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UNDERPINNINGS OF HIGHER LEVEL MOTIVATIONAL ORIENTATIONS

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Abstract

This thesis explored underpinnings of the higher level motivational orientations, generic to various types of human choice, such as pro-social, intrinsic, achievement motivation and free-riding. Two different choice situations were examined: a choice of degree was utilized as a model of a real life choice and an experimental economic game (e.g. a public goods game) was used to study choices in a controlled laboratory environment. Reinforcement Sensitivity Theory (RST, Gray & McNaughton, 2000) was employed as a theoretical framework of biological motivational traits to examine their links to higher level motivational orientations. RST proposes that individual differences in a vast range of behaviours are linked to individual propensities to approach or avoid in rewarding or punishing contexts. Thus, an individual differences framework was applied to study underpinnings of higher level motivational orientations through their links to the basic motivational traits of behavioural approach and inhibition.

The results demonstrated that similar motivations (e.g. pro-social or strategic achievement tendencies) affected individual choices in both situations. In addition, these motivations were linked in a coherent fashion to the biological motivational traits of approach and avoidance. Specifically, individual differences in both intrinsic and strategic achievement motivation were associated with the trait behavioural approach. Pro-social and free-riding motivations were linked to the behavioural inhibition. Furthermore, individual choices in two different situations were mutually consistent.

This research agenda reinforces the notion that individual choices on different levels (with a long-term influence, e.g. a choice of degree, or with a short-term influence, e.g. making a charitable donation) in part depend on dispositional traits (e.g. behavioural approach and inhibition). Incorporating the knowledge of basic motivational and affective decision-making mechanisms into the models of individual differences in motivation could considerably improve predictions about individual choices in real life. The findings contribute to the understanding of basic mechanisms underlying individual motivation. Links are established

herein of the basic motivational traits to the higher level motivational orientations. These can serve as a starting point to develop further hypotheses about the underlying neurobiological mechanisms of higher level motivational orientations and individual choices in real life.

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Chapter 1

General Introduction

1.1 Overview and Aims of the Thesis

Choices constitute an important part of our life. Individuals make different kinds of choices every day, some affect their lives in a short term (e.g. a choice how to spend an evening - to go out and socialize with friends or to stay at home and watch a movie), and some have long-term consequences (e.g. what kind of job to take, whether to get married or not, what degree to study at the university). While our decisions are largely affected by situational factors (e.g. which alternatives are available, social norms, etc), choices made by a particular person in various situations are also not independent from one another. Such as, there are similarities in individual choice patterns or in the way the same person chooses between alternatives in various situations. For instance, the same person could prefer to go out to socialize with friends, instead of a quiet evening at home; as well as to choose a degree that offers an opportunity to work with people instead of a degree which leads into a high achieving career path.

Research on individual differences provides extensive evidence on personality traits (e.g. extroversion, neuroticism, etc, Eysenck, 1991; McCrae & Costa, 1999), which reliably explain behavioural outcomes in various domains (educational, health, interpersonal relationships, career, etc). Models such the Big Five mainly capitalize on co-occurrence of individual choices in various situations (e.g. a choice of an individual to self-report oneself in a questionnaire as an outgoing individual and a choice to spend an evening socializing instead of reading a book at home). While other personality models assume some common basic underlying mechanisms to be linked to these choices (e.g. individual differences in cortical arousal are linked to extroversion, Eysenck, 1991). Such assumptions create a possibility to predict individual choices in any given situation provided that we know both situational parameters as well as individual dispositional factors. However, while individual differences in personality research has established that there is some stability in individual behaviours across situations,

we still cannot predict individual choices in a particular situation (e.g. will this particular person choose to make a charity donation? under which conditions?). One of the reasons for inability of current personality models (such as the Big Five, McCrae & Costa, 1999) to predict choices on an individual level is the lack of research linking basic decision-making mechanisms to dispositional individual differences in real life behavioural outcomes (e.g. pro-sociality). These putatively stable cross-situational characteristics of individual choice (i.e. motivational orientations), as well as their underpinnings, are examined in this thesis.

This thesis investigates the underpinnings of higher-level motivational orientations (e.g. pro-social, intrinsic motivation, etc), and sets out to demonstrate that they are generic to different human choice domains. There is a large body of research, predominately in the field of social psychology, which scrutinizes behavioural outputs of higher level motivational orientations (Deci & Ryan, 2002; Elliot & Harackiewicz, 1996). Those are interpreted as in part dispositional (Denissen & Penke, 2008; Elliot, 2006; Komarraju, Karau, & Schmeck, 2009). Moreover, an influential line of investigations into neural and behavioural underpinnings of decision-making, established that our choices are, to a large extent, biased by basic motivational and affective mechanisms (e.g. Everitt & Robbins, 2005; Rangel, Camerer, & Montague, 2008). These have also been linked to trait-like constructs (Gray & McNaughton, 2000), suggesting that individual propensities underlying a broad spectrum of behaviours (e.g. volunteering, cooperation as well as substance misuse, anti-social behaviours) can be explained, in part, by a common set of basic motivational traits (approach or avoidance in rewarding and punishing contexts, Gray & McNaughton, 2000). Therefore, it is possible that higher level motivational orientations are, at least in part, associated with lower level decision-making mechanisms. However, there is a gap in the literature with regards to investigations concerning the underpinnings of higher level motivational traits. Here I employ a bottom-up approach to analyse the underpinnings of higher level motivational orientations. Specifically, I investigate how individual differences in sensitivities to rewards and punishments (basic motivational traits) manifest in higher level motivational orientations (e.g. pro-social motivation) and affect real life behaviours (e.g. choice of degree).

I report a theoretical analysis and a set of empirical studies, which provide initial evidence for the nature of underpinnings of higher level motivational orientations. This is achieved through exploring associations between higher level motivational orientations and motivational traits, and through employing theoretical concepts from neuroscience of personality and decision-making (e.g. reward-processing, delayed reward gratification, inhibitory control, etc). The correlational design of these studies limits the interpretation of the findings in terms of causal relationships between higher level motivational orientations and motivational traits. As such, drawing conclusions on causal relationships between different levels of motivation is out of the scope of this thesis.

1.1.1 Models of Motivation

The structure of human motivation is known to be hierarchical (Elliot, 2006; Maslow, 1943). Elliot and colleges (Elliot, Gable, & Mapes, 2006; Elliot & Thrash, 2002) suggest that there are two broad families of motivational constructs.

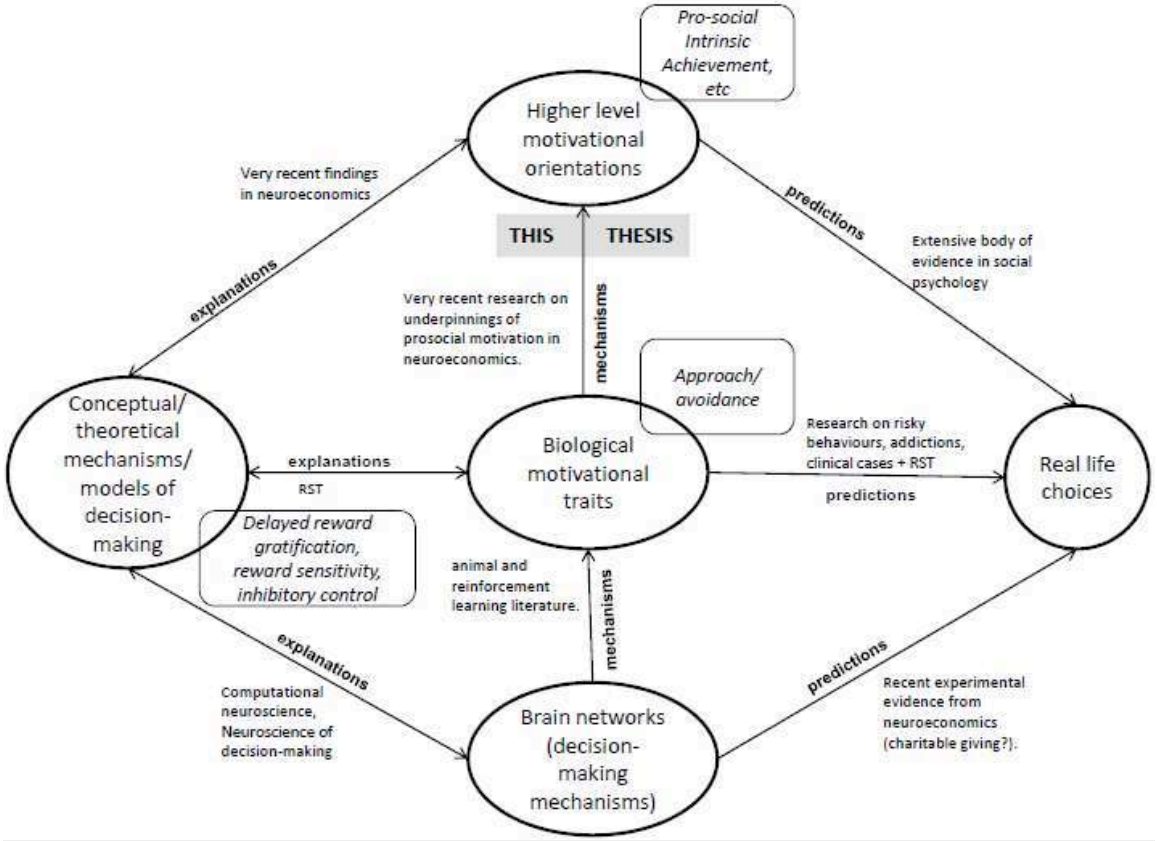
The first level comprises motivations with a specified biological basis, such as behavioural approach and avoidance (Elliot, 2006; Gray & McNaughton, 2000). Individual differences in approach and avoidance motivation are referred to in this thesis as basic motivational traits. These are common to humans and other species (e.g. chimpanzees, dogs, etc, see Smillie, 2008).

The second level consists of higher level socially constructed motivations such as intrinsic, pro-social motivation, motivation of achievement, etc. These motivational orientations are central for many human-specific behaviours (Deci & Ryan, 2002; Elliot & Thrash, 2002; Penner, Dovidio, Piliavin, & Schroeder, 2005). However, see also the evidence on motivational tendencies, such as cooperation, in non-human animals (Clutton-Brock, 2009). An extensive body of research demonstrates that such motivational constructs are powerful predictors of real life choices (e.g. pro-social motivation predicts volunteering, achievement motivation predicts success in work and education, Omoto, Snyder, & Hackett, 2010; Pekrun, Elliot, & Maier, 2009; Porath & Bateman, 2006). Such motivational constructs are referred to in this

thesis as higher level motivational orientations. I argue that these are domain-general as they guide individual choices in various domains (e.g. education, work, social dilemmas, relationships, etc, see Section 1.3.5 for details).

Figure 1.1 depicts a conceptual overview of the studies in the area of motivation. The motivational hierarchy is represented here as a bottom-up structure. Specifically, basic brain level mechanisms underlie and define biological motivational traits. Those, in turn, serve as a base for higher level motivational orientations, such as pro-social, intrinsic, achievement motivation, etc.

Figure 1.1. Individual differences in motivation: conceptual summary of research in the field



The links between brain structures and approach/avoidance motivation have been studied in-depth (see e.g. Depue & Collins, 1999; Seymour, Singer, & Dolan, 2007 for reviews). The literature suggests that both approach and avoidance are linked to basic decision-making mechanisms (see Section 5 for a detailed discussion). There is a vast body of literature on the basic mechanisms of decision-making which are associated with specific brain structures (Daw, Niv, & Dayan, 2005; Krain, Wilson, Arbuckle, Castellanos, & Milham, 2006; Rangel et al., 2008). Furthermore, the links between higher level motivational orientations and real world choices are extensively studied within the field of social psychology (e.g. Clark & Schroth, 2010; Elliot et al., 2006; Gagné & Deci, 2005, further discussion in the Section 1.3.4).

Individual differences literature on basic motivational traits (as, for instance, defined in Reinforcement Sensitivity Theory, Gray & McNaughton, 2000) provide a wealth of theoretical and empirical evidence on the links between theoretical decision-making mechanisms and traits, as well as real life choices (Corr, 2008). Furthermore, studies of clinical behaviours, such as various types of addictions, as well as some normal range behaviours (e.g. risky behaviours) produced a wealth of findings linking motivational traits (e.g. reward/punishment sensitivity) to real life choices (e.g. taking drugs, Perry & Carroll, 2008). However, whether motivational orientations of higher level (e.g. pro-social, intrinsic, achievement motivation) are based on lower level motivational traits have been largely neglected in the literature on motivation.

A very recent line of research in neuroeconomics (e.g. Fehr & Fischbacher, 2003; Harbaugh, Mayr, & Burghart, 2007) suggests that higher level motivational orientations (e.g. pro-sociality) might be linked to basic decision-making mechanisms (e.g. reward-processing) both on behavioural and neural level. However, this research tradition focuses on a specific decision-making domain, e.g. when the choices evolve around pro-self/other alternatives, for instance, as in social dilemmas. This thesis aimed to take such theoretical approach further, and looks into the broader range of higher level motivational traits, such as those which can affect individual decisions in various choice domains, and those that can be subsequently linked to more basic motivational traits.

1.1.2 Dimensions of Motivation

Converging findings from neuroscience and psychology (Elliot, 2006) provide strong evidence supporting a two-dimensional structure for biological motivation (i.e. approach and avoidance, although, see the revised account of RST for three factor structure, Gray & McNaughton, 2000).

However, there is much less consensus with regards to domain non-specific dimensions of higher level motivations, such as pro-sociality or intrinsic motivation (Denissen & Penke, 2008; Elliot & Thrash, 2002; Strack & Deutsch, 2004). Decades of findings on values, social orientations, life goals, social norms and individual preferences suggests that there is a conceptual overlap between various motivational constructs of higher level, although the sufficient number of common dimensions of higher level motivational orientations is yet to be established. This is specifically important in predicting individual choices: e.g. will a particular individual make pro-social or intrinsically motivated choices? Which factors do define these differences?

This thesis aimed to investigate core dimensions of higher level motivational orientations, which are generalizible to different choice domains (e.g. large scale life-long decisions, and small-scale choices with immediate outcomes). It further explored their links with biological motivational traits.

1.1.3 Inter-Situational Coherence in Motivation

If motivational traits represent dispositions, then individual behaviour in different domains should be, in part, a function of these motivational traits. These traits, then, should have a bottom-up effect on higher level motivational orientations and subsequent real life behaviours (see Figure 1.1). If individuals are coherent in choices within situations of different levels (e.g. in the degree choice domain and in the social dilemmas), this can demonstrate that motivational orientations that influence those choices (e.g. pro-sociality) are domain general. In addition, this will provide further evidence to support that higher level motivational traits examined in this thesis are, in part, dispositionally determined.

There is a gap in the literature with regards to research that examines the coherence in individual motivational patterns between choices on different levels. Specifically, with regards to large-scale choices with a long-term influence on one's life (e.g. a choice of degree), and small-scale choices with a short-term immediate choices modelled in a lab based economic game.

1.1.4 Aims of the Thesis

This thesis aimed to cover the discussed gaps by:

(1) Examining the overlap in higher level motivational constructs in social psychology and behavioural economics to identify possible core dimensions of domain-general motivational orientations;

(2) Exploring the links between dimensions of higher level motivational orientations with basic motivational traits in a social dilemma (a public goods game), and real life choices (choice of degree);

(3) Investigating if individuals are coherent in their choices in two choice situations (a large-scale choice situation, the choice of degree, and a small-scale choice situation in public goods games). Inter-situational coherence of individual behaviour provides further evidence that there are specific domain-general dispositional factors (e.g. motivational orientations and motivational traits) that influence behaviour and choices in these domains;

(4) Finally, this thesis aimed to demonstrate that individual differences in approach and avoidance traits, could in part explain the variability in higher level motivational orientations, therefore demonstrating their dispositional underpinnings (e.g. achievement motivation evolving around reward sensitivity).

The general introduction discusses why the choice of degree and choices in social dilemmas are appropriate models to study individual differences in domain-general higher level motivational orientations. It outlines the idea that behavioural strategies in choices on different levels are related to each other and should be influenced by the same basic

motivational traits of approach and avoidance. It further argues that combining the investigation of different levels of choices can lead to uncovering the mechanisms underpinning higher level motivational orientations.

1.2. Choices on the Large and Small-Scale Level: Two Choice Domains to Study Higher Level Motivational Orientations

Two empirical choice domains were examined in this thesis to investigate basic motivational traits that underpin higher level motivational orientations. The domains were chosen as there is evidence to suggest that both higher level motivations and basic motivational traits could potentially influence decisions in those domains. To study individual differences it was crucial that the variability in choices within chosen domains was present.

Employing two different scenarios – a real life one (degree choice) and an experimental choice (a public goods game – see Section 1.2.1 for definitions) – allowed the exploration of the generalizibilty of the findings. Specifically, I examined if the links between motivational traits and higher level motivational orientations are present in both types of choice domains.

The situations were selected where (i) heterogeneity in choices is well-reported and can be explained by differences in motivation; (ii) there is empirical evidence or/and strong theoretical claims that these different choice patterns are, at least in part, dispositional.

Below I discuss and further compare two empirical models of choice behaviour studied in this thesis: (1) choices in a social dilemma, a public goods game; (2) a real life choice, a choice of degree.

1.2.1 Public Goods Games

Social dilemmas, such as a Public Good Game (PGG) are used in economics to model behaviour in situations when one needs to consider another persons' good, or other-oriented, pro-social motivation. In a typical PGG several participants are matched to play together in a group (usually four) and are given a certain amount of Money Units (MU). They face an individual choice: how much to leave to themselves and how much to invest into the

public account of their group. All money invested into the public account is multiplied by a certain coefficient and are then distributed equally to all group members. Participants are familiarized with the payoff procedure in advance. Each contributed MU makes a profit when invested into the public good. However, this creates a dilemma: if everybody from the group invests equality, then all group members get equal returns and increase their profit. If individuals do not invest equally, some of participants (those who invested less) end up with more money than those who invested more, because everybody gets an equal return from the public good.

This scenario creates an opportunity to cooperate (i.e. give something into public good), or to free ride (i.e. give nothing into the public good but get the profit from public good). Because participants usually do not know who they are playing with (even if they have met the people before, they do not know what to expect), there is always uncertainty about the behaviour of the other group members.

A typical finding for the PGGs experiments is a large variation in behaviour of the participants, with standard deviations of the contribution levels in such games almost always larger than the mean. For instance, Keser and van Winden (2000) have demonstrated that the variation in the average contribution level for different groups of participants (10 groups overall) ranged from 1 MU (out of 10) to 9.45 MU, with 4.53 on average and standard deviation of 3.03 MU.

A growing body of research in experimental economics has established heterogeneity in behavioural strategies in PGGs. Economists explain heterogeneity by constraints and parameters of the task. For instance, contribution levels increase when the punishment is possible (e.g. Egas & Riedl, 2008; Fehr & Gachter, 2000). The variability in choices could potentially be accounted for by individual differences in motivations that lead to different choice outcomes.

In support to that, a review of the literature on social dilemmas (Fehr & Gintis, 2007) concludes that there are two types of agents or motivational orientations: self-regarding (or

free-riding) and norm-regarding (or reciprocating) individuals. These strategies are theoretically claimed to represent dispositional traits and assumed to be internally consistent behavioural styles (Fehr & Fischbacher, 2003). For instance, a study by Burlando and Guala (2005) found a great degree of coherence in individual behaviours across several different games. Furthermore, a study by Cesarini et al (2008) with monozygotic and dizygotic twins demonstrated that cooperative behaviour in a trust game is partially due to common genetic variance, suggesting a pre-disposed genetic basis of pro-social behaviour.

Evidence reported above advocates that heterogeneous motivational orientations, modelled in the PGGs as behavioural choice strategies, are in part dispositional. Therefore, it is possible to utilize choices in the PGGs as a domain to examine higher level motivational orientations and their dispositional underpinnings.

1.2.2 A Choice of Degree

Of those who decide to go to university, the choice of degree is usually one of the first relatively independent and important life decisions. Extensive research suggests that the choice to take a certain long-term career path represents a stable life-long strategy (e.g. being oriented towards people or things, Prediger, 1996; Tracey & Rounds, 1996).

The vocational choice literature established personality differences which are associated with large-scale, life-path decisions (Ackerman & Heggestad, 1997; Mount, Barrick, Scullen, & Rounds, 2005). As such, Staggs, Larson and Bogen (2007) reported the correlations between vocational interests and personality traits (measured by Tellegen's Multidimensional Personality Questionnaire, Tellegen, 1982), which ranged from |.20| to |.49|. For instance, social vocational interests (indicative of preferences to work with people, see Ackerman & Heggestad, 1997), which are conceptually close to pro-social motivation or other-oriented motivation, correlated positively with facets of the Big Five agreeableness (Sullivan & Hansen, 2004), specifically altruism ($r = .32$, $p < .01$) and tender-mindedness ($r = .37$, $p < .01$).

Furthermore, Hansen, Sullivan and Luciana (2011) demonstrated associations between sociability (a combination of social and enterprising vocational interests) and approach

temperament (measured psychometrically with a number of scales, including BAS Charles S. Carver & Teri L. White, 1994). Based on these data, they speculated on the possible neurobiological motivational processes that might underline the communality of vocational interests and personality traits.

In summary, different motivational orientations (e.g. to work with people or things, with data or ideas) have been largely implicated in real life choices in vocational choice domain (Armstrong, Rounds, & Hubert, 2007; Tracey & Rounds, 1996). There is a consistent overlap in common variance between personality traits and vocational interests. This suggests that vocational interests have dispositional underpinnings, as well as links to more basic motivational processes. Vocational interests have not been directly studied in relationships to more general higher level motivational orientations that were shown to guide individual decisions (e.g. pro-social, intrinsic motivation). Furthermore, they have not been applied to model motivation in the degree choice domain.

1.2.3 Large and Small-Scale Choices: Similarities

There is a conceptual overlap between the domain of degree choice and the choices within a social dilemma. In both domains tentative links of motivational orientations to traits are implicated. In both situations there is strong evidence for behavioural heterogeneity as well as some evidence that this heterogeneity can be in part explained by dispositions. Former allows proposing that these two choice situations are appropriate domains to study dispositional underpinnings of higher level motivational orientations.

1.2.4 Large and Small-Scale Choices: Differences

While there are a number of communalities between degree choice and choice in the PGGs, there are also several apparent differences. Differences between these choice domains are summarized in the Table 1.2 and discussed below. Table 1.1 also summarizes how these two scenarios, a choice of degree and choices in social dilemmas, are complementary to each other in terms of generalizing the findings of this thesis.

Table 1.1 Comparison of small and large-scale choices. Structural differences between two choice situations

	Large scale: choice of degree	Small scale: public goods games
Factors, which define the decision	Complex environmental factors, uncontrolled individual utilities of rewards and punishments, high ecological validity, etc	Simple environmental factors, controlled individual utilities of rewards and punishments, lower ecological validity, etc
Consequences	Life-long	Immediate

First, the stake of decisions in these two choice situations differs. In a laboratory-based game only a small amount of money is at stake and the choices during the games, as well as their consequences, do not have any major influence on the course of individuals' life. With the choice of degree, however, the stakes are much higher, as the consequences of the choice have potentially a life-long influence.

A second difference between these two situations is in the external factors or constraints that define the decision. In the choice of degree situation an individual faces a wider number of alternatives. Such circumstances make the choice of degree situation to vary more between individuals, and add a number of factors that could have an influence on choice outcomes (e.g. parents or friends, location of the university, individual financial possibilities, etc).

The choices in the lab-based social dilemmas are strictly limited to the options defined by the experimenter, and, although there is evidence to suggest that they do model well real life choices, they still, as any model, have lower ecological validity compared to actual choices in real life. However, in the laboratory experiment the choice alternatives are controlled through experimental design, therefore we can be more confident about the factors that influence the outcomes.

Furthermore, in economic games (such as public goods games), the individual utility of rewarding and punishing alternatives (e.g. wins or losses in money unites) is usually assumed equal for all participants (Ledyard, 1995). Moreover, in the experimental games there is an objectively quantifiable measure of motivational orientations (e.g. whether a choice was self-oriented, i.e. leaving the money endowment to oneself or other-oriented, i.e. contributing to the public good).

Finally, in the case of a real life choice individual utility for the outcome can differ for different people. For instance, for some people the utility can be expressed in the amount of money they earn after getting a degree, and for others in the amount of enjoyment they obtain from doing something that interests them.

If we could demonstrate that similar motivational orientations explain variability in choices under both controlled experimental conditions and in the real life domain, this would provide some evidence that these motivational orientations are generic for different types of activities (i.e. domain-general).

Furthermore, if similar relationships between higher level motivational orientations and more basic motivational traits are presented in both choice domains, this generalizes the findings on dispositional underpinnings of higher level motivational orientations to a broader decision-making context.

The next section examines motivational constructs that can be hypothesised as potential candidates for the core dimensions of higher level motivational orientations. Specifically, it analyses the evidence for the overlap in higher level motivational orientations identified in social psychology and behavioural economics.

1.3 Higher Level Motivational Orientations

A number of different higher level motivational constructs have been identified in the literature, including motivation of achievement, intrinsic motivation and pro-social motivation. An important feature of these motivational constructs is that they are claimed,

according to respective theoretical accounts, to be generic to different types of activities. For instance, intrinsic motivation was shown to predict performance in sport, health, educational, work and other domains (Conroy & Elliot, 2004; Conroy, Elliot, & Pincus, 2009; Hagger & Chatzisarantis, 2009; Kasser & Ryan, 1993; Walker, Greene, & Mansell, 2006). While there is strong evidence supporting that these motivational orientations represent important forces guiding human behaviour, there are very few theoretical accounts that attempt to systematically analyse higher level human motivations as predictors of individual choices within a single model (cf. Elliot, 2006). As a result, by focusing on one specific type of motivation (e.g. intrinsic versus extrinsic), such models do not provide an explanation for the factors that define whether an individual is pro-sociality motivated or strives for achievements. To explain such differences in motivation is important if we aim to predict individual choices. I attempt to provide such unified theoretical account on domain general higher level motivational orientations here, and subsequently to test it empirically.

1.3.1 Hierarchical Structure of Human Motivation: a Need to Identify Domain-General Higher Level Motivational Orientations

An attempt to provide a systematic analysis of human motivational structure was performed by Elliot and colleges (Elliot, 2006; Elliot et al., 2006; Elliot & Thrash, 2002). They suggested that human motivation has a hierarchical structure comprising two levels, a level of basic motivational traits and a level of higher level motivational constructs. They also suggested that higher level motivational orientations are limited to domain-specific constructs (e.g. performance-approach applied to educational domain, Murayama & Elliot, 2009). However, there is strong evidence for domain-general motivational constructs (e.g. intrinsic, pro-social motivation, Deci & Ryan, 2002; Fehr & Gintis, 2007), and these need to be integrated into the hierarchical structure of human motivation.

By analysing a conceptual overlap in higher level motivational orientations, the investigation in this thesis proposes to add a level of domain-general higher level motivational orientations to the hierarchical model of human motivation. Domain-general motivational orientations

(e.g. motivation of achievement) are suggested to mediate the link between basic motivational traits (e.g. approach) and more proximal domain-specific motivations (e.g. striving for mastery in educational domain), as well as real life choices.

It is crucial to demonstrate domain generally of these motivational orientations. This will allow assuming inter-situational stability of motivational orientations, which in turn would improve models aiming to predict real life individual choices. As such, if motivation of achievement is a domain-general motivational orientation, it should then predict striving for mastery in educational domain, as well as in other domains (e.g. sport).

1.3.2 Overlap in Motivational Constructs

The vocational choice literature suggests that a choice to take a certain long-term career path represents a stable life-long strategy (e.g. being oriented towards people or things, Prediger, 1996; Tracey & Rounds, 1996). Conversely, evidence from behavioural economics suggests that short-term choices in the lab-based games reflect similar behavioural strategies (e.g. cooperate or free-ride, Fehr & Gintis, 2007). This suggests that a generic set of stable motivational strategies underlies short-term choices and long-term life-changing decisions.

Thus, it should be possible to develop a generic model of motivational orientations that reflects common dimensions observed across studies on short-term lab based and long-term real world choices. While conceptually it seems that these constructs describe similar real life phenomena, there is a gap in the literature with regards to their theoretical and potential empirical overlap. One of the central aims of this thesis is to fill this gap by examining a broader theoretical perspective of overlapping motivational orientations derived from behavioural economics and social psychology.

1.3.3 Performance versus Choice Motivation

A reason for such a gap in the literature might be due to predominant methodological approach to study higher level motivational orientations as a performance motivation.

Performance motivation can be defined as a motivation that leads to optimal or successful performance within a certain domain (e.g. education or work).

Most studies of the real world motivation have focused on performance motivation or motivational constructs (e.g., pro-social or achievement motivation) that predict successful performance in a certain domain (e.g. sport, education, volunteering, Carlo, Okun, Knight, & de Guzman, 2005; Conroy & Elliot, 2004; de Fruyt & Mervielde, 1996). However, this leaves open a question why do some individuals become pro-social or achievement orientated in the first place? In other words, why individuals are motivated to choose to pursue the activity in a certain domain has been neglected in general models of motivation.

Choice motivation can be defined as motivation that leads to different choices within a domain or between different domains (e.g. to choose to engage in volunteering in your spare time). While a *motivation to perform well* has to be linked to a specific domain (otherwise there is no criteria to assess the optimal performance), the *motivation to choose* between alternatives does not have to be linked to a particular domain, as one can choose both activities within a specific domain (e.g. in the education – the choice of strategies to study) or between domains (e.g. in the spare time – the choice to volunteer or to read books).

The importance of examining choice motivation as a type of motivation separate from performance motivation can be supported from the evidence in vocational choice literature. In the vocational choice domain, it has been established that there are individual differences in terms of vocational choices and those are strongly linked to individual personality and cognitive styles (e.g. Ackerman & Heggestad, 1997; Armstrong, Day, McVay, & Rounds, 2008). For instance, individuals choose careers because they are orientated towards people or things (Holland, 1985; Prediger, 1982). However, in vocational choice literature there are no theoretical accounts of generic motivational constructs (e.g. such as intrinsic motivation) that would fit within indentified individual difference in vocational choice.

Focusing on the choice outcomes, rather than performance outcomes, allows studying domain-general motivational orientations. Moreover, studying different trends in the choice

motivation, not performance motivation, allows identifying broader types of motivational orientations, with these not being domain-specific (even when they can be translated into a specific domain, e.g. the degree choice).

To predict why different people choose to pursue activities in different domains in the first place, we need to establish domain-general motivational orientations. A systematic theory-driven approach to identifying common dimensions in generic choice motivators is developed below. Potential candidates for domain-general motivational orientations are reviewed bellow in this chapter.

1.3.4 Dimensions of Higher Level Motivational Orientations

While a number of disciplines examine theoretical constructs relevant to higher level motivational orientations, this review focuses around accounts from social psychology and economics. Research in social psychology and behavioural economics have examined individual motivation for choice and could serve as a basis for developing a theory-driven model of higher level motivational orientations. These are reviewed below and theoretical commonalities are highlighted.

To scrutinize a motivational construct as a potential candidate for being a core dimension of human motivation; it requires (i) to be generalizible to various choice domains; (ii) to be linked to real life choices and behaviours; and (iii) to have evidence for its dispositionality (i.e. be empirically or theoretically linked to traits). The latter implies that this motivational construct would have internal consistency of behaviours across different situations.

1.3.4.1 Pro-social Motivation

Pro-social motivation defines behaviours which benefit community, society overall and/or other individuals. Distinct individual differences in terms of prosociality are described in experimental economics and are referred to as other-orientated individual preferences (e.g. (Bardsley & Moffatt, 2007; Fehr & Gintis, 2007; Fischbacher, Gachter, & Fehr, 2001). Furthermore, the literature on social values orientations defines strong individual differences

in self- and others-regarding motivation (McClintock & Liebrand, 1988; van Lange, Otten, DeBruin, & Joireman, 1997; van Lange, Rusbult et al., 1997).

Pro-social motivation seems to affect individual choices and behaviours in different domains. As such, individuals make vocational choices (e.g. medicine or social work) because they prefer to work with people (Tracey & Rounds, 1996). Similarly, pro-sociality on the individual level predicts more active engagement in volunteering activities (e.g. Cameron, Brown, & Chapman, 1998; Carlo et al., 2005) or monetary donations to charities (e.g. Van Lange, Bekkers, Schuyt, & Van Vugt, 2007).

Dispositionality of pro-social motivation has been extensively studied in psychology and has been strongly linked to the trait empathy (e.g. Penner et al., 2005). Pro-social motivation has been reliably found to predict real life choices in various domains, such as volunteering (Carpenter & Myers, in press). Furthermore, recent genetic evidence suggested that pro-social behaviours have some genetic underpinnings. For instance, arginine vasopressin 1a receptor was linked to altruistic behaviour in a social dilemma (Knafo et al., 2008).

Therefore, an overlap of pro-social motivation and other-regarding economic preferences, as well as evidence for its dispositionality, suggests that there might be a corresponding trait-like motivational orientation that influences individual choices in various domain of behaviour.

1.3.4.2 Free-riding

Free-riding is referred to as a self-regarding behaviour that results in exploiting communal resources without equivalent compensation (Carpenter, 2007). Free-riding is linked to a broad cluster of social phenomena, including social loafing (Arnscheid, Diehl, & Stroebe, 1997) and anti-social behaviours (Nikiforakis, 2008). It is as well employed to explain tax avoidance, causes of financial crises and effective development of society in general (Boadway, Marceau, & Mongrain, 2007; Dabrowski, in press; Goette & Huffman, 2007). As there is evidence for free-riding as a behavioural strategy in various types of human choice behaviour, it is therefore a potential candidate for a generic higher level motivational orientation.

Free-riding has been theorized within economics literature as a disposition (or, in economic terms, as an individual preference). It affects individual choices in the situation alike social dilemmas. However, it has not been yet explained whether free-riding is in part a life-long stable behavioural strategy, and therefore if it has any dispositional underpinnings. There is some recent evidence with regard to correlations of individual free-riding behaviour in the lab-based social dilemmas and personality traits. Volk, Thoeni and Ruigrok (in press) reported that those who free rode in the experimental PGGs self-reported lower Big Five agreeableness.

Free-riding as an individual strategy have been primarily studied within behavioural economics, and it is still unclear if it generalizes to other behavioural domains. Here we examine if conceptualizing of free-riding as a trait, recently emerged in economics (Fehr & Camerer, 2007; Fehr & Gintis, 2007), can be extended to real life large-scale choices. It is further examined if free-riding has links to more basic dispositional motivational mechanisms (see Section 1.5.3 for specific predictions).

1.3.4.3 Intrinsic Motivation

Self-Determination Theory (SDT, Deci & Ryan, 2002) proposes intrinsic motivation to be an important predictor of various choice outcomes. Intrinsic motivation is known to guide choices when goals have a personal internalized significance for an individual. For example, individuals might be progressing in their careers because they enjoy their job tasks, but not because they aim to reach a certain level of wealth. An activity is intrinsically motivated when it is performed for the sake of the pure enjoyment of the processes (Deci, 1971).

SDT suggests that a propensity to be involved in more or less intrinsically motivated activity is a disposition, which can explain individual variation in terms of choice outcomes in different domains (Gagné & Deci, 2005; Komarraju et al., 2009; Lam & Gurland, 2008; Neighbors & Larimer, 2004).

It has been shown that intrinsic motivation can predict real life outcomes. Studies provide evidence that intrinsic, as compared to extrinsic, life goals predict higher life satisfaction, self-

esteem and self-actualization; attenuate depression and anxiety, and also an increase in cooperative behaviour (Kasser & Ryan, 1993, 1996; McHoskey, 1999; Sheldon & McGregor, 2000; Sheldon, Sheldon, & Osbaldiston, 2000; Vansteenkiste et al., 2007). For instance, Walker et al (2006) showed that in educational settings intrinsic motivation predicts a choice to seek for a meaningful cognitive engagement (a productive way of learning, when one tries to understand concepts rather than memorise information).

It is, therefore, possible to suggest that intrinsic motivation is one of the core higher level motivational orientations with underlying dispositional mechanisms.

1.3.4.4 Motivation of Achievement

Motivation of achievement implies striving for individual performance that exceeds certain internal or compared to a group of reference standard (Covington, 2000; Elliot & McGregor, 2001). Motivation of achievement has been employed to explain human behaviours in psychological studies for more than half a century (Covington, 2000).

Achievement motivation has been shown to predict real life outcomes in education, sport, work, etc (Conroy & Elliot, 2004; Porath & Bateman, 2006; Richardson & Abraham, 2009; Vansteenkiste et al.). There are a number of dispositional traits which have been reliably associated with motivation of achievement (e.g. the Big Five extraversion and conscientiousness, Komarraju et al., 2009) suggesting that it can be considered itself a disposition. Furthermore, recent studies linked achievement motivation to differences on the neural and genetic level. Specifically, the ratio of dopamine D2 receptors in the left versus right hemisphere (Tomer, Goldstein, Wang, Wong, & Volkow, 2008) and genetic polymorphism of dopamine transporter (DAT 3-'VNTR, Osinsky et al., in press) was shown to be associated with motivation of achievement. This suggests that achievement motivation has some dispositional underpinnings and can be analysed as a potential core dimension of motivational orientations.

1.3.5 Four-Dimensional Model of Higher Level Motivational Orientations

The evidence reviewed above suggest that pro-social, achievement, intrinsic motivation and free-riding are potential candidates for core dimensions of higher level motivational orientations. As such, it is expected that if an individual is high in pro-social motivation will choose a degree that proves with an opportunity to help others; in the social dilemma domain they will make an other-oriented, cooperative choice; in the interpersonal domain they will choose a relationship that is based on sharing and more engagement with one another life. Instead, somebody who is high in free-riding orientation, might choose a degree that provides an opportunity to obtain a degree without doing much work; in the social dilemma they will make a choice to free-riding on other people's contributions into communal good; in the interpersonal domain they will choose a relationship that gives an opportunity to free-ride on the partner's financial or emotional resources. All four dimensions are generalizible to the variety of domains.

While these four motivations might represent core domain-general dimensions of higher level motivational orientations; this does not imply that individuals will always employ all of these dimensions to make a decision in any possible domain of human choice. As such, motivations, which guide a specific choice or a choice in a specific domain, are contingent on the set of alternatives, which individual is presented with in the situation or/and which they are considering. For instance, in an experimental social dilemma, participants usually face a choice either to be pro-social (e.g. cooperate and contribute some proportion of the money endowment to the public good) or free ride (e.g. leave all the money to themselves and exploit others).

Therefore, in similar situations the dimensions of motivational orientations might be reduced to self- versus other-oriented motivation. Furthermore, the consequences of the choice can also differ. For instance, in the one-shot standard PGGs there is no rational to cooperate, while in the repeated interactions scenarios, there is a rational to cooperate as it leads to increased profits through cooperation in the future. Therefore, the same motivational orientation can lead to different choices depending on the consequences, e.g. in repeated

and one-shot social dilemmas. As such, strategic achievement motivation should lead to self-oriented choice in one-shot games, and to cooperation in the repeated scenario.

The next section focuses on the examination of dimensions of basic motivational traits, which can potentially explain variability in identified core dimensions of higher level motivational orientations.

1.4 Approach/Avoidance Traits: Reinforcement Sensitivity Theory

The overlap in domain-general higher level motivational orientations, which tentatively influence individual choices in different types of situations, was reviewed above.

I have also specified two empirical domains with the evidence for these higher levels motivational to be displayed: a choice of degree and choices in PPGs. In this section biological motivational traits that can potentially be utilized to explain underpinnings of higher level motivational orientations are reviewed.

Recent advances in neuroscience of personality offer an advantageous approach in terms of its theoretical insight into the basic mechanisms of individual differences in motivation (Gray & McNaughton, 2000). This approach suggests that (i) motivation is central to human personality and basic motivational traits, such as approach and avoidance, and can explain variation in personality; (ii) approach and avoidance traits are linked to definite underlying neural substrates that are evolved around reward and punishment mechanisms; and (iii) reward and punishment mechanisms affect choice and decision-making in various lab-based experimental tasks and real life situations (e.g. Deci, 1971; Fehr & Gachter, 2000; Skatova & Ferguson, in press).

1.4.1 Reward and Punishments Sensitivities and Higher Level Motivational Orientations

Over the past decades of research in psychology, neuroscience and economics have demonstrated that different affective and motivational states have a large influence on specific types of choice, as well as predict real life behaviours (K. S. Blair, Morton, Leonard, & Blair, 2006; Ferguson, Farrell, & Lawrence, 2008; Goette & Huffman, 2007; Rangel et al.,

2008). Specifically, in the situation when choice alternatives lead to different levels of rewards or punishments.

Theoretically, we know that reward and punishment contingencies are implicated in different kinds of choices, and bias decision-making process to a large extent. Reward and punishment contingencies, both as state and trait parameters, are implicated in a vast majority of real life behaviors. Specifically, they were related to such behavioral outcomes as addictions (drug (Everitt & Robbins, 2005), tobacco (Dawkins, Powell, Pickering, Powell, & West, 2009), eating disorders (Harrison, O'Brien, Lopez, & Treasure, 2010), criminal behavior (e.g. psychopathy, Corr, 2010; Heym & Lawrence, 2010), behaviours related to high risks and uncertainty (e.g. investment with high financial risks, Knutson, Wimmer, Kuhnen, & Winkielman, 2008), as well as pro-social behaviors (Rand, Dreber, Ellingsen, Fudenberg, & Nowak, 2009) such as blood donation (Ferguson et al., 2008). They have been also shown to have a critical influence on decision-making in basic level laboratory decisions and real life choices. As such, when reward or punishment processing is impaired, it leads to harmful choices of engaging in pathological gambling (Reuter et al., 2005), drug abuse (e.g. Perry & Carroll, 2008; Volkow et al., 2010) or committing crimes (K. S. Blair et al., 2006).

There is a wealth of data on the specific roles of reward and punishment contingencies in simple laboratory paradigms, as well as the links between some untypical behaviours and traits of approach and avoidance have been established (Heym & Lawrence, 2010; Scholten, van Honk, Aleman, & Kahn, 2006; Vergara & Roberts). It is still not clear, however, if individual differences in higher level motivational orientations (e.g., pro-social, intrinsic motivation) within a normal range are, at least in part, linked to differences in basic biological motivational traits. A theoretical framework that can be employed to explain the links between two motivational levels is proposed by the Reinforcement Sensitivity Theory (RST, Gray & McNaughton, 2000).

1.4.2 Reinforcement Sensitivity Theory

RST was developed based on models of animal learning and clinical studies (Gray & McNaughton, 2000). However, the latest version of the RST (Gray & McNaughton, 2000) is widely applied in various domains of personality psychology (Corr, 2008). RST suggests that there are three main conceptual motivational systems that can explain various individual behavioural outcomes: Behavioural Activation System (BAS); Flight, Fight, Freeze System (FFFS); and Behavioural Inhibition System (BIS). These systems are claimed to represent separate, but interrelated networks of neurons in the human (and other animal) brain, which are responsible for major classes of behavioural responses.

Three sections below examine how RST systems might be linked to dimensions of choice motivation.

1.4.2.1 BAS and choices

BAS is responsible for an individual's behaviour when a reward (either social, such as money, or physiological, such as food or alcohol), is presented; under such circumstances the BAS network is activated and makes calculations in order to determine the approach behaviour to the reward by the individual.

Proponents of RST claim that BAS can explain certain individual differences in personality – specifically that differences in functioning of BAS are linked to Eysenck's extraversion (Charles S. Carver & Teri L. White, 1994; Heubeck, Wilkinson, & Cologon, 1998; Jorm et al., 1998; Pickering & Smillie, 2008; Zelenski & Larsen, 1999); the Big Five extraversion (Smits & Boeck, 2006), impulsivity and psychoticism (Corr & McNaughton, 2008; Jorm et al., 1998). In addition, individuals high in BAS are found to be active, positive, optimistic (Gomez & Cooper, 2008); they demonstrate better coping mechanisms in stressful situations (Zinbarg & Yoon, 2008), and they are more easily tempted by an individual reward (Knyazev, Wilson, & Slobodskaya, 2008).

Individuals high in BAS are more likely to choose real life situations where a reward is achievable; while those who are low in BAS on average will not be as motivated to engage in

reward promising activities (see Section 1.4.2.5 for specific predictions of BAS in the degree choice domain and the social dilemmas).

1.4.2.2 FFFS

FFFS is the second behavioural system in RST and is responsible for behaviour towards punishment signals in the environment. If in a particular situation there is a threat of a punishment for an individual, RST suggests that a functional network of neurons is activated in order to manage behaviour in re-action towards punishment (for instance, punishment can be social, such as a risk of losing one's job, as well as physical, such as electroshock).

It has been demonstrated that differences in FFFS functioning mediate proneness to fear (see e.g. Corr, 2010). It has been also demonstrated that functioning of FFFS is negatively related to psychotisicm (see Wallace & Newman, 2008 for a discussion). FFFS is a more recent system within RST compared to BAS. Its links to personality traits are less conceptualized then those for the BAS and the BIS.

While some psychometric measures of FFFS have been recently emerging (e.g. Jackson, 2009), those were not available of at the time when the studies reported here were conducted. Thus within this thesis the role of FFFS in higher level motivational orientations was not investigated. I am omitting any predictions with regard to the links between individual differences in FFFS and higher level motivational orientations.

1.4.2.3 BIS and choices

The third basic conceptual system within RST is the BIS. This system is responsible for actions in the situation of a conflict of goals. In particular, it receives inputs from both the BAS and the FFFS. It is argued that the BIS network is activated when there is a goal conflict presented to an individual. It can be, for instance, approach-approach or approach-avoidance conflict. In the latter situation the BIS network calculates what is beneficial: to approach a certain goal or to withdraw from the situation in order to avoid a certain punishment. In the situation of approach-avoidance conflict there are two possible rewarding outcomes available, e.g. one

promising small but immediate rewards, and another, higher but delayed rewards. BIS conducts, therefore, control over ongoing choices, by inhibiting one or several behaviours in favour of the other. The computations which are performed by the BIS comprise risk assessment of the benefits/losses expected from outcomes (e.g. Knyazev et al., 2008).

BIS functioning has also been found to be linked to anxiety disorders, as well as to the trait anxiety (Corr, Pickering, & Gray, 1997; Gray & McNaughton, 2000). Within "Big" personality theories models, individual differences in BIS are linked to both Eysenck's and the Big Five's neuroticism (Corr, 2008). However, the authors comment that neither of the neuroticism behavioural outcomes can straightforwardly fit under the umbrella of the BIS activity (for a discussion see Corr & McNaughton, 2008).

BIS might mediate behaviours in the situation when risk-assessment is necessary (e.g. under the threat of punishment), causing risk-averse choices. As such, those who are higher in BIS should be more likely to make choices with lower risks (see Section 1.4.2.5 for specific predictions of BIS in degree choice and social dilemmas domains).

1.4.2.4 Original versus Revised Account of RST and Predictions in this Thesis

An important distinction between FFFS and BIS has been introduced within a revised account of RST (Gray & McNaughton, 2000), as compared to the original account of the theory (Gray, 1984). Instead of general "avoidance" motivational system (BIS in the original account of RST), FFFS is now linked to behaviours when facing a punishment, while BIS is specifically associated with mediating behaviours under uncertainty. As the predictions in this thesis fit both original and revised RST account of BIS, and because I am not making any specific predictions with regards to FFFS, the implications of the revised RST, as compared to the original account of the theory, are out of focus of this thesis.

1.4.2.5 RST and Choice Motivation: Predictions

RST allows making predictions about affective or motivational mechanisms around choice behaviour and decision-making. As such, those who are more prone to approach behaviour

are more likely to make choices that result in higher individual rewards, even when the prosperity of others is at stake (e.g. behave selfishly). For instance, Pothos et al (in press) demonstrated that high BAS predicts defecting (e.g. a self-oriented choice) in a one-shot social dilemma.

Based on the definitions of BIS, it should be linked to behaviours when two goals are at competition, such as getting an immediate versus a delayed reward. In this case, higher BIS should predict more strategic behaviour or cases when it is strategically beneficial to withdraw from a temptation to get an immediate reward in order to get a greater reward in the future (i.e. via cooperation).

While RST allows such theorizing, it has not been tested empirically. Much less is known of what the specific influence of traits of approach and avoidance are on choices in social dilemmas, as well as to what extent these traits can be linked to higher level motivational orientations in the real life choice domain, such as choice of degree. Specific predictions with regards to how BIS/BAS is linked to the choice of degree and choices in social dilemmas domain are discussed in respective chapters.

The next section discusses the links between RST traits and higher level motivational orientations.

1.5 Approach/Avoidance Traits and Higher Level Motivational Orientations

The previous sections indentified core dimensions of higher level motivational orientations, which guide individual choices in a variety of domains. I have also discussed basic motivational traits, which might provide a basis for these higher level orientations. This section discusses the tentative bottom-up links between these two levels of motivation, which are the main focus of this thesis. Specifically, I make predictions how higher level motivational orientations could be defined by basic motivational traits.

Extensive research has identified various basic decision-making mechanisms associated with motivation (e.g. processing of rewards and punishments, inhibitory control), as well as various

types of motivation (e.g., approach and avoidance, motivation of achievement, intrinsic and pro-social motivation). While my primarily goal was to examine putative links of traits of approach and avoidance and higher level motivational orientations, the empirical evidence for these links is very limited. Therefore, in this section I will take a broader theoretical perspective, and examine the role of reward, punishment and inhibitory mechanisms on choices. This allows both hypothesizing how traits of approach and avoidance can potentially be linked to individual differences in higher level motivational orientations, as well as to expand on a broader theoretical level the involvement of basic decision-making mechanisms in different types of choice behaviour.

1.5.1 Pro-social Motivation and Reward/Punishment Contingencies

Within economics (Andreoni, 1990; Crumpler & Grossman, 2008; Fehr & Camerer, 2007; Fehr & Fischbacher, 2003; Fehr & Gachter, 2000), psychology (Ferguson et al., 2008) and biology (Nowak & Sigmund, 2005; West, Griffin, Gardner, & Diggle, 2006), reward and punishment contingencies, as well as traits of approach and avoidance, have been related to various levels of cooperation or other-oriented behaviour both on the neural and behavioural level (de Quervain et al., 2004; Rilling et al., 2007; Scheres & Sanfey, 2006).

However, there is a controversy in the way reward-related mechanisms and traits are found to affect behaviour in social dilemmas like PGGs. While the traditional economic assumption implies that a reward (e.g. an opportunity to win more money) leads to selfish behaviour, such as free-riding; in the couple recent decades it has been established that one of the mechanisms of giving within social dilemmas is “warm glow” (e.g. Andreoni, 1990; Fehr & Fischbacher, 2003; Harbaugh et al., 2007), or feeling good about a donation. In this case, giving away money is interpreted as being rewarding as well. Thus, based on these findings, reward contingencies do affect choices in the economic games, although the causes for this are no entirely clear, as under different conditions they can lead to opposite choices, e.g. cooperating (through “warm glow” mechanism) or free-riding (because it leads to a higher monetary reward).

Furthermore, punishment contingencies also change levels of cooperation (Carpenter, 2007; Noussair & Tucker, 2005). For instance, experiments of Fehr and Gachter (2002) and Cinyabuguma, Page and Putterman (2005) demonstrated in a PGG scenario that when the possibility of punishment was introduced, either in the form of the punishment for free-riding by group members or in the form of exclusion from the group, respectively, participants significantly increased their contribution levels into the public good.

Moreover, the interaction of inhibitory and approach behaviours have been also linked to pro-social behaviour. For example, Moll et al (2006) demonstrated in a fMRI study that when people decide to donate (to a charity) not only mesolibic reward systems are involved, but also medial orbitofrontal–subgenual and lateral orbitofrontal areas, which also play key roles in more primitive aversion mechanisms.

In keeping with this, Rilling et al (2007) demonstrated that mutual cooperation in an Iterated Prisonner's Dilemma was associated with the activation of both rostral anterior cingulate cortex and striatum. There is strong evidence that striatum is involved in reward processing (although, see Schultz, 1998; however, see Seymour, Daw, Dayan, Singer, & Dolan, 2007 for the role of striatum in processing punishment contingencies), while anterior cingulate cortex has been involved in the functioning of avoidance or inhibition system (Smillie, Dalgleish, & Jackson, 2007). Therefore, both reward and inhibitory systems have been implicated in pro-social behaviour.

It is possible, therefore, that traits of approach and avoidance/inhibition, which regulate individual reactions towards rewarding and punishing cues in the environment, could potentially explain the variation in pro-social motivation. However, as there is mixed evidence in terms of basic decision-making mechanisms involved in cooperative behaviour, it is not clear as yet whether individual differences in approach, avoidance/inhibition or interaction of both, can explain individual differences in pro-social motivation.

1.5.2 Intrinsic and Achievement Motivation and Reward/Punishment Contingencies

Both intrinsic and achievement motivations have not been studied much with regards to their links to basic motivational traits, such as approach and avoidance. However, conceptually, intrinsic motivation implies seeking an intrinsically rewarding activity. Some speculative links between achievement motivation and reward-processing have been discussed by Depue and Collins (1999) in their comprehensive review of the functions of neurotransmitter dopamine and its links to individual differences in personality. They, however, focus on a broader personality trait of extraversion and its underlying neural mechanisms and cite no studies on the links of higher level motivational orientations and behavioural approach. More recent research linked the achievement motivation to reward-related mechanisms on the neural (e.g. localization of dopamine receptors, Tomer et al., 2008) and genetic level (e.g. genetic polymorphism of dopamine transporter, Osinsky et al., in press).

Therefore, it can be expected that both motivational orientations develop around processing of different types of rewards, and should be linked to individual differences in behavioural approach. At present, there are no studies that investigate this relationship.

1.5.3 Free-riding and Reward/Punishment Contingencies

Free-riding in economics is mainly studied as a negative version of pro-sociality or cooperation. The structure of the games, such as the PGGs, often offers participants only two alternatives: either to free ride or to cooperate. However, in the real world, more alternatives are usually available. For instance, one can neither cooperate (share a part of their resource with others), nor free ride (exploit the communal resource), but make a third choice - withdraw from communal activities altogether. The latter choice is not a form of free-riding, if it does not lead to benefiting from being a part of community.

To delineate free-riding from cooperation it is critical to examine more basic motivational processes that might underpin both of them. For instance, when free-riding is viewed as a negative end of cooperative behaviour, it is usually linked to reward-related mechanisms. As such, it has been demonstrated (see e.g. Fehr & Camerer, 2007) that free-riding in PGGs coincides with activation in reward-related brain areas. However, other findings suggested

that free-riding in social dilemmas might be associated with diminished inhibitory processes on the neural level (McCabe, Houser, Ryan, Smith, & Trouard, 2001). Furthermore, in a broader societal perspective, the free-riding can be interpreted as anti-social behaviour, which is in turn, often linked to poor inhibition and self-control (e.g. de Kemp et al., 2009).

Therefore, it is not clear which basic motivational mechanism defines free-riding - enhanced reward processing or poor inhibition, or interaction of the both. More specific predictions with regards to basic mechanisms that underpin free-riding are discussed in respective chapters of this thesis.

1.6 Summary of Theoretical Themes and Predictions

The hierarchical structure of human motivation is hypothesized in the literature (Elliot, 2006). A number of overlapping motivational constructs were proposed (i) as important motivational predictors of real life choices, and (ii) to be dispositional. However, there is still not much understanding of the basic mechanisms which underlie higher level motivational orientations. Furthermore, the bottom-up effect of basic decision-making mechanisms on individual variation in these motivational orientations is not established as yet.

Establishing the links between higher level motivational orientations and more basic motivational traits is a first step to elucidate basic decision-making mechanisms which are recruited when complex real life choices are made (e.g. to volunteer, to pursue a highly competitive career, etc). This will considerably contribute to the models that aim to predict individual choices in the real world.

This thesis investigates higher level motivational orientations and their underpinnings at the example of two complementary models of individual choice: an immediate type choice in a social dilemma, a PGG, and a choice with a long-term consequences, a choice of degree. By employing these two models, the relationships between motivational traits and higher level motivational orientations, which are common for different types of situations, were examined.

Based on the theoretical overview above the following gaps in the literature have been identified and were explored theoretically and empirically in the following chapters of this thesis.

First, a unified framework of the dimensions of higher level motivational orientations, common for different types of choices, is lacking in the literature. By examining the overlap in different motivational constructs in economics and social psychology, I developed a model of motivators for a real life choice, at the example of the choice of degree, along with a psychometric instrument to measure these reasons (Chapter 2-4). Based on theoretical analysis, I predicted that motivations for the choice of degree cluster around four dimensions aligned with motivation of achievement, intrinsic motivation, pro-social motivation and free-riding.

Second, although there is some evidence that basic decision-making processes, which define traits of approach and avoidance, are linked to higher level motivational orientations, there is not much research on the relationships of individual difference in basic motivational traits (RST) and higher level motivational orientations. I investigated these links by examining individual choices in two different domains: the PGGs (Chapters 7 and 8) and the choice of degree (Chapter 6). This thesis employed RST as a model of basic motivational traits. I predicted that pro-social motivation, measured as behaviour in PGGs and as self-reported reasons for the choice of degree, to be linked to both behavioural approach and inhibition. Furthermore, I expected the intrinsic interest and achievement motivation to be linked to behavioural approach. Finally, individual differences in free-riding were expected to be linked to behavioural inhibition.

Third, if higher level motivational orientations are regulated in a bottom-up fashion by more basic motivational traits, individuals should demonstrate a level of consistency in choices across domains. As such, based on individual motivational orientations in the degree choice domain we should be able to predict similar outcomes for the choice in the PGG scenarios. There are no investigations that examine if higher level motivational orientations measured in

the laboratory games (e.g. such as PGGs) are coherent with motivations for a long-term real life choice, such as choice of degree. I investigated the level of coherence in choices on small and large-scale level (Chapter 9). If higher level motivational orientations represent dispositions, individuals should make choices on similar grounds in both small and large-scale situations.

Chapter 2

2 A Model of Domain-General Motivation within the Context of Degree Choice

2.1 Overview

The aim of this chapter was to investigate the overlap in motivational constructs in order to devise a domain-general model of higher level motivational orientations in the degree choice domain. A growing body of evidence suggests that similar individual motivational orientations influence both small and large-scale choices (Fehr & Gintis, 2007; Gray & McNaughton, 2000). This chapter applied a theory driven approach to the assessment of individual differences in the choice motivation for life-path decisions. This model was then employed to develop a psychometric tool to measure dimensions of the degree choice motivation.

In addition to the theoretical analysis, and in order to avoid any bias in selecting the items to measure degree choice motivations, I explored if the motivations, which arise from a wider range of empirical sources, are similar to theoretically derived dimensions.

2.1.1 Degree Choice as an Empirical Model to Study Motivational Differences

A choice of degree was utilized to test the theoretical model of higher level motivational orientations, developed in the General Introduction (see Chapter 1). A choice of degree is a common life-path decision, which encapsulates basic decision mechanisms. As such, a choice of degree involves a consideration of self- versus other-benefits (e.g. staying near family or moving away to study if it secures better career options). Furthermore, degree choice implies prospective analyses of future benefits (e.g. a well-paid job) in an uncertain world (e.g., will the job market be stable after my degree is finished?). Such features (e.g. costs-benefit analysis, discounting of initial costs to attain future rewards) seem to represent fundamental mechanisms of any choice situation including major life decisions such as the choice of degree. Thus, modelling individual differences in motivation for major life choices in the degree context was considered appropriate.

2.1.2 Theoretical Approach to Choice Motivation

A body of vocational literature suggests that a career choice represents a stable life strategy (e.g. being oriented towards people or things), which is associated with personality differences (e.g. de Fruyt & Mervielde, 1996; Prediger, 1996). Therefore, similar disposition-like motivational orientations (e.g. other/self-oriented) should be displayed as motivators for the degree choice. However, no previous research on predictors of degree choice have explored if individual motivations underlying degree choices are consistent with more generic motivations such as, for instance, free-riding (Fehr & Gintis, 2007).

Furthermore, researchers who investigate reasons behind degree choice decisions often focus on factors such as abilities, social background and personality traits (e.g. Ackerman & Heggestad, 1997; Barrick, Mount, & Gupta, 2003; de Fruyt & Mervielde, 1996). Within the vocational choice literature a simple correspondence between motivations and degrees is often proposed (e.g. medical students have a "people" orientation, Holland, 1985). This violates the principles of multidetermination (i.e. any choice is a result of a combination of motivations) and equifinality (i.e. the same outcome could be predicted by different motives, Pervin, 2001). For instance, the same reason (career perspectives) can lead to the choice of different degrees (e.g. medicine or engineering), while different reasons may lead to choosing the same degree (e.g. the choice of medicine to help others or because of good career options). Assuming that a single motive can predict a certain choice outcome could result in misspecified models, as these models do not account for individual differences in motivation and multidetermined nature of human choice.

Research on motivation behind pursuing specific subject areas (e.g. Buddeberg-Fischer, Klaghofer, Abel, & Buddeberg, 2006; Roness & Smith, 2009) confirms equifinallity and multidetermination in terms of degree choice reasons. It has also been demonstrated that there are differences in motivation to pursue these subjects, which is contrary to vocational choice literature. However, subject-specific studies lack generalizability as they investigate specific subject-related motives (e.g. helping others in relation to medicine, Crossley & Mubarik, 2002).

While studies examined multiple motivations for specific degrees (e.g. Buddeberg-Fischer et al., 2006), there are no general, degree non-specific models that could explain motivational differences across all degree choices. The aim of this study was to fill this gap by applying a broader set of motivational strategies, derived theoretically in Chapter 1, to the degree choice domain. These were then explored empirically on three samples of undergraduates (see studies in this chapter and Chapter 3).

2.1.3 Individual Motivational Orientations

Within economics two broad motivational dimensions have been identified, namely, self and other orientation (Fehr & Gintis, 2007). Moreover, Self-Determination Theory (SDT) distinguishes intrinsically (i.e. performed for the sake of the pure enjoyment from the process) or extrinsically (i.e. performed due to some external demands) motivated activity (Deci & Ryan, 2002). Based on the theoretical analysis in Chapter 1 (see Section 1.3) and drawing on these two dichotomies, four potential motivations for the degree choice are summarized in the Table 2.1 and developed below in respect to the choice of degree.

Table 2.1 Dimensions of theoretically derived degree choice reasons

	Behavioural economics (e.g., Fehr & Gintis, 2007)	**Self-Determination Theory (Deci & Ryan, 2000)**	**Deemer et al (2010)**	**Astin & Nichols (1964)**	**Sauermann (2005)**	**Buddeberg-Fischer et al (2010)**	**Prediger (1996)**	**Holland (1985)**
Career	Self	Extrinsic	Extrinsic reward	Prestige		Extrinsic	High Occupational aspirations	
Helping	Others			Altruism			High People orientation	Social
Loafing	Self				Minimizing effort			
Interest		Intrinsic	Intrinsic Reward			Intrinsic		Artistic, Investigative

Free-riding implies a self-oriented behaviour, even when at some cost to others. It is analogous to social loafing (i.e. exploiting communal benefits without proportional contribution into communal good, Karau & Williams, 1993). Thus, I refer to this free-riding tendency as a *loafing* orientation. A similar choice goal of minimizing efforts while making a decision was discussed as a factor of career decision process (Sauermann, 2005).

Helping or other-oriented altruistic motivation was established through experimental social dilemmas and reported in vocational domain as altruism (Astin & Nichols, 1964). Furthermore, orientation towards others resembles the social type within Holland's classification.

A *career* orientation implies attainting social status as a function of career choice. It is aligned with extrinsic motivation and resembles self-regarding behavioural orientation from behavioural economics. It differs from loafing as it does not entail choosing the easiest way to achieve one's goals at the cost of others, but merely represents high career aspirations. Extrinsic rewards were reported by science students as a motivation for research (Deemer, Martens, & Buboltz, in press) and by medical students while choosing their speciality (Buddeberg-Fischer et al., 2006).

Finally, intrinsic *interest* reflects choices defined by expectation of enjoyment from the proposed activity. Intrinsic rewards were reported by science students to motivate research (Deemer et al., in press) and by medics while choosing an area of speciality (Buddeberg-Fischer et al., 2006).

Based on the reviewed literature, I expected differences in motivation for degree choices to be explained by a four-factor model with loafing, career, helping and interest orientations.

2.1.4 Measuring Degree Choice Motivation

To measure four dimensions of degree choice motivation existing psychometric tools could be potentially used [e.g. Aspiration Index (Kasser & Ryan, 1996), Assessment of Individual Motives-Questionnaire (AIM-Q, Bernard, 2009), Vocational choice: Self-Directed Choice

Inventory (Holland, 1985), Research Motivation Scale (Deemer et al., in press)]. While some of these scales are conceptually close to the identified degree choice motivational domains (e.g. helping – life goal community and social vocational interests), none of the measures cover all four domains. Furthermore, loafing orientation is missing from all existing measures. As none of the scales measure all four degree choice motivators, I aimed to develop a new instrument that is theoretically complete.

2.2 Vector of Individual Choice-Degree: Item Generation

Studies 1 and 2 aimed to generate a broad set of items that corresponded to the motivation for the degree choice and test if those were applicable to the actual reasons that students could refer to when describing their degree choices. All items were created as 6-point Likert-type scales. Participants judged how relevant each specific reason was for their choice of degree, ranging from *not at all* to *very much so*.

Studies 1 and 2 focused on the preliminary analyses of the proposed dimensions. They investigated if the generated items corresponded to the actual degree choice reason of undergraduate students. This allowed selecting appropriate items, which were then used for the scale development in a large sample in the study reported in Chapter 3.

In Study 1, a set of twenty-four items were generated. To insure that the item-generation process was not biased by the theoretical framework, the items for this study were generated in an exploratory fashion: by analysing an applied web based tool for career consulting and a pilot study (see details in the Section 2.2.1).

In Study 2, the items from Study 1 were combined with an additional set of thirty-one items. These were generated around four theoretically derived degree choice reasons (see Section 2.1.3).

To insure that the generated items corresponded to the actual degree choice reasons of undergraduate students, in Studies 1 and 2 the distribution of individual items was analysed. I expected that if an item corresponded to the actual degree choice reason, the distribution of

the participants' responses on those items would be close to normal. This would indicate that a particular item reflects a real degree choice reason. While if an item did not correspond to the degree choice reason, the scores on this item would be expected to be close to the smallest rating scale value. For example, if a particular item was not representing a valid degree choice reason, I expected that close to 100% of participants would answer "not at all" when rating if this item was relevant for them as a degree choice reason.

I further preliminarily explored if the dimensions emerging from this data, corresponded to four underlying latent factors (higher level motivational orientations) that were tested comprehensively in the study reported in Chapter 3.

2.2.1 Study 1

In this study, the aim was to explore if motivational orientations of interest, helping, loafing and career emerge from the data. Items for Study 1 were generated in an exploratory fashion: i.e. instead of following four theoretically derived themes, item generation was based around themes, which were identified through a web based tool for career consulting, the Prospector Planner (www.prospects.ac.uk), and a pilot study.

The Prospector Planer is a web based tool and is widely used by University Career Services in the UK for the purposes for career consulting. By the means of various questions, it allows students to classify their goals, motives and job preferences, and based on this information it creates the profile of the suitable jobs for a particular individual.

For the pilot study, research students and associates at the School of Psychology, University of Nottingham were contacted via school's mailing list and were asked to specify their reasons for the choice of the first degree as an answer to the open-ended question (see Appendix 1). 25 people replied.

A group of additional items about external influence on the choice were also added (e.g. "I have chosen this degree because of family influences").

Twenty-four items comprised a first version of VIC-Degree questionnaire.

2.2.1.1 Participants and Procedures

The data was collected as an online survey, which was distributed via undergraduate mailing lists. A sample of 113 undergraduates was recruited: 76% female; mean age 20 years old. 40% participant reported studying psychology; 21% economics, 31% biology, 8% other.

2.2.1.2 Results & Discussion

2.2.1.2.1 Descriptive Statistics

All items were post-hoc classified as to which of four theoretically derived factors (i.e. helping, career, loafing or interest) they could be related (see Table 2.2). Six items did not fall into any of the factors (e.g. item 7, Table 2.2). Out of twenty-one items only five were not classified based on the four theoretically derived factors (i.e. 1, 7, 9, 11, 16, see Table 2.2).

Means, standard deviations and skew statistics for twenty-four items in the first version of VIC-Degree are reported in the Table 2.2. The majority of the items showed distribution of responses close to normal (identified based on the skew statistic < 2). Three items: 18, 22 and 23, showed a higher skew, and therefore were potentially not normally distributed.

Therefore, twenty-one items seemed to correspond to actual reasons for degree choice. It was decided, mainly on practical reasons, to exclude three items (18, 22 and 23, see Table 2.2) with a higher skew, as they seemed not to correspond well to common degree choice reasons of undergraduates. Specifically, 80.7% of participants reported that "I didn't get in where I wanted to go" (item 18, Table 2.2) was "not at all" their degree choice reason; 76.3% reported that "pure chance" (item 22, Table 2.2) was "not at all" their degree choice reason; 90.4% reported that "it was the only offer I had" (item 23, Table 2.2) was "not at all" their degree choice reason). These three items were excluded from subsequent analyses.

Table 2.2 Descriptive statistics for VIC-Degree, 24 items, Study 1 (N = 113): Mean (M), SD (Standard Deviation), S (Skew). The table shows the item's number for Study 1, 2 and final version of the survey for a possibility of comparison with the previous version of the survey.

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	**I have chosen this degree because….**	Relevance to the theoretical dimensions	M	SD	S
17	14	06	….it was the easiest option for me.	Loafing	1.84	1.07	1.34
22			….of pure chance.	Loafing	1.46	0.96	2.11
02	02	01	….I was always interested in this subject.	Interest	4.69	1.21	-1.14
10	08	04	….I wanted to know more about this subject.	Interest	4.93	1.04	-1.24
12	41		….I feel it will lead to personal development.	Interest	3.95	1.39	-0.71
20	22		….it's an enjoyable subject to study.	Interest	4.80	1.07	-1.46
05	05	02	….I want to help other people.	Helping	3.64	1.72	-0.16
08	48	18	….I want to make world a better place.	Helping	3.15	1.62	0.07
21	17	09	….I want to serve society.	Helping	3.22	1.50	0.13
03	37		….a high social status is important for me.	Career	2.59	1.22	0.29
04	04		….a particular lifestyle is important for me.	Career	2.95	1.37	0.23
06	06		….I was good at this subject at school.	Career	4.12	1.66	-0.79
13	10		….I want to be respected by other people.	Career	3.19	1.42	0.12
15	12		….it's intellectually challenging.	Career	4.30	1.17	-0.84
19	15	07	….I want to get a well-paid job in the future.	Career	3.90	1.55	-0.41
24	18	10	…. it provides good career options.	Career	4.29	1.43	-0.64
14	11		….I didn't know what else to do.	Career (-)	2.59	1.58	0.61
18			….I didn't get in where I wanted to go.	Career (-)	1.53	1.33	2.69
01	01		….of family influences.		1.76	1.22	1.54
07			….I wanted to live in Nottingham: I like the city.		2.63	1.45	0.69
09			….the University is good, has good facilities and reputation.		4.66	1.25	-1.26
11			….of a school teacher suggestion.		2.36	1.47	0.82
16	47		….of the influence of my friend(s).		1.53	0.83	1.55
23			….it was the only offer I had.		1.18	0.71	4.98

2.2.1.2.2 Exploratory Analysis of the Factor Structure

To explore whether a theoretically meaningful latent factor structure can be extracted from the data on the remaining twenty-one items, Principal Component Analysis (PCA) with varimax rotation was conducted. The number of cases was adequate to conduct PCA, > 100

(Ferguson & Cox, 1993). Adequacy of applying factor analyses to the data was confirmed by Kaiser-Myer-Olkin (KMO) and Barlett's test of sphericity (BS): KMO = .632, BS's $p < .001$.

Table 2.3 Results of the PCA on twenty-one items, Study 1, see text for explanations

	I have chosen this degree because….	1	2	3
8	….I want to make world a better place	0.83	-0.09	0.01
5	….I want to help other people	0.80	0.08	0.11
10	…. I wanted to know more about this subject	0.77	-0.06	-0.16
21	….. I want to serve society	0.73	0.10	0.02
12	….. I feel it will lead to personal development	0.67	0.15	0.16
20	…. it's an enjoyable subject to study	0.59	0.21	-0.18
15	…. it's intellectually challenging	0.49	0.27	-0.19
9	….the University is good, has good facilities and reputation	0.38	0.35	0.06
19	…. I want to get a well-paid job in the future	0.04	0.81	-0.02
24	….. it provides good career options	0.15	0.78	-0.15
3	….a high social status is important for me	0.10	0.63	0.08
13	…. I want to be respected by other people	0.41	0.61	0.19
4	….a particular lifestyle is important for me	0.13	0.60	-0.05
6	….I was good at this subject at school	-0.10	0.33	0.11
16	…. of the influence of my friend(s)	0.01	0.07	0.71
17	…. it was the easiest option for me	-0.01	-0.16	0.68
14	…. I didn't know what else to do	-0.18	-0.08	0.62
1	….family influence	-0.11	0.28	0.61
11	….. of a school teacher suggestion	0.15	0.12	0.36
2	….I was always interested in this subject	0.27	0.07	-0.32
7	…. I wanted to live in Nottingham: I like the city	0.20	0.02	0.27

The scree plot was used to determine the appropriate for this data number of factors (Cattell, 1966). It demonstrated that three-factor solution explains the data well. This solution explained 41% of variance. Factor loadings are reported in the Table 2.3. To analyze if the extracted factors meaningfully corresponded to theoretical degree choice reasons, an arbitrary cut-off for an item factor loading of .3 was utilized. The first factor ($\alpha = .83$) was interpreted as a combination of helping and interest orientations, the second factor ($\alpha = .76$) was aligned with the career orientation, and the third factor ($\alpha = .60$) was close to the loafing orientation.

To further reduce the number of items, I examined the factor loadings of the five items that were not initially classified according to four motivational dimensions but emerged from exploratory item-generation strategies. I investigated if these items were linked to theoretically meaningful factors or if they changed the interpretation of any of the factors. The latter suggests that there might be more common dimensions for degree choice reasons that I have accounted for before.

Out of these five items, three were removed based on the PCA: 7, 9 and 11. These items were not initially relevant to the theoretically derived the motivational orientations (they were added on purely empirical reasons, based on the pilot study). In addition, they also have not loaded highly on any of the factors in the Study 1 (see Table 2.3). Specifically, all of them had loadings of less than .4 on any of the factors. Items 1 and 16 loaded highly on the factor three (.61 and .71, respectively), therefore, it was decided to leave them in the second version of the questionnaire.

The results of PCA demonstrated that interest and helping collapsed into one factor, at least in this sample. This might reflect a sample specific selection bias (e.g. the majority of students who took part in Study 1 were from the psychology department). It could be as well due to the fact there might have been not enough items representing certain factors, which could have affected the factor structure.

The results of PCA demonstrated that reasons for degree choice could fall into at least three factors, of which two (career and loafing) were theoretically predicted. This preliminary result suggested that the real degree choice reasons of undergraduate students might correspond to a broader set of higher level motivational orientations predicted based on the literature revised in the General Introduction, Section 1.3. However, based on the current set of items it was not possible to distinguish between the helping and interest orientation. Therefore, a second study (Study 2) was conducted with a broader set of items. Eighteen items from the first version of the VIC-Degree were selected to be included in the second version of VIC-Degree in Study 2.

2.2.2 Study 2

For the Study 2, an additional set of thirty-one items (see Table 2.4) was combined with eighteen items from the Study 1. Thirty new items were specifically designed to correspond to four motivational orientations of loafing, career, interest and helping. An additional item (28, see Table 2.4) was added as a degree choice reason, which could potentially in combination with items 1 and 47 form a separate factor (e.g., choosing a degree under influence of

important others). This was reported in previous studies as a degree choice reason (Schoon & Parsons, 2002).

All items were classified as to which of four theoretically derived factors (i.e. helping, career, loafing or interest) they can represent (see Table 2.4).

This study aimed to test if newly added items, together with the eighteen items from Study 1 represent meaningful actual reasons of degree choice, as well as to explore if a four-factor structure emerges from the data.

2.2.2.1 Participants and Procedures

The data was collected as an online survey, which was distributed via undergraduate mailing lists. A sample of 126 undergraduates was recruited, 58% female; mean age 20.5 years old. 14% reported studying the arts & humanities; 28% social sciences; 1% medical sciences; 17% sciences; 40% engineering.

2.2.2.2 Results & Discussion

2.2.2.2.1 Descriptive Statistics

Means, standard deviations and skew statistics for forty-nine items from the second version of VIC-Degree are reported in the Table 2.4. The majority of items show distribution of responses close to normal (based on the skew statistics), with only four items (i.e. 7, 19, 29, 47) with a skew higher than 2 (see Table 2.4). None of the forty-nine items were excluded based on the analysis of the descriptive statistics at this stage.

Table 2.4 Descriptive statistics for VIC-Degree, 49 items, Study 2 (N = 126): Mean (M), SD (Standard Deviation), S (Skew). Table includes the item's number for Study 1, 2 and the final version of the survey for a possibility of comparison with the previous version of the survey.

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	I have chosen this degree because….	Relevance to the theoretical dimensions	M	SD	S
	35		….I wouldn't want to do a job that involves hurting other people's feelings.	Loafing (-)	2.24	1.41	1.02
	3		….I want to realize my goals at any costs, even when at the expense of others.	Loafing	1.86	1.27	1.54
	7	03	….I'm not particularly concerned about other people.	Loafing	1.60	0.99	2.02
	13	05	….my individual goals are more important than the prosperity of society.	Loafing	1.94	1.27	1.42
17	14	06	….it was the easiest option for me.	Loafing	2.30	1.29	0.75
	27		….I want to be in a position to get people to do want I want them to do.	Loafing	1.94	1.03	1.01
	29		….I enjoy manipulating other people's feelings.	Loafing	1.26	0.65	3.41
	31	14	….I knew that I'd manage to pass the degree without doing too much work.	Loafing	2.02	1.17	1.19
	33		….I want to influence other people's actions.	Loafing	2.02	1.21	0.94
	36	16	….the degree seemed to be easy to pass.	Loafing	1.69	0.98	1.47
	44		….I am good at telling people what they want to hear, in order to get them to do what I want.	Loafing	1.67	0.99	1.71
2	2	01	….I was always interested in this subject.	Interest	4.71	1.21	-0.84
10	8	04	….I wanted to know more about this subject.	Interest	4.87	1.11	-1.01
22	20	11	….for me it is very important to study a degree that I enjoy.	Interest	4.85	1.28	-1.14
	22		….it's an enjoyable subject to study.	Interest	4.62	1.20	-0.62
	26	13	….it is a fascinating subject to study.	Interest	4.65	1.24	-0.77
	34		….when I found out about this course, I instantly knew that I want to apply: It was one-moment decision.	Interest	2.56	1.54	1.01
	39		….it was something new and exciting.	Interest	3.31	1.45	-0.07
12	41		….I feel it will lead to personal development.	Interest	3.91	1.32	-0.49
	43		….it was interesting, even though it doesn't provide very secure career options.	Interest	2.79	1.55	0.62
	24		….I don't want to deal with other people's feelings.	Helping (-)	1.94	1.30	1.58
	40		….I would prefer to have a job where I don't need to interact with people a lot.	Helping (-)	1.72	1.00	1.42
5	5	02	….I want to help other people.	Helping	2.90	1.53	0.46
	9		….in my future job I want to interact with people as much as possible.	Helping	3.25	1.45	0.12
21	17	09	….I want to serve society.	Helping	2.92	1.43	0.21
	21	12	….I am interested in people.	Helping	3.22	1.55	0.13
	30		….I will feel more comfortable when working with people.	Helping	2.41	1.36	0.58
	45		….the call of duty means a lot to me.	Helping	2.27	1.41	0.78
	46	17	….I am interested in understanding other people's perspectives.	Helping	3.11	1.65	0.23
8	48	18	….I want to make world a better place.	Helping	3.34	1.65	-0.05

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	I have chosen this degree because….	Relevance to the theoretical dimensions	M	SD	S
14	11		….I didn't know what else to do.	Career (-)	2.61	1.62	0.59
	19		….I didn't care that much about what I'm going to study.	Career (-)	1.72	1.11	2.04
	42		….I avoid highly competitive situations, and getting into this program was not very competitive.	Career (-)	1.84	1.09	1.83
4	4		….a particular lifestyle is important for me.	Career	2.85	1.43	0.32
6	6		….I was good at this subject at school.	Career	4.39	1.43	-1.16
13	10		….I want to be respected by other people.	Career	3.13	1.59	-0.05
15	12		….it's intellectually challenging.	Career	4.18	1.09	-0.41
19	15	07	….I want to get a well-paid job in the future.	Career	3.82	1.57	-0.35
	16	08	….it is very competitive and I am an achiever.	Career	2.89	1.47	0.18
24	18	10	….because it provides good career options.	Career	3.99	1.60	-0.58
	23		….I knew exactly what I would get from the course.	Career	3.09	1.26	0.40
	25		….I carefully appraised all pros and cons and this degree was the best one for me.	Career	3.18	1.44	0.10
	32	15	….it provides me with secure career options.	Career	3.58	1.57	-0.30
3	37		….a high social status is important for me.	Career	2.27	1.26	0.62
	38		….it was a safe option for me.	Career	2.42	1.20	0.39
	49		….because according to my extensive research of various opportunities, it was the best option.	Career	3.38	1.46	-0.04
1	1		….of family influences.		1.87	1.23	1.29
	28		….I didn't want to move far from family and/or friends.		1.77	1.17	1.78
16	47		….of the influence of my friend(s).		1.55	0.94	2.12

2.2.2.2.2 Exploratory Analysis of the Factor Structure

To examine possible underlying dimensions of degree choice reason on the current set of items, the PCA with varimax rotation on forty-nine items was conducted. The number of cases was adequate to conduct PCA, > 100 (Ferguson & Cox, 1993). Adequacy of applying factor analyses to the data was confirmed by Kaiser-Myer-Olkin (KMO) and Barlett's test of sphericity (BS): KMO = .938, BS's $p < .001$. Based on the scree plot (Cattell, 1966), a four-factor solution appeared to be presented in the data. This solution explained 45.34 % of variance.

Table 2.5 Results of the PCA on 49 items, Study 2

	Items	Career	Interest	Helping	Loafing
18	….because it provides good career options.	0.82	-0.07	0.20	-0.01
32	….it provides me with secure career options.	0.80	-0.17	0.20	0.06
15	….I want to get a well-paid job in the future.	0.77	-0.10	0.01	0.10
10	….I want to be respected by other people.	0.72	-0.07	0.28	0.08
16	….it is very competitive and I am an achiever.	0.65	0.26	0.10	0.07
37	….a high social status is important for me.	0.60	0.02	0.22	0.26
43	….it was interesting, even though it doesn't provide very secure career options.	-0.57	0.37	-0.05	0.20
49	….because according to my extensive research of various opportunities, it was the best option.	0.43	0.31	0.14	-0.02
04	….a particular lifestyle is important for me.	0.42	0.03	0.16	0.31
06	….I was good at this subject at school.	0.32	0.14	0.05	0.04
26	….it is a fascinating subject to study.	-0.10	0.84	0.08	-0.02
20	….for me it is very important to study a degree that I enjoy.	0.04	0.84	0.08	-0.02
22	….it's an enjoyable subject to study.	-0.13	0.80	0.06	-0.17
08	….I wanted to know more about this subject.	0.03	0.69	0.02	0.00
11	….I didn't know what else to do.	-0.09	-0.65	0.01	0.39
02	….I was always interested in this subject.	0.13	0.61	-0.02	-0.03
23	….I knew exactly what I would get from the course.	0.15	0.57	0.26	0.00
12	….it's intellectually challenging.	0.33	0.49	0.12	0.02
34	….when I found out about this course, I instantly knew that I want to apply: It was one-moment decision.	-0.03	0.45	0.07	0.19
39	….it was something new and exciting.	-0.10	0.40	0.26	0.14
01	….of family influences.	0.24	-0.37	0.11	0.26
25	….I carefully appraised all pros and cons and this degree was the best one for me.	0.33	0.35	0.17	0.05
21	….I am interested in people.	-0.08	0.19	0.78	-0.03
17	….I want to serve society.	0.42	0.17	0.75	-0.02
45	….the call of duty means a lot to me.	0.08	-0.01	0.73	0.13
05	….I want to help other people.	0.35	0.03	0.72	-0.13
30	….I will feel more comfortable when working with people.	0.23	-0.01	0.71	0.15
48	….I want to make world a better place.	0.22	0.19	0.67	0.03
46	….I am interested in understanding other people's perspectives.	-0.28	0.19	0.64	0.03
09	….in my future job I want to interact with people as much as possible.	0.37	0.01	0.63	-0.01
47	….of the influence of my friend(s).	0.12	-0.13	0.46	0.40
41	….I feel it will lead to personal development.	0.32	0.32	0.39	-0.09
33	….I want to influence other people's actions.	0.18	0.01	0.38	0.16
07	….I'm not particularly concerned about other people.	-0.02	0.08	-0.20	0.68
24	….I don't want to deal with other people's feelings.	0.36	0.25	-0.21	0.62
42	….I avoid highly competitive situations, and getting into this program was not very competitive.	0.04	0.02	0.13	0.59
40	….I would prefer to have a job where I don't need to interact with people a lot.	0.21	0.12	-0.21	0.58
44	….I am good at telling people what they want to hear, in order to get them to do what I want.	0.04	-0.08	0.17	0.56
13	….my individual goals are more important than the prosperity of society.	0.31	0.36	-0.16	0.56
36	….the degree seemed to be easy to pass.	-0.20	-0.05	0.10	0.56
31	….I knew that I'd manage to pass the degree without doing too much work.	-0.06	-0.06	0.11	0.52
19	….I didn't care that much about what I'm going to study.	0.03	-0.44	0.06	0.52
35	….I wouldn't want to do a job that involves hurting other people's feelings.	0.19	0.06	0.47	0.48
		Career	Interest	Helping	Loafing
14	….it was the easiest option for me.	0.02	-0.23	0.06	0.48
29	….I enjoy manipulating other people's feelings.	-0.03	-0.04	-0.01	0.47
03	….I want to realize my goals at any costs, even when at the expense of others.	0.31	0.32	-0.07	0.47
27	….I want to be in a position to get people to do want I want them to do.	0.43	0.04	0.00	0.45
38	….it was a safe option for me.	0.15	-0.29	0.17	0.42
28	….I didn't want to move far from family and/or friends.	0.08	0.01	0.12	0.29

To analyze if the extracted factors meaningfully corresponded to theoretical degree choice reasons, an arbitrary cut-off for an item factor loading of .3 was utilized. Here I used a lower

item-factor loading cut-off point, as four instead of three factors were extracted, therefore, item-factor loadings overall were expected to be lower.

Four factors extracted empirically by the means of PCA, meaningfully corresponded to the four theoretically derived higher level motivational orientations of career (α = .85), helping (α = .88), loafing (α = .83) and interest (α = .84) (see Table 2.5). Based on the findings in Study 2, it was concluded that all forty-nine items can potentially represent degree choice reasons, as well as that they meaningfully relate to the broader motivational orientations.

2.3 General Discussion

The results of Study 1 and 2 confirmed that the degree choice reasons clustered around limited motivational dimensions. These dimensions largely correspond to broader motivational orientations, which were identified in Chapter 1. Such as, students reported that they have chosen a degree either because they were interested in the subject or because it provided an easy opportunity to obtain higher education. However, the exploratory analyses in this chapter suggested that three-factor structure might fit the data better, as in Study 1 items that correspond to the helping and interest orientations loaded highly on the same factor (see Table 2.3). Therefore, it is not clear whether a three or a four factor model of higher level motivational orientations domain explains the degree choice reasons better.

2.4 Limitations

While self-reports rating scales are one of the most common approaches to measure higher level motivational orientations, there are constraints on to which conclusions can be drawn based on such studies. For instance, individuals could be biased in reporting only degree choice reasons which they find socially acceptable. Further studies could investigate if self-reported degree choice reasons match actual reasons for the degree choice.

2.5 Next Chapter

In this chapter, the overlap in motivational constructs in relation to degree choice domain in economics and social psychology was examined. A four-dimensional model with factors of

interest, loafing, career and helping was theoretically justified. I further employed both data-driven (see Study 1, this chapter) and theory-driven (see Study 2, this chapter) approaches to examine possible reasons for the choice of degree in two samples of undergraduate students. Fifty-five items were generated to measure degree choice reasons and examined in two studies in this chapter.

The findings look promising and further suggest four-factor structure of degree choice motivation, which is meaningfully aligned with theoretically justified dimensions of career, loafing, helping and interest. The next chapter focuses on the development of the questionnaire to measure the degree choice motivation and explores its psychometric properties on a large sample of undergraduate students.

Chapter 3

3 Development of a Psychometric Tool to Measure Degree Choice Motivation

3.1 Overview

Four core dimensions of motivational orientations to represent generic choice motivators were identified in the General Introduction. Drawing from economics and psychology these were applied in this chapter to the choice of degree domain. Chapter 3 aimed to develop the scales to measure the helping, career, loafing and interest orientations representing the degree choice reasons on a large sample of undergraduate students by the means of forty-nine items generated and selected in the Chapter 2. The psychometric properties of this model were then explored empirically.

3.2 Method

3.2.1 Participants and Procedures

The data was collected through online and pen/paper versions of questionnaires at two different universities. A representative sample of 989 participants was recruited. The online version of the survey was distributed via undergraduate mailing lists. A pen/paper version was distributed in the halls of residence. All undergraduates who took part in the study entered a prize draw of £75 (see the consent form for this study in the Appendix 2).

The overall sample included three opportunity subsamples: an online from a large city-based British university ("Online 1", N = 397), an online from a large campus-based British university ("Online 2", N = 272) and a pen/paper from the same university as a second sample ("P&P", N = 271). The subsamples differed significantly in age and gender, with participants from subsample P&P being younger than both Online 1 and Online 2 ($F(2,937) = 22.87$, $p < .001$). The subsample P&P had equal gender distribution (46.9% female); the proportion of females was significantly higher in Online 1 and Online 2 (59.9% and 64.7% female, respectively, $\chi 2 (2) = 19.32$, $p < .001$). The overall sample was not different in gender (57.5% female) and age (M

= 20.48, SD = 2.8) from a typical undergraduate sample. As subsamples differed in age and gender, I controlled for these variables in all subsequent analyses.

3.2.2 Factor Analytic Procedures

The whole sample was randomly half-split, with one part used for Exploratory Factor Analysis (EFA, N = 494) and the second for Confirmatory Factor Analysis (CFA, N = 495). In the exploratory phase the number of factors to extract was identified using parallel analysis (Turner, 1998) and the scree plot test (Cattell, 1966). The model was further refined by examining the significance of item loadings on each factor through several iterations of EFA with varimax rotation, using maximum likelihood estimation by the means of the Comprehensive Exploratory Factor Analysis (CEFA) software (Browne, Cudeck, Tateneni, & G., 2008). I removed the items (see Table 3.1) which (1) did not load significantly on any of the factors (labelled as "No significant loadings" in the Table 3.1); (2) loaded significantly on two or more factors, with the difference in the item-factor loadings less than .1 (labelled as "Significant crossloadings" in the Table 3.1); or (3) were duplicates (i.e., one of a pair, both loaded significantly on the same factor and were highly correlated with each other) (labelled as "Duplicates" in the Table 3.1). Adequacy of applying factor analyses to the data was confirmed by Kaiser-Myer-Olkin (KMO) and Barlett's test of sphericity (BS).

CFA models were estimated with Sattora-Bentler correction in LISREL 8.7 and ran from polychoric correlations estimated from the asymptotic covariance matrix (Du Toit, Du Toit, Joreskog, & Sorbom, 1999). Model fit was assessed using the χ^2-value, the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the incremental fit index (IFI). A model with a RMSEA below .08 and CFI and IFI greater .95 indicates a good fit of the data (Hu & Bentler, 1999).

3.3 Results

3.3.1 Descriptive Statistics & EFA

Means, standard deviations and the skew statistics for forty-nine items are reported in the Table 3.1.

Table 3.1 Descriptive statistics for VIC-Degree, 49 items (N = 989): Mean (M), SD (Standard Deviation), S (Skew). Table includes the item's number for Study 1, 2 and the final version of the survey for a possibility of comparison with the previous version of the survey. It also includes reasons to select the items into the final version of the VIC-Degree, which was based on the series of CEFA. See text for a detailed discussion

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	I have chosen this degree because….	M	SD	S	The reason for the item to be excluded, numbers correspond to 49-item version
1	1		….of family influences.	2.13	1.36	0.95	No significant loadings
2	2	01	….I was always interested in this subject.	4.78	1.22	-0.94	
	3		….I want to realize my goals at any costs, even when at the expense of others.	2.34	1.37	0.78	Significant cross loadings
4	4		….a particular lifestyle is important for me.	3.42	1.51	-0.08	No significant loadings
5	5	02	….I want to help other people.	3.76	1.55	-0.24	
6	6		….I was good at this subject at school.	4.41	1.48	-0.91	No significant loadings
	7	03	….I'm not particularly concerned about other people.	1.77	1.15	1.58	
10	8	04	….I wanted to know more about this subject.	4.93	1.13	-1.14	
	9		….in my future job I want to interact with people as much as possible.	3.70	1.45	-0.14	As a duplicate of 21
13	10		….I want to be respected by other people.	3.66	1.48	-0.24	Significant cross loadings
14	11		….I didn't know what else to do.	2.50	1.57	0.68	Significant cross loadings
15	12		….it's intellectually challenging.	4.56	1.17	-0.85	Significant cross loadings
	13	05	….my individual goals are more important than the prosperity of society.	2.50	1.35	0.65	
17	14	06	….it was the easiest option for me.	2.28	1.36	0.92	
19	15	07	….I want to get a well-paid job in the future.	4.22	1.45	-0.65	

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	I have chosen this degree because….	M	SD	S	The reason for the item to be excluded, numbers correspond to 49-item version
	16	08	….it is very competitive and I am an achiever.	3.40	1.51	0.02	
21	17	09	….I want to serve society.	3.50	1.43	-0.06	
24	18	10	….because it provides good career options.	4.48	1.29	-0.79	
	19		….I didn't care that much about what I'm going to study.	1.79	1.13	1.51	Significant cross loadings
22	20	11	….for me it is very important to study a degree that I enjoy.	4.87	1.26	-1.02	
	21	12	….I am interested in people.	3.81	1.56	-0.20	
	22		….it's an enjoyable subject to study.	4.67	1.23	-0.83	As a duplicate of 26
	23		….I knew exactly what I would get from the course.	3.56	1.39	-0.03	Significant cross loadings
	24		….I don't want to deal with other people's feelings.	2.21	1.35	1.01	Significant cross loadings
	25		….I carefully appraised all pros and cons and this degree was the best one for me.	3.53	1.52	-0.07	Significant cross loadings
	26	13	….it is a fascinating subject to study.	4.78	1.22	-0.97	
	27		….I want to be in a position to get people to do want I want them to do.	2.40	1.42	0.81	Significant cross loadings
	28		….I didn't want to move far from family and/or friends.	2.01	1.36	1.30	No significant loadings
	29		….I enjoy manipulating other people's feelings.	1.57	1.09	2.27	High skew
	30		….I will feel more comfortable when working with people.	3.13	1.45	0.09	As a duplicate of 21
	31	14	….I knew that I'd manage to pass the degree without doing too much work.	1.97	1.22	1.20	
	32	15	….it provides me with secure career options.	4.03	1.47	-0.48	

Item Number, Study 1	Item Number, Study 2	Item Number, Study 3 (final version)	I have chosen this degree because….	M	SD	S	The reason for the item to be excluded, numbers correspond to 49-item version
	33		….I want to influence other people's actions.	2.60	1.44	0.57	As a duplicate of 13
	34		….when I found out about this course, I instantly knew that I want to apply: It was one-moment decision.	2.81	1.55	0.53	Significant cross loadings
	35		….I wouldn't want to do a job that involves hurting other people's feelings.	2.96	1.70	0.41	Significant cross loadings
	36	16	….the degree seemed to be easy to pass.	1.82	1.12	1.41	
3	37		….a high social status is important for me.	2.90	1.49	0.29	As a duplicate of 15
	38		….it was a safe option for me.	2.67	1.37	0.48	Significant cross loadings
	39		….it was something new and exciting.	3.81	1.38	-0.23	As a duplicate of 26
	40		….I would prefer to have a job where I don't need to interact with people a lot.	2.02	1.26	1.25	Significant cross loadings
12	41		….I feel it will lead to personal development.	4.26	1.27	-0.61	Significant cross loadings
	42		….I avoid highly competitive situations, and getting into this program was not very competitive.	1.92	1.16	1.31	As a duplicate of 16
	43		….it was interesting, even though it doesn't provide very secure career options.	2.75	1.57	0.60	Significant cross loadings
	44		….I am good at telling people what they want to hear, in order to get them to do what I want.	2.07	1.26	1.17	Significant cross loadings
	45		….the call of duty means a lot to me.	2.81	1.46	0.33	As a duplicate of 17
	46	17	….I am interested in understanding other people's perspectives.	3.49	1.63	-0.08	
16	47		….of the influence of my friend(s).	1.75	1.15	1.53	No significant loadings
8	48	18	….I want to make world a better place.	3.69	1.61	-0.22	
	49		….because according to my extensive research of various opportunities, it was the best option.	3.56	1.54	-0.11	No significant loadings

Prior to the analyses, one item was removed due to a high skew. Parallel analysis on the remaining forty-eight items confirmed four-factor structure of the model. In several iterations of CEFA, the model was refined according to the criteria set out in the Section 3.2.2 (Factor Analytic Procedure). Thirty items were removed during the analyses: six items did not load significantly on any of four factors, sixteen items loaded significantly on more than one factor, eight items were removed as duplicates (see Table 3.1 for the details).

A final eighteen items four factor solution, was identified (KMO = .749, BS's $p < .001$). The four-factor model corresponded to the predicted theoretical model, explained 60% of variance and had good fit statistics (based on CEFA): χ^2=403.54, df= 87, RMSEA (CI) = .086 (.078; .094). The final model is presented in Table 3.2.

Table 3.2 Descriptive statistics and internal consistency of the final version of VIC-Degree scales. All items in bold load significantly on the corresponding factors ($p < .01$).

Final list of items	**Help** **α = .81**	**Loafing** **α = .73**	**Interest** **α = .83**	**Career** **α = .81**
02. I want to help other people.	**0.79**	-0.03	0.11	0.07
09. I want to serve society.	**0.73**	-0.03	0.05	0.09
12. I am interested in people.	**0.67**	0.07	0.18	0.01
18. I want to make the world a better place.	**0.61**	-0.05	0.14	-0.01
17. I am interested in understanding other people's perspectives.	**0.54**	0.13	0.20	-0.08
16. the degree seemed to be easy to pass.	0.04	**0.84**	-0.12	-0.07
14. I knew that I'd manage to pass the degree without doing too much work.	0.00	**0.79**	-0.12	0.04
06. it was the easiest option for me.	-0.06	**0.57**	-0.13	0.02
03. I'm not particularly concerned about other people.	-0.26	**0.34**	-0.06	-0.01
05. my individual goals are more important than the prosperity of society.	-0.09	**0.31**	0.03	0.19
13. it is a fascinating subject to study.	0.13	-0.14	**0.83**	0.03
11. for me it is very important to study a degree that I enjoy.	0.17	-0.02	**0.77**	-0.02
04. I wanted to know more about this subject.	0.10	-0.19	**0.73**	-0.01
01. I was always interested in this subject.	-0.02	-0.01	**0.6**	0.02
15. it provides me with secure career options.	0	-0.02	-0.03	**0.85**
10. it provides good career options.	0.07	-0.08	0.09	**0.81**
07. I want to get a well-paid job in the future.	0.02	0.06	-0.09	**0.7**
08. it is very competitive and I am an achiever.	0.12	0.19	0.09	**0.50**
M	3.64	2.04	4.81	4.07
SD	1.16	0.86	0.99	1.15

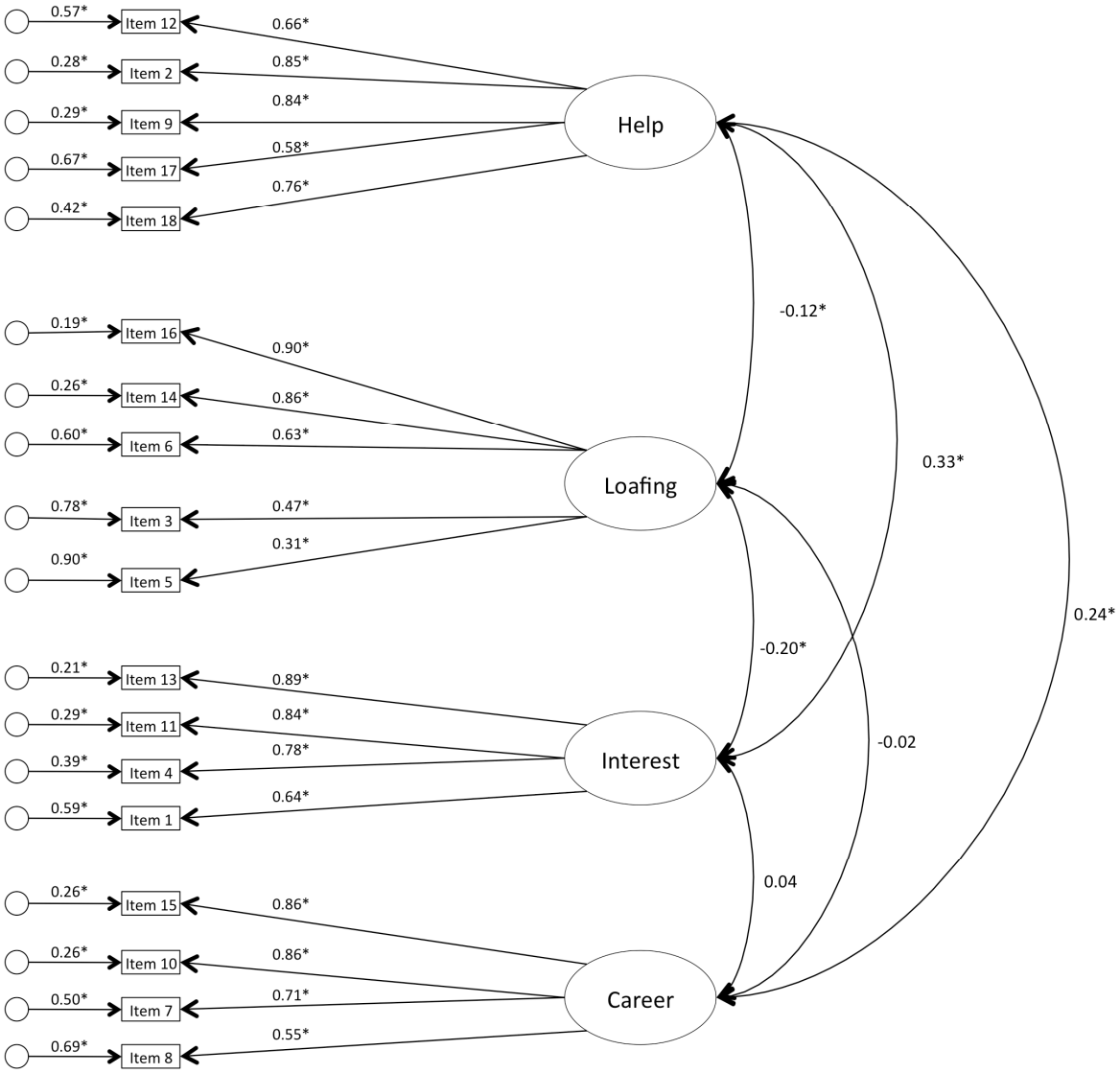
3.3.2 CFA

Due to the principals of motivational multidetermination (Pervin, 2001), I did not expect the dimensions of the motivational orientations to be orthogonal. Therefore, in the targeted model, the motivational factors were set free to correlate. I also tested an alternative model where the dimensions of motivational orientations were set as orthogonal. As exploratory analysis in Chapter 2, Study 1 suggested that a three-factor model, with a common factor of the interest and the helping orientations, might fit the data better; I have also specified a

three-factor alternative model. In addition, an alternative one-factor model, which would assume no individual differences in the motivational orientations for degree choice reasons, was tested.

The four-factor oblique model (see Figure 3.1), specified based on EFA, demonstrated good fit to the data (χ^2= 434.94, df = 129, p < .001, RMSEA (CI) = .069 (.062; .077), CFI = .95, IFI = .95, N = 495). In comparison to the oblique model, a four-factor orthogonal model, demonstrated poorer fit to the data (χ^2= 768.62, df = 135, RMSEA (CI) = 0.12 (.11 ; .12), NFI = .87, CFI = .89, IFI = .89, N = 495). In comparison to the four-factor oblique model, a three-factor oblique model, also demonstrated poorer fit to the data (χ^2= 898.15, df = 132, RMSEA (CI) = 0.11 (.10 ; .12), NFI = .85, CFI = .87, IFI = .87, N = 495). In comparison to the four-factor model, a one-factor model, demonstrated poorer fit to the data (χ^2= 3694.37, df = 170, RMSEA (CI) = 0.20 (.20 ; .21), NFI = .49, CFI = .50, IFI = .50, N = 495)

Figure 3.1 CFA model: VIC-Degree, undergraduate sample



Note. Item numbers refer to the items in Table 3.2

To insure that the factor structure did not vary in any of subsamples, I conducted additional CFAs separately with each subsample. CFAs demonstrated acceptable to good fit for the four-factor oblique model (Online 1, (χ^2= 448.18, df = 129, p < .001, RMSEA (CI) = .079 (.071; .087), CFI = .93, IFI = .93, N = 397); Online 2, (χ^2= 315.96, df = 129, p < .001, RMSEA (CI) = .073 (.063; .083), CFI = .94, IFI = .94, N = 272); P&P (χ^2= 271.08, df = 129, p < .001, RMSEA (CI) = .064 (.053; .074), CFI = .95, IFI = .95, N = 273)).

3.3.3 Correlations between Motivational Dimensions

The CFA model was specified as oblique, as it was not expected for motivational factors to be orthogonal. It has been identified that the helping orientation correlates positively with the career and the interest orientations, and negatively with the loafing. In addition, a negative correlation between the loafing and the interest was observed.

3.4 Discussion

By integrating the findings from behavioural economics and social psychology a theoretically driven four-factor model (interest, loafing, career and helping) of higher level motivational orientations for life-path choices was derived. This model was empirically tested in the context of degree choice in this chapter. Four empirically extracted factors meaningfully corresponded to the theoretical dimensions of higher level motivational orientations.

Furthermore, the degree choice orientations correlated between each other in a meaningful fashion. As such, both the helping and career orientations in the domain where repeated interactions can be assumed (such as degree choice), should result in other oriented choices. Therefore, in this domain such motivations correlated positively. The helping orientation also correlated negatively with loafing. This might be due to the fact that helping broadly corresponds to other-oriented motivation, while loafing to self-oriented motivation. I also observed a positive correlation between helping and interest. This is in line with theorizing in SDT literature (Deci & Ryan, 2002; Kasser & Ryan, 1996), which suggests that life goals to engage with community (conceptually similar to helping orientation) and of personal growth (conceptually similar to interest orientation) represent intrinsic motivation.

The dimensions of this model were interpreted below as domain-general motivators for life choices. Furthermore, theoretical implications of this framework to study choice motivation were outlined. As the degree choice features are similar to other major life choices, the four-factor model is expected to generalize to other life domains (e.g. relationships, work, health, leisure) and represent domain-general orientations as a part of the hierarchical structure of motivation (e.g. Elliot, 2006).

3.4.1 Vector of Individual Choice as a Model of Higher Level Motivation

The *helping* dimension stands for an endeavour to work with people and engage in activities, which benefit not only oneself, but also society in general. As well as a reason for choosing a degree to help others, this motivator could lead to the choices of similar career paths (e.g. non-profit organizations, health care); choices of extra-curricular "helping" activities in the spare time (e.g. volunteering, engaging in community activities, etc) instead of purely leisure activities, certain strategies in relationships (e.g. seeking opportunities to help family and friends whenever it is possible, engaging in "living for the other" type intimate relationships).

The *loafing* dimension represents a strategy to engage in activities, which provide the easiest route to one's goals even when at the cost to others. Apart from the choices of degrees, which allow obtaining higher education without much effort, this motivator could lead to choosing jobs with easy success or to free-riding on public benefits; relationships strategies which allow taking advantage of another person(s) in psychological or financial sense.

The *interest* dimension represents an orientation to choose alternatives with intrinsic rewards. This motivation should lead to career path or spare time activities where the process of activity has a potential to be enjoyable, as well as engaging in fulfilling on their own relationships. In broader respect, the interest orientation might represent an ability to enjoy the process of activity without a necessity to have or/and achieve any goal.

Finally, the *career* dimension represents an orientation to be successful as a member of a social group. It should lead to strategic choices, which provide success in society (e.g. beneficial for the future career extra-curricular rather than pure leisure activities in the spare time) or building relationships' strategy around one's career strategy. The career orientation could be interpreted as traditional construct of achievement motivation.

Future research needs to confirm whether or not the structure is the same in other choice domains, or additional factors to explain complexity human choices are required. This can be done by testing generalizability of interest, career, loafing and help motivators to other domains of real life choices (leisure activities, relationships, health behaviours, career choices)

as well as studying if individuals maintain a coherent strategy of choices in different life domains.

3.5 Limitations

While the domain of the choice of degree represents an important and common life choice, therefore, core dimensions that were devised based on the choice of degree should be representative of core domain-general higher level motivational orientations, it is possible that four dimensions of career, interest, loafing and helping do not exhaust all possible core dimensions of higher level motivational orientations. Future studies could extend the model of higher level motivational orientations to other domains (e.g. relationships, health, etc). For instance, it is possible that motivational orientations, indentified here, will also lead to the choice of different styles of close relationships. As such, free-riding might lead to relationships where one exploits their partner in financial or emotional sense, while pro-social orientation might lead to relationships, where interactions are based on mutual costly investments in each others' well-being or/and future (e.g. investing time resources in spending time with a partners family or/and friends).

3.6 Next Chapter

In this chapter, I have developed scales to measure four dimensions of higher level motivational orientations, namely career, helping, loafing and interest. The next chapter looks into the validity of these scales.

Chapter 4

4 Validity of the Model of Higher Level Motivational Orientations within the Context of Degree Choice

4.1 Overview

In Chapters 2-3 a psychometric tool to measure higher level motivational orientations in the context of the choice of degree, i.e. VIC-Degree, was developed (see a final version of the survey in the Appendix 3). The current chapter examined the convergent, construct and incremental validity of the VIC-Degree, utilizing the same sample of undergraduate students, as employed in Chapter 3.

4.1.1 Convergent validity

The convergent validity of the proposed model was assessed in relation to the Five Factor Model (Goldberg, Johnson, Eber, Hogan, Ashton, Cloninger & Gough, 2006) and emotional empathy (Davis, 1983). Predictions with regards to relationships between the VIC-degree scales and the Big Five and emotional empathy were as follows.

The helping orientation entails other-oriented and pro-social behaviours (Penner, Dovidio, Piliavin, & Schroeder, 2005), therefore, it should positively correlate with empathic concern. Altruism is a facet of agreeableness, thus helping orientation should be associated positively with agreeableness (Penner et al., 2005).

The loafing orientation implies a tendency to reach one's goals even at others' prosperity. In part, extraversion is orientation towards others (Ashton, Lee, & Paunonen, 2002). Therefore, low extraversion implies lack of consideration of others' welfare and should be related to loafing. Conscientiousness implies a thorough attitude towards one's work and was negatively associated with loafing (Mohammed & Angell, 2003). Further, lack of emotional empathy was linked to selfish and anti-social behaviours (R. J. R. Blair, 2005). Therefore, the loafing should be negatively related to empathic concern and conscientiousness.

Intrinsic motivation in job settings was positively related to conscientiousness and openness (Furnham, Petrides, Jackson, & Cotter, 2002). Thus, the interest was expected to be positively associated with conscientiousness and openness.

Conscientiousness was positively associated with career success (Judge, Jackson, Shaw, Scott, & Rich, 2007). Therefore, career orientation should be positively linked to conscientiousness.

4.1.2 Incremental validity

To justify the use of the new model of motivational differences and corresponding questionnaire to study degree choice motivation, I compared its predictive power to the previously developed psychometric measure of general life goals. Specifically, I used the Aspirations Index (Kasser & Ryan, 1996), developed within the SDT (Deci & Ryan, 2002), to measure general life goals. I examined if motivational orientations of career, helping, loafing and interest, measured by the VIC-Degree, predicted the actual choice of degree above general life goals, measured by the Aspirations Index.

It has been also shown that life goals are highly correlated with each other (Kasser & Ryan, 1996), suggesting that there may might be less underlying dimensions of general life goals, than suggested by STD. If a more parsimonious model with four factors that predict better actual real life choices, then it will be beneficial both theoretically and empirically.

4.1.3 Construct validity

To investigate the construct validity of the degree choice motivators, their predictions in terms of actual degree choices have been tested. Overview of the prediction with regards to the degree type is summarised in the Table 4.1.

Table 4.1 Motivational orientations predicting different types of degrees (+)/(-) refers to the positive/negative links between the variables

Motivational orientations	**Degree type**
Helping (+), Career (+)	Medical sciences
Interest (+), Career (-), Loafing (+)	Arts & Humanities
Career (+), Interest (-), Helping (-), Loafing (-)	Engineering
Interest (+), Career (+), Helping (-), Loafing (-)	Sciences
Helping (+), Career (-)	Social Sciences

Both medical and social sciences are conceptualized as being social type vocations (Holland, 1985) with those who pursue them, reporting higher social vocational interests (Crossley & Mubarik, 2002; de Fruyt & Mervielde, 1996). Helping implies being oriented towards others and preference for working with people. Therefore, I expected that choices of both medical and social sciences degrees to be positively predicted by helping. Science and engineering degrees, contrary to that, reported lower social vocational interests (de Fruyt & Mervielde, 1996). Therefore, I expected that the choice of both science and engineering degrees negatively predicted by orientation towards helping.

Loafing orientation implies taking an easy route. Therefore, in the degree choice domain, pursuing an easy degree that does not require much effort and entails exploiting communal resources. My predictions with regards to loafing were purely speculative. The arts & humanities (e.g. modern languages) degrees are often seen as relatively easy options which might not require as much thorough effort (as compared to sciences or engineering degrees). Therefore, I expected that the choice of arts & humanities was positively predicted by loafing, while science and engineering degrees was negatively predicted by loafing.

It has been shown that the arts & humanities students reported artistic vocational interests (which is conceptually similar to intrinsic motivation, de Fruyt & Mervielde, 1996). In addition,

science students reported that intrinsic rewards were important in their choice of degree (Deemer et al., in press). On contrary, engineering students reported low artistic vocational interests (de Fruyt & Mervielde, 1996). I, therefore, expected that interest positively predicts the choice of arts & humanities and sciences, and to be negatively associated with the choice of engineering.

Finally, often a reason to choose medical or engineering degree is to be successful (Inkson, 1971; Tracey, 2002). Therefore, I expected that career orientation positively predicts the choice of medical and engineering degree.

4.2 Method

4.2.1 Participants and Procedures

The same sample (N = 989) as in Chapter 2 was utilized here.

Some participants did not fill in all of the questionnaires (they were free to withdraw at any point). Additional analyses showed that participants who did not finish all the questionnaires were not different in characteristics from the rest of participants on the available data. Therefore, they were included in all relevant analyses.

4.2.2 Outcome Measure: Degree Choice

The opportunity sample, used to test the predictions in this chapter, was not collected to be representative of the real distribution of degree types in the universities. The percentage of participants involved in each degree type was as follows. 3.3% of the overall sample reported studying medical sciences, 29.1% social sciences, 44.7% sciences, 11.1% arts & humanities and 11.8% engineering. Based on Higher Education Statistic Agency (HESA), in 2009/10 15% of students at British universities studied medical science, 31% social sciences, 17% science, 25% arts & humanities, 6% engineering. Therefore, current sample was representative of general population in terms of social sciences. However it is important to bear in mind that it under-represents students of medical and arts & humanities degrees and over-represents science and engineering students.

4.2.3 Trait Measures

Life goals were measured using the *Aspirations Index* (see Appendix 7, Kasser & Ryan, 1996). The stem was "How important is this to you?" and response options ranged from *not at all* (1) to *very* (7). It included six scales (relationships, community, personal growth, wealth, fame, image) with each scale represented by five items.

Goldberg's 35 bi-polar markers (see Appendix 5, Goldberg et al., 2006) were used to measure the Big Five. Respondents rated adjectives on a 9-point Likert-type scale from *very inaccurate* (scored 1) to *very accurate* (scored 9).

Empathic Concern subscale from The Interpersonal Reactivity Index (see Appendix 6Davis, 1983) was used to measure individual differences in emotional empathy.

4.3 Results

4.3.1 Descriptive Statistics

Descriptive statistics and reliabilities for all scales are reported in Table 4.2.

Table 4.2 Means (M), standard deviations (SD) and ɑronbach's alfa (α) for psychometric scales, undergraduate sample

	N	M	SD	α
VIC-Degree				
Helping	942	3.63	1.19	.82
Loafing	942	2.08	0.85	.72
Career	942	4.03	1.14	.82
Interest	942	4.82	0.99	.84
Big Five				
Extraversion	815	6.12	1.27	.82
Emotional Stability	815	5.62	1.31	.80
Agreeableness	815	6.86	1.09	.78
Conscientiousness	815	6.44	1.26	.81
Openness	815	6.94	0.99	.74
Empathy				
Empathic Concern	807	3.78	0.67	.78
Life Goals				
Wealth	844	4.39	1.39	.90
Fame	844	3.42	1.29	.85
Image	844	3.49	1.38	.86
Personal Growth	844	5.85	0.85	.74
Community	844	5.12	1.23	.90
Relationships	844	6.23	0.98	.88

4.3.2 Zero-order correlations

The zero-order correlations between the Big Five, Empathic Concern, Life Goals and VIC-Degree are presented in Table 4.3. Correlations of VIC-Degree with the rest of the scales were in line with the predicted.

Table 4.3. Zero-order Pearson's correlations for psychometric scales, undergraduate sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Helping (1)	1.00														
Loafing (2)	-0.07*	1.00													
Career (3)	0.12***	0.11**	1.00												
Interest (4)	0.26***	-0.13***	0.05	1.00											
Extraversion (5)	0.10**	-0.10**	0.08*	0.06	1.00										
Emotional Stability (6)	0.04	0.02	0.11**	0.03	0.31***	1.00									
Agreeableness (7)	0.20***	-0.22***	0.13***	0.10**	0.24***	0.30***	1.00								
Conscientiousness (8)	0.18***	-0.21***	0.16***	0.21***	0.16***	0.17***	0.39***	1.00							
Openness (9)	0.15***	-0.06	0.12***	0.20***	0.32***	0.15***	0.33***	0.32***	1.00						
Empathic Concern (10)	0.33***	-0.35***	-0.05	0.17***	0.07	-0.08*	0.46***	0.23***	0.22***	1.00					
Wealth (11)	-0.09*	0.20***	0.48***	-0.11**	0.08	0.00	0.00	0.04	0.09*	-0.19***	1.00				
Fame (12)	0.15***	0.29***	0.19***	-0.02	0.12***	0.01	-0.06	-0.09*	0.13***	-0.17***	0.42***	1.00			
Image (13)	0.09*	0.22***	0.24***	-0.09*	0.11**	-0.05	0.05	-0.01	0.08*	-0.05	0.58***	0.51***	1.00		
Personal Growth (14)	0.30***	-0.21***	0.15***	0.32***	0.20***	-0.04	0.24***	0.24***	0.36***	0.35***	0.13***	0.08*	0.09*	1.00	
Community (15)	0.63***	-0.26***	-0.01	0.22***	0.14***	0.01	0.34***	0.23***	0.20***	0.54***	-0.11**	0.09*	0.09*	0.51***	1.00
Relationships (16)	0.14***	-0.24***	0.11**	0.17***	0.15***	-0.05	0.31***	0.19***	0.24***	0.39***	0.11**	-0.03	0.15***	0.56***	0.36***

Note. ***$p < .001$, **$p < .01$, * $p < .0$

Specifically, the helping orientation positively correlated with empathic concern and agreeableness. In addition, helping was found to positively correlate with career, interest, extraversion, conscientiousness, openness, fame, image, personal growth, community and relationships and negatively with loafing and wealth.

The loafing, as predicted, was negatively correlated with extraversion, conscientiousness and empathic concern. In addition, the loafing was negatively related to helping, interest, agreeableness, personal growth, community and relationships. The loafing was positively related to career, wealth, fame, and image.

As predicted, the interest was positively related to conscientiousness and openness. In addition, it was positively related to helping, agreeableness, empathic concern, personal growth, community, relationships. The interest was negatively related to loafing, wealth, and image.

As predicted, the career orientation was positively linked to conscientiousness. In addition, it was found to be positively linked to helping, loafing, extraversion, emotional stability, agreeableness, openness, wealth, fame, image, personal growth and relationships.

There were no predictions made with regards to relationships between the Big Five, empathic concern, and the Life Goals, as it was out of scope of the aims of this thesis. Overall, correlations, summarized in Table 4.3, demonstrated that all variables correlated highly between each other in a meaningful way. As such, empathic concern correlated positively with agreeableness (.46) and life goal relationships (.33). Significant associations between the scales do not contradict those, which are generally reported in the literature. A large number of significant correlations might be due to the sample size. Accounting for high level of inter-variable correlations, in order to test convergent validity of the scales, I utilized hierarchical linear regression.

4.3.3 Convergent Validity

Convergent validity was tested on the overall sample with the age and gender controlled, as there were differences in the age and gender between subsamples (see Section 3.2.1). The results of regressions are reported in the Table 4.4. Gender was a significant associate of interest, loafing and career, with male students reporting higher loafing and career than females, and females reporting higher interest orientation. Age was negatively associated with both career and loafing: the older participants were the least likely they were to report loafing or career as a motivation for the degree choice. Although all first steps in the models explained significant proportion of variance, entering personality variables demonstrated significant increase in the explained variance, ranging from 5.1 to 11.8%.

Table 4.4 Hierarchical linear regression models predicting degree choice motivators (standardized βs, significance levels and R^2s), undergraduate sample

		Helping	Loafing	Interest	Career
1 Step	Gender	.06	-.09**	.12**	-.13***
	Age	.06	-.10**	.03	-.09*
	R^2-change	**.027*** **	**.059*** **	**.026*** **	**.025*** **
2 Step	Extraversion	.04	-.09*	-.02	.02
	Agreeableness	-.01	-.03	-.06	.12**
	Conscientiousness	.08*	-.14***	.15***	.14***
	Emotional Stability	.05	.02	.04	-.01
	Openness	.05	.09*	.15***	.05
	Emotional Empathy	.29***	-.29***	.09*	-.11**
	R^2-change	**.109*** **	**.118*** **	**.066*** **	**.051*** **
	R^2 overall	**.128*** **	**.177*** **	**.091*** **	**.076*** **

Note. ***p < .001

In line with the predictions, helping was positively associated with empathic concern, as well as conscientiousness. Loafing was negatively associated with extraversion, conscientiousness and empathic concern, but positively with openness. Interest was positively associated with conscientiousness, openness and empathic concern. Finally, career was positively associated with conscientiousness and agreeableness, and negatively with empathic concern.

4.3.4 Incremental validity

To test if the VIC scales provided incremental validity in predictions of chosen degrees above the general life goals, a series of binary logistic regressions were conducted. In each regression an outcome variable was a degree choice (e.g., the choice of medical sciences against all others), and the predictors were entered in three steps: age and gender (Step 1); Life Goals (Step 2); VIC-Degree scales (Step 3).

Table 4.5. Logistic regression models predicting degree types (fit statistic), undergraduate sample

Degree Type (outcome)		Step's χ^2	Nagelkerke R^2
Medical Degrees	Step 1	1.31	.006
	Step 2	31.27***	.140
	Step 3	53.24***	.358
	Overall Model	85.83***	.504
Arts & Humanities	Step 1	9.18**	.022
	Step 2	19.86**	.067
	Step 3	65.68***	.211
	Overall Model	94.71***	.300
Social Sciences	Step 1	.399	.001
	Step 2	10.06	.018
	Step 3	32.09***	.070
	Overall Model	42.56***	.089
Sciences	Step 1	19.96***	.031
	Step 2	7.40	.043
	Step 3	22.56***	.077
	Overall Model	49.92***	.151
Engineering	Step 1	86.03***	.190
	Step 2	17.33	.226
	Step 3	51.14***	.328
	Overall Model	154.50***	.744

Note. ***$p < .001$, **$p < .01$

Table 4.5 demonstrates the fit statistics of each step and the overall statistic for the models for each of the degree type separately. Age and gender significantly predicted all degree types apart from social and medical sciences. Life Goals added significantly in the case of medical sciences and the arts & humanities. After VIC-Degree scales were entered, the increase in R^2

was significant in the models for each degree type, with the proportion of explained variance ranging from 7% to 35.8%. This demonstrated, as predicted, that degree choice motivations had incremental validity over general life goals.

4.3.5 Construct Validity

Overall, the validity of the degree choice motivation scales mainly conformed to the construct relationships with the degree outcomes, therefore, demonstrated good predictive validity.

Table 4.6 Wald statistic and odds ratios for logistic regression, undergraduate sample. Only significant predictors are reported in the table.

Degree type (outcome)	Variable	Wald statistic	Odds ratio
Medical Sciences	Helping	22.01***	5.30
	Career	10.61**	2.44
Arts &Humanities	Interest	9.54**	1.60
	Loafing	27.44***	2.20
	Career (-)	31.96***	2.00
Sciences	Career	8.21**	1.24
	Helping (-)	10.94**	1.32
	Interest	5.00*	1.20
Engineering	Interest (-)	12.01**	1.55
	Career	25.71***	2.14
	Helping (-)	10.91**	1.60
Social Science	Helping	17.70***	1.49
	Interest (-)	4.93*	1.21
	Career (-)	17.39***	1.41

***$p < .001$, **$p < .01$, *$p < .05$

In terms of specific degree types (see Table 4.6 for wald statistic and odds ratios), the choice of medical degree was positively associated with helping and career. The choice of science degree was positively associated with interest, career and negatively with helping. Engineering degree was associated positively with career, and negatively with helping, interest. The choice of the arts & humanities was associated positively with interest, loafing

and negatively with career. The choice of social science degrees was positively associated with helping and negatively with career and interest.

4.4 Discussion

The VIC-Degree model demonstrated good validity properties in terms of meaningful links with established personality constructs (Big Five, emotional empathy) and incremental validity over general life goals.

Furthermore, the scales predicted well actual degree choices. While career, helping, loafing and interest have been here measured as motivation for degree choice, based on the theoretical framework, developed in Chapter 1, these motivations should be reflective of broader life orientations. Therefore, it is possible that, for instance, helping motivation measured as a degree choice reason is indicative of a broader individual motivational orientation, i.e. pro-sociality. This led to the choice of a degree (e.g. medicine or social science) that allowed realising pro-social behaviours as a part of their job. This is in line with a concept of person-environment fit, developed in the organizational psychology and vocational choice literature (Feldman, Smart, & Ethington, 1999; Holland, 1985; Porter & Umbach, 2006; Rounds, Dawis, & Lofquist, 1987). Person-environment fit implies that individuals make career choices, which make it possible to find the best match of their individual traits and abilities to the environment and opportunities along the career path.

Due to the correlational design of this study, I cannot draw any conclusions about causal relationships between motivational orientations and chosen degrees. However, it is possible that certain motivational orientations led to the choices of certain vocations (i.e. combination of high pro-sociality and strategic achievement motivation led to the choice of medicine). Further I interpret the choices of specific degree types.

4.4.1 Motivational Orientations and the Choice of Degree

The choice of medical degree was predicted by the combination of career and helping orientation. This suggests that high pro-sociality and strategic achievement motivation led to

the choice of medicine. Perhaps pro-sociality and striving for achievement are necessary to pursue medicine as a career.

Those who reported studying social sciences (includes sociology, politics, economics), also reported high pro-social motivation as well as low career orientation. Like medicine, social sciences focus on studying human behaviour; therefore, it is natural to suggest that interest towards people would lead to the choice to study regularities of human behaviour (i.e. social sciences). While high career orientation leads to the choice of medical degree, the choice of social science degree was predicted by low career orientation. This might be due to the fact that obtaining degree in the social sciences does not provide clear vocational career path options. For instance, while studying towards a degree in politics or economics, one does not acquire skills to work in a specific vocation, as opposed to, for instance, accountancy. Therefore, it is not surprising that those who have chosen social sciences degree types reported career perspectives as not important in terms of their degree choice. Interestingly, a degree in the social sciences was associated with low interest orientation.

In line with predictions, those who have chosen the arts & humanities reported high intrinsic, low strategic achievement motivation and high free-riding/loafing motivation as a reason for degree choice. This perhaps suggests that to choose the arts & humanities as a career, one needs not to value career perspectives as such. However, these individuals seem to value the enjoyment from the process of studying/future professional activity. In other words, it should be important for them to enjoy what they are doing as a job. They should be also able to tolerate the fact that their profession might entail free-riding on societal benefits. In respect to the arts & humanities, this seems inevitable, as while taking time and resources to create works of art or to study humanities, one might not provide any immediate benefit to the society.

In comparison to the arts & humanities, engineering degrees provide very clear and stable career paths. In addition, studying engineering focuses around learning already existing technological knowledge, which often does not imply much scope for creativity (as compared

to, for instance, the arts) or working with people (as compared to, for instance, medical professions). It is therefore logical that high in strategic achievement motivation, as well as low in intrinsic and pro-social motivation choose engineering.

Finally, science as a degree choice was associated with high strategic achievement and intrinsic motivation, as well as low pro-sociality. This corresponds well with the notion that scientific career paths are highly competitive and often do not provide much opportunity for immediate pro-social outputs (as compared, for instance, to medicine). The results here also suggest that enjoyment from the process of activity seems to be important for those who are choosing science as a profession.

4.4.2 Theoretical Implication to Studying Choice Motivation

Findings in this chapter demonstrated that the same degree could be chosen based on a combination of motivations conforming to the principal of multidetermination (Pervin, 2001). For instance, high career and helping aspirations led to a choice of medicine. This challenges a routine assumption of generic vocational choice models (e.g. Holland, 1985) where an outcome (i.e., a chosen degree) is employed as an indicator of a predominate motivation for that choice.

Furthermore, the results also conformed to the assumption of equipotentiality (Pervin, 2001). I demonstrated that the same motivation could lead to the choice of different degrees (e.g., helping predicted both choice of social science and medical degrees; intrinsic interest predicted both arts & humanities and science degrees). This evidence, consistent with other findings (e.g. Ferguson et al., 2008), suggested that ignoring motivational multidetermination and equifinality of any choice outcome is over-simplistic as it results in mis-specified models.

4.5 Limitations

One limitation of this study might have biased the conclusions with regards to the links between degree types and motivations to choose them. Specifically, some degree types were under-represented. For example, only 38 participants out of 989 reported studying medicine

(compared to, for instance, 112 reported studying engineering). This was due to data collection being contingent on the opportunities to distribute the experimental surveys. As such, it was easier to get a hold of engineering undergraduate programme mailing lists to distribute the survey, as compared to the medicine programs mailing list. Future research could examine how degree choice motivations predict the streaming of individuals into different degree types on the samples, which would provide equal representation of each degree type.

Furthermore, even though the degrees were classified into different types (e.g. medical or social sciences) based on the classification scheme routinely employed at the UK universities, some degree types appeared to be more heterogeneous in terms of subject areas than others. As such, while engineering degrees included different types of engineering, the arts & humanities included a range of degrees, from English literature to music. This heterogeneity in subject area might imply that motivations to pursue specific subjects within the degree type category could vary more for some degree types, such as the arts & humanities. Further research could investigate which motivational orientations predict the choice of specific degrees (e.g. English literature or music?).

Another potential bias of this study was that the students here reported their reasons for the choice of degree retrospectively. It is possible that actual reasons for the degree choice differed at the time when this choice was made, as compared to the self-reported retrospective reasons. To insure that the structure of the identified model for the degree choice motivations was not biased by the way it was measured (i.e. as retrospective degree choice reasons), Chapter 5 examined prospective reasons for the choice of degree in a large sample of potential students who attended university Open Days.

4.6 Next Chapter

Chapter 4 examined the validity of the new psychometric tool to measure individual differences in motivation for the choice of degree. The next chapter tests if the same dimensions of higher level motivational orientations were present when the degree choice

reasons were reported prospectively by students who planned to apply to the university. It also investigated if similar links of the motivational orientations of career, helping, interest and loafing to establish personality constructs (the Big Five and Empathic Concern) emerged from the data, as well as if the links of degree choice motivations to prospective choices of degree replicated the ones demonstrated at the sample of the current students.

Chapter 5

5 Retrospective versus Prospective Reasons for the Choice of Degree

5.1 Overview

VIC-Degree was developed on a sample of undergraduate students (see Chapter 2-3), to measure higher level motivational orientations in the degree choice domain. In that study, participants reported their reasons for the choice of degree retrospectively. This could have been biased by a number of reasons (the offer of the place they have received, their perception of degree might have changed over the time, etc).

To insure that this model was not affected by these biases, a second study was conducted on a sample of potential students who reported their prospective reasons for the choice of degree. If degree choice motivations, which were theoretically derived and empirically tested in previous chapters, are generic, the model structure of developed based on undergraduate sample should be replicated in a sample of potential students who plan to apply to study at university. It was further tested if the validity of the VIC-degree could be replicated in a sample of prospective students. The same predictions were made with regards to the links of helping, loafing, career and interest with the Big Five and Empathic Concern; as well as with regards to predictions of the planned choice of degree, which was discussed in Chapter 4.

5.2 Method

5.2.1 Participants and Procedure

Data collection was conducted using an online version of questionnaires. After attending the Open Days at a British university, potential students received a link from Open Days organizers, with the request to fill in the survey. A representative sample of 896 participants was recruited (mean age 17.36 years, ranging from 16 to 47, 28.1 % were male). The only difference between the VIC-Degree questionnaire used in this study from the one used in

Chapter 2 and 3 was that in the VIC-Degree administrated for potential students instead of the stem "I have chosen this degree because....", the stem was "I am choosing this degree because……." followed by a reason ("I was always interested in this subject"). As an incentive for taking part in the survey, participants entered a prize draw with the prize being £75 in Amazon vouchers. The Big Five and empathy were assessed using the same scales as in Chapter 3.

Some participants (see Table 5.1 for the exact numbers) did not fill in all of the questionnaires (they were free to withdraw at any point). Additional analyses showed that participants who did not finish all the questionnaires did not differ in variables measured from the rest of participants on the available data. Therefore, they were included in all relevant analyses.

The sample for the analyses in this chapter was an opportunity sample. It was not aiming to correspond to the current distribution of degrees types in universities. The percentage of participants involved in each degree type was as follows. 16.2% of the overall sample reported planning to apply for a medical degree, 25.8% social sciences, 24.9% sciences, 21.9% arts & humanities and 3.1% engineering. The sample was representative of a general population of applicants to UK universities, as, according to Universities & Colleges Admissions Service (UCAS) in 2010, 15% of all applicants to UK universities applied to study medical sciences degrees, 34% social sciences, 18% sciences, 18% arts & humanities, and 5% engineering.

5.2 Results

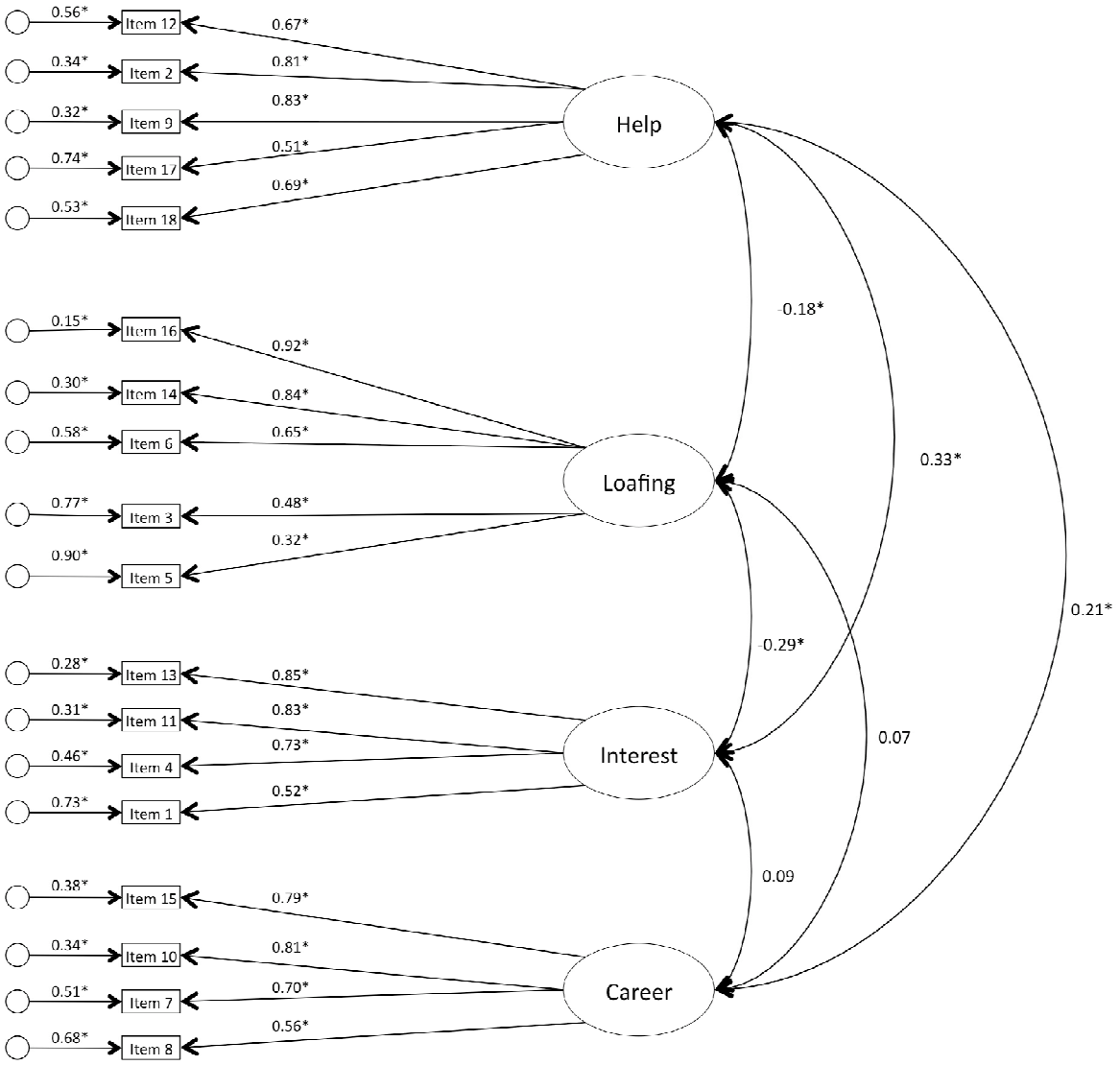
5.2.1 CFA

The four-factor oblique model, specified as in Chapter 3, demonstrated good fit to these data (χ^2= 759.71, df = 129, RMSEA (CI) = .074 (.069; .079), CFI = .94, IFI = .94, N = 896). All items loaded significantly on their target factors. All items in the potential students' sample loaded on the same factors as in the undergraduate sample (see Figure 3.1). Item-factor loadings of the potential students' sample were very close to those demonstrated with the CFA on undergraduate sample (see Figure 3.1), with the Person's zero-order correlation coefficient

between factor loadings from two CFAs (undergraduates and potential students) being .97 ($p < .001$).

In comparison to the oblique model, a four-factor orthogonal model, demonstrated poorer fit to the data (χ^2= 903.65, df = 135, RMSEA (CI) = 0.80 (.76 ; .97), NFI = .91, CFI = .92, IFI = .92, N = 896). In comparison to a four-factor oblique model, a three-factor oblique model also demonstrated poorer fit to the data (χ^2= 1785.88, df = 132, RMSEA (CI) = 0.12 (.11 ; .12), NFI = .82, CFI = .83, IFI = .83, N = 896). In comparison to a four-factor model, a one-factor model demonstrated poorer fit to these data (χ^2= 6364.22, df = 135, RMSEA (CI) = 0.18 (.17 ; .18), NFI = .61, CFI = .62, IFI = .62, N = 896).

Figure 5.1 CFA model: VIC-Degree, potential students' sample



Note. Item numbers refer to the items in Table 3

5.2.2 Correlations between Motivational Dimensions

Similar as in Chapter 3, the CFA model here was specified as oblique, as it was not expected for motivational factors to be orthogonal. As with the undergraduate sample, helping orientation correlated positively with career and interest, and negatively with loafing. In addition, a negative correlation between loafing and interest was observed. All correlations were very close in the magnitude and of the same direction, as in the undergraduate sample.

5.2.3 Descriptive Statistics: Scales

Descriptive statistics and reliabilities for all scales are reported in the Table 5.1.

Table 5.1 Means (M), standard deviations (SD) and cronbach's alfa (α) for questionnaires, potential students' sample

	N	M	SD	α
VIC-Degree				
Helping	896	3.79	1.15	.80
Loafing	896	1.80	.68	.66
Career	949	4.22	1.05	.77
Interest	949	5.46	.65	.75
Big Five				
Extraversion	817	6.20	1.33	.83
Emotional Stability	815	5.67	1.29	.80
Agreeableness	815	6.98	1.05	.77
Conscientiousness	815	6.71	1.14	.78
Openness	815	7.05	0.94	.72
Empathy				
Empathic Concern	807	3.86	0.65	.77
Life Goals				
Wealth	803	4.21	1.42	.91
Fame	803	3.19	1.29	.86
Image	803	3.40	1.38	.88
Personal Growth	803	5.98	0.79	.72
Community	803	5.21	1.19	.87
Relationships	803	6.25	0.97	.91

5.2.4 Zero-order Correlations

Table 5.2. Zero-order Pearson's correlations for psychometric scales, potential students' sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Helping (1)	1.00														
Loafing (2)	-0.16***	1.00													
Career (3)	0.13***	0.17***	1.00												
Interest (4)	0.26***	-0.12***	0.09*	1.00											
Extraversion (5)	0.16***	-0.14***	0.14***	0.12**	1.00										
Emotional Stability (6)	0.06	-0.12***	0.09*	0.11**	0.28***	1.00									
Agreeableness (7)	0.27***	-0.30***	0.04	0.21***	0.24***	0.36***	1.00								
Conscientiousness (8)	0.13***	-0.21***	0.10**	0.22***	0.20***	0.22***	0.46***	1.00							
Openness (9)	0.18***	-0.09*	0.10**	0.23***	0.33***	0.12**	0.24***	0.25***	1.00						
Empathic Concern (10)	0.36***	-0.31***	-0.04	0.16***	0.08*	-0.03	0.47***	0.17***	0.21***	1.00					
Wealth (11)	-0.22***	0.29***	0.47***	-0.11**	0.04	-0.06	-0.15***	-0.05	0.00	-0.26***	1.00				
Fame (12)	0.03	0.21***	0.21***	-0.06	0.14***	-0.08*	-0.05	-0.06	0.18***	-0.09*	0.48***	1.00			
Image (13)	0.03	0.18***	0.26***	-0.05	0.16***	-0.11**	-0.03	-0.08*	0.02	-0.03	0.57***	0.57***	1.00		
Personal Growth (14)	0.25***	-0.14***	0.15***	0.33***	0.19***	0.09*	0.30***	0.22***	0.34***	0.29***	0.14***	0.20***	0.17***	1.00	
Community (15)	0.59***	-0.29***	0.00	0.23***	0.15***	0.08*	0.40***	0.20***	0.20***	0.56***	-0.18***	0.10**	0.12**	0.49***	1.00
Relationships (16)	0.13***	-0.12**	0.08*	0.13***	0.18***	0.00	0.33***	0.13***	0.16***	0.33***	0.14***	0.13***	0.26***	0.50***	0.35***

Note. ***$p < .001$, **$p < .01$, * $p < .05$

The zero-order correlations between the Big Five, Empathic Concern, Life Goals and VIC-Degree are presented in Table 5.2. There were no predictions made with regards to relationships between the Big Five, Empathic Concern, and the Life Goals, as this was out of scope of the aims of this thesis. Overall correlations, summarized in the Table 5.2, demonstrated that all variables correlated highly between each other in a meaningful way. As such, empathic concern correlated positively with agreeableness (.47) and life goal relationships (.33). Significant associations between the scales do not contradict those which are generally reported in the literature. Correlations of VIC-Degree with the rest of the scales were in line with the predicted. Additional correlations of VIC-Degree scales with the Big Five, empathic concern, and the Life Goals, supported the predictions.

Specifically, the helping orientation positively correlated with empathic concern and agreeableness. In addition, helping was found to positively correlate with career, interest, extraversion, conscientiousness, openness, personal growth, community and relationships; and negatively with loafing and wealth.

The loafing, as predicted, was negatively correlated with extraversion, conscientiousness and empathic concern. In addition, loafing was negatively related to helping, interest, agreeableness, emotional stability, openness, personal growth, community and relationships. The loafing was positively related to career, wealth, fame, and image.

As predicted, the interest orientation was positively related to conscientiousness and openness. In addition, it was positively related to helping, extraversion, emotional stability, agreeableness, empathic concern, personal growth, community, relationships. Interest was negatively related to loafing, wealth, and image.

As predicted, the career orientation was positively linked to conscientiousness. In addition, it was found to be positively linked to helping, loafing, interest, extraversion, emotional stability, openness, wealth, fame, image, personal growth and relationships.

Correlations, summarized in the Table 5.2, demonstrated that all variables correlated highly between each other. Therefore, to test convergent validity of the scales, hierarchical linear regression was utilized.

5.2.5 Convergent Validity

To keep the results of the analysis comparable to the results in Chapter 4 (undergraduate students sample), convergent validity was tested with age and gender controlled. The results of regressions are reported in Table 5.3. Nor Gender neither age predicted significantly any of the motivational variables. Although first steps in the models explained significant proportion of variance (except for the career orientation), entering personality variables demonstrated significant increase in the explained variance, ranging from 3 to 14%.

The direction and significance of associations with the Big Five and empathy were generally in line with the predictions and replicated those of Chapter 3 (see Table 4.4), with the main difference for agreeableness and conscientiousness.

Table 5.3 Hierarchical linear regression models predicting degree choice motivators (standardized βs, significance levels and R^2s), potential students' sample.

		Helping	**Loafing**	**Interest**	**Career**
1 Step	Gender	.05	-.05	.04	-.04
	Age	.01	-.04	.06	-.01
	R^2-change	**.02*** **	**.02** **	**.01***	**.00**
2 Step	Extraversion	.09*	-.07	-.00	.10**
	Agreeableness	.08	-.12**	.05	-.02
	Conscientiousness	-.01	-.09*	.12**	.08*
	Emotional Stability	.02	-.06	.05	.04
	Openness	.07	.04	.18***	.06
	Empathic Concern	.29***	-.23***	.08	-.06
	R^2-change	.14***	.13***	.09***	.03***
	R^2 overall	**.16*** **	**.15*** **	**.10*** **	**.03*** **

In line with predictions, helping was positively associated with empathic concern; however, the association with agreeableness did not reach the level of significance. In this sample, helping was also positively associated with extraversion. Loafing, in line with predictions, was negatively associated with conscientiousness and empathic concern. In addition, it was negatively associated with agreeableness. In line with the predictions, interest was positively associated with conscientiousness and openness. Finally, in line with the predictions, career

was positively associated with conscientiousness. In addition, career orientation was positively associated with extraversion.

5.2.6 Construct Validity

Potential students reported the degrees they plan to study along with the reasons for them. In terms of specific degree types (see Table 5.4 for wald statistic and odds ratios), relationships between degree types and motivational orientations for potential students largely conform to the predicted (see Section 4.1.3).

Specifically, the choice of medical degree was positively associated with helping and career. In addition, in the potential students' sample, the choice of medical degree was associated with low interest orientation.

The choice of science degree was negatively associated with helping, and there were no expected relationships with interest and career.

Engineering degree was associated negatively with low interest. There were no associations of engineering with interest or career, which were predicted theoretically and were presented in the undergraduate sample. Furthermore, contrary to the predictions, the choice of engineering was positively associated with loafing.

The choice of arts & humanities, in line with the predictions and replicating the results on the undergraduate sample, was associated positively with interest, loafing and negatively with career. In addition, the choice of arts & humanities was negatively associated with helping.

In line with the predictions, the choice to study a social science degree was negatively associated interest. Contrary to the findings in the undergraduate sample, the choice of science degree was positively associated with career. The differences might be due to the fact that the proportion of different degrees, which were included into the "social sciences" category within undergraduate and potential students sample, might have differed. Social sciences included such degrees as politics and geography. For example, those who chose to study politics would be expected to be more career-oriented, then those who chose

geography. Different proportion of such degrees within a category might have changed associations of outcomes with motivators.

Table 5.4. Wald statistic and odds ratios for logistic regression; potential students' sample.

Degree type	Variable	Wald statistic	Odds ratio
Medical and Health Sciences	High Helping	42.55***	1.90
	Low Loafing	32.56***	3.27
	Low Interest	1.05*	1.10
Arts and Humanities	Low Helping	10.53**	1.28
	High Loafing	8.55**	1.46
	High Interest	32.94***	2.72
	Low Career	35.69***	1.62
Engineering	High Loafing	5.08*	1.68
	Low Interest	12.25***	2.13
Sciences	Low Helping	4.30*	1.16
Social Science	Low Interest	10.64**	1.48
	High Career	25.40***	1.52

***$p < .001$, **$p < .01$, *$p < .05$

5.3 Discussion

The study in this chapter in part tackled the limitations outlined in Section 4.5, Chapter 4. It further extended the findings in Chapter 5 findings on a sample of potential students. The results demonstrated that the model of motivational orientations along with the corresponding psychometric tool, VIC-Degree, was not limited to retrospective degree choice motivation, as it fit well when tested on the sample of potential students who reported their prospective degree choice reasons.

It has been demonstrated that a factor structure in both samples, whether participants reported their prospective or retrospective degree choice motivation, did not differ, with the correlation between item-factor loadings between two samples being highly significant (.97). Furthermore, very similar correlation coefficients between VIC-degree scales were observed in both samples. As such, in both samples career and helping orientation were positively associated with a similar in magnitude correlation coefficients: .21 in the potential students' sample and .24 in the undergraduate sample. Other similarities included a positive link between helping and interest motivation, .33 in both samples; a negative link between helping and loafing, -.18 for potential students, and -.12 for undergraduates; as well as a negative link between loafing and interest, -.29 for potential students and -.20 for undergraduates. These results suggest that four-dimensional model of motivational for

degree choice developed on the undergraduate students sample generalizes to prospective degree choice reasons.

5.4 Limitations

Similar limitations as for the study reported in Chapters 2-4 can be refer to in this chapter. The sample of potential students was an opportunity sample, as well as the sample of undergraduates in Chapters 2-4, and some degree types were under-represented. Future studies could investigate how motivational orientation of helping, career, loafing and interest relate to the choice of specific prospective degrees.

Furthermore, the design of this study was purely correlational and it does not permit any conclusions about causal relationships between variables. As such, based on this data, it cannot be proven if higher level motivational orientations predict actual degree choice. Such as, it is not clear whether a planned choice to study medicine results from the high career and helping orientations, or it is the high career and helping orientations are just a reflection of a decision to study medicine. Furthermore, it is questionable whether students who are high in career and helping will actually choose (or get enrolled into) a medical degree, as it depends on many other factors, both individual (abilities, grades, etc) and environmental (opportunities at specific universities, number of applicants for specific program, etc).

While decisive conclusions in this respect can be made only based on the longitudinal designs, the complementary and coherent cross-sectional findings, reported in Chapters 2-5, allow to tentatively suggest that there might be a causal relationship between higher level motivational orientations and large-scale choices, with the former predicting the latter. However, only future longitudinal designs can establish whether motivational orientations in the degree choice domain predict the actual choice of degrees.

5.5 Next Chapter

Chapters 2-3 explored higher level motivational orientations at the example of degree choice domain. A new psychometric tool, VIC-Degree, to measure dimensions of career, loafing,

helping and interest was developed on the sample of undergraduates. Chapter 4 demonstrated its validity in terms of meaningful relationships to the established personality measures (the Big Five and empathic concern), increased incremental validity in comparison to an existing measure of individual differences in a closely related domain of life goals (i.e. Aspirations Index, Kasser & Ryan, 1996), as well as meaningful predictions of actual choice of degree. This chapter, Chapter 5, demonstrated that career, loafing, helping and interest orientations represent dimensions of degree choice motivation for prospective students, as well as secured its validity on this sample. The next chapter investigates the links of motivational orientations to basic motivational traits.

Chapter 6

6 Dispositional Mechanisms of the Choice Motivation

6.1 Overview

In Chapters 2-5, I have theoretically derived and empirically tested a four-factor model of domain-general higher level motivational orientations at the example of the real life choice, a choice of degree. The model included the dimensions of interest, career, helping and loafing, which correspond to broader motivational constructs of intrinsic motivation, achievement motivation, pro-social motivation and free-riding. These higher level motivational orientations have been linked to dispositions or claimed to represent stable life-long strategies.

In this chapter I aimed to demonstrate that motivational orientations in the degree choice domain are linked to dispositional motivational traits. Predicting real life choices is one of the ultimate goals of modelling motivation. Basic reward and punishment contingencies are implicated both in real life outcomes and motivational constructs predicting real life outcomes. However, no studies as yet have looked if higher level motivational orientations are linked to basic motivational traits. Thus, dispositional properties and mechanisms of domain-general motivational orientations are still not clear. This information is essential when predicting real life behaviours and can further provide contribute to the understanding of neural and behavioural mechanisms of higher level motivational orientations.

Drawing on evidence from psychology and neuroeconomics, I review how basic reward/punishment contingencies can be involved in domain-general motivational orientations at the example of degree choice.

Theoretical accounts, such as the RST (Gray & McNaughton, 2000), conceptualize the level of biological motivation as dispositional behavioural approach (BAS) and inhibition systems (BIS) which evolved around basic neural mechanisms of reward, punishment and inhibition. There is much recent interest in the field of neuroeconomics with regards to linking reward, punishment and inhibitory mechanisms to behavioural strategies akin higher level

motivational orientations such as pro-sociality and free riding in lab-based experimental designs. The next step is to test if the same basic motivational mechanisms and related individual traits (reward/punishment sensitivities) are involved in predicting individual orientations in a range of domain-general motivational constructs.

Based on this review, I further derive hypotheses on the links between dispositional approach/avoidance motivational traits and domain-general motivational orientations. This might shed light on to how basic individual decision-making mechanisms evolved around processing of reward and punishment contingencies are aligned with domain-general higher level motivational orientations.

6.1.1 Pro-social Motivation

There is much recent evidence that real life pro-social behaviour is linked to reward processing. Ferguson, Farrell and Lawrence (2008) demonstrated the beliefs that in selfish gains (rather then societal benefits) predicted real-life pro-social behaviour (blood donation). Carpenter and Myers (in press) demonstrated that extrinsic rewards, such as an opportunity to have a "vanity" plate on one's car, career enhancing opportunities as well as monetary incentives have a direct effect on increase of responding to a call for fire fighting. Harbaugh, Mayr and Burghart (2007) showed in an fMRI experiment that both tax-like transfers to a charity and voluntary donations chosen as prosocial acts elicit neural response in areas linked to processing rewards (i.e. striatum and insula), with higher response rates for voluntary donations. Finally, SDT (Deci & Ryan, 2002) provides a body of research evidence that intrinsic rewards are important predictors of pro-social behaviour. Therefore, pro-social orientation should be linked to sensitivity to reward (BAS).

Furthermore, recent neuroscientific findings demonstrated that not only reward-related but also inhibitory control brain structures were recruited during pro-social acts. Specifically, Moll, Krueger, Zahn, Pardini, de Oliveira-Souza & Grafman (2006) demonstrated in an fMRI study that donation to real charitable organizations were linked to both neural systems of reward (i.e. striatum) and inhibition (i.e. dorsal anterior cingulate cortex and anterior

prefrontal cortex). Furthermore, they also reported that self-reported engagement in real-life volunteer activities was highly correlated with activation in dorsal anterior cingulate cortex (which has been linked to behavioural inhibition, see Smillie, 2008) during a costly donation (r = .87, p < .001). Thus, approach behaviour, mediated by inhibition, or seeking to achieve a higher long-term reward through cooperation, should be linked to pro-sociality. Therefore, high BAS moderated by high BIS should predict pro-social orientation.

6.1.2 Free-Riding Motivation

Free-riding as an individual preference identified in behavioural economics, represents selfishness, and therefore orientation towards selfish reward in behaviour. In the situation of experimental games free-riding is described as both behaviours when it is an optimal choice leading to self-benefit (e.g. as in a one-shot economic game) and/or when free riding is a choice to exploit other people's benefit (e.g. as in the game where reputation building is possible). The important difference is that in the first case there is no delayed reward possible, so there is no rational for cooperating, and therefore free-riding is an optimal choice. In the second case, however, a larger reward can be gained through withdrawing an immediate response of free riding, building reputation and cooperating. In real life individuals rarely have one-shot situations and mechanisms like reputation building are almost always involved. Therefore, free-riding as real life phenomena perhaps is more precisely described as a choice to exploit rather than a simple self-benefit choice. An fMRI study by McCabe, Houser, Ryan, Smith, and Trouard (2001) demonstrated that free-riding does not occur if a neural network, which provides binding of a joint attention to mutual gains with inhibition of immediate reward, is recruited: those who cooperate inhibit the dominant response of getting a quick smaller reward in order to gain a larger delayed reward by the means of cooperation. An example of real life free-riding is anti-social behaviour (e.g. criminal behaviour, illegal risky behaviours, psychopathologies) which is often linked with poor inhibitory control (Nigg et al., 2006). Therefore, I hypothesized that low BIS predicts free-riding.

6.1.3 Interest & Strategic Achievement Motivation

Both intrinsic interest and achievement choices represent reward approaching behaviour. In the case of intrinsic motivation, the reward is intrinsic; while with achievement-orientated motivation, activity is performed to gain extrinsic reward (e.g. money, high social status). Elliot and Thrash (2002) demonstrated that BAS was a positive predictor of both mastery goals (focusing on development of competence and task mastery, reflects that activity is motivated by intrinsic rewards) and performance-approach goals (attainting competence relevant to others, indicative of orientation towards achievement rewards) in the settings of class achievements. Therefore, BAS should predict both interest and strategic achievement choices.

6.1.4 Predictions

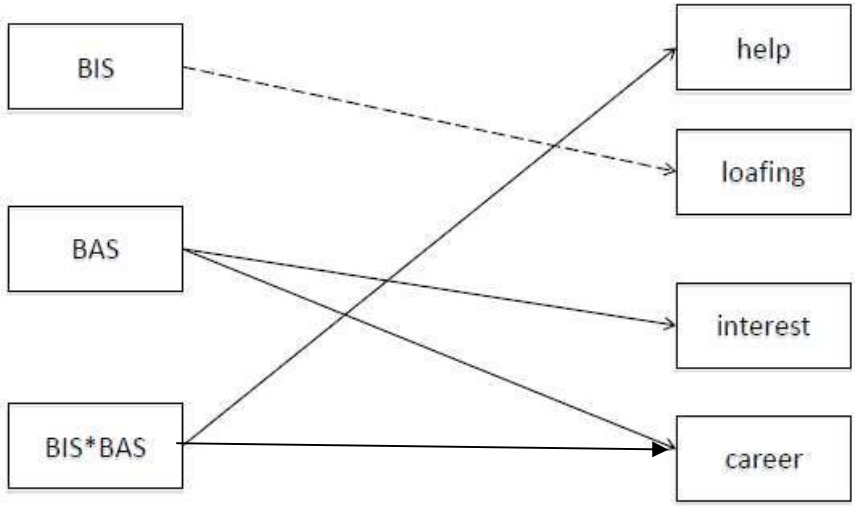
This study aimed to investigate if domain-general motivational orientations for the real life choice are linked to basic motivational traits, namely, sensitivities to reward and punishment.

In the previous studies (see Chapters 2-5), a psychometric tool (VIC-Degree) was developed comprising four scales of interest, career, helping and loafing. VIC-Degree measures motivational orientations in the degree choice domain. However, theoretical justification of the dimensions of motivational orientations (see Section 1.3) tentatively suggests that four motivations are not domain-specific, as there is some evidence that similar motivational constructs have been identified in other domains of human behaviour (e.g. relationships, health, sport, hobbies, etc). Establishing links between individual differences in approach/avoidance traits and domain-general higher level motivational orientations, which are translated into real life choice situation of degree choice, is advantageous as it secures external validity and generalizability of the findings.

This study looked at whether domain-general motivational orientations, namely, helping, loafing, interest and career, are linked to predisposed sensitivities to reward and punishment (see Figure 6.1 for a theoretical model). I hypothesized helping to be positively predicted by BAS moderated by BIS; loafing negatively by BIS; both interest and career to be positively

predicted by BAS. In addition, BAS moderated by BIS, was predicted to be linked to career orientation.

Figure 6.1 Theoretically predicted links between VIC-degree and BIS/BAS scales. Dotted line refers to a negative relationship.



6.2 Method

6.2.1 Participants and Procedures

The two samples that were used for this chapter were the same as in Chapters 3-5: a sample of undergraduate students (N = 989), and a sample of potential students who attended the university open days (N = 896). Some of participants in both samples did not fill in all the questionnaires, as they were free to withdraw at any point. Therefore, the sample sizes submitted for this analysis were N = 885 for an undergraduate sample, and N = 851 for a potential students sample. Additional analyses showed that participants who did not finish all the questionnaires were not different in measured characteristics from the rest of participants on the available data.

BIS/BAS: In addition to VIC-Degree, all participants also filled in BIS/BAS scale (see Appendix 4, C. S. Carver & T. L. White, 1994) as a part of the same survey (for the details, see Chapters 3-4). The Carver and White (1994) BIS/BAS questionnaire contains 24 items to be rated on a

four point scale assessing avoidance (BIS) and approach orientation (BAS). Based on the literature overview, I did not have specific predictions about BAS subscales (Reward Responsiveness, Fun Seeking and Drive). Therefore, I did not use subscale in the analyses in this chapter. Reliability and descriptive statistics (M – mean, SD – standard deviation) for the samples were the following: (1) undergraduates: BIS (α = .81, M = 2.93, SD = .60); BAS (α =.84, M = 2.96, SD = .47); (2) potential students BIS (α = .79, M = 2.04, SD = .56); BAS (α =.83, M = 2.03, SD = .46).

6.2.2 Statistical Analysis

To investigate relationships between motivational traits and higher level motivational orientations, I employed a path model analysis. The analysis was run in LISREL 8.7 with maximum likelihood estimation. The models were specified based on theoretical predictions (see Section 6.1.4). In addition, I also tested the paths that revealed significant relationships in exploratory correlational analysis. The following fit statistics were used to assess the models: the comparative fit (CFI), incremental fit (IFI) indexes, the root mean square error of approximation (RMSEA) and chi-square. A model with a RMSEA below .08 and CFI and IFI greater .95 indicates a good fit of the data (Hu & Bentler, 1999).

6.3 Results

6.3.1 Correlations

Pearson's zero-order correlation coefficients were used to explore the relationships between the motivational traits and orientations.

Table 6.1 Zero-order Pearson's correlations for the VIC-Degree and BIS/BAS for undergraduate and potential student's samples

	Sample	BIS	BAS
Helping	Undergraduate	.072*	.055
	Open Days	.058	.064
Loafing	Undergraduate	-.163**	-.028
	Open Days	-.065	.055
Interest	Undergraduate	.051	.116**
	Open Days	.027	.068*
Career	Undergraduate	-.031	.107**
	Open Days	-.041	.180**

Note. **p < .001, *p < .05

Similar pattern of correlations were observed in both samples, with correlations between basic motivational traits and motivational orientations being more pronounced in the undergraduate sample (see Table 6.1 for correlation coefficients and significance levels for both samples). Interest correlated with BAS in both samples. Career correlated with BAS in both samples.

BIS correlated negatively with loafing and positively with helping only in the undergraduate sample.

6.3.2 Hierarchical Regression Analyses

To investigate predicted relationships between BIS, BAS and BIS/BAS interaction and helping, I calculated the product of the respective mean-centred scale scores, and subjected them to hierarchical regression analyses. The scales were mean-centred prior to the analysis. At the first step the mean-centred BAS was entered, at the second step a moderator (BIS) was entered, and at the third step the interaction term was entered. The results are reported in the Table 6.2.

Table 6.2 Hierarchical linear regression models predicting degree choice motivators (standardized βs, significance levels and R^2s), undergraduate and potential students' sample

		Sample	Helping	Loafing	Interest	Career
1 Step	BAS	Undergraduate	.066	-.013	.118**	.139***
		Open days	.067	.072*	.082*	.217***
	R^2-change	Undergraduate	**.003**	**.001**	**.014****	**.011****
		Open days	**.004**	**.003**	**.005***	**.032*****
2 Step	BIS	Undergraduate	.074*	-.168***	.036	-.038
		Open days	.056	-.072*	.028	.053
	R^2-change	Undergraduate	**.004**	**.026*****	**.001**	**.002**
		Open days	**.002**	**.006***	**.000**	**.005***
3 Step	BIS*BAS	Undergraduate	.082*	-.042	.027	.094**
		Open days	.043	.022	.070	.107**
	R^2-change	Undergraduate	**.006***	**.002**	**.001**	**.008****
		Open days	**.002**	**.000**	**.004**	**.010****
	R^2 overall	Undergraduate	**.013****	**.028*****	**.015****	**.018*****
		Open days	**.005**	**.006**	**.006***	**.044*****

Note. *p < .05, **p < .01, ***p < .001

The analysis revealed, as hypothesized, that BAS positively predicted interest and career in both samples. There was also a positive effect of BAS on loafing, but only in the potential students' sample.

As predicted, BIS was negatively associated with loafing in both samples. In addition, BIS positively predicted helping, but only in the undergraduate sample.

The analysis demonstrated a significant moderation effect of BIS on BAS in predicting helping (as hypothesised), although only in the undergraduate sample. Moreover, BIS significantly moderates BAS in predicting career on both samples.

Overall, BIS/BAS explained significant proportion for all VIC-Degree scales in undergraduate sample, ranging from 1.3 to 2.8%, and only for career and interest in the open days sample, 1.8 and 1.5%, respectively.

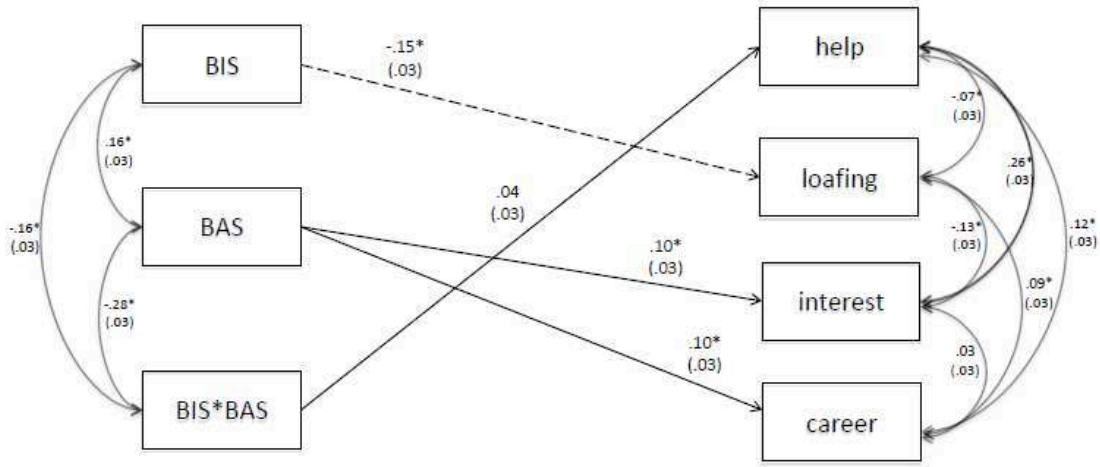
6.3.3 Path Model Analyses

The data was modelled in LISREL 8.7 using maximum likelihood estimation (Du Toit et al., 1999).

6.3.3.1 Undergraduates

A first path model was specified based on theoretical predictions (see Section 6.1.4). This model was a moderate fit to these data: χ^2 (8, N = 885) = 21.05, $p < .01$, RMSEA = .043 (0.21; 0.066), NFI = .93, CFI = .95. The path model (see Figure 6.2 for standardized coefficients and standard error terms), in line with predictions, showed that BAS predicted interest and career, BIS negatively predicted loafing. The effect of the interaction of BIS and BAS on helping did not reach the level of significance.

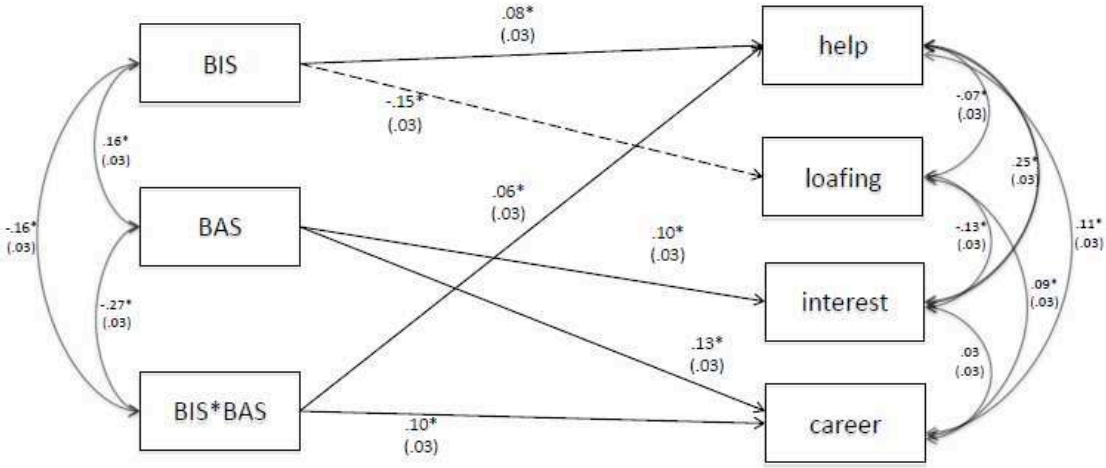
Figure 6.2 Path model 1, BIS/BAS scales as predictors and VIC-degree scales as outcome measures, undergraduate sample. Dotted line refers to a negative relationship. All variables were mean-centred, as suggested by (Baron & Kenny, 1986). The model was specified with free to correlate variances of both BIS/BAS and VIC-Degree scales.



Hierarchical regression analysis revealed significant moderating effect of BIS on BAS in predicting career, as well as negative association between BIS and helping. To further investigate theses effects emerged from the data, I added additional paths to the theoretically derived model, i.e. BIS – helping and BIS/BAS - career.

The second path model (see Figure 6.3 for standardized coefficients and standard error terms), in line with predictions, showed that BAS predicted interest and career, BIS negatively predicted loafing and positively helping; and interaction of BIS and BAS predicted helping and career. This model was a better fit to these data, as compared to the first model (see Figure 6.2): χ^2 (6, N = 885) = 7.45, p = .28, RMSEA = .0017 (0.0; 0.049), NFI = .97, CFI = .99.

Figure 6.3. Path model 2, with BIS/BAS scales as predictors and VIC-degree scales as outcome measures, undergraduate sample. Dotted line refers to a negative relationship. All variables were mean-centred, as suggested by (Baron & Kenny, 1986). The model was specified with free to correlate variances of both BIS/BAS and VIC-Degree scales.

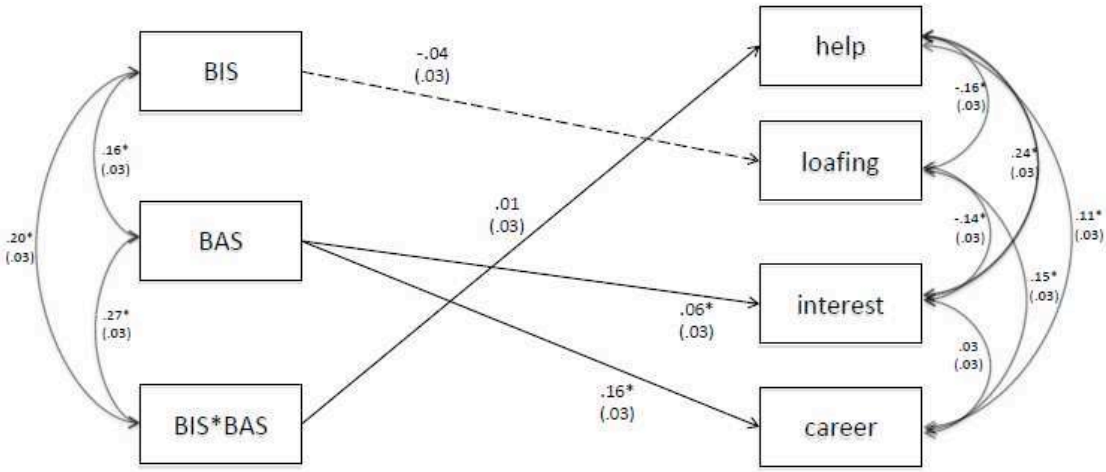


6.3.3.2 Open Days

In similar fashion as with the undergraduate sample, the first model based specified based on theoretical predictions.

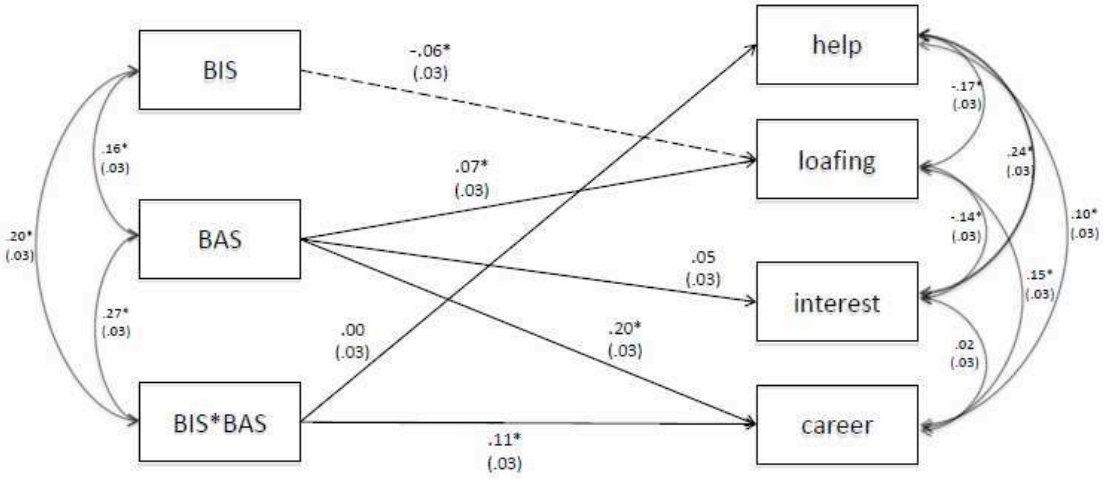
This model was a moderate fit to these data: χ^2 (8, N = 881) = 28.18, p < .001, RMSEA = .055 (0.009; 0.048), NFI = .90, CFI = .93. The path model (see Figure 6.4 for standardized coefficients and standard error terms), in line with predictions, showed that BAS predicted interest and career, BIS negatively predicted loafing. The effect of the interaction of BIS and BAS on helping did not reach the level of significance.

Figure 6.4 Path model 1, with BIS/BAS scales as predictors and VIC-degree scales as outcome measures, potential students sample. Dotted line refers to a negative relationship. All variables were mean-centred, as suggested by (Baron & Kenny, 1986). The model was specified with free to correlate variances of both BIS/BAS and VIC-Degree scales.



Hierarchical regression analysis revealed significant moderating effect of BIS on BAS in predicting career, as well as positive association between loafing and BAS. To further investigate the effects these relationships emerged from the data, I added additional paths to the theoretically derived model, BIS/BAS – career, BAS - loafing.

Figure 6.5 Path model 2, with BIS/BAS scales as predictors and VIC-degree scales as outcome measures, potential students sample. Dotted line refers to a negative relationship. All variables were mean-centred, as suggested by (Baron & Kenny, 1986). The model was specified with free to correlate variances of both BIS/BAS and VIC-Degree scales.



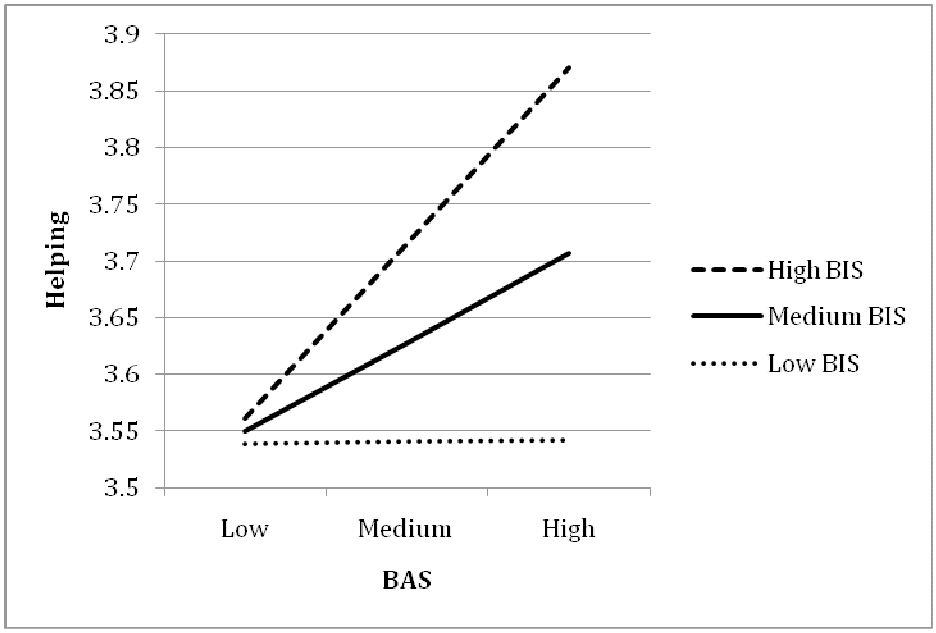
The second path model (see Figure 6.5 for standardized coefficients and standard error terms), in line with the predictions and replicating the results with undergraduates, showed that BAS predicted career. However, the link between BAS and interest did not reach the level of significance; BIS predicted loafing, and interaction of BIS and BAS in predicting helping was not significant. The paths added based on the hierarchical regression stayed significant: BAS positively predicted loafing, as well as BIS moderated the effect of BAS on career. This model was a better fit to this data, as compared to the first path model (see Figure 6.4): χ^2 (6, N = 851) = 14.02, p = .029, RMSEA = .040 (0.012; 0.067), NFI = .95, CFI = .97.

6.3.4 Moderation Analysis

6.3.4.1 BAS by BIS on Helping, Undergraduates

To further investigate the interaction of BIS and BAS and their effect on helping motivation in the undergraduate sample, I conducted the moderation analysis (Jose, 2008). BIS and BAS were mean-centred prior to the analysis, as suggested by (Baron & Kenny, 1986).

Figure 6.6 Moderation of BAS by BIS on helping, undergraduate sample



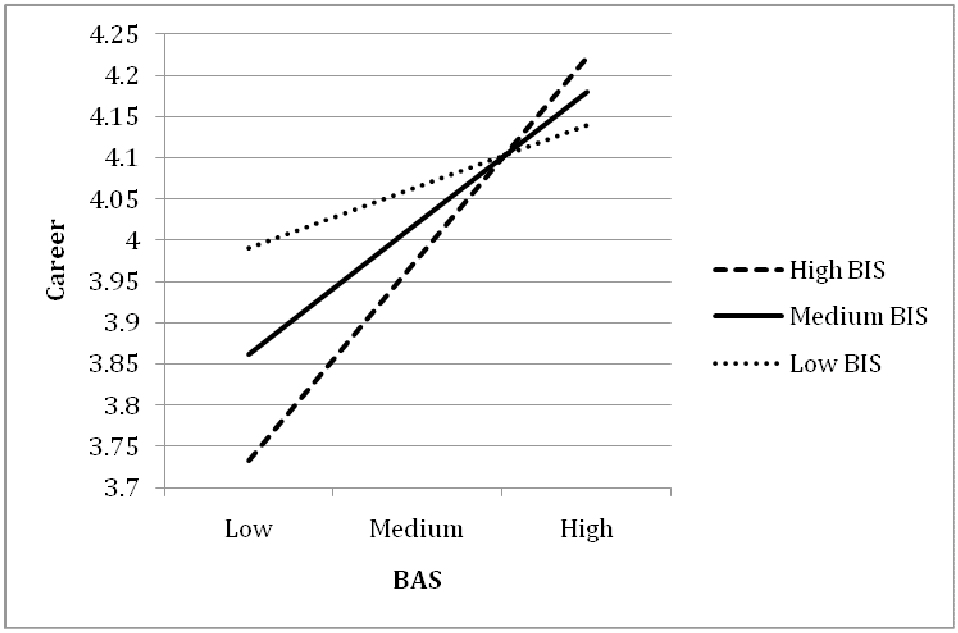
The results of moderation analysis (see Figure 6.6) demonstrated moderation effect of BIS on BAS predicting helping. Specifically, only for those who reported high BIS, BAS was positively associated with helping orientation while choosing a degree (simple slope effect 0.33, t (881) = 2.56, $p < .01$). For those with medium BIS, the effect was approaching the level of significance (simple slope effect 0.17, t (881) = 1.88, $p = .06$). However, for those with low BIS (simple slope effect 0.00, t (881) = 0.04, p = ns) it was no significant.

These results suggest that BIS positively enhanced the association between BAS and helping. Interestingly, the same interaction on the potential students' sample was not observed.

6.3.4.2 BAS by BIS on Career, Undergraduates

To further investigate the interaction of BIS and BAS and their effects on career in the undergraduate sample, I conducted a moderation analysis (Jose, 2008). BIS and BAS were mean-centred prior to the analysis, as suggested by (Baron & Kenny, 1986).

Figure 6.7 Moderation of BAS by BIS on career, undergraduate sample



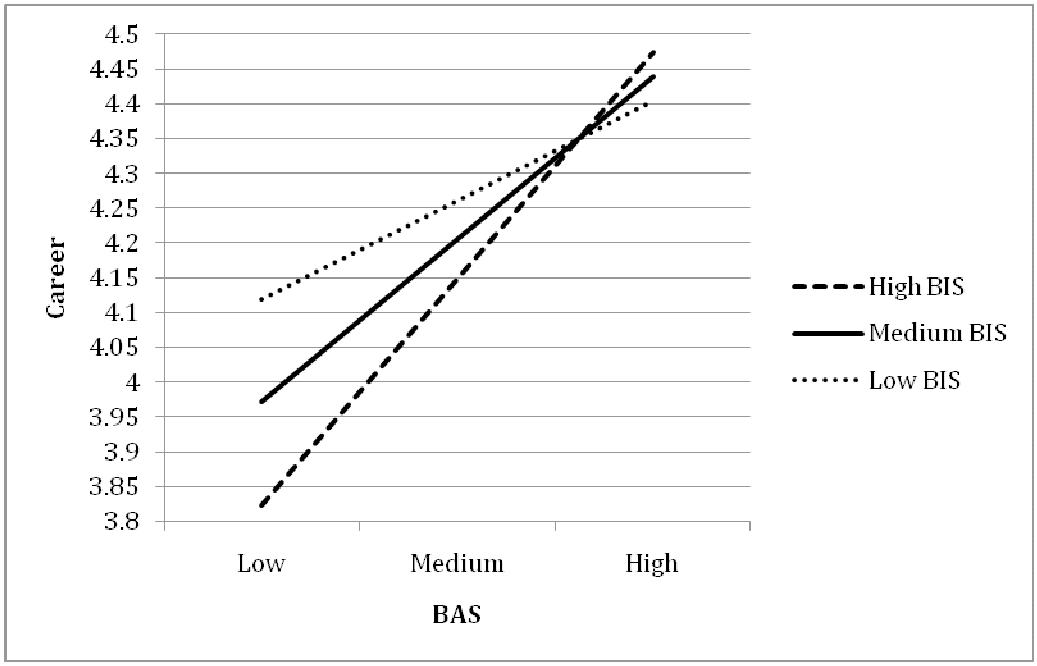
The results of moderation analysis (see Figure 6.7) demonstrated a moderation effect of BIS on BAS predicting career. Specifically, for those who reported high BIS, BAS positively associated with career orientations (simple slope effect 0.53, t (881) = 4.23, $p < .001$). For those with medium BIS, the effect was also significant (simple slope effect 0.34, t (881) = 4.09, $p < .001$). It was not significant for those with low BIS (simple slope effect 0.16, t (881) = 1.77, $p = .07$).

These results suggested that high BIS increased positive association between BAS and career orientation.

6.3.4.3 BAS by BIS on Career, Open Days

To further investigate the interaction of BIS and BAS and their effect on career in the potential students' sample, I conducted the moderation analysis (Jose, 2008). BIS and BAS were mean-centred prior to the analysis, as suggested by (Baron & Kenny, 1986).

Figure 6.8 Moderation of BAS by BIS on career, potential students' sample



The results of the moderation analysis (see Figure 6.8) demonstrated moderation effect of BIS on BAS predicting for career. Specifically, for those who reported high BIS, BAS significantly positively predicted career orientation while choosing a degree (simple slope effect 0.69, t (847) = 7.37, $p < .001$). For those with medium BIS, the effect was also significant (simple slope effect 0.50, t (847) = 5.96, $p < .001$). It was also significant for those with low BIS (simple slope effect 0.302, t (847) = 2.61, $p < .001$).

Consistent with the results with the undergraduate sample, in the potential students' sample high BIS increased positive association between BAS and career orientation.

6.4 Discussion

The links between higher level motivational orientations and motivational traits, empirically tested in this chapter on undergraduate and potential students' samples mostly conformed to the predicted.

Specifically, as predicted, career orientation was linked to BAS in both samples. The interest orientation was associated with BAS only in the undergraduate sample. As such, those who report higher reward sensitivity were guided by internal (enjoyment, interest) or external

(e.g. good career perspectives) rewards in their choice of degree. This is in line with theorizing of SDT with regards to intrinsically and extrinsically motivated behaviours as driven by different types of rewards. However, it still leaves open a question which factors define whether somebody high in reward sensitivity chooses to pursue intrinsic or extrinsic rewards. The path between BAS and interest was not significant for the potential students' sample. Further research should investigate the reasons, due to which these differences arose.

Helping orientation, as predicted, was linked to BIS/BAS interaction, with BIS moderating effect of BAS on helping. This effect was observed only on the undergraduate sample. Specifically, those who reported higher BAS, were more likely to report helping as a degree choice reason only when they were high in BIS as well. In addition, on the undergraduate sample, helping was positively predicted by BIS. This is in line with recent findings in behavioural economics, which suggest that both reward-related and inhibitory processes are involved in pro-social behaviour (Fehr & Camerer, 2007; McCabe et al., 2001). Furthermore, this suggests that in a broader perspective of real life choices, where repetitive pro-social acts are more common than one-shot interactions typically modelled in such games, pro-social behaviour might have evolved around mechanisms of delayed reward gratification, where reward and inhibitory mechanisms interact. The findings suggest that the core motivational mechanism defining pro-social behaviours was an interaction between both trait behavioural approach and inhibition. Specifically, to express pro-sociality, one needs to be able to inhibit desire to get immediate often selfish benefit in order to get a larger delayed reward through cooperation.

In line with predictions, I further demonstrated that free-riding/loafing orientation was negatively associated with BIS in both samples. I defined free-riding orientation as a tendency to make choices that result in exploitation of communal resources (see Section 1.3.4.2). In the case of free-riding, inability to withdraw from an immediate desire to exploit, based on the literature, was hypothesized as a consequence of low behavioural inhibition. This was confirmed on both samples, as those who self-reported low behavioural inhibition, also

reported choosing a degree because it provides an easy route to acquire higher education or allows achieving one's selfish goals.

Exploratory analysis, based on the results of hierarchical regressions, revealed a significant moderation of BAS by BIS in predicting career orientation in both samples. Specifically, for those who self-reported low BAS, high BIS seemed to hinder their choice of degree as driven by career prospective. Low BIS leads to higher levels of career driven motivation at the low levels of BAS. It is possible that high behavioural inhibition in combination with low levels of approach motivation prevents individuals from being oriented towards strategic achievements. Perhaps, this also leads to the avoidance of environments where high achievements are essential).

While those who self-report low levels of approach motivation and also behavioural disinhibition are more likely to aim for success in life (perhaps, because nothing holds them back). These preliminary conclusions should be tested in the future studies.

6.5 Limitations

I derived predictions based on theoretical analysis, however, the design I employed in this chapter to verify the hypotheses was purely correlational. Therefore, conclusions were limited to initial evidence establishing the links between higher level motivational orientations and more basic motivational traits. Further longitudinal and experimental studies are required to draw conclusions on causal effects of the underpinnings of higher level motivational orientations.

Another limitation was the use of BIS/BAS scales to measure behavioural approach and inhibition. This scales were developed to psychometrically assess basic motivational traits based on the original account of RST (Gray, 1984), which only hypothesized two systems, approach (BAS) and avoidance/inhibition (BIS). However, in 2000 the revised account of RST was published (Gray & McNaughton, 2000), which distinguishes fear FFFS and inhibitory BIS systems, previously were hypothesized as a single inhibitory/avoidance system. There are several recent attempts to develop psychometric tools that measure separate behavioural

outputs of FFFS and BIS (Heym, Ferguson, & Lawrence, 2008; Jackson, 2009). However, for the purpose of this thesis, I focused on inhibitory effects of avoidance system, which fits both revised and original account of RST. I have not developed specific hypotheses about FFFS and motivational orientations within this thesis. Therefore, for the purpose of this analysis, I used BIS scale based on original RST.

However, it should be noted that the results of the analyses in this chapter should be interpreted taking into account that BIS-scale in this case measures a combination of both FFFS and BIS outputs. The distinctive effects of BIS and FFFS on higher level motivational traits should be further explored in more specifically targeted experimental designs.

6.6 Next Chapter

In Chapters 2-6 I explored the dimensions of higher level motivational orientations, as well as their links to basic motivational traits in the degree choice domain. In Chapters 7 and 8 I employed experimental social dilemmas to explore if similar links between motivational orientations and traits are presented in the small-scale choices.

Chapter 7

7 What Makes People Cooperate?

Individual Differences in BAS/BIS Predict Strategic Reciprocation in a Public Goods Game

7.1 Overview

In this chapter I investigated motivational orientations which define individual choices in social dilemmas, as well as their links to basic motivational traits. Specifically, I examined the links of basic motivational traits of behavioural approach and avoidance, conceptualized by RST (Gray & McNaughton, 2000), to cooperating or free-riding choices in an experimental social dilemma.

7.1.1 Public Goods Games (PGGs) and Reinforcement Sensitivity

PGGs provide an experimental model to explore peoples' preferences towards pro-social or selfish actions (Fehr & Gintis, 2007). Even though over multiple anonymous trials the tendency is towards free riding (Fehr & Gintis, 2007), a large proportion of individuals make non-zero contributions (e.g. ~50% of their endowment, Keser & van Winden, 2000) into the public good, which is a puzzle in behavioural economics. Free riding is reduced when the possibility of reputation building is created or there is a risk of punishment (Fehr & Gintis, 2007; Nowak & Sigmund, 2005; Rockenbach & Milinski, 2006; West et al., 2006). Reciprocation, or acting as you expect others to behave, is one predominate mechanism that drives contributions in the PGG (see Falk & Fischbacher, 2006, for a discussion).

Given the focus on rewards and punishments as part of the explanation for cooperation it is argued that traits associated with reward and punishment should predict performance on PGGs. In this respect the revised account of RST (Gray & McNaughton, 2000) is particularly pertinent. Individuals high in BAS-trait are more likely to choose behaviours with higher rewards, such as to free ride and get a larger profit (i.e. financial reward). BIS is responsible for actions when goal conflict is present. After receiving inputs from both BAS and FFFS, BIS calculates what is beneficial: to approach a goal or to avoid a punishment by withdrawing. By

inhibiting one or several ongoing behaviours in favour of the others, BIS performs computations of risk assessment for benefits/losses expected from the outcomes. When there is no evident punishment possible (such as in a standard PGG), BIS might receive two reward-related inputs: approaching immediate reward or a greater delayed reward through the means of cooperation.

7.1.2 Individual Differences in Strategies within PGGs: The Roles of BIS and BAS

Distinctive behavioural strategies are observed in PGGs, which may be grouped as either self-regarding, free riding or other-regarding (e.g. reciprocation, conditional cooperation) strategies (e.g. Bardsley & Moffatt, 2007; Fehr & Gintis, 2007; Fischbacher et al., 2001). They resemble degree choice motivational orientations of strategic career orientation, loafing and helping, respectively. Similar strategies like other-regarding (altruists: maximize benefits for others; and co-operators: maximize joint group benefits) and self-regarding (individualists: maximize their own benefits; and competitors: maximize their relative advantage to other players) have been reported in the social value orientation literature (McClintock & Liebrand, 1988; van Lange, Otten et al., 1997; van Lange, Rusbult et al., 1997). While these classifications of participants' strategies are important, no trait-like mechanisms that may underlie these patterns is suggested (e.g. Burlando & Guala, 2005; Fischbacher et al., 2001). As an initial step forward in this regard, this chapter explores the role of BIS and BAS.

Scheres and Sanfey (2006) looked at BAS effects on performance in a Dictator Game (DG) and an Ultimatum Game (UG). Both games involved two players: a proposer and a recipient, with the proposer dividing their initial endowment between themselves and the recipient. While in the DG the recipient has no power over the decision, in the UG they can refuse the offer in which case neither party gets anything. If people are strategic, they should give less in the DG (as the recipient cannot reject the offer) but more in the UG (to ensure that the recipient does not reject the offer) and the difference between contributions in UG and DG should be larger. Scheres and Sanfey (2006) showed that BAS Reward Responsiveness (BAS-RR) was associated with strategic giving: predicting lower offers in the DG (but not the UG), as well as

a larger discrepancy of individual contributions in UG and DG: thus high BAS-RR was linked to a strategy to maximize rewards.

The present experiment extends this work drawing on a design used by Bardsley and Sausgruber (2005). They demonstrated that when participants knew that their own group gave a high average proportion of their endowment they donated more compared to a low average contribution condition (evidence in favour of reciprocation).

Thus this design allows to examine if BAS-RR individuals act strategically to maximize their rewards when they have full knowledge that others from their group have given a high proportion of their endowment. The experiment is a series of one-shot PGGs, where participants do not know each other, and know that in each game they might be playing with different participants. Thus anonymity is maintained and there is no option for reputation building or tit-for-tat responding. The optimal strategy to maximize reward would be to give less: be more self-regarding. This should not be the case when others contributed a small amount, as there is less to be gained by defecting. Thus it is hypothesised that when participants know that their group partners contributed high amounts, high BAS-RR should be related to reduced contributions.

It is important to note here that if we consider a repeated PGG scenario (where participants play with the same group partners over a number of rounds), the predictions regarding BAS-RR would have been opposite, as the strategy to maximize reward in such a context would be to invest more into public good. This should result in greater cooperation associated with higher BAS-RR.

While there are no studies examining the role of BIS within economic games, Hirsh and Peterson (2009) showed that Neuroticism, which is linked to BIS (Corr, 2008), was associated with greater cooperation in a repeated Prisoners Dilemma (PD) game. Furthermore, an fMRI study by McCabe et al (2001) demonstrated that cooperative behaviour occurs through a neural network, which provides binding of joint attention to mutual gains with inhibition of immediate reward: those who cooperate inhibit the dominant response of getting a quick

smaller reward in order to gain a larger delayed reward by the means of cooperation. Thus, I test the prediction that BIS should be associated with more cooperative behavioural strategies in the one-shot games studied here.

Based on the theory reviewed in the Section 1.5.3 and the findings in Chapter 6, I also examined if BAS, moderated by BIS, was linked to more cooperative behaviour in the PGG scenario.

7.2 Method

7.2.1 Participants & Procedure

The participants were 72 undergraduates (mean age 20.5, ranged 18-40, 58% female) drawn from different departments, mainly psychology. Questionnaires were administered using online software prior to the experiment. The experiment took place in the computer room, where all participants, in groups of 8 or 16, were seated in the individual booths with dividers. They were told that they would not know about any participants' individual contributions or meet after the experiment. After finishing the experiment participants were debriefed and paid individually. They received £5 as a show-up fee and they had an opportunity to earn up to £4.25 extra. On average, participants received £7.6 for a one-hour experiment. The experiment was programmed using Z-Tree (Fischbacher, 2007). One participant was excluded from relevant analyses due to missing questionnaire data.

7.2.2 Measures of Motivational Orientations

BIS/BAS: The Carver and White (1994) BIS/BAS questionnaire was used (see Appendix 4). This contains 24 items to be rated on a four point scale assessing (1) avoidance orientation: BIS (α = .71); (2) approach orientation (BAS): overall BAS (α = .84), plus subscales BAS Drive (α = .74), BAS Fun Seeking (α = .75) and BAS Reward Responsiveness (α = .89). BIS-anxiety (α = .81) score was calculated a as suggested by Heym et al. (2008).

7.2.3 The Public Good Game (PGG)

The experiment comprised 4 practice and 22 experimental trials. No deception was involved in this study, as the trials were organized in a Conditional Information Lottery (see Bardsley, 2000, for a discussion). Participants were informed that all trials except for one (a real trial) would not be played with people in the room. For the non-real trials all information appeared on the computer screen would be defined by the experimenter. Only the earnings from the real trial counted towards their final payment and participants were aware of this. In the debrief participants stated that they were unable to detect which was the real trial and had treated all trials as if they were real.

Each trial consisted of an anonymous sequential one-shot PGG where participants played in the groups of four. In keeping with the original design of Bardsley and Sausgruber (Bardsley & Sausgruber, 2005), there were two key parameters to each trial: (1) player position (first or last mover) and (2) group membership (A and B). The first movers were not aware of the contributions of their own group before they made their contribution. The last mover, however, was aware of the average contributions made by their group members before they made the contribution. On each trial there were three first movers and one last mover.

The group membership could be either Group A or Group B. According to the rules, those who played in the group B, prior to their decisions, saw the average contribution of the participants in group A. In this way, when participants were on the first mover position, and prior to their decision, they saw the average contribution of another group (Group A). However, when they were in the last movers position, they saw both the average contribution of another group (Group A) and their own group (Group B).

The feedback about both “my” (B) and “other” (A) group mean contribution levels were manipulated as high, medium or low proportion of the initial endowment. In line with the design of Bardsley and Sausgruber (2005), I was interested in high versus low feedback manipulations while participants were on the last mover position. There were also medium feedback trials for the first mover position trials as “masks” to insure that the experimental trials of interest were not salient for participants. Additional analyses with medium trials did

not affect the significance of any results. Mean group contributions were drawn randomly from a normal distribution with 17.5 average for high, 10 for a medium and 3.5 for low condition with a standard deviation of a 1 MU. There were a number of different combinations of feedback which produced different trial types. This study focused on the last mover trials with the feedback about contributions of "my" group, which was manipulated to be either "high" (4 trials) or "low" (4 trials). In addition to the information about their own group contributions, and in each of 4 high "my" group trials, participants were provided with the information about the "other" groups (Group A) average contributions: it was either high (2 trials) or low (2 trials). Likewise, for 4 low "my" group last mover trials, in 2 trials the feedback about "other" group was provided as high and in 2 it was provided as low. All participants underwent exactly the same experimental schedule (i.e. had the same number of trials of each type). The order of the trials was randomized for each participant. To exclude the possibility of hearing when other participants were making decisions, everybody was required to enter a number (the prompt appeared on the screen) whilst waiting for others' decisions.

In each game the participants had to divide their initial endowment of 20 MU (equal to £2) into the private and the group account. After everybody made their decisions, the investments were calculated based on the following pay-off function:

$$\pi_i = 20 - g_i + 0.5\sum_{j=1}^{4} g_j ,$$

Where a pay-off (π) for a participant *i* is defined by their contribution (*g*) and the sum of contributions of other players.

Participants received individual feedback of how much they earned at the end of each trial. An example of consent form, full instructions with example games, control questions and post-experimental surveys can be found in the Appendices 8-11.

To investigate the effect of traits on behaviour, I used both contribution levels and whether a participant contributed zero at least once or not in each condition (zero contributions). The

latter have been previously described to be associated with different behavioural strategies in the PGGs (e.g. Bardsley & Moffatt, 2007; Keser & van Winden, 2000).

7.3 Results

7.3.1 Descriptive Statistic

Table 7.1 provides the means (M), standard deviations (SD) and inter-variable correlations for all personality and motivational traits. All variables were normally distributed except for BAS-RR (Z = 1.91, p < .01, Kologorov-Smirnov test for normality of the distribution) which was treated as non-parametric for all subsequent analyses.

Table 7.1 The means (M), standard deviations (SD) and zero-order correlations for all motivational variables

Scale	M (SD)	(1)	(2)	(3)	(4)	(5)
(1) BAS Overall	2.95(.48)	1.00				
(2) BAS Drive	2.66(.59)	0.61***	1.00			
(3) BAS Fun Seeking	2.90(.65)	0.83***	0.32**	1.00		
(4) BAS Reward Responsiveness	3.31(.69)	0.77***	0.11	0.51***	1.00	
(5) BIS	2.91(.68)	0.15	-0.26*	0.04	0.49	1.00
(6)BIS-anxiety	3.09(.70)	0.20	-0.21	0.05	0.54	0.93***

Note. ***p < .001, **p < .01, * p < .05

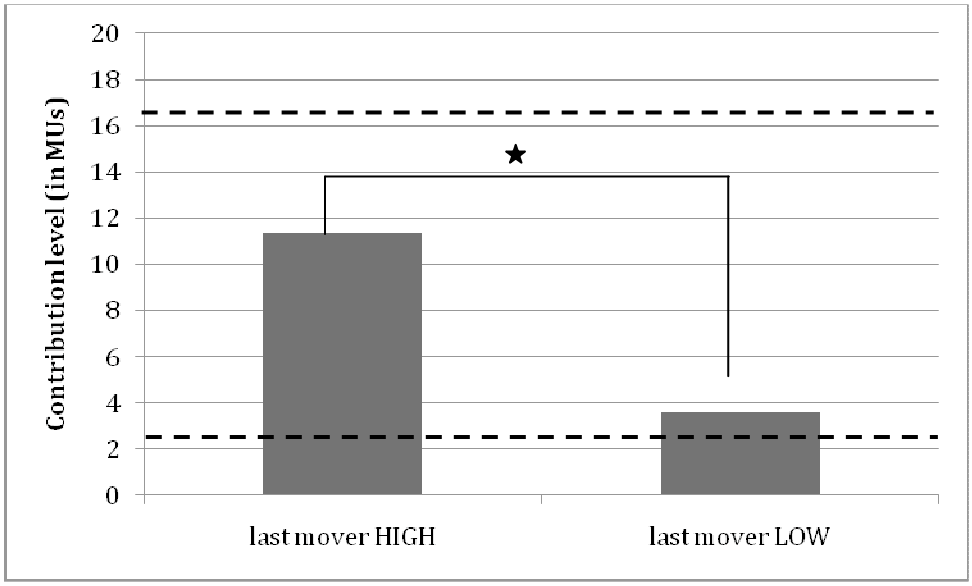
7.3.2 Effects of the Information about the Contribution of Others on Individual Behaviour

To explore the relationship between group contribution levels and a position a 2 (Other Group Contribution: High or Low) by 3 (Position: first mover, last mover with "my" group high, and last mover "my" group low) repeated measures ANOVA was conducted. There were significant main effects of both "other" group contribution ($F_{(1,71)}$ = 13.85, p < .001) and position ($F_{(2,70)}$ = 67.08, p < .001) and a significant interaction between the two ($F_{(2,70)}$ = 12.49, p < .001). Planned comparisons revealed that the contribution levels on the first movers position were significantly different when participants received the information of "other" groups level of feedback as either high or low ($F_{(1,71)}$ = 40.11, p < .001). Such that when the other group contribution was high they gave more (M = 10.04 MU, SD = 5.39) and when it was low they gave less (M = 7.5 MU, SD = 5.12). When participants were on the last mover position, there was no significant effect (p = .319) of Other Group Contribution both with "my" group high ("other" high, M = 11.58, SD = 6.60; "other" low, M = 11.11, SD = 6.75;)

and “my” group low feedback (“other” high, M = 3.56, SD = 3.85; “other” low, M = 3.65, SD = 3.97; p = .840). These analyses showed that the information about the other group contribution affects only contributions on the first mover position, but not the last mover position.

To further explore the effects of the “other” group and the “my” group contributions in the last mover positions – which were the focus of this study – a 2 (My Group: High or low) by 2 (Other Group: High or Low) repeated measures ANOVA was conducted (for the means and standard deviations refer to the previous paragraph). There was a significant main effect of the “my” group contribution ($F_{(1,71)}$ = 126.38, p < .001), no significant effect of the “other” group contribution feedback and no significant interactions. Regardless of what the other group contributed, participants on the last mover position contributed more if their own group contributed high on average, and less if their group contributed low on average: results are depicted on the Figure 7.1. As there was no effect of other group contributions manipulation when participants were last movers, for all subsequent analyses contributions were averaged across “my” group high (M = 11.34, SD = 6.37) and “my” group low (M = 3.60, SD = 3.50) conditions.

Figure 7.1 Reciprocation effect: contribution levels. Dotted lines represent high and low contribution feedback.



I have demonstrated that individuals' contribution levels changed in response to high or low contributions of others in their group, which may be interpreted as evidence for reciprocation (Bardsley & Sausgruber, 2005). Upon closer inspection, it was observed that in the low feedback trials the contribution levels matched the feedback about the group contribution (15% of the endowment: the difference between group average and individual contributions was not significantly different, one-sample t-test t (71) = .09, ns). However, in the high feedback trials, and after seeing that their group contributed 85% of endowment, participants only increased their contributions to the public good up to 55% of endowment, which was significantly lower than their group had given (t(71) = -8.33, p <. 0001, one-sample).

7.3.3 Influence of Personality Traits

7.3.3.1 Correlations

Table 7.2 reports correlations between motivational traits and contribution levels in the different conditions.

Table 7.2. Correlations between motivational traits and outcomes in the different conditions of the PGGs. All correlations reported are zero-order Pearson's coefficients, with the exception of BAS-RR. For BAS-RR Spearman's coefficients are reported.

Scale	Average contributions, high last	Average contributions, low last
BAS Overall	-0.07	0.00
BAS Drive	0.07	0.00
BAS Fun Seeking	-0.11	-0.03
BAS Reward Responsiveness	-0.27*	-0.09
BIS	0.09	0.10
BIS-anxiety	0.11	0.10
FFFS-fear	0.04	0.08

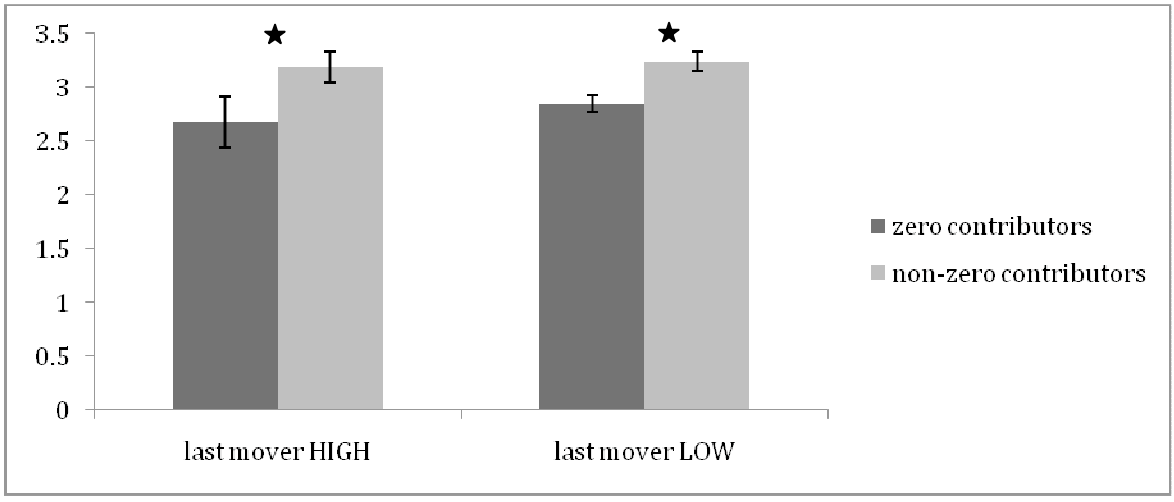
Note. * p < .05

Consistent with the prediction, BAS-RR was negatively correlated with the contributions in the high "my" group feedback last mover position (r = -.269, p < .05). This correlation indicates that those high in reward responsiveness gave less when they knew that others in their group had contributed a large proportion of their endowment. There were no other significant effects.

When was scored as BIS-anxiety (Heym et al., 2008), BIS-anxiety was significantly lower for those who contribution zero on at least one of the games in the last mover high "my" group

feedback condition (zero contributors, N = 14, BIS-anxiety: M = 2.58, SD = .90) as compared to those who contributed something on all of the games (non-zero contributors, N = 57, BIS-anxiety: M = 3.19, SD = .61): t (69) = -2.53, $p < .05$. The scores for overall BIS scale were also significantly different for these groups: t (69) = -2.12, $p < .05$. The same pattern was presented for the last mover low "my" group feedback condition, zero contributors, N = 28 (BIS-anxiety: M = 2.85, SD = .75), versus non-zero contributors, N = 43 (BIS-anxiety, M = 3.24, SD = .63): t (69) = -2.40, $p < .05$ (see Figure 7.2). The scores for overall BIS scale were also significantly different for these groups: t (69) = -2.31, $p < .05$.

Figure 7.2. Differences in the mean BIS-anxiety for zero and non-zero contributors, last mover high/low "my" group feedback conditions. Error bars represent standard error of the mean.



Note. * $p < .05$

Thus high BIS-anxiety participants were more cooperative, as they tended to contribute something (not zero) when they knew that others from their group had contributed on average a large or low proportion of their endowment. There were no other significant effects.

7.3.3.2 Moderation of BIS on BAS in predicting outcomes in PGGs

There were no significant effects of moderation of BIS or BIS-anxiety on BAS or any BAS subscales in predicting choices in the games. While this effect was prominent in the previous large scale study (see Chapter 6), it was not presented here. This might have been due to differences in the way motivational traits and orientations were measured in the case of

experimental social dilemma. While the traits were measured by the means of a self-report scale, orientations were measured as averaged choices in the PGG scenario in experimental conditions. It is possible that the differences in the nature of the scales mask some individual differences effects.

7.4 Discussion

These results demonstrated, consistent with the predictions, that individual differences in basic motivational mechanisms, which are associated with sensitivity to reward and behavioural inhibition, explained variation in cooperation and free-riding in a PGG scenario. Specifically, within the context of a one-shot game, BAS-RR was related to the strategic use of self-regarding behaviour (reduced contributions) while BIS-anxiety (Heym et al., 2008) was related to less free riding. These findings are interpreted in relation to strategic responding in the PGGs.

7.4.1 Strategic Reciprocation as the Main Mechanism of Giving the PGGs

In line with the wealth of previous findings (e.g. Croson, 2007; Falk & Fischbacher, 2006), a form of reciprocation has been shown as a dominant mechanism explaining voluntary contribution levels in PGGs. Specifically, participants were affected by the feedback about the level of contribution in their group: while, on average, they fully reciprocated to the cooperation of others (gave the same amount as their group) when the cost for cooperation was low, they gave significantly less than others on average when they were provided with the information that their group partners gave a high amount. This suggests that people reciprocate fully in environments when known costs are low, while when reciprocation requires high costs, people are less willing to do so (Ferguson et al., 2008). However, it must be noted here that the absolute amount of giving was still larger when individuals were provided with the information that the average amount given by others was high.

I have demonstrated that individual differences in motivational traits associated with reward and punishment influenced performance in the PGGs. BAS-RR was negatively associated with contribution levels, specifically when participants knew that others from their group

contributed a large proportion of their endowment: those high on BAS-RR gave less. However, BIS-anxiety (Heym et al., 2008) showed a negative relationship with the proportion of non-zero contributions. This indicated that BIS-anxiety was related to reduced free riding. This suggests that behavioural inhibition plays a role in moderating the contribution levels in the PGG, and more broadly, in the decision whether to cooperate or not. In this PGG experiment, those who were low in BIS were less likely to inhibit the dominating response of getting an immediate reward, especially in the situation when the reward was high (high feedback last mover trials, see McCabe et al., 2001).

Furthermore, these results are in line with the findings reported in Chapter 6. At the example of the large scale choice, a choice of degree, I have shown that low BIS predicts loafing as a degree choice reason both for potential and current students. Furthermore, BAS predicted career orientation as a motivation for the choice of degree in both samples. Correlations of the subscales of BAS and BIS with indices of strategic and free-riding behaviour, respectively, is suggestive of both behavioural approach and inhibition affecting strategic and free-riding choices in small and large-scale choices in a consistent fashion. Future studies should investigate if this effect was due to a specific moderation of BIS by BAS or to other type of interaction between BIS and BAS in regulating cooperative choices.

7.5 Limitations

Experiment reported in this chapter investigated higher motivational orientations through choices in the PGGs, where feedback about contributions of group members was manipulated either as high or low. While I have demonstrated the links of self-regarding behaviour with BAS-RR and BIS-anxiety, these results are limited to specific experimental conditions, or their real life extensions, modelled in this experiment. Further investigations that manipulate other parameters of the games (e.g. possibility of punishment for free-riding, reputation building) are required to establish the links between motivational traits and motivational orientations.

Furthermore, due to restrained conditions of the laboratory games, it was not possible to create the experimental design where all four motivational orientations would be prominent

as guiding individual choices. As such, I did not expect intrinsic motivation to be quantifiable within the behaviour in the social dilemmas.

7.6 Next Chapter

The next chapter employed a PGGs scenario, where a different structural parameter of the game was manipulated. Namely, I investigated the effect of punishment conditions on the choices in the PGGs, as well as what kind of individual differences in motivational traits can guide individual choices under the threat of a monetary punishment.

Chapter 8

8 Mechanism of Increase in the Contribution Levels in Public Goods Games with Punishment Risk

8.1 Overview

Previous chapter (Chapter 7) examined if feedback about the contribution of others affects strategic other-oriented choices (i.e. individual investments into the public good). Individual choices in the one-shot PGG scenario were assumed to be indicative of higher level motivational orientations (i.e. strategic motivation and free-riding). It further examined individual difference in basic motivational traits that can explain heterogeneity in choices. This chapter examines a different structural parameter that has been shown to affect contribution levels in the PGGs (i.e. punishment risk). It further examined how individual differences in basic motivational traits can explain variability in choices when facing a punishment risk in a PGG scenario.

8.1.1 Heterogeneity in the Behaviour when Facing a Punishment in the PGG scenario

PGGs with punishment conditions provide a model of many social processes, including a punishment in form of taxation, fines and other regulations (Fehr & Gachter, 2002). Different forms of punishment are effective in eliminating free-riding and sustaining cooperation, specifically through increasing contribution levels to the public good.

However, while a wealth of findings (Falk & Fischbacher, 2006; Gintis, Bowles, Boyd, & Fehr, 2003; Henrich et al., 2006) attempted to explain mechanism behind behaviour of the punisher (e.g. strong reciprocity), there is a gap in the literature with regards to investigations of motivational mechanisms that could explain overall trends as well as individual behaviour of those who expect a punishment (i.e., increase in contribution levels in response to the punishment risk). For instance, a mechanism of altruistic punishment was suggested to underlie cooperation (Egas & Riedl, 2008; Fehr & Gachter, 2002). However, it is not clear whether in this case the fear of being punished per se leads to increased contribution levels;

or it is the fear of being punished by a group partner; or the expectations that others will punish them for free-riding because they themselves punish free-riders. Such designs, therefore, potentially mask the effects of more basic mechanisms, such as processing of reward and punishment contingencies, which have been shown to be largely implicated in decision-making (Seymour, Singer et al., 2007). This chapter brings novel evidence for mechanisms which could underlie both aggregate and individual behaviour in response to the risk of punishment in one-shot anonymous PGGs.

8.1.2 Punishment Risk in the Public Goods Games

A wealth of evidence has established that contribution levels in PGGs increased in response to a possibility of punishment for free-riding (de Quervain et al., 2004; Fehr & Gachter, 2002). For instance, Ones and Putterman (2007) demonstrated that after the actual punishment participants increased contribution levels between 59 and 72 percent in the next period of the games.

Further, it was demonstrated that when explicitly informed prior to the game about the risk of punishment for free-riding in the PGGs scenarios, individuals take the risks into account (i.e. they change their contributions into public good) while making their choices (Fehr & Gachter, 2000; Noussair & Tucker, 2005). As such, higher levels of punishment risk led to an increase in contribution levels in the PGGs (Anderson & Stafford, 2003). However, in real life punishment risk is often not explicitly known and individuals need to estimate it based on experience. In such cases punishment expectations could vary depending on whether expected punishment occurred or not. For instance, Fundenberg and Pathak (in press) employed PGGs to demonstrate that in an observed punishment condition (i.e. after each game participants were informed about the punishment points they received) participants contributed more than in the unobserved punishment condition (i.e. all punishment points were revealed in the end of the experiment). The difference in the conditions might be linked to punishment expectations. In the observed punishment condition there was a high “online” punishment risk. As such, if an individual free rode, they were punished. Therefore, they were

more likely to expect to be punished for similar actions in the next games. This led to increased contribution levels. However, in the unobserved conditions, participants did not know if they were punished or not until the end of the experiment when the expectations about punishment risk became already irrelevant. Therefore, they could not estimate the risk of being punished for free-riding; instead, they presumably expected it to be lower as they cooperated less. Thus, differences in punishment risk expectations could potentially be a factor affecting contribution levels in the PGGs. However, in the experiment of Fundenberg and Pathak punishment points were assigned by the group members and presumably were contingent on what those who punished considered as behaviour worth punishing. Therefore, a potential confounding variable was that punishment levels might have differed between individuals depending on their group partners' contributions.

8.1.3 Individual Difference in Behaviours in Response to Punishment Risk and Behavioural Inhibition

Evidence from PGGs with punishment options (Cinyabuguma et al., 2005; Fehr & Gachter, 2000; Henrich et al., 2006) and real life examples (e.g. tax avoidance, Boadway et al., 2007) show that some individulas free ride even when there is a risk of punishment (Masclet & Villeval, 2008; Nikiforakis & Normann, 2008). Motivational processes (e.g. linked to motivational traits of avoidance and approach, Gray & McNaughton, 2000) were associated with risk assessment (Demaree, DeDonno, Burns, & Erik Everhart, 2008). Furthermore, these motivations could potentially influence individual expectations of how likely the punishment is to occur in the PGGs scenario. At present, no motivational mechanism has been employed to explain individual differences in such behaviour.

A potentially fruitful framework to investigate this issue was offered by RST (Gray & McNaughton, 2000), as it specifies how individual differences in reward and punishment sensitivity affect choices in various situations. Specifically, BIS was linked to risk assessment (Gray & McNaughton, 2000; Knyazev et al., 2008), choices under uncertainty (Amodio, Master, Yee, & Taylor, 2008) and risky behaviours in general (e.g. different forms of

dependencies, psychopathologies, Dawe, Gullo, & Loxton, 2004; Heym & Lawrence, 2010). However, traits associated with reduced BIS (or conceptually similar traits, such as constraint, self-control) are yet have not been studied in relation to free riding in a PGG when punishment risk differs across conditions. In the situations of higher ambiguity the punishment risk is less certain (e.g. punishment was expected but it did not happen). Under such circumstances, behavioural inhibition could potentially explain individual differences in behaviours, making some individuals choose to cooperate in order to avoid the punishment. Others, instead, might choose to free ride, as it might lead to a larger immediate individual reward, despite the risk of being caught.

8.1.4 Experimental Design and Predictions

To generalize punishment mechanisms in the PGGs to real world contexts, where individuals usually do not know punishment risks and need to estimate them based on available information, I investigated how different punishment rates could affect contributions in a PGG scenario.

The aim of this study was twofold: (1) to compare contribution levels of PGGs when the punishment risk was not expected (a baseline standard PGGs condition) with the conditions when it was expected, and the expectations were either met (an actual punishment condition) or not (a possibility of punishment condition); and (2) to investigate if varying punishment conditions had a differential effect on the free-riding behaviour in PGGs for individuals with different levels of behavioural control.

It was predicted that if individuals made choices about contributions taking into account punishment risks, then contributions should be higher when the punishment expectations were met (i.e. in the condition when they experienced an actual punishment) as compared to condition when the punishment was expected but did not occur (i.e. the possibility of punishment condition). Conversely, if individual expectations of punishment risk did not change whether punishment occurred or not and individuals merely reacted to the

punishment as present in the games, they should contribute equally in both punishment conditions.

If punishment risk has an effect on contribution levels and low BIS is associated with risky choices then lower BIS should also lead to higher levels of free-riding under conditions with lower punishment risk (i.e. when punishment is expected but does not occur). Specifically, I predicted that individual differences in behavioural inhibition should be linked to decrease in contribution levels when the punishment was expected but did not occur (the risk was low).

Furthermore, it was demonstrated that prisoners, who tend to be higher in risk-seeking tendencies, were sensitive to the change in punishment risk in a repeated social dilemma experiment. Specifically, they were more likely to free ride in the conditions of low punishment risk compared to a student sample (Block & Gerety, 1995). While the scenario employed here included only one-shot games, I expected that similar underlying mechanisms in terms of sensitivity to the rate of punishment should be present in those with free-riding orientations. It was predicted that the behaviour of individuals with free-riding tendencies under a lower risk of punishment condition was mediated by behavioural inhibition.

To have a baseline, I compared both punishment conditions to two standard PGGs conditions without punishment. To insure that punishment instruction itself did not change the behaviour of participants, the first condition included a set of standard games without a punishment played before the punishment instructions were introduced. The second set of games occurred after the instructions were introduced. In addition, to insure that the order of three conditions after the punishment instruction (a possibility of punishment, an actual punishment and a standard game block) did not affect the contribution levels, I manipulated the order of three blocks as a between-subject factor.

Three hypotheses were tested in this experiment. First, I expected that individuals contributed more after they actually experienced the punishment for free-riding as compared to the condition when a punishment was possible but did not occur. Second, individual differences in BIS were predicted to be associated with the change in behaviours (change in

contribution levels and a number of zero contributions) when the "online" punishment risk changes, i.e. between an actual punishment and a possibility of punishment condition. Third, based on (Block & Gerety, 1995), the behaviour of individuals with free-riding tendencies was expected to be dependent on their levels of behavioural inhibition under the condition when punishment risk was more uncertain.

8.2 Method

8.2.1. Participants and Procedure

The participants were 79 undergraduates (mean age 20.96, ranged from 18 to 36, 67.1% female). Questionnaires were administrated using online software prior to the experiment. The experiment took place in the computer room, where all participants were seated in individual booths with dividers. They were told that they would not know about any of other participants' individual contributions or meet after the experiment. After finishing the experiment participants were debriefed and paid individually. They received £3 as a show-up fee and they had an opportunity to earn up to £5 extra. On average, participants received £6.67 for a one-hour experiment. The experiment was programmed using Z-Tree (Fischbacher, 2007).

8.2.2 Measures of Motivational Orientations

BIS/BAS: The Carver and White (1994) BIS scale from BIS/BAS questionnaire was used. This assessed behavioural inhibition: BIS (α = .81). Following Heym et al. (2008), I also used a split of BIS scale to calculate BIS-anxiety (α = .83), as it allows deriving a more precise measure of behavioural inhibition by separating it from fearfulness. There were no predictions with regard to individual differences in BAS. Therefore, analysis of this scale was omitted from the results in this chapter.

8.2.3. The Public Goods Game

The experiment comprised four blocks, with two parts. In the first part, participants played series of standard PGGs (a baseline condition). After the first part, participants received the

instructions for the second part, which introduced a punishment rule for some of the games. The rule stated that in some games they might be "fined" (punished) if they contributed less than their group partners on average (calculated by the computer). They were told that there were several blocks of games and that the punishment rule applied only on some of the blocks. There were three blocks of games in the second part of the experiment; participants were not explicitly informed about this. They were informed before the beginning of each block if the punishment rule operated in that block.

There were two different punishment blocks: (i) an actual punishment condition (participants were told that they would receive a punishment for free-riding and a punishment actually occurred), and (ii) a possibility of punishment condition (participants were told that they might receive a punishment, but it never happened). In addition, there was another block of standard PGGs. The order of three blocks in the second part of experiment was counterbalanced through six pseudorandom sequences, with approximately the same number of participants in each sequence (see Table 8.1 for the sequences and the number of participants in each sequence).

Table 8.1. Structure of the blocks sequences in the second part of the experiment after the punishing instruction and number of participants that underwent each sequence

Sequence of blocks	Number of participants
Standard PGGs, Possibility of punishment, Actual punishment	N = 15
Possibility of punishment, standard PGGs, Actual punishment	N = 12
Possibility of punishment, Actual punishment, Standard PGGs	N = 12
Standard PGGs, Actual punishment, Possibility of punishment	N = 12
Actual punishment, Standard PGGs, Possibility of punishment	N = 16
Actual punishment, Possibility of punishment, Standard PGGs	N = 12

Each block consisted of a number of one-shot games, which are referred to here as trials. Each trial was an anonymous PGG, where participants played in the groups of four and had to divide their initial endowment of 20 MU (equal to £2) into the private and public/group

account. After everybody made their decisions, the investments were calculated based on the following pay-off function:

$$\pi_i = 20 - g_i + 0.5\sum_{j=1}^{4} g_j ,$$

Where a pay-off (π) for a participant *i* is defined by their contribution (*g*) and the sum of contributions of other players.

After participants made their decisions and entered their contribution into the group account, they received a feedback about how much on average their group contributed and how much they have earned.

On all trials, besides a real game, where participants were playing with each other, the information they received about the group's average contribution was manipulated. No deception was involved in this study, as the trials were organized in a Conditional Information Lottery (see Bardsley, 2000, for a discussion). That is, participants were informed that all trials except for one (a real trial) would not be played with people in the room, and for the non-real trials all information appeared on the computer screen would be defined by the experimenter. Only the earnings from the real trial counted towards their final payment and participants were aware of this. In the debrief participants stated that they were unable to detect which was the real trial and had treated all trials as if they were real.

To be able to pseudo-randomize the occurrence of the "punishing" trials, in each block there were a different number of trials. There were 12 trials in a standard PGGs block before a punishing instruction; 13 trials in an actual punishment block; 14 trials in a possibility of punishment block; and 15 trials in a standard PGGs block after the punishing instructions. In two trials in each block participants received a feedback about a high average group contribution level (between 16 and 18 MUs). In the rest of the trials in the block the feedback informed participants that their group partners contributed a medium amount (between 7 and 12 MUs).

High contribution feedback ensured that the majority of participants could experience punishment in the actual punishment block (as participants were punished only if they contributed less than the group on average). High contribution trials were included in the other blocks to secure similar structural parameters between blocks. A varied schedule of medium and high contribution levels was introduced to imitate natural variability in the behaviour of group partners, thus preventing participants from detecting experimental trials. Different number of trials in each block insured that participants could not predict how many trials there were in each block.

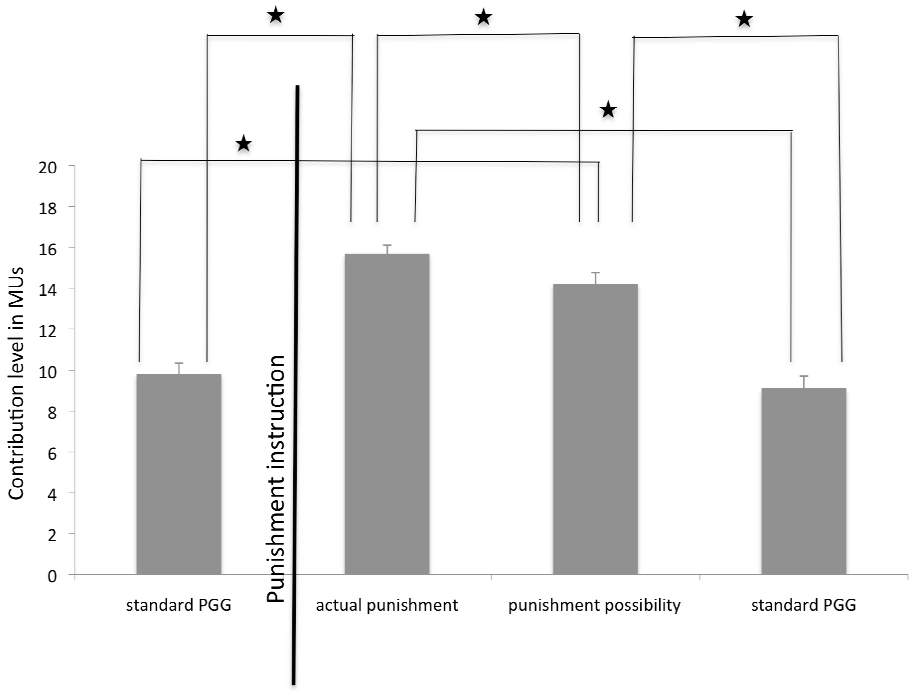
An example of consent form, full instructions with the example games, control questions and post-experimental surveys can be found in the Appendices 12-15.

To investigate the effect of the traits on behaviour I used both contribution levels and zero contributions (whether a participant contributed zero at least once in each condition). Both indicators have been previously described to be associated with different behavioural strategies in the PGGs (e.g. Bardsley & Moffatt, 2007; Keser & van Winden, 2000).

8.3 Results

8.3.1 Effects of Punishment on Contribution Levels

Figure 8.1 Mean contribution levels for each block (block 1: M = 9.78, SD = 4.92; block 2: M = 15.67, SD = 4.00; block 3: M = 14.19, SD = 5.08; block 3: M = 9.09, SD = 5.54). Error bars represent standard errors of the mean.



To explore if there was a main effect of different punishment conditions, a two-way mixed ANOVA on average contribution levels was conducted. There was one within-subjects factor of the block (four levels – four blocks) and one between-subjects factor of the order (the order of the blocks in part two). Descriptive statistic for the level of each factor can be found in the Appendix 16. The results revealed a main effect of block ($F_{(3,71)}$ = 45.95, p < .001), no effect of the sequence ($F_{(5,73)}$ = 1.71, ns) and no significant effect of interaction of order of the blocks and the block ($F_{(15,219)}$ = 1.47, ns). This demonstrated that the pseudo-random ordering did not affect individual contribution levels in each block. Figure 8.1 summarizes these results.

To further explore if there was any effect of the order of punishment versus possibility of punishment blocks on choices in the PGGs, I compared contributions levels on each block for those who had the actual punishment block before the possibility of punishment block (N = 40), and those who had these blocks in opposite order (N = 39). It could have been possible that participants who had experienced the actual punishment block prior to the possibility of punishment block, expected punishment as more likely to happen, and therefore contributed more. While those, who experienced the possibility of punishment block before they had the

actual punishment block, would not expect punishment as likely to happen. Therefore, they would have contributed less. There were no significant differences in contribution levels of any of the blocks: block 1 (t (77) = -1.41, ns), block 2 (t (77) = -1.41, ns), block 3 (t (77) = -1.28, ns), block 4 (t (77) = -.64, ns). For the descriptive statistics corresponding to each t-test refer to the Appendix 17.

Post-hoc tests were conducted to follow-up the results of the two-way mixed ANOVA. Bonferroni correction of the significance level for the number of comparisons was applied. The analyses demonstrated that:

(1) Contributions in both punishment blocks were significantly higher than in two standard PGGs blocks without punishment: participants contributed more both when they experienced punishment[1] and when there was a possibility of punishment compared to no punishment conditions (a standard PGG block before the instruction versus actual punishment block, t (78) = 10.40, $p < .001$; a standard PGG block before the instruction versus possibility of punishment block, t (78) = 10.70, $p < .001$; a standard PGG block after the instruction versus actual punishment block, t (78) = 7.20, $p < .001$; a standard PGG block after the instruction versus possibility of punishment block, t (78) = 7.47, $p < .001$);

(2) Contributions in standard PGGs blocks were not significantly different from each other: participants contributed similarly in a standard PGG before they received the instruction about possible punishment or after (t (78) = 1.31, ns). Therefore, there was no effect of a "punishing" instruction itself;

(3) Contributions in the block when the punishment actually occurred were significantly higher than in the conditions when the punishment was possible but did not occur (t (78) = 4.11, $p < .001$).

[1] Not all participants received a punishment in the actual punishment block, as in order to be punished one had to contribute less than group partners, which was 16 or 17 MUs. 74.7% participants experienced punishment. The rest never experienced punishment, as they contributed more than group average on "punishing" trials. Additional analyses with only contribution levels of participants who were punished did not change significance of any results.

8.3.2 Influence of Motivation Traits on the Change in Behaviour in Different Punishment Conditions

Table 8.2 provides the means, standard deviations (SD) for BIS and BIS-anxiety. All variables were normally distributed.

Table 8.2 Means, standard deviations (SD) and zero-order correlations for motivational variables

Scale	Mean (SD)	(1)	(2)
(1)BIS	2.93 (.56)	1.00	
(2)BIS-anxiety	3.13 (.64)	0.93***	1.00

Note. ***p < .001

I expected that individual differences in behavioural inhibition should predict a decrease in contribution levels when the risk of punishment became lower. To analyse the effect of behavioural inhibition on the decrease in contribution levels in the punishment possibility block (punishment was expected but did not occur) as compared to actual punishment block, I calculated the difference score between levels of contributions in possibility of punishment versus actual punishment blocks. This difference was calculated for each individual participant by subtracting their average contribution in the actual punishment block from an average contribution in the possibility of punishment block (i.e. the individual contribution in actual punishment condition minus the contribution in a possibility of punishment condition). These were then correlated with the traits. The difference (M = 1.47, SD = 3.19) was significantly negatively correlated with BIS (r = -.237, p < .05) and BIS-anxiety (r = -.240, p < .05). This supports the prediction and suggests that participants who self-reported low behavioural inhibition decreased their contribution levels when punishment expectations were not met compared to the condition when punishment expectations were met.

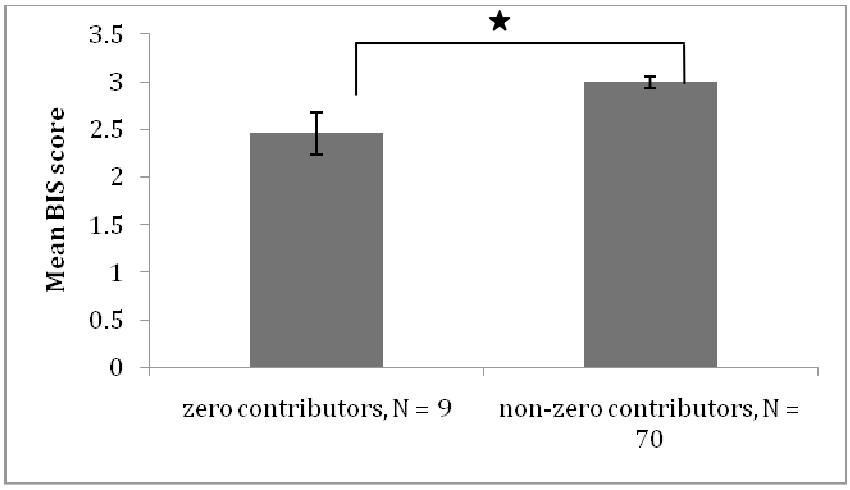
8.3.3 Free-riding and Individual Differences in Behavioural Inhibition

8.3.3.1 Zero Contributions and Behavioural Inhibition

I investigated if there was a link between zero contributions on any of the blocks and BIS. I divided participants into zero contributors (i.e. those, who made at least one zero

contribution across all games in the block, N = 9) and non-zero contributors (i.e. those, who never made a zero contribution during any of the games in a particular block, N = 70). An independent sample t-test demonstrated that only in the possibility of punishment block those who never made a zero contribution on any of the games were significantly higher in self-reported BIS: t (77) = -2.80, $p < .01$ (the differences in BIS-anxiety were also significant, t (77) = -2.50, $p < .05$, respectively). This supports the predictions in terms of links between BIS and risk assessment. Such as, in the situation when the possibility of punishment was less certain (a possibility of punishment block), those who self-reported lower BIS seemed to be more likely to free ride (make a zero contribution on at least one the trials) compared to those with a higher BIS. Figure 8.2 summarizing these findings.

Figure 8.2 Differences in mean BIS for zero and non-zero contributors, a possibility of punishment block



8.3.3.2 Free-riding Tendencies and Behavioural Inhibition

Furthermore, I tested if the level of contributions of those with free-riding tendencies under the possibility of punishment condition (i.e. punishment expectations were not met) were mediated by trait behavioural inhibition.

I used a standard PGGs block before the punishment instruction to classify participants into free-riders and non free-riders. Those who contributed in this block less than mean group contribution on average were classified as free-riders (N = 23). This classification criterion to identify free-riders was used previously in the literature (Carpenter, 2007; Fehr & Gachter, 2000). By the structure of the game, mean average contribution was 7 MUs. Therefore, under the conditions of the games in this experiment, individuals free rode only when contributed less than 7 MUs on average. Instead, those who contributed more than 7 MUs did not free ride (on average). The choices of non free-riding group could have followed either reciprocating strategy (i.e. attempting to match contributions to the group's average) or altruistic strategy (i.e. giving more than was expected from the group). However, in the one-shot scenario of games in this experiment, I expected motivational traits not to be associated with the latter two strategies, as there were no rational reasons for cooperating (i.e. no reputation building possibilities). I, therefore, did not distinguish between the group of those who contributed around group average (i.e. reciprocated) or those who consistently

contributed more than group average (i.e. demonstrated altruistic behaviour) for the sake for this analysis.

As predicted, only for free-riders BIS-anxiety correlated positively with contribution levels in possibility of punishment condition ($r = .433$, $p < .05$). Therefore, individuals with free-riding tendencies, in the possibility of punishment block, contributed more only if they were high in behavioural inhibition.

8.4 Discussion

The results of this study demonstrated how punishment affects contribution levels in a one-shot PGG, where participants were instructed about a possible fine for free-riding. Specifically, with other factors controlled (e.g. group partners' contribution levels), I showed that when there was a possibility of punishment for free-riding, individuals contributed significantly more, compared to when there was no punishment for free-riding. This is in line with findings from behavioural economics on the effects of punishment on cooperation levels in PGGs, social dilemmas and pro-social behaviour in general (Fehr & Gachter, 2002; Masclet & Villeval, 2008; Nikiforakis, 2008).

In this experiment basic punishment risk was manipulated. Unknown to participants, experimental conditions were arranged so that unless they contributed almost all of their initial endowment (more than 17 MUs out 20) they were punished. This design differs from other research on the effects of punishment contingencies on behaviour in social dilemmas (e.g. Cinyabuguma et al., 2005; Fehr & Gachter, 2002). In those studies, punishment levels depend on the contribution levels of real group partners as well as the behaviour of the "punishers" in response. In my design punishment contingencies (either actual or possible) were fixed for all participants (everybody underwent exactly the same schedule), and did not depend on neither other players' contribution levels nor participants' individual contribution levels (unless they contributed more than 17 MUs on the "punishing" trial). Such design allowed studying behaviour of participants in response to the fixed punishment contingencies, revealing the basic regularities of behaviour when facing a punishment or its

possibility in the PGGs. Such design further allowed investigating the role of individual differences in free-riding behaviours in the presence of the punishment contingencies.

8.4.1 Possibility of Punishment is enough to Increase Contribution Levels

There are a number of recent investigations of how punishment effects pro-social behaviour in social dilemmas (Cinyabuguma et al., 2005; Fehr & Gachter, 2002). However, these studies mostly employ "real partners" design, which makes it impossible to experimentally control the feedback about group contribution levels each participant faces in each game. The design reported here is beneficial in this regard, as without deceiving participants (Bardsley, 2000), I experimentally controlled for the group contribution levels. Furthermore, the structure of each block in terms of feedback about group contribution levels was also similar. Therefore, I could assume that individual contribution levels changed only as a function of the experimental conditions (e.g. actual punishment versus possibility of punishment).

I hypothesised that a possibility to manipulate the information about "online" punishment probability within the block of games was to have individuals experience or not actual punishment during the games. The results, in line with the predictions, demonstrated that the contribution levels under the conditions of actual punishment were higher than when the punishment was possible but never occurred. This conforms to general accounts of broader theoretical models of decision-making (e.g. reinforcement learning models, Dayan & Daw, 2008) and suggests that a beneficial choice in each trial was affected by the information about reward/punishment risks known prior to the decision. Specifically, individuals estimated "online" probability of punishment as higher when they actually experienced a punishment. When the punishment was possible in the games, but never occurred, as all the rest was kept equal, "online" probability of punishment was lower for the participants. As a result, they free rode more: contribution levels in the possibility of punishment block were lower than in the actual punishment block.

8.4.2 Effect of Individual Differences in Behavioural Inhibition on Contribution Levels and Zero Contributions

I hypothesized that behavioural inhibition can differentiate behaviours in case of different probabilities of punishment risk.

In line with the predictions, individual discrepancy between contribution levels in the actual and possibility of punishment blocks was correlated with self-reported behavioural inhibition. Those participants, who reported lower behavioural inhibition, were faster in decreasing contribution levels in the possibility of punishment block as compared to actual punishment block as compared to those who reported higher behavioural inhibition. In other words, high BIS individuals were making similar contributions in both blocks, whether the punishment was actual or possible.

Furthermore, those who invested something in the possibility of punishment block on all trials, self-reported higher levels of BIS. Those who gave a zero contribution on at least one of the games, self-reported lower levels of BIS. Therefore, BIS was associated with the behaviour when the presence of punishment was less certain.

This is in line with recent theorizing that trait behavioural inhibition could mediate behaviours in the situation of uncertainty. In case of this experiment, uncertainty was about the punishment probability: those with higher behavioural inhibition seemed to be less sensitive to the change in the "online" punishment probability and were perhaps more likely to follow the rule, which were established by the instruction in the beginning of the block.

The evidence derived here supports this claim. Those with higher BIS seemed to be slower in adjusting to the change of actual punishment contingencies in the environment. This is in line with broader interpretation of behavioural inhibition as being associated with depressive states (Meyer, Johnson, & Winters, 2001). Depressive states are in turn linked to overvaluation of punishment contingencies (Must et al., 2006) and might, therefore, lead to risk aversion in the situation of uncertainty.

8.4.3 Low Behavioural Inhibition in Free-Riders Predicts Lower Contribution Levels When the Risk of Punishment is Low

In line with predictions, for those who demonstrated free-riding tendencies during a standard baseline block of PGGs, BIS was mediating their behaviour in punishment blocks. Specifically, while in the actual punishment block no correlation with BIS was observed for behaviours of either free-riders or non-free-riders, i.e. everybody contributed highly (15.7 MUs on average); in the possibility of punishment block only free-riders with higher BIS-anxiety contributed highly. Free-riders, who reported lower BIS-anxiety, contributed less in the games where the punishment risk was lower. This is in line with the evidence of Block and Gerety (1995), who showed that a group of individuals who can be considered as more risk-seeking (prisoners), were more sensitive to the change in the punishment risk in the social dilemma scenario than university students.

8.5 Limitations

The central hypothesis of this study focused on studying the links between BIS and punishment risk in the PGGs scenario. This design provided only indirect manipulation of different levels of the probabilities of punishment, as I aimed to secure its ecological validity. Furthermore, I did not assess subjective risk perception, as it might have had an influence on individual responses. This line of research can be taken further by eliminating abovementioned limitations.

8.6 Next Chapter

In Chapters 6 and 7 I employed experimental social dilemmas to study higher level motivational orientations in the laboratory conditions. Specifically, I investigated how manipulations of reward and punishment contingencies affect individual choices. Furthermore, I explored the links between basic motivational traits and the individual differences in higher level motivational orientations, expressed as behavioural choices in the PGGs. In the next chapter, I re-analysed the data from two experiments to correlate it with self-reported individual differences in higher level motivational orientations, displayed as motivations for degree choice.

Chapter 9

9 Coherence in Small and Large-Scale Choices

9.1 Overview

In Chapters 2-5 I demonstrated that in a real life choice domain - a degree choice – individuals are guided by the extent to which a chosen alternative is self- or other-orientated. Specifically, amongst reported reasons for the choice of degree were career (i.e. strategic motivation), loafing (selfish free-riding motivation) and helping (i.e. pro-social motivation). Conceptually, these motivational orientations resemble choices that individuals make in scenarios like PGGs. As such, in the PGGs individuals choose either pro-social (i.e. to cooperate) or pro-self options (i.e. to free ride). Thus, individual behavioural strategies and choice motivators in two different situations (e.g., in social dilemmas and while choosing a degree) appear to be corresponding theoretically. It is possible, therefore, that behavioural strategies identified through economic games and generic motivational constructs established in the social psychology could be different representations of the same core motivational orientations. Thus, correspondence of motivations in the PGGs and the choice of degree domain was investigated empirically in this chapter.

9.1.1 Individual Preferences in Social Dilemmas Extended to Real Life Choices

Studies, which extend behavioural strategies identified in the laboratory into real life, showed that individual behaviours in similar lab and real life settings correlate. In support to cross-situational coherence of pro-self/others orientations, a few recent studies showed correlations between behavioural choices in the lab and in real life (e.g. charity donations, Baran, Sapienza, & Zingales, 2010; Van Lange et al., 2007). Specifically, Carpenter and Myers (in press) demonstrated that altruistic choices in an experimental donation game predicted decision to take part in real life pro-social behaviour (volunteering for a local fire fighting brigade). Further, Benz and Meier (2008) showed that individual donations of students in a laboratory setting to a charity and to a social fund significantly correlated with donations to a social fund outside the lab (see Baran et al., 2010, for similar evidence using a trust game).

While there is some similarity in pro-self/others behaviours in the lab and in real life, findings of correlations between lab and real life choices largely depend on conditions (e.g. how choice options are framed, what incentives are used). Therefore, it is still not clear to what extent motivational orientations identified as behavioural strategies in the lab are a function of specific experimental conditions. Alternatively, they could in part originate from dispositional motivational strategies.

Furthermore, depending whether the interactions are expected to be repeated or one-shot by an individual, strategic orientation can be associated with either pro-social or selfish choices, respectively. Knowing if these motivational orientations are dispositional is important for predictions of real world choices in many life domains (e.g., purchasing, risky behaviours, blood donation, charity donations, etc). However, there is not much research yet that demonstrates cross-situational coherence of such orientations in a greater variety of situations (e.g., are those who make donations, also make similar life-path choices, such as choose a job which provides with an opportunity to help others).

9.1.2 Motivational Traits and Motivational Orientations

In Chapter 6 I have demonstrated that BIS positively was associated with helping motivation in both undergraduate and potential students' samples, as well as moderated effects of BAS on helping motivation as a reason for degree choice in the undergraduate sample.

I have also demonstrated that career or strategic self-oriented behaviour was linked to BAS in both large scale and small scale domain. Specifically, BAS predicted career orientation (see Chapter 6) as a reason for degree choice for both undergraduate and potential students' sample. In addition, a subscale of BAS (i.e. BAS-RR), predicted strategic behaviour in the PGGs experiment (see Chapter 7).

Loafing, which represents free-riding orientation in the degree choice domain, was negatively associated with BIS in both samples, as well as positively with BAS, but only in the open days sample. Furthermore, free-riding choices in the PGGs (i.e. zero-contributions) were associated with BIS in both experiments.

Taken together, these results suggest that individuals might demonstrate inter-situational coherence in their motivational orientations. If individual choice is driven by a specific motivational orientation, which can be in part dispositional, then individual choice strategies should be coherent between these two situations (laboratory games and a choice of degree as an example of a real life choice).

Based on the evidence from behavioural economics and social psychology, I expected that individuals who choose a degree due to strategic reasons, free-riding opportunities or to help others, would demonstrate coherent choice strategies in the social dilemma, i.e. they would be strategic (in the case of one-shot social dilemmas, self-oriented), free ride (self-oriented) or pro-social. If the patterns are coherent, this provides evidence that these individual motivational orientations are represented across different domains and could be reflective of a stable individual behavioural choice strategy.

9.1.3 Motivational Orientations in the PGGs and Degree Choice Domain

This chapter is devoted to the investigation whether individual differences in self-reported pro-social, selfish free-riding and strategic motivation in real life choice domain is associated on the individual level with individual behavioural strategies in the laboratory experimental social dilemmas.

If motivational orientations quantified in two different domains (i.e. the PGGs and degree choice domain) are similar (e.g. reflect pro-sociality), they could be in part a function of the same individual motivational disposition. Thus, I expected individual differences in pro-social choices in social dilemmas, and while choosing a degree, to be coherent. In similar fashion, I expected individual differences in strategic orientation (career) and free-riding (loafing) to be associated with both self-orientated strategic choices in social dilemmas and while choosing a degree.

9.1.4 Aims and Predictions

Two choice situations studied here were a choice to cooperate or free ride in a PGGs and a real life choice – a decision which degree to study at the university, where grounds on which the choices were made included motivational orientations of career, loafing and helping. Participants reported their reasons for degree choice by the means of the questionnaire (VIC-Degree).

The same participants also played in the series of one-shot laboratory anonymous public goods games (PGGs), where they faced a choice either to free ride or to cooperate (see Chapters 7 and 8 for the details of the experimental procedures). I tested whether the same individual choices in the laboratory social dilemma were associated with the motivation behind their real life decisions in the situation of the degree of choice. No previous research looked into if the same motivations guide individual choices in the lab-based social dilemmas and large-scale life-path choices such as a choice of degree.

I predicted individuals to be coherent in their pro-self/others tendencies in two different situations. As such, those who made pro-social choices in social dilemmas (PGGs reciprocity and punishment experiments, Chapters 7 and 8) were expected to report helping as their motivation for the choice of degree; while those who were pro-self in social dilemmas were expected to report career and loafing as their degree choice reason. There were no predictions for interest orientation; therefore this scale was omitted from analyses in this chapter.

9.2 Method

For the analysis in this chapter, the same samples as in Chapter 7 and 8 were utilized. See Chapter 7 and 8 for the information about participants and experimental procedures.

VIC-Degree scales (see Chapters 2-5 for a detailed description) were utilized to measure helping (PGGs reciprocity experiment, α = .85, M (Mean) = 3.90, SD (Standard Deviation) = 1.13; PGGs punishment experiment, α = .87, M = 3.90, SD = 1.24), career (PGG reciprocity experiment, α =.79, M = 3.81, SD = .96; PGGs punishment experiment, α = .87, M = 3.93, SD =

1.12) and loafing (PGG reciprocity, α = .59, M = 2.06, SD = .71; PGGs punishment, α = .69, M = 1.97, SD =.67).

To quantify motivational orientations in the PGGs experiments, the same indices as were used in the previous analyses of the results in Chapters 7 and 8 were utilized here. Namely, average contribution levels and zero contributions in two conditions of the reciprocity PGGs experiments (see Chapter 7 for the details), high/low last mover position; and contribution levels and zero contributions in each of the blocks in punishment PGGs experiment (see Chapter 8 for the details).

9.3 Results

9.3.1 Correlations

Table 9.1 reports between variable zero-order Pearson's correlations for VIC-scales and indices derived based on the choices in the PGGs, which were used for the analyses in this chapter. Only significant results are discussed below.

Table 9.1 Zero-order Pearson's correlations between outcomes in PGGs and VIC-Degree scales of helping and career

	PGGs reciprocity (N = 71)		**PGGs: punishment (N = 79)**			
	high last	low last	standard block before a punishing instruction	actual punishment block	possibility of punishment block	standard block after a punishing instruction
Helping	-.03	.01	.16	.08	.08	.11
Career	-.24*	-.20	-.21 (p = .05)	-.02	-.07	-.08
Loafing	.12	-.02	-.047	-.065	-.062	-.009

Note. * p < .05

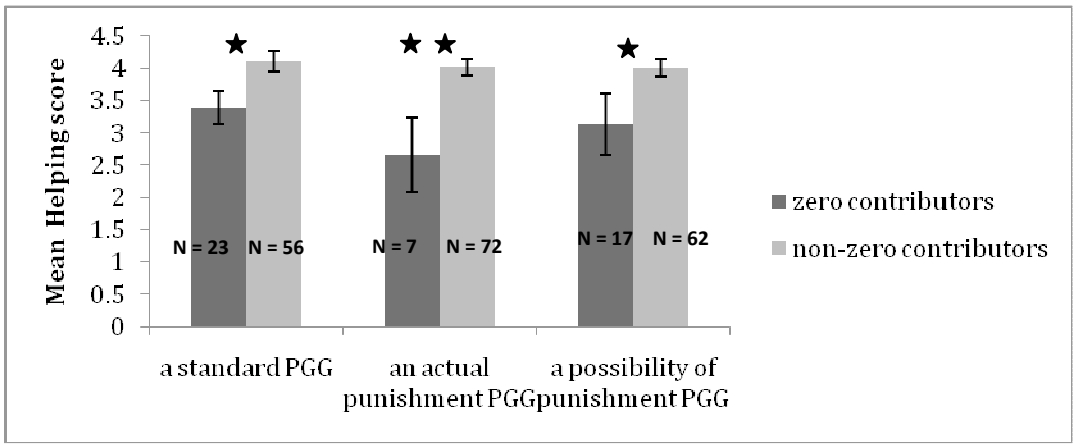
Career orientation was found to negatively correlate with contribution levels in the condition when participants received the feedback that their group gave a high amount into the public good: -.234, $p < .05$, PGGs reciprocity experiment.

Career orientation was found to correlate marginally negatively with overall contribution levels in a standard game before a punishing instruction: -.215, $p = .05$, PGGs punishment experiment.

There were no associations of loafing with contribution levels in either of experiments.

Furthermore, I compared self-reported degree choice motivation (helping and career scales) between the groups of zero contributors (i.e. those, who made at least one zero contribution in any of the games in a block) and non-zero contributors (i.e. those, who never made a zero contribution during any of the games in a particular block) in a PGGs punishment experiment. There was a significant difference in the mean score of helping for all blocks (see Figure 9.1): a standard PGGs block (here the data was collapsed across two blocks, before and after the punishing instruction, as there were no significant differences between blocks, pair-samples t-test, t (78) = -.19, ns): t (77) = -2.41, $p < .05$; actual punishment block: t (77) = -2.91, $p < .001$; possibility of punishment block: t (77) = -2.01, $p < .05$). There were no differences in contribution levels associated with career or loafing orientation. Similar analysis for PGGs reciprocity experiment did not reveal any significant differences.

Figure 9.1. Differences in mean helping scores for zero and non-zero contributors, a PGGs punishment experiment. Ns refer to the number of participants in each group of contributors for each condition of the experiment



Note. ** $p < .001$, * $p < .05$

Results demonstrated that in all blocks during the PGG punishment experiment those who made at least one zero contribution in any of the games were lower in self-report helping as the reason for the choice of degree.

9.4 Discussion

While behaviours in two situations seem to be different in many respects (see Table 1.1 for the summary in differences in two choices domains studied here), results supported theoretical similarity of choices: individuals demonstrated cross-situational coherence in large and small-scale choice domains. Specifically, those who reported choosing their degree because it offered good career options contributed less under conditions in both PGGs experiments. They reciprocated less to their group partners' contributions in the reciprocity PGGs experiment, when this choice led to a higher monetary reward. They also contributed less on average in a standard PGG (Chapter 8), which led to an increased monetary pay-off.

Furthermore, those who reported that they had chosen their degree because it provided opportunities to help others did not make zero contributions in any of the punishment PGGs experiment blocks.

This suggests that individual career and helping orientations, as well as reflecting degree choice reasons, were coherent within individual choices in the experimental laboratory PGGs. The findings contribute to the body of recent evidence (Benz & Meier, 2008; Carpenter &

Myers, in press; Van Lange et al., 2007) suggesting that behaviour in the experimental social dilemmas resembles real life choices. Furthermore, it implies that from choices in social dilemmas we can potentially predict real life individual behaviours.

These findings further reinforce the idea that motivational orientations (e.g. pro-social and strategic career motivation) are domain general as they seem to guide individual behaviours in various domains. It also suggests that they might potentially have the same basic motivational traits that underpin them. Specifically, pro-social orientation in both domains seems to be linked to BIS, while strategic career orientation seem to be linked to BAS.

9.5 Limitations

While I demonstrated cross-situational coherence of pro-social and strategic achievement motivation, I have not found experimental evidence for cross-situational coherence of intrinsic motivational orientations or free riding motivation orientations. The former is due the fact that intrinsic motivation is theoretically irrelevant to choices in social dilemmas. The latter might be due to differences in the way free-riding manifests in two different domains.

9.6 Next chapter

Final chapter discusses findings of this thesis and interprets them in the broader context of motivational theories.

Chapter 10

10 General Discussion

This thesis examined the underpinnings of higher level motivational orientations. Three main research questions were investigated at two choice domains: the choice of degree and experimental social dilemmas.

First, the dimensions of higher level motivational orientations were examined. The findings demonstrated that four core higher level motivational orientations, namely pro-social, intrinsic, achievement motivation and free-riding, in part resemble motivational patterns in the social dilemmas, and guide individual choices in a real life choice domain – a choice of degree.

Second, the links between higher level motivational orientations and motivational traits were investigated (see Table 10.1 for a summary). The results demonstrated that both intrinsic and strategic achievement motivations were mainly associated with behavioural approach, while pro-social motivation and free-riding were pre-dominantly associated with behavioural inhibition.

Table 10.1 Underpinnings of higher level motivational orientations, summary of findings in the thesis:

"**+**" depicts positive associations; "**–**" – negative; "**X**" – interaction

Motivation	Reward sensitivity	Behavioural inhibition	Reward sensitivity by behavioural inhibition
Intrinsic	**+**[1]		
Strategic achievement	**+**[1,2]		**X**[1]
Pro-social		**+**[1]	**X**[1]
Free-riding	**+**[1]	**–** [1,2]	

Note: Evidence based on: [1]degree choice domain; [2]PPGs

Third, the coherence in individual motivational patterns between experimental social dilemmas and in the real life choice domain was studied. Pro-social and strategic achievement motivations were coherent on the individual level with motivational patterns in the experimental one-shot social dilemmas, displayed as cooperative and strategic self-oriented behaviour.

Further I provide a discussion of these findings in the light of previous research.

10.1 Motivational Orientations

10.1.1 A Four Factor Model of Motivational Orientations

A number of models identified various types of higher level motivational orientations (e.g. intrinsic and extrinsic motivation in SDT Deci & Ryan, 2002; pro-social and free-riding orientations in behavioural economics, Fehr & Gintis, 2007) which seem to be domain general. These motivations are also conceptualised to predict real life choices (i.e. pro-social individuals are more likely to make donations to the charities, Benz & Meier, 2008). However, these models cannot predict individual choices in real life situations (e.g. choice of degree) where different motivations compete (e.g. pro-social versus strategic achievement).

To study this gap, I developed a model of choice motivation by analysing a conceptual overlap of higher level motivations in social psychology and behavioural economics. It was further applied to the degree choice domain, where I have empirically established four core dimensions of motivational orientations. The findings here supported SDT (Deci & Ryan, 2002), as both extrinsic (career) and intrinsic (interest) orientations seem to represent dimensions of degree choice reasons; and findings in behavioural economics (Fehr & Gintis, 2007), as both pro-social (helping) and free-riding (loafing) orientation also manifested as degree choice reasons. Conceptual similarity of motivational orientations in the degree choice domain, behavioural economics and social psychology further supported domain-generality of pro-social, intrinsic, strategic achievement motivation and free-riding. Thus, these four dimensions can potentially explain individual choices in other domains of human behaviour (e.g. relationships, health, sport, work, etc).

10.1.2 Limitations and Future Research: Domain-Generality of Four Dimensions

The evidence from previous research suggests that four higher level motivational orientations, specified above, affect choices in various domains. However, it is not necessary that all four orientations would be employed to explain choices in any domain of human behaviour. Whether one or the other dimension is involved in predicting an individual choice outcome in a certain domain or situation depends on the set of options one is choosing from. Depending on the set of options, one or another type of motivation could be involved in guiding one's choices. Such as, in some domains, intrinsic motivation might be not applicable. For instance, it was not associated with choices in social dilemmas (see Chapter 9). Taking into account these caveats, future studies could examine how higher level motivational orientations are represented in various choice domains and in what way the set of possible alternatives defines the necessary number of motivational dimensions to explain individual differences in choices.

10.2 Underpinnings of Higher Level Motivational Orientations

While both social psychology literature on motivation (e.g. Deci & Ryan, 2002; Elliot, 2006) and neuroscience literature on decision-making (e.g. Dayan & Daw, 2008; Rangel et al., 2008) essentially aim to model how people make choices, there only very modest links between two fields has been established.

10.2.1 Implications for Pro-Social Motivation and Free-Riding

Recent research in behavioural economics proposed tentative links between basic motivational mechanisms and choices. As such, both pro-social motivation and free-riding is predominantly has been previously explained through reward processing (Fischbacher et al., 2001; Harbaugh et al., 2007). However, given that reward sensitivity is hypothesized within neuroscientific approaches to personality as a disposition (e.g. Gray & McNaughton, 2000), it is not clear whether somebody high in reward sensitivity will cooperate or free ride in a given situation. In this thesis I aimed to investigate the links of basic motivational traits (e.g.

behavioural approach and inhibition) with motivational orientations such as pro-sociality and free-riding.

I have argued that pro-social motivation can potentially be driven by a combination of approach and inhibitory processes. This is in line with recent evidence on delayed reward gratification as a potential mechanism behind pro-social behaviour (McCabe et al., 2001; Stevens & Hauser, 2004). Specifically, inhibition of an initial desire to get a quick immediate reward, leads to larger reward in the future through the means of cooperation. In line of this theorising, while reward-related neural and behavioural mechanisms should be involved in cooperative acts, pro-sociality cannot be explained purely through reward-related mechanisms. Supporting these claims, my findings demonstrated that manipulation of both reward and punishment contingencies affected levels of cooperation in the PGGs. Furthermore, I have shown that individual differences in behavioural inhibition enhanced association between behavioural approach and pro-social motivation in the degree choice domain. Moreover, I have demonstrated that individual differences in behavioural inhibition explain free-riding tendencies in two different PGGs experiments, as well as are negatively associated with free-riding (loafing orientation) as a degree choice reason.

Overall, the findings with regards to pro-social motivation and free-riding in this thesis contradict mainstream explanations of cooperation in behavioural economics. Specifically, I concluded that while reward-related mechanisms may play a part in cooperative behaviour, it is inhibition-related processes and related traits that explain individual differences in pro-social motivation. Thus, individual differences in behavioural inhibition in combination with reward sensitivity should predict whether one is cooperative or not.

10.2.2 Implications for Investigations on Extrinsic and Intrinsic Motivation

A strong line of research within social psychology distinguishes between extrinsic and intrinsic motivation, suggesting that the former is driven by external goals while the latter by enjoyment of the process of the activity itself (Deci & Ryan, 2002). Furthermore, extrinsic motivation seems to conceptually overlap with achievement motivation (Heckhausen, 1977).

While differences in these motivations have been shown to lead to a variety of different outcomes (Kasser & Ryan, 1996; Sheldon & McGregor, 2000; Walker et al., 2006) and have been also demonstrated to be distinct dimensions through experimental designs (Deci, 1971), it is still not clear what are the basic motivational processes underlying extrinsic and intrinsic motivation. As both motivations should theoretically be driven by rewards (albeit of different types), I hypothesized that reward sensitivity is associated with both strategic achievement (extrinsic) and intrinsic motivations.

My findings confirmed that extrinsic and intrinsic motivations represent two distinct dimensions to guide individual choices. As such, both motivational orientations represented separate dimensions in the degree choice domain (career and interest orientation, respectively), as well as strategic achievement was only linked to strategic choices in the PGGs reciprocity experiment. Individual differences in both motivational orientations within a degree choice domain were linked to behavioural approach. This is in line with a comprehensive review of Depue and Collins (1999) on approach motivation and its neural underpinnings, which linked a cluster of its behavioural outcomes (including achievement motivation) to reward processing. This also corresponds to the findings Myrayama and Elliot (2009), who demonstrated that BAS positively predict mastery (reflects a type of learning based around intrinsic interest in the subject) and performance-approach (reflects a type of learning based around achievement goals) in educational settings. Therefore, together with previous research, my findings suggest that both strategic achievement and intrinsic motivation are associated with individual differences in reward sensitivity.

10.2.3 Limitations and Future Research: Underpinnings of Motivational Orientations

A general limitation for the interpretation of the empirical results of this thesis is that the conclusions can only be made about associations between motivational traits and orientations but not about causal relationships. For instance, it cannot be decisively concluded that sensitivity to reward leads to the development of intrinsic and/or achievement motivation. Future studies with longitudinal designs could investigate whether

relationships between motivational traits (and underlying basic mechanisms of reward-processing and inhibition) and higher level motivational orientations are causal.

10.3 Intra-situational Coherence in Individual Choices

A handful of recent studies demonstrated inter-situational coherence between motivational patterns modelled in laboratory settings and in real life situations (e.g. pro-social choices in the lab has been shown to correlate with pro-social behaviours in real life, Benz & Meier, 2008; Carpenter & Myers, in press). Findings reported here contributed to this body of research by demonstrating that individuals display coherent motivational patterns in two different choice situations. Specifically, helping and career orientation in the degree choice domain, indicators of pro-social and strategic achievement motivation, were correlated with similar individual behaviours in the PGGs.

Therefore, we can conclude that at least with regards to pro-social and strategic achievement motivational dimensions, individual choices are, in part, a function of the same motivational disposition (in this case, either pro-sociality or strategic achievement motivation). This further suggests a possibility to expand predictions based from motivational orientations to broader range of situations. Specifically, it could be investigated if strategic motivation predicts strategic choices in other domains (e.g. relationships, sport, health, etc), further establishing domain-generality of higher level motivational orientations. Such as, if one is strategic when choosing their degree, we might also expect them more likely to engage in strategic activities in their leisure time or make strategic choices in their everyday lives (e.g. make friends with people who can be useful for career development in the future). Therefore, studies on individual differences in higher level motivational orientations can contribute to the models of decision-making and choice behaviour by improving their specificity in terms of predicting individual choices.

10.4 General Implications for Reinforcement Sensitivity Theory

The role of approach and avoidance motivation in decision-making have been well established in both psychological (e.g. Elliot, 2006) and neuroscience (e.g. Gray & McNaughton, 2000)

investigations of personality. There is a growing body of research on the roles of both approach/avoidance and corresponding underlying mechanisms of reward and punishment to explain a variety of clinical outcomes outside a normal range, including addictions (Everitt & Robbins, 2005), depression (Must et al., 2006), psychopathy (Heym & Lawrence, 2010), etc. However, it is still unclear how exactly behavioural activation/inhibition system manifest in higher level motivations (e.g. pro-social motivation) and real life decisions (e.g. choice of degree), specifically within a normal range.

I have demonstrated that BAS is associated with career orientation in both undergraduate and potential students' samples, as well as with strategic behaviour in the PGGs. It has also been linked to interest orientation but only in the undergraduate sample. Career and interest orientations appear to be similar in the sense that both imply being driven by a reward. The difference between these two motivations is in the nature of reward, it being either extrinsic (career) or intrinsic (interest). Therefore, while the basic hypothesized motivational process is common, it manifests in two different motivational orientations. Future research could investigate what are the processes that define whether a high in BAS individual becomes career or interested oriented. Specifically, by investigating how these two motivations can be distinguished on the level of basic motivational mechanisms.

I have also demonstrated that low BIS-anxiety, scored as suggested by Heym et al (2008) was associated with zero contributions in both PGGs, and with a larger drop in the contribution levels under the conditions when the punishment probability (but not its magnitude) decreased. Furthermore, amongst those who demonstrated free-riding tendencies, BIS-anxiety was negatively associated with contributions under conditions of lower punishment probability. Furthermore, overall BIS (Charles S. Carver & Teri L. White, 1994) was associated negatively with loafing as a degree choice reason on both undergraduate and potential students samples, as well as it was positively associated with helping as a degree choice reason although only in the undergraduate sample.

Within a revised RST, BIS-trait has been broadly associated with behaviours under uncertainty, however, the exact behavioural manifestation of this trait has not been established as yet, specifically within a normal range. My findings contribute to clarifying how BIS-anxiety could explain individual differences when facing uncertainty. For instance, in the PGG punishment experiment (Chapter 8), in the punishment possibility condition the uncertainty might have been created, as the explicit rule of the game informed participants that they might be punished for free riding. However, the punishment had never actually happened. It is, therefore, possible that one could strategically conform to the rule in order to avoid the fine or choose another strategy - adjust their behaviour in the conditions when the punishment was not occurring, and free ride. These strategies might be similar to what is described in decision-making literature as control of behaviour through top-down cognitive strategies versus behaviour associated with more primitive, habitual stimulus-response mechanisms (e.g. Dayan & Daw, 2008), respectively. In this regard, high BIS individuals in the PGGs punishment experiment seemed to be following the instruction, even when no punishment had occurred, while low BIS individuals adjusted their behaviour and made the choices that led to higher rewards (and, perhaps, were faster in disregarding the consequences of the choice, i.e. a still possible punishment). In the similar fashion, a loafing orientation in the degree choice domain could be interpreted as choosing an easier route to obtain higher education without a consideration of the future consequences (e.g. a lack of good career options after finishing a degree). This evidence tentatively suggests that higher BIS individuals might have better capacities to use top-down control cognitive strategies. Future research could establish how exactly pre-disposition to behavioural inhibition affects individual choices.

10.5 Uncovering Mechanisms of Motivation and Choice Behaviour through Individual Differences

Findings in this thesis bring together different methodologies and approaches to study human motivation. This allows developing explanations and making predictions about the links between different levels of motivation, from basic decision-making mechanisms to motivation

for real world choices (see Figure 1). This research reinforces the idea that basic decision-making mechanisms are implicated in real life choices on different levels. Through revealing associations between individual differences in traits, evolved around basic decision-making mechanisms (e.g. reward and punishment processing), and higher level motivations (e.g. pro-sociality), we can establish the role of those basic mechanisms in real life behaviours.

As well as advancing the knowledge on motivation in the field of psychology (see previous sections of the General Discussion), findings in this thesis also contributed to the broader non-psychological literature on choice behaviour and decision-making. Such as, for instance, the interaction of the motivational traits of behavioural approach and inhibition, which could be theoretically linked to delayed reward gratification, was associated with pro-social motivation while choosing a degree. Therefore, I have demonstrated how it is possible to apply theorizing on basic decision-making mechanisms to real life choices.

Furthermore, the empirical findings presented here can potentially contribute to the economic literature by uncovering mechanisms underlying specific types of behaviours, such as cooperation. Classifying behaviours into different types, as is routinely done in behavioural economics, requires assuming that a qualitative difference in terms of personality traits underpins such behaviours as free riding and cooperating. Whether these are distinct stable forms of behaviour is an empirical question and one that psychology is in a good position to test with techniques such as taximetrics (Ferguson, 2009; Ferguson et al., 2009).

This research agenda reinforces the notion that individual choices on different levels (with a long-term influence, e.g. a choice of degree, or with a short-term influence, e.g. making a charitable donation) in part can be explained by dispositional traits, such as behavioural approach and inhibition. These traits evolve around basic decision-making mechanisms of processing reward and punishment contingencies in the environment. Incorporating knowledge of basic motivational and affective decision-making mechanisms into the models of individual differences in motivation, could considerably improve their predictions about real life choices. Moreover, established here links can serve as a starting point to develop

further hypothesis about neurobiological mechanisms underlying individual differences in real life choices.

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Appendices

Appendix 1 Pilot Study Survey

1. Please name the subject of your first degree:

2. Please recall and put in the table several reasons why you've chosen this particular program. Then rank the reasons according to their importance for yourself, putting the most important reason first.

Reason	Rank

Thank you very much for your help!

Appendix 2 Degree Choice Study, Consent Form

PLEASE FILL IN THIS CONSENT FORM AND RETURN IT TO RESEARCHER OR TO THE QUESTIONAIRE RETURN BOX AT THE RECEPTION (OR LODGE) OF YOUR HALL OF RESIDENCE

Consent Form

A survey study of attitudes toward the degree choice among the students of British universities
Investigators: Anna Skatova and Professor Eamonn Ferguson – School of Psychology, University of Nottingham

You should complete the whole of this sheet yourself. Please cross out as necessary:

• Have you read and understood the participant information sheet?	YES/NO
• Have you had the opportunity to ask questions about the study?	YES/NO
• Have all the questions been answered satisfactorily?	YES/NO
• Have you received enough information about the study?	YES/NO
• Do you understand that you are free to withdraw from the study:	
at any time?	YES/NO
without having to give a reason?	YES/NO
• Do you agree to take part in the study?	YES/NO

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

Participant's Signature: _____

Print Name: _____

Date: _____

Appendix 3 Vector of Individual Choice Questionnaire (final version)

What were your reasons for choosing this degree? Below you will find some statements about possible reasons that might have influenced your choice of degree. **EACH SENTENCE STARTS WITH: I have chosen this degree because……..** followed by the statement in the list. Please indicate how true each statement is for you, assigning "1" when the statement is not true for you at all, "6" – when it is very true for you. Choose **ONLY ONE** response to each statement.

I have chosen this degree because…….

		Not true at all					Very true for me
1….	I was always interested in this subject.	1	2	3	4	5	6
2….	I want to help other people.	1	2	3	4	5	6
3….	I'm not particularly concerned about other people.	1	2	3	4	5	6
4….	I wanted to know more about this subject.	1	2	3	4	5	6
5….	my individual goals are more important than the prosperity of society.	1	2	3	4	5	6
6….	it was the easiest option for me.	1	2	3	4	5	6
7….	I want to get a well-paid job in the future.	1	2	3	4	5	6
8….	it is very competitive and I am an achiever.	1	2	3	4	5	6
9….	I want to serve society.	1	2	3	4	5	6
10..	it provides good career options.	1	2	3	4	5	6
11..	for me it is very important to study a degree that I enjoy.	1	2	3	4	5	6
12..	I am interested in people.	1	2	3	4	5	6
13..	it is a fascinating subject to study.	1	2	3	4	5	6
14..	I knew that I'd manage to pass the degree without doing too much work.	1	2	3	4	5	6
15..	it provides me with secure career options.	1	2	3	4	5	6
16..	the degree seemed to be easy to pass.	1	2	3	4	5	6
17..	I am interested in understanding other people's perspectives.	1	2	3	4	5	6
18..	I want to make the world a better place.	1	2	3	4	5	6

If there are any other reasons that were important for you, please be so kind to specify them in the box below:

Appendix 4 BIS/BAS Questionnaire

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose **ONLY ONE** response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1	**2**	**3**	**4**
very true for me	**somewhat true for me**	**somewhat false for me**	**very false for me**

1. A person's family is the most important thing in life.	1	2	3	4
2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.	1	2	3	4
3. I go out of my way to get things I want.	1	2	3	4
4. I always like to carefully appraise any situation before making a decision.	1	2	3	4
5. I often freeze/tense up in extremely threatening situations.	1	2	3	4
6. When I'm doing well at something I love to keep at it.	1	2	3	4
7. I'm always willing to try something new if I think it will be fun.	1	2	3	4
8. I generally worry a lot.	1	2	3	4
9. How I dress is important to me.	1	2	3	4
10. If I know something unpleasant is about to happen to me, I try to avoid the situation under any circumstance.	1	2	3	4
11. When I get something I want, I feel excited and energized.	1	2	3	4
12. Criticism or scolding hurts me quite a bit.	1	2	3	4
13. I sometimes react in an irrationally aggressive way in threatening situations.	1	2	3	4
14. When I want something I usually go all-out to get it.	1	2	3	4
15. When an opportunity arises I tend to weigh up all the pros and cons.	1	2	3	4
16. I will often do things for no other reason than that they might be fun.	1	2	3	4
17. It's hard for me to find the time to do things such as get a haircut.	1	2	3	4
18. The thought of failure makes me very anxious.	1	2	3	4
19. I tend to avoid situations that are threatening or potentially harmful.	1	2	3	4
20. If I see a chance to get something I want I move on it right away.	1	2	3	4
21. I feel pretty worried or upset when I think or know somebody is angry at me.	1	2	3	4
22. My first response in threatening situations is to get away as soon as possible.	1	2	3	4
23. When I see an opportunity for something I like I get excited right away.	1	2	3	4
24. I often act on the spur of the moment.	1	2	3	4
25. I tend to collect lots of information before making final decisions.	1	2	3	4
26. If I think something unpleasant is going to happen I usually get pretty "worked up."	1	2	3	4
27. I often wonder why people act the way they do.	1	2	3	4
28. I dislike ambiguity.	1	2	3	4
29. I get easily frightened in threatening situations.	1	2	3	4
30. When good things happen to me, it affects me strongly.	1	2	3	4
31. I feel worried when I think I have done poorly at something important.	1	2	3	4
32. I have been known to lash out without thinking when I've been scared.	1	2	3	4
33. I crave excitement and new sensations.	1	2	3	4

34.	I am generally a very cautious person.	1	2	3	4
35.	When I go after something I use a "no holds barred" approach.	1	2	3	4
36.	I have very few fears compared to my friends.	1	2	3	4
37.	It would excite me to win a contest.	1	2	3	4
38.	I worry about making mistakes.	1	2	3	4
39.	When I sense some threat in a situation, I normally check it out straight away.	1	2	3	4
40.	I am often sensitive to a negative atmosphere.	1	2	3	4
41.	If I know I will get punished for something I have done, I become very agitated.	1	2	3	4

Appendix 5 Goldberg Big 5 markers

How accurately can you describe yourself?

Please use the following list of common human traits to describe yourself as accurately as possible by circling a number. Describe yourself as you see yourself at the present time, not as you wish to be in the future. Describe yourself as you are generally or typically, as compared with other persons you know of the same sex and of roughly your same age.

		Very			Moderately	Neither	Moderately			Very	
1.	introverted	1	2	3	4	5	6	7	8	9	extraverted
2.	unenergetic	1	2	3	4	5	6	7	8	9	energetic
3.	silent	1	2	3	4	5	6	7	8	9	talkative
4.	timid	1	2	3	4	5	6	7	8	9	bold
5.	inactive	1	2	3	4	5	6	7	8	9	active
6.	unassertive	1	2	3	4	5	6	7	8	9	assertive
7.	unadventurous	1	2	3	4	5	6	7	8	9	adventurous
8.	cold	1	2	3	4	5	6	7	8	9	warm
9.	unkind	1	2	3	4	5	6	7	8	9	kind
10.	uncooperative	1	2	3	4	5	6	7	8	9	cooperative
11.	selfish	1	2	3	4	5	6	7	8	9	unselfish
12.	disagreeable	1	2	3	4	5	6	7	8	9	agreeable
13.	distrustful	1	2	3	4	5	6	7	8	9	trustful
14.	stingy	1	2	3	4	5	6	7	8	9	generous
15.	disorganised	1	2	3	4	5	6	7	8	9	organised
16.	irresponsible	1	2	3	4	5	6	7	8	9	responsible
17.	negligent	1	2	3	4	5	6	7	8	9	conscientious
18.	impractical	1	2	3	4	5	6	7	8	9	practical
19.	careless	1	2	3	4	5	6	7	8	9	thorough
20.	lazy	1	2	3	4	5	6	7	8	9	hardworking
21.	extravagant	1	2	3	4	5	6	7	8	9	thrifty
22.	angry	1	2	3	4	5	6	7	8	9	calm
23.	tense	1	2	3	4	5	6	7	8	9	relaxed
24.	nervous	1	2	3	4	5	6	7	8	9	at ease
25.	envious	1	2	3	4	5	6	7	8	9	not envious
26.	unstable	1	2	3	4	5	6	7	8	9	stable
27.	discontented	1	2	3	4	5	6	7	8	9	contented
28.	emotional	1	2	3	4	5	6	7	8	9	unemotional
29.	unintelligent	1	2	3	4	5	6	7	8	9	intelligent
30.	unanalytical	1	2	3	4	5	6	7	8	9	analytical
31.	unreflective	1	2	3	4	5	6	7	8	9	reflective
32.	uninquisitive	1	2	3	4	5	6	7	8	9	curious
33.	unimaginative	1	2	3	4	5	6	7	8	9	imaginative
34.	uncreative	1	2	3	4	5	6	7	8	9	creative
35.	unsophisticated	1	2	3	4	5	6	7	8	9	sophisticated

Appendix 6 Perspective Taking and Empathic Concern Scales

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by circling the appropriate number on the scale. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can.

The following statement describes me.....

	not very well	only moderately well	Neither inaccurate nor accurate	Fairly well	very well
1. I often have tender, concerned feelings for people less fortunate than me.	1	2	3	4	5
2. I sometimes find it difficult to see things from the "other guy's" point of view.	1	2	3	4	5
3. Sometimes I don't feel very sorry for other people when they are having problems.	1	2	3	4	5
4. I try to look at everybody's side of a disagreement before I make a decision.	1	2	3	4	5
5. When I see someone being taken advantage of, I feel kind of protective towards them.	1	2	3	4	5
6. I sometimes try to understand my friends better by imagining how things look from their perspective.	1	2	3	4	5
7. Other people's misfortunes do not usually disturb me a great deal.	1	2	3	4	5
8. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.	1	2	3	4	5
9. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.	1	2	3	4	5
10. I am often quite touched by things that I see happen.	1	2	3	4	5
11. I believe that there are two sides to every question and try to look at them both.	1	2	3	4	5
12. I would describe myself as a pretty soft-hearted person.	1	2	3	4	5
13. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.	1	2	3	4	5
14. Before criticizing somebody, I try to imagine how I would feel if I were in their place.	1	2	3	4	5

Appendix 7 Aspiration Index Questionnaire

Everyone has long-term Goals or Aspirations. These are the things that individuals hope to accomplish over the course of their lives. In this section, you will find a number of life goals, presented one at a time, and we ask you how important is each goal for you. Please use the following scale in answering each of the three questions about each life goal. Please indicate your answer, assigning "1" when the goal is the least important for you and "7" when it is very important. Choose **ONLY ONE** response to each statement.

	Not important at all			Moderately			Very important
1. Life-goal: To be a very wealthy person.	1	2	3	4	5	6	7
2. Life-goal: To grow and learn new things.	1	2	3	4	5	6	7
3. Life-goal: To have my name known by many people.	1	2	3	4	5	6	7
4. Life-goal: To have good friends that I can count on.	1	2	3	4	5	6	7
5. Life-goal: To successfully hide the signs of aging.	1	2	3	4	5	6	7
6. Life-goal: To work for the betterment of society.	1	2	3	4	5	6	7
7. Life-goal: To be physically healthy.	1	2	3	4	5	6	7
8. Life-goal: To have many expensive possessions.	1	2	3	4	5	6	7
10. Life-goal: At the end of my life, to be able to look back on my life as meaningful and complete.	1	2	3	4	5	6	7
11. Life-goal: To be admired by many people.	1	2	3	4	5	6	7
12. Life-goal: To share my life with someone I love.	1	2	3	4	5	6	7
13. Life-goal: To have people comment often about how attractive I look.	1	2	3	4	5	6	7
14. Life-goal: To assist people who need it, asking nothing in return.	1	2	3	4	5	6	7
15. Life-goal: To feel good about my level of physical fitness.	1	2	3	4	5	6	7
16. Life-goal: To be financially successful.	1	2	3	4	5	6	7
17. Life-goal: To choose what I do, instead of being pushed along by life.	1	2	3	4	5	6	7
18. Life-goal: To be famous.	1	2	3	4	5	6	7
19. Life-goal: To have committed, intimate relationships.	1	2	3	4	5	6	7
20. Life-goal: To keep up with fashions in hair and clothing.	1	2	3	4	5	6	7
21. Life-goal: To work to make the world a better place.	1	2	3	4	5	6	7
22. Life-goal: To keep myself healthy and well.	1	2	3	4	5	6	7
23. Life-goal: To be rich.	1	2	3	4	5	6	7
24. Life-goal: To know and accept who I really am.	1	2	3	4	5	6	7
25. Life-goal: To have my name appear frequently in the media.	1	2	3	4	5	6	7
26. Life-goal: To feel that there are people who really love me, and whom I love.	1	2	3	4	5	6	7
27. Life-goal: To achieve the "look" I've been after.	1	2	3	4	5	6	7
28. Life-goal: To help others improve their lives.	1	2	3	4	5	6	7
29. Life-goal: To be relatively free from sickness.	1	2	3	4	5	6	7

30. Life-goal: To have enough money to buy everything I want.	1	2	3	4	5	6	7
31. Life-goal: To gain increasing insight into why I do the things I do.	1	2	3	4	5	6	7
32. Life-goal: To be admired by lots of different people.	1	2	3	4	5	6	7
33. Life-goal: To have deep enduring relationships.	1	2	3	4	5	6	7
34. Life-goal: To have an image that others find appealing.	1	2	3	4	5	6	7
35. Life-goal: To help people in need.	1	2	3	4	5	6	7
36. Life-goal: To have a physically healthy life style.	1	2	3	4	5	6	7

Appendix 8 Public Goods Game Reciprocity, Consent Form

PLEASE FILL IN THIS CONSENT FORM AND RETURN IT TO RESEARCHER IN THE END OF THE EXPERIMENT

Consent Form

An experimental study of decision-making
Investigators: Anya Skatova and Eamonn Ferguson – School of Psychology, University of Nottingham

You should complete the whole of this sheet yourself. Please cross out as necessary:

- Have you read and understood the participant information sheet? YES/NO
- Have you had the opportunity to ask questions about the study? YES/NO
- Have all the questions been answered satisfactorily? YES/NO
- Have you received enough information about the study? YES/NO
- Do you understand that you are free to withdraw from the study:

at any time? YES/NO
without having to give a reason? YES/NO

- Do you agree to take part in the study? YES/NO

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time.

Participant's Signature: _____
Print Name: _____
Date: _____

Appendix 9 Public Goods Game Reciprocity, Instructions

Instructions

Dear participant! If you read the following instructions carefully, you can – depending on your decisions – earn some more money in addition to the £5, which you can keep in any case. The entire amount which you earned with your decisions will receive in cash in the end of experiment. **You are not allowed to communicate during the experiment**. If you have any questions, please raise your hand and the experimenter will come to you and answer them in private.

We will not speak of Pounds during the experiment, but rather of points. Your whole income will first be calculated in points. At the end of experiment, the total amount of points you earned will be converted to Pounds at the following rate:

1 point = 10 pence

All participants in this room will be divided in groups of four members. Except for the experimenter, no one knows who is in which group. During this experiment you will be presented with a number of simple games. In each game each group member has to decide on the allocation of 20 points. You need to decide: leave these 20 points in your private account or you invest them fully or partially into a project. According to the rules of the game, all money invested in the project makes profit. After all four people made their decisions; the sum of overall team's investment is calculated. The money then is equally distributed between all members of the group, with the additional profit. The sum of the overall investment is multiplied by 0.5 (the additional profit that you all get by investing in communal account), and all four of you receive equal amount into your private accounts. You will increase the amount of your money by investing in the communal account only if all other members invest as well. If other members do not invest or invest less then you, the return from the communal account for you personally might be less then you have invested (because everybody gets equal parts of it). After you receive your return from the communal account, then, whatever amount you have transferred into your private account, it is added to your profit from the project, and in the end of the game you receive the information about how much have your earned.

If you a bit confused, don't worry, you will have an opportunity to practice and ask questions if you don't understand any of the rules.

As mentioned before, there will be a number of such games. Only one of the games will be real (you will be actually playing with other people in the room), other games will be fictional and investments of others will be entered by an experimenter. Only during a real game, you will be able to earn money (up to £4.4) additional to your inconvenience allowance (£5) depending on what decisions you and other people in your group make. Remember! There is only one real game, all other ones are fictional, and the profit during these fictional games won't affect your final payment. However, because you don't know which game is real, you will need to play as if every game is real. This way you will make sure that you have maximum earnings in this experiment.

Now, please take part in a practice game. Here, you will be playing with other people in the room, but earnings from this game won't count towards your final payment. You will have only 20 seconds to make each decision.

Practice trial:

Time: 20 seconds

You are matched with three other people in this room to play together for this game.

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

You will be provided with some additional information during all games. In each game, after all participants in this room are divided into the groups of four, three participants in each group are called "first movers", and they make their decisions at the same time, when the fourth participant is called "last mover". Last mover waits until first movers have made their decisions about money investment, and then he/she sees the mean contribution of his/her group members, and then makes his/her own decision. You can take part in a practice game now, which will show you how it works.

Practice trial:
First mover scenario

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the first mover.

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 20 seconds

It's not your turn now; you will need to wait till the last mover makes his/her decision.

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

Last mover scenario

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover. It's not your turn now. Please wait till the first movers from your group make their decisions.

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover. It's now your turn to make a decision.

Mean contribution of your group is: 10 points

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

As you saw in this game, if you were told that you were a first mover, then you were, along with two other people from your group, making a decision about investing into the project, then you were waiting until the last mover decides, and then you were receiving the feedback about your earnings in this game. If you were told that you were a last mover, you waiting until three first movers decide, then you receive the information about their mean contribution to the project, and then you had to make your own decision. In the end you also received feedback about your earnings at this period. During the experimental games, you may be a first mover in some games and a last mover in others, and each time you will be told in which position you are.

In addition to that, at the beginning of each game, after you are randomly matched with three other people to form a group of four, half of the groups will be labeled green and half will be blue. You will be informed at the beginning of each game which type of group you belong to. If you are in the green group, then when the game starts, you will be required to make a decision about the investment (as was explained before, first movers first, and last movers second). Then you will need to wait when the blue groups made their decisions. If you are in the blue group, then, first, you need to wait until all members of the green groups have made their decisions, then you will receive the information about the mean group contribution of one of the green groups (a random one). After that, first movers from blue groups make their decisions, and then last movers from the blue groups receive the information about the mean contribution of their group members (in addition to one they have about another mean group contribution), then they need to make their decisions about the money transfer. It is important to note that the earnings of the green and blue groups do not affect each other and your earnings in the game will be based only on how much you and other three group members will contribute in this game, and how much you and they will leave to yourselves. Now you will see how it all works together in a practice trial.

Practice trial:
Green group scenario, First mover scenario

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are in the green group.
You are the first mover.

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 20 seconds

It's not your turn now; you will need to wait till the last mover from your group makes his/her decision.

Time: 40 seconds

It's not your turn now; you will need to wait till members of the blue group make their decisions.

Time: 10 seconds

This game is over

Your contribution to the communal account: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

Last mover scenario, Green group

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover. It's not your turn now. Please wait till the first movers from your group make their decisions.

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover. It's your turn now to make a decision.

Mean contribution of your group is: 10 points

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 40 seconds

It's not your turn now; you will need to wait till members of the blue group make their decisions.

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

Blue group scenario
First mover scenario

Time: 40 seconds

You are matched with three other people in this room to play together for this game.
You are in the blue group.
You are the first mover.
It's not your turn now; you will need to wait till members of the green group make their decisions.

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are in the blue group.
You are the first mover.
It's your turn now to make a decision.

Mean contribution of one of the green groups is: 10 points

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 20 seconds

It's not your turn now; you will need to wait till the last mover from your group makes his/her decision.

Time: 10 seconds

This game is over

Your contribution to the project: 10 points

Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

Last mover scenario, Blue group

Time: 40 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover.
You are in the blue group.
It's not your turn now; you will need to wait till members of the green group make their decisions.

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover.
You are in the blue group.
It's not your turn now; you will need to wait till fist movers of your group make their decisions.

Mean contribution of one of the green groups is: 10 points

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
You are the last mover.
You are in the blue group.
It's your turn now to make a decision.

Mean contribution of one of the green groups is: 10 points
Mean contribution of your group is: 10 points

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 30 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

All other times while you are waiting, you will be prompted to do a simple task by pressing the buttons on the keyboard. You are not allowed to talk to anybody during experiment. If you have a question now or at any point of the experiment regarding the instructions, you need to raise your hand and the experimenter will come up to you. As this experiment requires simultaneous participation of all participants in the room, you will violate the results if you not follow the rules of the game (for example,

not make your decision during the 20 seconds). Please try to pay attention to all explanations and instructions which appear during the games, and then we will be able to finish the experiment in time. If you feel unwell or due to any other reason you want to quit experiment, you are free to withdraw at any stage of the experiment. In this case, please be so kind to raise your hand, experimenter will come up to you to terminate your program. After the experimental games finish, you will receive a de-brief information on the screen and your payment. You will be able to find out which games were real and which games were fictional. Now, please take part in two more practice trials.

Two practice trials

Appendix 10 Public Goods Game Reciprocity Experiment Control Questions

Before the experimental games start, please be so kind to answer the following questions. These questions are designed in order to find out if you understood all instructions. After you answer the question, you will see if you gave a correct or wrong answer. If you have a wrong answer, you won't be able to proceed further till you give the correct answer.

1. Who you will be playing with?
A. Computer
B. Experimenter
B. 3 other people in the class

2. What will happen with the money that you've kept on your private account?
A. If it is a real game, they will be added to my final payment for the experiment.
B. They will be divided between people in my group.
C. They will be transferred to the next game.

3. What will happen if you transfer 10 points to the project?
A. I will never see them again.
B. One person from my group will receive it and I will receive his/her.
C. My 10 points and the transfers of other 3 members of the group will be summed up, multiplied by 0.4, and I will receive the resulting amount back. Other members from my group will receive the same amount, no matter how much they have transferred themselves.

4. What are you required to do during the waiting period of the games?
A. Watch what other people are doing.
B. Follow the instructions on the screen and press the button.
C. Nothing.

5. When will be the real game?
A. It will be the first game.
B. I don't know – it can be any of the games.
C. There won't be any real game, all games will be fictional.

6. What is your final payment based on?
A. My final payment will include £5 show-up fee and my earnings in the real game.
B. My final payment will be only £5 show-up.
C. My final payment will be £5 show-up fee and everything I've earned during all games.

7. What does "mean contribution of one of green group is 10 points" mean?
A. It means that one of the person in the green group contributed 10 points.
B. It means that I should contribute 10 points.
C. It means that group members of one of the green group contributed on average 10 points.

8. What does "mean contribution of my group is 8 points" mean?
A. It means that all members of my group in this game contributed on average 8 points.
B. It means all people in the room on average contributed 8 points.
C. I don't know.

9. Who are three other people in your group?
A. Three people in my row.
B. Any three people in the room.
C. Any three people with an even identification number.

10. How is the final profit for each game calculated?
A. Final profit for each game is £5.
B. Final profit is calculated based on average investment of my group.
C. Final profit is a sum of the money I've kept in my private account and the money that I've received from a project of my group.

Now, please press any key in order to start the experimental games. Remember! During these games you can earn up to £4.4 (or 440 points). All your earnings during one real game will be paid to you in real money in addition to your £5 show-up fee.

Appendix 11 Public Goods Game Reciprocity, Post-Experimental Survey

Please answer the following questions:

1. Have you ever taken part in similar studies before (economic games, gambling games, game theory experiments)? Yes/No

2. Have you treated all games as real? Yes/No

3. Have you realized that any of the games was fictional prior to making a decision about the money transfer? Yes/No

4. Do you know which game was real? Yes/No
   If yes, please specify which one:_____

5. Could you notice during the games when other participants were playing on the different from you positions or in a different group type? Yes/No

6. Do you know personally any of the people in the room? Yes/No

7. If during the game you were in the blue group, and you have just found out that the members of the green group contributed a lot of points; did it make you contribute more as well? Yes/No
If yes, can you please specify, why:_____

Appendix 12 Public Goods Game Punishment, Consent Form

PLEASE FILL IN THIS CONSENT FORM AND RETURN IT TO RESEARCHER IN THE END OF THE EXPERIMENT

Consent Form

An experimental study of decision-making

Investigators: Anya Skatova and Eamonn Ferguson – School of Psychology, University of Nottingham

You should complete the whole of this sheet yourself. Please cross out as necessary:

- Have you read and understood the participant information sheet? YES/NO
- Have you had the opportunity to ask questions about the study? YES/NO
- Have all the questions been answered satisfactorily? YES/NO
- Have you received enough information about the study? YES/NO
- Do you understand that you are free to withdraw from the study:

  at any time? YES/NO

  without having to give a reason? YES/NO
- Do you agree to take part in the study? YES/NO

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time.

Participant's Signature: _____

Print Name:_____

Date: _____

Appendix 13 Public Goods Game Reciprocity, Instructions

Please have a look at the **Information Sheet** (you can keep it for yourself), fill in the **Consent Form**, return it to the experimenter, and read the **Instructions**.

INSTRUCTIONS

INSTRUCTIONS PART 1

Dear participant! If you read the following instructions carefully, you can – depending on your decisions – earn some more money in addition to the £3 participation fee, which you will receive in any case. The entire amount that you eventually earn will be given to you in cash at the end of the experiment. **You are not allowed to communicate with other participants during the experiment**. If you have any questions, please raise your hand and the experimenter will come to you and answer them in private.

We will not speak about pounds (£) during the experiment, but rather about points. Your whole income will first be calculated in points. At the end of the experiment, the total amount of points you have earned will be converted to pounds at the following rate:

1 point = 10 pence

During this experiment you will be presented with a number of simple games. For the games, participants in the room will be divided in groups of four. During the games, no one knows who is in which group, including the experimenter. In each game each group member has to decide on the allocation of 20 points. You need to decide: leave these 20 points in your private account or invest them fully or partially into a project. According to the rules of the game, all money invested in the project makes a profit. After all four people have made their decisions the sum of overall group's investment is calculated. The sum of the overall investment is multiplied by 2 (the additional profit that all of you get by investing in the project) then divided by the number of people in the group (4), and all four of you receive equal amounts back into your private accounts. All amounts are rounded to the nearest integer. You will increase the amount of your money by investing in the project only if all other members invest as well. If other members do not invest or invest less than you, the return from the project for you personally might be less than what you have invested (because everybody gets equal parts of it). After you receive your return from the project, whatever amount you have transferred into your private account is added to your profit from the project, and at the end of the game you receive the information about how much you have earned in addition to your show-up fee. Before entering the amount you want to contribute to the project, you will need also to estimate how much on average you think other members of your group will invest.

If you are a bit confused, don't worry, you will have an opportunity to practice and ask questions if you don't understand any of the rules.

As mentioned before, there will be a number of such games. Only one of the games will be real (you will be actually playing with other people in the room), other games will be fictional and the investments of others will be entered by an experimenter. Only during a real game will you be able to add money (up to **£4**) to your show-up fee (**£3**) depending on what decisions you and the other people in your group make. Remember! There is only one real game; all the other ones are fictional, and the profit during these fictional games won't affect your final payment. However, because you don't know which game is real, you will need to play as if every game is real. This way you will make sure that you have maximum earnings in this experiment.

Now, please take part in a practice game. Here, you will be playing with other people in the room, but earnings from this game won't count towards your final payment. You will have only 20 seconds to make each decision. Please press the START button on the screen when you are ready. The practice trial will start when everybody is ready. You might need to wait before all of the other participants finish reading the instructions.

Practice trial:

Time: 20 seconds
You are matched with three other people in this room to play together for this game.
You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 10 seconds

This game is over

Your contribution to the project: 10 points
Your private account: 10 points
Sum of all contributions: 20 points
Your earnings (if it is a real situation): 10 points + (30*2 points)/4 = 25 points

INSTRUCTIONS PART 2

Now, in addition to the previous rules, in some games, depending on your contributions and the contributions of the other three people in your group, you might receive a fine: if you contribute less than the average contribution of three people in your group, you might be punished, and in this case all of your earnings on that game will be taken away as a punishment. The punishment will be assigned by a computer after calculating the difference between your contribution and the average contribution of the three other people you are playing with.

However, you will not be punished on all of the games in which you contributed less than the other three people in your group, but only on some of the games (you won't know which ones are the "punishment" games). The whole experiment will consist of several parts – blocks of games. Each part will consist of a number of games. Before the start of each block you will be informed if the punishment is possible in this part of experiment. You can take part in a practice game now, which will show you how it works. Please press the START button on the screen when you are ready. The practice game will start when everybody is ready. You might need to wait until all the other participants finish reading the instructions.

Practice trial:
Punishment scenario

Time: 20 seconds

You are matched with three other people in this room to play together for this game.
In this part of the game you might be punished for contributing less than your partners on average.

You have 20 points on your private account

Please make a decision: how much money you want to contribute to the project? The rest will be kept at your private account. After you've made your decision, please press CONFIRM button to proceed to the next stage. REMEMBER! You have only 20 seconds.

Your contribution to the project:

CONFIRM

Time: 10 seconds

This game is over
You have been punished on this game, as you contributed less than your partner.

Your contribution to the project: 5 points
Your private account: 15 points
Sum of all contributions: 30 points

Your earnings (if it is a real situation): 0 points

INSTRUCTIONS PART 3

You are not allowed to talk to any other participants during the experiment. If you have a question now or at any point of the experiment concerning the instructions, raise your hand and the experimenter will come up to you. As this experiment requires simultaneous participation of all participants in the room, you will invalidate the results if you do not follow the rules of the game (for example, if you do not make your decision during the 20 second period). Please try to pay attention to all explanations and instructions which appear during the games, and then we will be able to finish the experiment in time. If you feel unwell or due to any other reason you want to quit the experiment, you are free to withdraw at any stage. In this case, please be so kind to raise your hand; the experimenter will come up to you to terminate your program. After the experimental games finish, you will receive de-brief information on the screen and your payment. You will be able to find out which games were real and which games were fictional. Now, please take part in one more practice trial. Please press the START button on the screen when you are ready. The practice trial will start when everybody is ready. You might need to wait until all of the other participants have finished reading the instructions.

Two practice trials

Appendix 14 Public Goods Game Punishment, Control Questions

Control questions, part 1.

Before the experimental games start, please be so kind to answer the following questions. These questions are designed to find out if you understood all the instructions. After you answer the question, you will see if you gave a correct or a wrong answer. If you gave a wrong answer, you won't be able to proceed further until you give a correct answer.

1. Who you will be playing with?
A. Computer.
B. Experimenter.
C. Another person in the room.

2. What will happen with the money that you've kept on your private account?
A. If it is a real game, they will be added to my final payment for the experiment.
B. They will be divided between me and other three people in my group.
C. They will be transferred to the next game.

2. What will happen if you transfer 1 point to the project?
A. I will never see it again.
B. One of three other people in my group will receive it and I will receive theirs
C. My 1 point transfer and the transfers of three other people in my group will be summed up, multiplied by 2 (profit coefficient) then divided by the number of people in the group (4), and I will receive the resulting amount back. Other three people in my group will receive the same amount, no matter how much they have transferred themselves.

3. When will be the real game?
A. It will be the first game.
B. I don't know – it can be any of the games throughout the experiment.
C. There won't be any real game, all games will be fictional.

4. What is your final payment based on?
A. My final payment will include £3 show-up fee and my earnings in the real game.
B. My final payment will be only £3 show-up.
C. My final payment will be £3 show-up fee and everything I've earned during all games.

5. Who can be among other three people in I'll be playing with?
A. Any person on my row.
B. Any person in the room.
C. The experimenter.

6. How is the final profit for each game calculated?
A. Final profit for each game is £3.
B. Final profit is calculated based on the average investment of all four people in the group, including myself, for this game.
C. Final profit is the sum of money I've kept in my private account and money that I've received from a project of the group.

Now, please press any key to start the experimental games. Remember! During these games you can earn up to £3 (or 3 points). All your earnings during one real game will be paid to you in real money in addition to your £3 show-up fee.

Control questions, part 2.

Before the start of the next part of experimental games, please be so kind to answer the following questions. Some of them repeat the previous ones, just to insure that you understood well all instructions. After you answer the question, you will see if you gave a correct or a wrong answer. If you gave a wrong answer, you won't be able to proceed further until you give the correct answer.

1. Who you will be playing with?
A. Computer.
B. Experimenter.

C. Another person in the room.

2. What will happen with the money that you've kept on your private account?
A. If it is a real game, they will be added to my final payment for the experiment.
B. They will be divided between me and other three people in my group.
C. They will be transferred to the next game.

3. What will happen if you transfer 1 point to the project?
A. I will never see it again.
B. One of three other people in my group will receive it and I will receive theirs.
C. My 1 point transfer and the transfers of three other people in my group will be summed up, multiplied by 2 (profit coefficient) then divided by the number of people in the group (4), and I will receive the resulting amount back. Other three people in my group will receive the same amount, no matter how much they have transferred themselves.

4. When will be the real game?
A. It will be the first game.
B. I don't know – it can be any of the games throughout the experiment.
C. There won't be any real game, all games will be fictional.

5. What is your final payment based on?
A. My final payment will include £3 show-up fee and my earnings in the real game.
B. My final payment will be only £3 show-up.
C. My final payment will be £3 show-up fee and everything I've earned during all games.

6. Who can be among other three people in my group?
A. Any person on my row.
B. Any person in the room.
C. The experimenter.

7. How is the final profit for each game calculated?
A. Final profit for each game is £3.
B. Final profit is calculated based on the average investment of all four people in my group, including myself, for this game.
C. Final profit is the sum of money I've kept in my private account and money that I've received from a project of my group.

8. What will happen if I am punished?
A. All of my overall profit for this game will be taken, so if I was supposed to get 10 points, I will earn 0.
B. Only the money that I have kept on my private account will be taken.
C. Only the money that I could have received from the group account will be taken.

9. Who will decide if I am punished on a particular game or not?
A. The punishment will be assigned randomly, regardless of my investment.
B. The experimenter will decide who will be punished on any particular game.
C. The punishment will be assigned by computer, after calculating if I contributed less than the average contribution of other three people in my group.

10. When can I be punished?
A. On any of the games.
B. Only in the parts of the experiment, when I have been told prior to the start of this part that the punishment is possible now and if I contribute less than average contribution of other three people in my group.
C. When I contribute 0.

11. Why can I be punished?
A. Because I contributed less than average contribution of other three people in my group.
B. Because one of three people of my group contributed a lot.
C. Because I haven't been punished during previous 5 games.

12. After I was punished, where does the money that has been taken from me go?
A. It doesn't go anywhere, it burns.

B. It goes to the experimenter.
C. It goes to other three people in my group.

Now, please press any key to start the experimental games. Remember! During these games you can earn up to £3 (or 3 points). All your earnings during one real game will be paid to you in real money in addition to your £3 show-up fee.

Appendix 15 Public Goods Game Punishment, Post-Experimental Survey

Please answer the following questions:

1. Have you ever taken part in similar studies before (economic games, gambling games, game theory experiments)? Yes/No

2. Have you treated all the games as real? Yes/No

3. Before you have made a decision about the money transfer, in any of the games, have you realized that this particular game is fictional? Yes/No

4. Do you know which game was real? Yes/No

   If yes, please specify which one:_____

5. Do you personally know any of the people in the room? Yes/No

If yes, can you please specify, why:_____

Appendix 16 Public Goods Game Punishment, Descriptive statistic of the Contribution levels

	sequence	Mean	Standard Deviation
block1	1	8.85	3.70
	2	8.13	5.94
	3	8.92	4.85
	4	11.59	4.89
	5	10.34	5.28
	6	11.05	4.20
	Total	9.78	4.92
block2	1	12.72	7.10
	2	16.45	3.08
	3	16.24	2.77
	4	15.76	2.72
	5	15.51	3.66
	6	16.80	2.64
	Total	15.67	4.00
block3	1	11.19	7.38
	2	14.69	4.31
	3	14.00	4.44
	4	14.93	4.49
	5	14.14	5.47
	6	15.67	3.89
	Total	14.19	5.08
block4	1	6.05	5.61
	2	7.80	5.67
	3	9.39	6.20
	4	7.85	5.43
	5	12.53	4.11
	6	10.90	4.52
	Total	9.09	5.54

Appendix 17 Public Goods Game Punishment, Descriptive statistic for different sequences of punishment versus possibility of punishment blocks

	Punishment block before the possibility of punishment or after	M	SD
block1	1	9.01	5.11
	2	10.56	4.64
block2	1	15.05	4.92
	2	16.31	2.67
block3	1	13.48	5.77
	2	14.93	4.20
block4	1	8.69	5.74
	2	9.50	5.37

Note. 1 – Punishment block was before the possibility of punishment block
2 – Punishment block was after the possibility of punishment block