acredito que devemos ter em conta a autoridade religiosa quando se trata de tomar decisões respeitantes à moral.					
39. Algumas pessoas consideram-me frio(a) e calculista.					
40. Quando assumo um compromisso podem sempre contar que eu o cumpra.					
41. Muitas vezes quando as coisas não me correm bem perco a coragem e tenho vontade de desistir.					
42. Não sou um(a) grande optimista.					
43. Às vezes ao ler poesia e ao olhar para uma obra de arte sinto um arrepio ou uma onda de emoção.					
44. Sou inflexível e duro(a) nas minhas atitudes.					
45. Às vezes não sou tão seguro(a) ou digno(a) de confiança como deveria ser.					
46. Raramente estou triste ou deprimido(a).					
47. A minha vida decorre a um ritmo rápido.					
48. Gosto pouco de me pronunciar sobre a natureza do universo e da condição humana.					
49. Geralmente procuro ser atencioso(a) e delicado(a).					
50. Sou uma pessoa aplicada, conseguindo sempre realizar o meu trabalho.					
51. Sinto-me, muitas vezes, desamparado(a), desejando que alguém resolva os meus problemas por mim.					
52. Sou uma pessoa muito activa.					
53. Tenho muita curiosidade intelectual.					
54. Quando não gosto das pessoas faço-lhe saber.					
55. Parece que nunca consigo ser organizado(a).					
56. Já houve alturas em que fiquei tão envergonhado(a) que desejava meter-me num buraco.					
57. Prefiro tratar da minha vida a ser chefe das outras pessoas.					
58. Muitas vezes dá-me prazer brincar com teorias e ideias abstractas.					
59. Se for necessário não hesito em manipular as pessoas para conseguir aquilo que quero.					
60. Esforço-me por ser excelente em tudo o que faço.					

8.2   Distributive simulation decision tree

```
                          ┌──────────────┐
                          │  User Input  │
                          └──────────────┘

First round action

┌────────────────────────┐              ◇ Offer
│   Counter-offer         │                < RP
│                         │
│ Add 'parking sensors'   │         First time that offer < RP
│ incentive               │
└────────────────────────┘              ┌────────────────────────┐
                    ◇ Offer              │   Counter-offer        │
                      >= RP              │                        │
                                         │ Decrease price by 100-200│
          ◇ Same                         │ "It's the best I can do"│
            offer as                     └────────────────────────┘
            previous                          Second time
                                         ┌────────────────────────┐
        Yes              No              │   Counter-offer        │
                                         │                        │
┌────────────────────┐   ┌─────────────┐│ Add 'alarm system'     │
│   Special event    │   │1) Generate  ││ incentive              │
│                    │   │random number││                        │
│ "I feel we are     │   │X from 1 to  │└────────────────────────┘
│ close to a deal    │   │100. 2)      │     Third time
│ but not there yet" │   │Calculate    │
│ - Resume           │   │probability Y│┌────────────────────────┐
│ negotiation?       │   │of accepting ││   Counter-offer        │
└────────────────────┘   │offer.       ││                        │
         No              │             ││ Decrease price by 100-200│
                         │ Is X <= Y?  ││ "Take it or leave it"  │
                    Yes  └─────────────┘└────────────────────────┘
  ┌──────────────────┐         No
  │ Accept last offer│
  └──────────────────┘   ┌─────────────┐
                         │1) Generate  │
                         │random number│
                         │X from 1 to  │
                         │100. 2)      │
                         │Calculate    │
                         │probability Y│
                         │of second    │
                         │incentive.   │
                         │             │
                         │ Is X <= Y?  │
                         └─────────────┘
     Yes                        Yes but it's already been
                                added to the negotiation
                                        No
┌────────────────────┐         ┌────────────────────┐
│   Counter-offer    │         │   Counter-offer    │
│                    │         │                    │
│ Add 'alarm system' │         │ Decrease price by  │
│ incentive          │         │ 100-200            │
└────────────────────┘         └────────────────────┘
```

8.3 Source code for the platform core

```python
# Author: Manuel Saraiva (mnlsrv@gmail.com)
# Code developed solely for my master thesis project

# Imports & db related functions were removed
# Configuration file with tunables not included

""" """ """ """ """ """ """ """ """ """ """ """


# Introduction to the project - homepage

@app.route('/')
def p0():
 return render_template('0.html')


# Personality questionnaire and demographics

@app.route('/1/', methods=['POST', 'GET'])
def p1():
 if app.debug == True or request.method == 'POST':
  i = codecs.open(conf.p_questionsf, encoding='iso-8859-1')
  j = i.readlines()
  i.close()
  return render_template('1.html', qs=j, inv=conf.p_inv)

# Distributive negotiation simulator

@app.route('/2/', methods=['POST', 'GET'])
def p2():
 if app.debug == True or request.method == 'POST':

  try:
   who = request.form['who']
   r = int(request.form['r'])

   # Round zero (register initiative and proceed)
   if r == 0:
    role = int(request.form['role'])
    inject(1, 0, r, role, who)
    g.db.commit()
    r += 1
    return render_template('2.html', who=who, r=r, a=role)

   # Rounds limit (if reached, exit without agreement)
   elif r > conf.d_mxrnd:
    f = codecs.open(conf.survey1, encoding='iso-8859-1')
```

```
 q = f.readlines()
 return render_template('survey.html', who=who, rmt=1, lines=q, d=1)


# Round non-zero
else:
 p = request.form['action']
 q = p.split(' ')


 # Register offer if it is valid
 if p == conf.d_action1 or p == conf.d_action2:
  pre = val(r, request.form['offer'], who)
  if pre[0] is 0:
   error = 0
   x = int(request.form['offer'])
   inject(1, 0, r, x, who)


   # Round one specific actions
   if (r == 1) and ((conf.d_bprice - x) > conf.d_dfs):
    inject(1, 1, 'bonus', 1, who)
    r += 1
    coffer = conf.d_bprice
    bonus = obtain(col(1, 1, 'bonus'), who)
    last = obtain(col(1, 0, r - 1), who)
    return render_template('2.html', who=who, r=r, error=error, coffer=
        coffer, b=bonus, last=last)
   elif (r == 1) and ((conf.d_bprice - x) <= conf.d_dfs):
    inject(1, 1, 'finished', x, who)
    f = codecs.open(conf.survey1, encoding='iso-8859-1')
    q = f.readlines()
    return render_template('survey.html', who=who, rmt=1, lines=q, d=2,
        v=x)


   # Round non-one
   elif (r > 1):


    # Offer higher than RP
    if (x >= conf.d_sprice):
     last = obtain(col(1, 0, r - 1), who)


     # Check if = previous offer
     if (x == last):
      chlg = obtain(col(1, 1, 'challenge'), who)
      chlg += 1
      inject(1, 1, 'challenge', chlg, who)
      if (chlg == 2):
       inject(1, 1, 'finished', x, who)
       f = codecs.open(conf.survey1, encoding='iso-8859-1')
```

```python
    q = f.readlines()
    return render_template('survey.html', who=who, rmt=1, lines=q, d
        =2, v=x)
  error = 7
  r += 1
  last = obtain(col(1, 0, r - 1), who)
  coffer = request.form['lcoffer']
  bonus = obtain(col(1, 1, 'bonus'), who)
  return render_template('2.html', who=who, r=r, error=error, coffer
      =coffer, last=last, b=bonus)


# Calculate probability of acceptance & exit if yes
o = int(random() * 100)
v = ((x * conf.d_slope1m) + conf.d_slope1b)
if (o <= v):
 inject(1, 1, 'finished', x, who)
 f = codecs.open(conf.survey1, encoding='iso-8859-1')
 q = f.readlines()
 return render_template('survey.html', who=who, rmt=1, lines=q, d
     =2, v=x)


# ... if not, generate counter-offer or incentive
else:
 bonus = obtain(col(1, 1, 'bonus'), who)
 o = int(random() * 100)
 v = ((x * conf.d_slope2m) + conf.d_slope2b)
 if (bonus < 2) and (o <= v):
  coffer = int(request.form['lcoffer'])
  inject(1, 1, 'bonus', 2, who)
  error = 6
 else:
  if (r == 2):
   y = conf.d_bprice
  else:
   y = int(request.form['lcoffer'])
  coffer = y - int(choice(conf.d_adj))
  if (coffer <= x) or ((coffer - x) <= conf.d_dfs):
   inject(1, 1, 'finished', x, who)
   f = codecs.open(conf.survey1, encoding='iso-8859-1')
   q = f.readlines()
   return render_template('survey.html', who=who, rmt=1, lines=q, d
       =2, v=x)
 r += 1
 last = obtain(col(1, 0, r - 1), who)
 bonus = obtain(col(1, 1, 'bonus'), who)
 return render_template('2.html', who=who, r=r, error=error, coffer
     =coffer, last=last, b=bonus)
```

```python
        # Offer lower than RP
        else:
         rloffer = obtain(col(1, 1, 'rloffer'), who)
         rloffer += 1
         inject(1, 1, 'rloffer', rloffer, who)

         # First time
         if (rloffer == 1):
          error = 8
          coffer = conf.d_bprice - int(choice(conf.d_adj))
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          bonus = obtain(col(1, 1, 'bonus'), who)
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last, b=bonus)

         # Second time
         elif (rloffer == 2):
          bonus = obtain(col(1, 1, 'bonus'), who)
          if (bonus < 2):
           coffer = int(request.form['lcoffer'])
           inject(1, 1, 'bonus', 2, who)
           error = 6
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          bonus += 1
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last, b=bonus)

         # Third time
         elif (rloffer == 3):
          error = 9
          coffer = int(request.form['lcoffer']) - int(choice(conf.d_adj))
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          inject(1, 1, 'pol', 1, who)
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last)

# Offer not valid, transmit error
else:
 error = pre[0]
 if r >= 2:
  last = obtain(col(1, 0, r - 1), who)
  coffer = request.form['lcoffer']
  bonus = obtain(col(1, 1, 'bonus'), who)
```

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```python
        # Offer lower than RP
        else:
         rloffer = obtain(col(1, 1, 'rloffer'), who)
         rloffer += 1
         inject(1, 1, 'rloffer', rloffer, who)

         # First time
         if (rloffer == 1):
          error = 8
          coffer = conf.d_bprice - int(choice(conf.d_adj))
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          bonus = obtain(col(1, 1, 'bonus'), who)
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last, b=bonus)

         # Second time
         elif (rloffer == 2):
          bonus = obtain(col(1, 1, 'bonus'), who)
          if (bonus < 2):
           coffer = int(request.form['lcoffer'])
           inject(1, 1, 'bonus', 2, who)
           error = 6
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          bonus += 1
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last, b=bonus)

         # Third time
         elif (rloffer == 3):
          error = 9
          coffer = int(request.form['lcoffer']) - int(choice(conf.d_adj))
          r += 1
          last = obtain(col(1, 0, r - 1), who)
          inject(1, 1, 'pol', 1, who)
          return render_template('2.html', who=who, r=r, error=error, coffer
              =coffer, last=last)

# Offer not valid, transmit error
else:
 error = pre[0]
 if r >= 2:
  last = obtain(col(1, 0, r - 1), who)
  coffer = request.form['lcoffer']
  bonus = obtain(col(1, 1, 'bonus'), who)
```

```
        lerror = int(request.form['lerror'])
        return render_template('2.html', who=who, r=r, error=error, coffer=
            coffer, last=last, b=bonus, lerror=lerror)
      else:
        role = obtain(col(1, 0, 0), who)
        return render_template('2.html', who=who, r=r, error=error, a=role)


    # Special action (resume/abandon event)
    elif (p == conf.d_action5):
      last = obtain(col(1, 0, r − 1), who)
      coffer = request.form['lcoffer']
      bonus = obtain(col(1, 1, 'bonus'), who)
      error = 10
      return render_template('2.html', who=who, r=r, coffer=coffer, last=
          last, b=bonus, error=error)


    # Special actions (accept, abandon)
    else:
      if (p == conf.d_action3) or (p == conf.d_action7):
        if (r == 1):
          ap = conf.d_bprice
        else:
          ap = request.form['lcoffer']
        inject(1, 1, 'finished', ap, who)
      elif (p == conf.d_action6):
        ap = obtain(col(1, 0, r − 1), who)
        inject(1, 1, 'finished', ap, who)
      f = codecs.open(conf.survey1, encoding='iso−8859−1')
      q = f.readlines()
      if (p == conf.d_action4) or (p == conf.d_action8):
        return render_template('survey.html', who=who, rmt=1, lines=q, d=3)
      else:
        return render_template('survey.html', who=who, rmt=1, lines=q, d=2, v
            =ap)

# Create new database entry for the personality inventory answers
except KeyError:
  who = uuid.uuid4().hex
  when = (datetime.utcnow()).strftime("%d–%m–%Y %H:%M")
  g.db.execute(conf.inject_uid, [who, when])
  if request.method == 'POST':
    i = request.form
    for j in range(1,(len(i.keys())−2)):
      x = "neoffi_" + str(j)
      y = conf.inject1 + x + conf.inject2
      g.db.execute(y, [i.get(str(j), type=int), who])
    age = request.form['age']
```

```python
    inject(3,1,0,age,who)
    gender = request.form['gender']
    inject(3,2,0,gender,who)
    try:
     color = request.form['color']
     if any(color.lower().encode('utf-8') in s for s in conf.p_colors):
       inject(3,3,0,color,who)
     else:
       inject(3,3,0,0,who)
    except KeyError:
       inject(3,3,0,0,who)
    g.db.commit()
    return render_template('2.html', who=who, r=0)


# Integrative negotiation simulator

@app.route('/3/', methods=['POST', 'GET'])
def p3():
 if app.debug == True or request.method == 'POST':

  # Registers survey answers
  try:
   rmt = request.form['rmt']
   who = request.form['who']
   i = request.form
   for j in range(1,(len(i.keys())-1)):
    x = "survey" + str(rmt) + "_" + str(j)
    y = conf.inject1 + x + conf.inject2
    g.db.execute(y, [i.get(str(j), type=int), who])
   g.db.commit()
   return render_template('3.html', who=who, r=0)

  # Checks if simulation has started
  except KeyError:
   who = request.form['who']
   r = int(request.form['r'])
   if r >= 1:
    if request.form['action'] == conf.i_action1:
     a = 1
    elif request.form['action'] == conf.i_action2:
     a = 0

    # Tit-for-Tat AI
    if r <= conf.i_subgame1:
     if r == 1:
      o = 1
     else:
```

```
    l = obtain ( col ( 2 , 0 , r − 1) , who)
    if  l >= 10:
     o = 1
    else :
     o = 0


  # Modified Tit−for−Tat AI (with surprise defection )
  elif  r > conf.i_subgame1 :
   shock = obtain ( col ( 2 , 1 , 'shock ') , who)
   if  shock == 1:
    when = obtain ( col ( 2 , 1 , 'shock_when ') , who)
    dif = int ( r ) − int (when)
    if  dif == 1:
     o = 1
     inject ( 2 , 1 , 'shock_r1 ' , a , who)
    elif  dif == 2:
     o = 1
     inject ( 2 , 1 , 'shock_r2 ' , a , who)
    else :
     l = obtain ( col ( 2 , 0 , r − 1) , who)
     if  l >= 10:
      o = 1
     else :
      o = 0
   else :
    l1 = obtain ( col ( 2 , 0 , r − 1) , who)
    l2 = obtain ( col ( 2 , 0 , r − 2) , who)
    l3 = obtain ( col ( 2 , 0 , r − 3) , who)
    l = int ( l1 ) + int ( l2 ) + int ( l3 )
    dis = int ( conf.i_subgame2 ) − int ( r )
    if  l >= 30 and  dis >= 3:
     inject ( 2 , 1 , 'shock ' , 1 , who)
     inject ( 2 , 1 , 'shock_when ' , r , who)
     o = 0
    else :
     la = obtain ( col ( 2 , 0 , r − 1) , who)
     if  la >= 10:
      o = 1
     else :
      o = 0


  # Register decisions and exit if it's the last round
  z = int ( str ( a ) + str ( o ))
  inject ( 2 , 0 , r , z , who)
  if  r == conf.i_end :
   f = codecs.open ( conf.survey2 , encoding='iso −8859−1')
   q = f.readlines ()
```

```python
        return render_template('survey.html', who=who, rmt=2, lines=q)

      # ... otherwise proceed
      else:
       k = []; q = []; v = []
       i = 1; j = r
       while (i <= j):
        wc = obtain(col(2, 0, i), who)
        if wc == 1:
         k.append(conf.i_action2)
         q.append(conf.i_action1)
         v.append(conf.i_gain1)
        elif wc == 10:
         k.append(conf.i_action1)
         q.append(conf.i_action2)
         v.append(conf.i_gain2)
        elif wc == 11:
         k.append(conf.i_action1)
         q.append(conf.i_action1)
         v.append(conf.i_gain3)
        elif wc == 0:
         k.append(conf.i_action2)
         q.append(conf.i_action2)
         v.append(conf.i_gain4)
        i += 1
       wa = str(uuid.uuid4().hex)
       wb = wa[0:4]
       r += 1
       e = conf.i_end - r
       return render_template('3.html', who=who, r=r, code=wb, pp=k, pc=q, gf
           =v, e=e)

    # If simulation hasn't started yet
    else:
     wa = str(uuid.uuid4().hex)
     wb = wa[0:4]
     r += 1
     return render_template('3.html', who=who, r=r, code=wb)

# Closing page

@app.route('/4/', methods=['POST', 'GET'])
def p4():
 if app.debug == True or request.method == 'POST':

   # Register answers from survey and redirect to ty page
   rmt = request.form['rmt']
```

```python
who = request.form['who']
i = request.form
for j in range(1,(len(i.keys())-1)):
 x = "survey" + str(rmt) + "_" + str(j)
 y = conf.inject1 + x + conf.inject2
 g.db.execute(y, [i.get(str(j), type=int), who])
g.db.commit()
return render_template('4.html', who=who)
```