

Are personality traits contextualized?

Effects of situational characteristics on the manifestation of trait expressions

Haisu Sun

Supervised by Dr. Luke D. Smillie

Submitted in total fulfilment of the requirements of the degree of

Doctor of Philosophy

November 2019

Melbourne School of Psychological Sciences

The University of Melbourne

Abstract

Personality traits are the main currency of the field of personality psychology. However, historically there has been much confusion concerning the conceptualization of traits in relation to context, which remains unclear to date. Some personality psychologists have proposed that traits are internal and decontextualized dispositions that account for consistency in behaviour and experience across time and situations, whereas others have argued that traits are patterns of behaviour and experience that are contextualized and require appropriate eliciting stimuli for manifestation. Although there is a long history of research on the interplay of traits and situations, the contextualized view has received little attention and not yet been systematically examined in empirical studies.

This thesis aims to evaluate the contextualized view of traits, and to clarify what is meant exactly when describing someone as high or low on a personality trait, specifically in relation to context. When we call someone an ‘extravert’, are we describing their typical patterns of behaviour and experience *across all contexts*, or are we describing their typical patterns of behaviour and experience *in particular contexts*? Among all traits, extraversion and neuroticism are perhaps the best understood in terms of eliciting stimuli—reward and threat, respectively— which have been described and incorporated in several personality theories. For this reason, they are the focus of this thesis. It is expected that traits will predict their corresponding expressions most strongly within situations containing relevant eliciting stimuli. The hypotheses were: (a) the relation between trait extraversion and patterns of state extraversion would be the strongest within contexts characterized by rewarding stimuli; and (b) the relation between trait neuroticism and patterns of state neuroticism would be the strongest within contexts characterized by threatening stimuli.

A collection of four studies were designed to examine the contextualized nature of extraversion and neuroticism using different methodologies. The first study was an online

survey, examining the hypotheses by asking participants to imagine their behaviour in certain context, the second one in a controlled lab environment, and the third and the fourth studies in people's everyday life context using experience sampling methods. Across these studies, a mixture of subjective and objective measures of personality states and situations were employed.

All four studies showed that extraversion and neuroticism significantly predicted state extraversion and state neuroticism, respectively, across all contexts. Meanwhile, state extraversion was significantly higher in rewarding contexts and state neuroticism was significantly higher in threatening contexts—both within-person and between-persons. However, the magnitude of the relation between trait and state extraversion, or between trait and state neuroticism, did not vary strongly across contexts. Although the results differed slightly depending on the study, the trait (extraversion vs. neuroticism), and the measure used (subjective vs. objective situation ratings), overall there was very weak evidence that trait-state associations vary across context. These findings therefore suggest trait extraversion and neuroticism are not strongly contextualized.

These findings have broad theoretical implications for understanding what a trait is in relation to context. Additionally, some findings may have theoretical implications for how traits influence experiences of situations via situation perception and selection processes. Some practical implications concern the use of situation reappraisal as a coping strategy to improve people's functioning in different contexts. Future studies could extend this thesis by examining the contextualized view in relation to other trait domains, aspects, and facets. They could also explore personality's effects on situations more rigorously to disentangle the various mechanisms concerned with situation perception, situation selection, situation transformation, and situation evocation. Furthermore, they could apply these understanding to improve people's wellbeing and facilitate personality change.

Declaration

This is to certify that:

The thesis comprises only my original work towards the degree of Doctor of Philosophy, except where indicated in the Preface;

Due acknowledgment has been made in the text to all other material used; and

The thesis is fewer than 100,000 words, exclusive of tables, figures, footnotes, references, and appendices.

Haisu Sun
4 November 2019

Acknowledgements

I would like to express my gratitude to a number of people without whom this thesis would not have been possible. First, I wish to thank Luke Smillie, my supervisor. I have been impressed by his wisdom and kindness throughout the years in countless ways. I am grateful to have known him. I could not have had a better mentor. I appreciate the time he generously spent on this thesis and the effort he patiently put in grooming me for an academic career. I thank him for helping me become a kinder and more open-minded person.

I am also grateful to Ben Richardson, my PhD advisor, for his help with running experience sampling studies and guidance on data analysis. To my committee members—Olivia Carter and Nick Haslam, and my work supervisor—Mara Olekalns, for their genuine support throughout this PhD. I am also grateful to Kun Zhao, my academic sister, for our heart-to-heart conversations and for setting a great example of what an outstanding researcher is like. To the academic family: Kate, Beatrice, Hayley, Erin, Nick, Reb, and Yang. Thank you for being such a supportive community. Special thanks go to Jessie for generously sharing her knowledge and experience, which got this project off the ground quickly. To Rowan, for being my R-Aladdin who “pops out the lamp” whenever I needed his magic running R. To Tim, for being a brilliant listener and a wise life advisor. And to my PhD buddies, Yi-Leng and Alex, for sharing the ups and downs in our PhD journey together.

To my best friends, Lena and Sujata, thank you for your genuine care and support in all aspects of my life. To my parents, Yahua and Kaihua, for their love, encouragement, and sacrifices. To my mother for constantly reminding me that I must apply my knowledge in psychology to help people, and to my father, whose dedication to research continues to inspire me. Finally, to my husband Arun, for telling me that life should be lived for passion and for supporting my somewhat risky decision of starting a new career at a relatively late stage in life.

Preface

The author played a significant role in all aspects of the studies within this thesis. This included study conception and design, participant recruitment, data collection, analysis and interpretation, and the preparation and revision of chapters and manuscripts.

All chapters below were written with the author's supervisor, Dr. Luke Smillie. The author's contribution to these chapter was 80%. All chapters are intended to be published in scientific journals. The author's intended contribution to the planned publications is 60%.

Chapter 1: General Introduction and Literature Review

Chapter 2: Are Traits Contextualized? An Initial Examination Based on Prospective Self-reports (Study 1)

Chapter 3: Are traits contextualized? Manipulating context in the lab (Study 2)

Chapter 4: Are traits contextualized? Sampling real-world contexts over time (Study 3)

Chapter 5: Are traits contextualized? Sampling real-world contexts over time using 'objective' measures of context (Study 4)

Chapter 6: General Discussion

Funding

Financial support for the studies conducted in this thesis was provided by a scholarship awarded to Haisu Sun as part of the PhD program and by a grant awarded to Dr. Luke Smillie, from the Melbourne School of Psychological Science, University of Melbourne.

Planned Publications and Conferences Abstracts Arising From This Thesis**Planned peer-reviewed article**

Sun, H., Smillie, L. D., Sun, J., Hamilton, R., Richardson, B., Are traits contextualized? The effects of situation characteristics on the manifestation of trait expressions.
Manuscript in preparation.

Conference Abstracts

Sun, H., Richardson, B., Smillie, L. D. Are traits contextualized? *Australian Conference on Personality and Individual Differences*, Sydney, Australia (Dec, 2017). Oral presentation

Sun, H., Richardson, B., Smillie, L. D. Are traits contextualized? *The International Society for the Study of Individual Differences Conference*, Warsaw Poland (July, 2017). Oral presentation

Sun, H., Richardson, B., Smillie, L. D. Are traits contextualized? *The Society of Australasian Social Psychologists Conference*, Melbourne Australia (April, 2017). Oral presentation

Table of Contents

Abstract	2
Declaration	4
Acknowledgements	5
Preface	6
Planned Publications and Conferences Abstracts Arising From This Thesis	7
Chapter 1 General Introduction and Literature Review	9
1.1 Overview	9
1.2 What is the Contextualized View of Traits?	10
1.3 Distinguishing the Contextualized View from Person-Situation Transactions	16
1.4 Evidence For and Against the Contextualized View of Traits	22
1.5 How Should We Assess Situations to Evaluate the Contextualized View of Traits?	28
1.6 The Present Thesis	37
Chapter 2 Are Traits Contextualized? An Initial Examination Based on Prospective Self-reports	39
2.1 Overview	39
2.2 Method	40
2.3 Results	43
2.4 Discussion	52
Chapter 3 Are Traits Contextualized? Manipulating Context in the Lab	57
3.1 Overview	57
3.2 Method	59
3.3 Results	62
3.4 Discussion	72
Chapter 4 Are Traits Contextualized? Sampling Real-World Contexts over Time	79
4.1 Overview	79
4.2 Method	80
4.3 Results	85
4.4 Discussion	93
Chapter 5 Are Traits Contextualized? Sampling Real-World Contexts over Time Using ‘Objective’ Measures of Context	99
5.1 Overview	99
5.2 Method	104
5.3 Results	111
5.4 Discussion	127
Chapter 6 General Discussion	134
6.1 Overview	134
6.2 Review of Findings	135
6.3 Implications	141
6.4 Limitations, Strengths, and Future Directions	147
6.5 Concluding Remarks	156
References	158
Appendices	185
Appendix A. Personality Questionnaires (Studies 1 to 4)	186
Appendix B. Chapter 2 (Study 1)	196
Appendix C. Chapter 3 (Study 2)	205
Appendix D. Chapter 4 (Study 3)	233
Appendix E. Chapter 5 (Study 4)	234

Chapter 1

General Introduction and Literature Review

1.1 Overview

In personality psychology, one of the most common units of analysis or subjects of study is the personality *trait*. There are major taxonomies of personality traits (e.g., the ‘Big Five’, see Table 1.1; Goldberg, 1990), there are arguments about the stability and changeability of traits (Allemand, Steiger, & Hill, 2013), and there are questions about what traits predict (e.g., Roberts et al. 2007; Soto, 2019). Thus, the concept of a ‘trait’ sits at the heart of almost every endeavour in personality psychology. But what is a trait exactly?

There has been much confusion concerning the definition of a personality trait. One critical point of difference in the ways people define traits concerns the relevance of context. The aim of this thesis is to directly evaluate the view that traits are, to some degree, *contextualized*. Therefore, this study will examine the effect of context on the relation between traits and trait-relevant state expressions through multiple methods. While context can be measured in various ways, this thesis will derive contexts that are considered trait-relevant based on the theoretical mechanisms of traits. Given the extensive research on trait extraversion and neuroticism’s underlying processes, they will be the focus of this thesis.

In this introductory chapter, I first review different conceptual definitions of traits (contextualized vs. decontextualized) from the previous literature. The emerging distribution depiction of traits is then presented for an integrated *contextualized* distribution view of traits, which might meaningfully explain the fluctuations in moment-to-moment behaviour and experience. Next, I review the long history of research on the interplay of traits and situations, and distinguish the contextualized view of traits from *interactionism*. Then I review the limited and mixed evidence as to whether traits are contextualized to some extent, including a discussion of potential explanations for such mixed findings. Specifically, a

possible account is that different studies have conceptualised and operationalized context differently. How situations have been studied in the previous literature is then reviewed (restricted to studies that examined both personality and situations), before theories and evidence suggesting extraversion and neuroticism's relevant eliciting stimuli are reviewed, with a focus on association between extraversion and rewarding stimuli and association between neuroticism and threatening stimuli. Finally, the aims and hypotheses of the thesis are presented, and further chapters of the thesis are outlined.

Table 1.1 Big Five Personality Traits

The Big Five	Description
Extraversion	Enthusiastic, outgoing, talkative, bold, energetic
Openness/Intellect	Curious, creative, interested in ideas and aesthetics
Agreeableness	Warm, friendly, kind, soft-hearted
Neuroticism	Tense, volatile, emotional
Conscientiousness	Hard working, organized, disciplined

1.2 What is the Contextualized View of Traits?

In this section, I will review different definitions of traits held by psychologists, the competing views about traits in relation to context, the emerging agreement on depicting traits as capturing properties of distributions of personality states, and finally how the contextualized view of traits may meaningfully explain variation in distributions of personality states.

1.2.1 What are Traits?

According to the Oxford dictionary, the origin of the word “trait” can be traced back to the French and Latin word “tract” which means “drawing or draught”. It was first used in the mid-16th Century, referring to “stroke of the pen or pencil in a picture”. This gave rise to the later sense, “a particular feature of mind or character”, used in the mid-18th Century. Psychology picked up this term in the 20th Century as traits emerged from lexical analyses of

adjectives used to describe people's characteristic ways of thinking, feeling, and behaving (John & Srivastava, 1999).

In the early 20th century, personality researchers did not clearly define traits. The word 'trait' was often used vaguely to suit the needs of the moment by different writers for distinct levels of behaviour (Allport, 1927). Many raised their concern over this issue. For instance, Edman (1920, p. xi+467) stated that "Social sciences will never attain the precision of the physical sciences until it also attains as clear and unambiguous a terminology." As the years progressed, personality psychologists developed a variety of definitions of traits. For example, McAdams and Pals (2006) asserted "Dispositional traits are those broad, non-conditional, *decontextualized* ... dimensions of human individuality" (p. 207, emphasis added by author). Similarly, McCrae & Costa (1984, p. 178) argued that "it is more productive to view personality as a set of characteristics of the individual that *transcend time, place, and context*, and so help give reference to life, and a sense of identity to the individual" [emphasis added by author]. Likewise, Wilt & Revelle (2015, p. 478) defined traits as "abstractions used to either explain or summarise coherent affect, behaviour, cognition (and sometimes desire) patterns *over time and space*" [emphasis added by author].

The common theme in these conceptualizations is that traits are considered as fundamentally non-conditional and decontextualized, which account for consistencies in behaviour from one situation to the next and over time (Goldberg, 1990; McAdams et al., 2004; McAdams & Pals, 2006; McCrae et al., 2000; McCrae & Costa, 1987). For example, according to this decontextualized view of traits, to describe someone as "an extravert" is to say he or she is more talkative, assertive, outgoing, and enthusiastic in general, *over time and across situations*.

However, in contrast to this decontextualized view, many theorists from different sub-fields of psychology, have either explicitly or implicitly subscribed to the view that

personality traits are in fact contextualized. For example, John Watson (e.g., 1930), the founder of behaviourism, described traits in terms of a person's behavioural response to various situational stimuli that he or she encounters. Sharing the same view, Tellegen (1981) and Carnap (1956) described traits as the disposition to exhibit certain reactions under certain conditions. Gordon Allport, the founder of trait theory, conceptualized traits as tendencies to respond in consistent ways to certain stimuli that are functionally equivalent (Allport, 1937).

From a methodological perspective, Raymond Cattell, who laid the foundational work for personality taxonomy using factor analysis methods, stated that environment has already been implicitly incorporated in trait models, because trait factors were abstracted from behavioural measures made upon a given sample of respondents in a given physiocultural environment. If the surrounding stimuli change, then the loading patterns in relation to the responses would change as well. "The trait itself thus takes its definition in part from the environment and the population factored" (Cattell, 1979, p.210).

Coming from a biological perspective, Jeffrey Gray, founder of one of the most influential bio-psychological theories of personality, defined traits as the manifestation of individual differences in the sensitivities of underlying neuropsychological systems to major classes of motivational stimuli (Gray, 1982). Along the same line, Revelle (1995) conceptualized traits in terms of differential sensitivities to situations and differential response biases. Interestingly, although it is often considered a critique of trait theory, Mischel and Shoda's (1995) cognitive-affective theory of personality can actually be considered a contextualized view of traits, construing personality as predictable patterns of situation-behaviour relations.

Another relevant perspective is Trait Activation Theory (TAT; Tett & Guterman, 2000), which posits that "the behavioural expression of a trait requires arousal of that trait by trait-relevant situational cues" (p. 398; see also Tett & Burnett, 2003). What is inherent to

TAT is the notion that traits must be ‘activated’ by relevant situational cues in order to manifest in behaviour and experience (Tett & Guterman, 2000). Put differently, the relation between traits and trait-relevant behaviour will be strengthened in the presence of certain stimuli (Lievens, De Koster, & Schollaert, 2008; Tett & Burnett, 2003).

For example, people high on trait aggression might not behave aggressively much of the time, but rather be quick to anger and direct their anger to others *if these responses are ‘activated’* by frustration or aggression-inducing stimuli (Tett & Guterman, 2000). To this extent, TAT captures much of the idea of contextualized traits. However, there has been surprisingly little research offering direct empirical evidence for the activating role of situations on expressions of personality. Some indirect evidence suggested that, in hypothetical settings, traits and behavioural intentions correlated more strongly in situations characterized by trait-relevant stimuli (Tett & Guterman, 2000). Also, in some studies conducted in work settings (i.e., assessment centers), higher convergent validity between traits and behaviour was obtained when employees were observed doing trait-relevant tasks (Chasteen, Day, & Christiansen, 2006; Haaland & Christiansen, 2002).

Consistent with TAT, the ‘interpersonal paradigm’ used in clinical settings is another example of assertion that personality traits are contextualized (Gill, 1983; McWilliams, 2011; Wallin, 2007). Here, theorists have operationalized personality as “nothing more (or less) than the patterned regularities that may be observed in an individual’s relations with other persons, who may be real in the sense of actually being present, real but absent and hence ‘personified,’ or ‘illusory’” (Carson, 1969, P. 26). Within the interpersonal paradigm, relationships with others constitute the environment, and a person’s recurring patterns of relationships over time constitute his or her “personality.” This suggests that personality emerges from numerous interpersonal force-fields, and manifests only in the context of such interpersonal fields (Sullivan, 1948). This theorizing is particularly relevant to trait

extraversion and agreeableness, which are fundamentally concerned with the social aspects of personality, relative to the other big five traits. For this reason, expressions of extraversion and agreeableness might be expected to manifest only in a social context. Indeed, how can someone be extraverted and agreeable when no one is around to be extraverted and agreeable towards? In sum, the perspective of the interpersonal paradigm provides another example of why we might expect traits to be contextualized.

More recently, the contextualized view of traits has been articulated by Roberts (2009) and DeYoung (2015). They argued that traits are relative stable patterns of thoughts, feelings, and behaviours that capture people's tendency to respond in certain ways to a broad range of stimuli (e.g., rewards and punishments), which have been present in human environments over evolutionary time. This definition is more specific than other definitions of traits by proposing that personality traits are not entirely decontextualized, and the stimuli in the context play an important role in eliciting traits' manifestations.

1.2.2 The Contextualized View of Traits and the Distribution Density Model

There is increasing agreement that we can depict traits as a distribution of trait-relevant states with each point reflecting the frequency of manifesting the particular trait at each level of the trait (DeYoung, 2015; Fleeson, 2001; Smillie, Zhao, & Barford, 2014; Wilt, Oehlberg, & Revelle, 2011; Wilt & Revelle, 2009). This view, known as the Distribution Density Model, suggests that traits are essentially summaries of dynamic patterns of (fluctuating) personality states. Personality states are thought to vary within-persons over time largely as a function of context. By accounting for context, the Distribution Density Model could offer a meaningful explanation for the stable patterns of behaviour and experience as well as the variability in the distribution.

Support for the Distribution Density Model comes primarily from studies using Experience Sampling Methods (ESM), which measure people's behaviours and experiences

in their natural settings in real time (or close to real time) on repeated occasions (Mehl & Conner, 2011). These studies found that, over time and across situations, most people display all levels of trait-relevant states regardless of whether they are high or low on any given trait (e.g., Fleeson, 2001, 2007; Fleeson & Gallagher, 2009). The difference is that people who are high on one trait will experience the corresponding states more often and more intensely than those low on that trait. For example, extraverts will be talkative, assertive, and outgoing more often than introverts, but even introverts can be highly talkative, assertive, and outgoing from time to time.

Although each individual shows very changeable states from moment-to-moment, their averaged level of states across many moments is highly stable from week to week ($r_s > .70$; Fleeson, 2001) and correspond well with the trait scores attained from personality questionnaire assessments ($r_s > .40$; Fleeson & Gallagher, 2009). However, it is worth noting that the temporal stability of traits' expressions should not be conflated with the idea that trait expressions are contingent on eliciting situations. Rather, they are two different perspectives and examine traits at different levels of analysis (Roberts, 2009).

Overall, these results have been supported in other experience sampling studies and are supported by meta-analyses (Fleeson, 2007; Fleeson & Gallagher, 2009; Sherman, Rauthmann, Brown, Serfass, & Jones, 2015). They suggested that traits are long term patterns of behaviour and experience, which can be described as the entire distributions of trait-relevant states, with the mean indicating an individual's typical state and standard deviation indicating the individual's variability in states (Fleeson, 2001).

Building on the distribution view of traits, the additional feature of Roberts (2009) and DeYoung (2015)'s definition is that, the moment-to-moment variation in states is systematically linked to the stimuli present in the situations where traits are manifested, and that the mean values of states are therefore reflective of context as well. It suggests that a trait

is not just the running average of the density distribution of states but an average state that is *contextually bound* (DeYoung, 2015).

1.3 Distinguishing the Contextualized View from Person-Situation Transactions

Although there has been a long history of research on the interplay of traits and situations, it is important to note that much of this work can be distinguished from the contextualized view of traits. The contextualized view of traits asks whether our descriptions of a person's traits include information about the situation or context. In contrast, most research has focussed on a broad range of phenomena relating to *person-situation transactions*. Person-situation transactions include questions about whether or when a trait or a situation will best predict someone's behaviour; how a trait can lead someone to be exposed to a situation; and whether traits are shaped by situations as well as vice versa. In each case, traits and contexts are viewed as separate units of analysis, and are even 'pitted against each other' in the prediction of behaviour. The following sections briefly re-trace some of the important developments in this literature, which form a backdrop for how the field currently thinks about the relation between traits and contexts.

1.3.1 Person-Situation Debate: Do Traits or Situations Predict Behaviour?

Although the trait approach is the most fruitful branch of personality psychology, it did not progress unchallenged. One way in which psychologists have explored person-situation transactions is to understand whether it is personality or situation that predicts behaviour. In the 1960s and 1970s, social psychologists raised many criticisms of trait psychology, one of which is known as *Situationism*.

Situationism refers to the claim that situations (and primarily *social* psychological factors) drive behaviour, whereas traits are weak predictors of behaviour, and of such limited evidentiary value as to be entirely "untenable" (Mischel, 1968; Mischel & Shoda, 1995). The view was famously proposed by Walter Mischel in his 1968 book "Personality and

Assessment”, which included a review of many early studies that seemed to show that behaviour is very changeable, with little or no consistency from one situation to the next.

For example, in a well-known study on deceitful behaviours (Hartshorne & May, 1928), children took multiple behavioural tests of dishonesty (i.e., lying, cheating, stealing). The results showed that their dishonest behaviours varied widely across situations (e.g., diverse classroom, home, social settings) with little apparent consistency. Different children displayed different dishonest behaviours in different situations. Most children were not consistently honest or dishonest across situations. Specifically, the average correlation among these behavioural tests was $r = 0.26$, which is far below a perfect correlation of 1. Such an effect size was thought to be so weak as to be easily dismissed.

However, the central claims made by Walter Mischel in his book did not support the extreme view of situationism. The fact that people behaved differently across different situations does not invalidate the concept of a stable personality trait. This is in fact a “straw man” argument, given that influential trait theorists such as Allport (1937, 1961) explicitly allowed for flexibility of behaviour across situations. Allport’s view is lucidly illustrated by Higgins and Scholer (2008) in their description of what it means to be authoritarian (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). Specifically, they explained that a person high on authoritarianism is submissive toward one’s leader but dominant toward one’s subordinates. Thus, although it seems as though authoritarians change their behaviour across contexts, these “inconsistent” behaviours are part of a meaningfully consistent pattern of behaviour; to be an authoritarian, one must be adaptive to the status that one holds across different situations. Thus, a stable personality trait does not equate with “invariance” as suggested by most of the descriptions of the social and cognitive model (Mischel & Shoda, 1995).

That said, the correlation of similar behaviours across two situations is actually much higher in more recent and highly controlled studies (e.g., Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004; Funder & Colvin, 1991), compared to what was observed in the very early studies described by Mischel. For example, Funder (1991) investigated 62 behaviours of 140 participants at three time points in three laboratory conditions—random interaction with a stranger in an unfamiliar lab (time point 1), random interaction with a stranger in the same lab (time point 2), and debate with the same person met at time 2 in the same lab (time point 3). He observed that a large number of behaviours manifested positive cross-situations correlations ranged from .28 to .70, indicating a moderate to strong correlation between personality and behaviour.

Furthermore, Mischel's (1968) argument seemed to suggest that, because traits are weak predictors of behaviour, situations must therefore be strong predictors of behaviour. In fact, efforts to quantify the effects of situations revealed that they predict behaviour no more strongly than personality traits, with correlations ranging from .36 to .42 (Blass, 1991; Funder & Ozer, 1983; Sherman et al., 2015). It is now well known that correlations of .20 to .30 correspond to above-average effect sizes in personality and social psychology (Richard, Bond & Stokes-Zoota, 2001). Item-total correlations between .20 and .40 are common for most major measures in psychology, not just personality psychology. Thus, correlations between personality and behaviour were not 'weak', and effects of situations were no stronger.

1.3.2 Person-Situation Interaction: When Does a Trait or a Situation Best Predict Behaviour?

It is now generally accepted that trait psychology survived the challenge by *Situationism*. Not only that, growing evidence for the consistency of behaviour and the stability of personality traits have also strengthened the role of traits as influential predictors of behaviour (Roberts et al., 2007; Soto, 2019). Today, most personality and social

psychologists reject the competitive view of persons versus situations, and instead view person-situation transactions through the lens of *interactionism*. Interactionism is a model whereby situations and traits combine to jointly influence behaviour (Magnusson & Endler, 1977; Mischel, 1977; Mischel & Shoda, 1998).

Many early lines of work planted the seeds of the interactionist perspective (Simpson & Winterheld, 2012), including Murray's (1938) model of needs and motives, Lewin's (1948) field theory, Kelly's (1955) theory of personal constructs, and Neisser's (1967) cognitive research. For instance, Kurt Lewin claimed that "To fully understand how and why individuals behave as they do, one must discern who they are as people (e.g., their traits, dispositions, values, attitudes), the types of situations to which they are responding, and how these variables sometimes combine (statistically interact) to influence how individuals think, feel, and behave" (Lewin, 1948, p. 494).

Over the years, the interaction approach has been widely and successfully applied to answer various research questions, such as how personality interacts with external factors to predict conformity (e.g., Santee & Maslach, 1982), how personality interacts with social cues and organizational roles to predict training behaviour (e.g., Morrell & Korsgaard, 2011); how personality interacts with different work contexts to predict the effectiveness of performance evaluation (Kell, Rittmayer, Crook., & Motowidlo, 2010); how personality interacts with stressful life events to predict depression (e.g., Mazure, Maciejewski, Jacobs, & Bruce, 2002); how dispositions and situations interact to predict the experience of boredom (Mercer-Lynn & Eastwood, 2013); and how personality interacts with social structures modelled within economic games to predict pro-social behaviour (Zhao, Ferguson, & Smillie, 2016).

Interactionism may seem similar to the idea of contextualized traits, because it acknowledges that situations must be taken into account to understand individual differences in behaviours and experiences. However, a key distinction between these perspectives

concerns the way traits are conceptualized. Within interactionism, a ‘trait’ is the decontextualized ‘internal’ dispositional variable that interacts with an ‘external’ situation to cause behaviour or experiences (Beaty, Cleveland, & Murphy, 2001; Funder & Ozer, 1983). In contrast, within the contextualized view of traits, a ‘trait’ is the descriptive patterns of behaviour and experience that are activated by particular stimuli and situations, in conjunction with the various underlying causes of traits. That is, a ‘trait’ is a function of both the person and the situations in which that person finds themselves.

Another distinction between these perspectives concerns the kind of research question that they would investigate. Proponents of *interactionism* are typically interested in whether traits interact with contexts predicting some sort of outcome that is separate from personality, such as longevity, relationship quality, or achievement (Roberts et al., 2007). Conversely, the contextualized view of traits asks whether contexts characterised by particular stimuli are fundamental for eliciting trait expressions—the building blocks of traits themselves. Put differently, interactionism may ask whether the relation between traits and some separate outcomes depends on contexts, whereas trait contextualization asks whether the relation between traits and their state expressions depends on contexts.

For example, from an *interactionist* perspective, one might ask whether trait agreeableness predicts work performance more strongly in some jobs compared to others (e.g., programmer vs. customer-facing role). It is clear that jobs are not part of trait agreeableness. In contrast, the contextualized view of traits would examine whether the behaviours and experiences described by agreeableness are somewhat restricted to contexts that provide opportunities to support, cooperate, or empathize with others. In this example, opportunities for prosocial behaviour is integral to the description of trait agreeableness.

To sum up, interactionism is the view that traits and situations are different antecedents of behaviour and experience, each of which jointly strengthens or weakens the

effect of the other in the form of a statistical interaction (Funder, 2006; Funder & Colvin, 1991). In contrast, the contextualized view holds that traits are naturally connected to particular contexts or certain stimuli (Allport, 1937) that are themselves *part of* traits. The author acknowledges that this distinction can at times be blurry and is perhaps better thought of as a conceptual rather than an empirical distinction. For example, any contextualized effects of trait extraversion (i.e., the general tendency to be talkative, bold, and enthusiastic) on state extraversion (i.e., momentary expressions of being talkative, bold, and enthusiastic) might also be seen to support interactionism. For the purposes of this thesis, however, interactionism is taken to apply only when the outcome being predicted cannot be considered part of the trait itself. Examples might include any instance where a contextual factor moderates the association between trait conscientiousness (i.e., the general tendency to be efficient, organized, and responsible) and longevity; trait agreeableness (i.e., the general tendency to be kind, cooperative, and polite) and risk of cardiovascular disease; or neuroticism (i.e., the general tendency to experience negative emotions such as anxiety and worry) and relationship dissolution (see Ozer & Bennet-Martinez, 2006). Overall, the differences between these two views are a matter of one's preferred definition, but the author maintains that a conceptual distinction can be made, even if a firm empirical distinction is somewhat blurrier.

Finally, it should also be noted that there are many other ways through which person-situation transactions could be explored, including the situation's effect on personality (e.g., through culture, evolution, and life experience; Funder, 1991; Imada & Ellsworth 2011; Nettle, 2006) and personality's effect on situation (e.g., through situation selection, situation perception, and situation transformation; Furr & Funder, 2019; Rauthmann et al., 2015; Sherman et al., 2013). These will not be elaborated here since they are not directly linked to the research question to be examined in this thesis.

1.4 Evidence For and Against the Contextualized View of Traits

Despite many social and personality psychologists having implicitly or explicitly subscribed to the contextualized conceptualization of traits, this account has surprisingly received minimal empirical examination. Moreover, the limited number of studies that indirectly or directly tested this view have provided mixed findings, creating more confusion than clarity. In this section, I will review the existing evidence for and against the contextualized view of traits, which paves the way for the research question examined in the current thesis.

1.4.1 Evidence for the Contextualized View from Early Studies

Some of the early support for the contextualized view of traits came from experimental studies on clinical traits (e.g., aggression, social anxiety). For example, Wright & Mischel (1987) found that children who were clinically diagnosed as more aggressive increased their physical and verbal aggression more sharply, compared to nonaggressive children, when the level of competence demanded by their situations increased from low (e.g., art, fishing) to medium (e.g., drama, adventure) to high (e.g., crafts, wood-working). In addition, Muller, Endler, & Parker (1990) found that adolescents and adults who scored high (i.e., above the median) on social evaluation and/or ambiguity related anxiety felt more anxious the night before a planned public speaking event, relative to those low (i.e., below the median) on these facets. This was observed despite the fact that the high and low anxious participants did not differ significantly from each other on state anxiety a week prior the event nor right after the event. This finding echoed a previous study by Flood and Endler (1980), who assessed male athletes' state social evaluation anxiety at two time points—right before a routine training and right before a stressful meet. The athletes who scored high on trait social evaluation anxiety (the top 40% of the sample) reported feeling a lot more anxious right before the stressful meet situation, relative to a routine training, when compared to those

low (the bottom 40% of the sample) on this trait. While these studies provided some evidence for the contextualized nature of traits, they mainly focused on clinical facets (e.g., aggression and social anxiety) and negative affect, thus may not be generalizable to personality traits more broadly.

More indirect evidence comes from a study by Larsen and Ketelaar (1991), who investigated the effects of Neuroticism and Extraversion on response to vignettes designed to induce positive and negative affect, respectively. It was found that extraverts responded more strongly to vignette characterized reward (e.g., *‘winning a \$50,000 in a lottery’*) and experienced more positive affective ‘highs’, whereas neurotics responded more strongly to vignette characterized by threat/punishment (e.g., *‘being expelled from school in an embarrassing manner’*) and experienced more negative affect. As positive affect is a central characteristic of extraversion, whereas negative affect is a central characteristic of neuroticism, this study seems to suggest that the relations between these traits and their affective states depend to some degree on context. On the other hand, it is not necessarily the case that a mood induction procedure can be equated with varying situations or contexts.

While the above-mentioned studies mostly focused on affective manifestations of traits, a couple of studies have looked at traits’ behavioural expressions, such as honest behaviours at workplace. Zettler et al. (2010) examined honesty-humility related behaviour and found that employees low on trait honesty-humility were very much likely to increase counterproductive work behaviour (e.g., *‘Came in late to work without permission’*) when they were made to believe that the level of organizational politics (i.e., self-serving behaviour demonstrated by co-workers and supervisors) was high. By contrast, employees high on trait honesty-humility reported the same amount of counterproductive work behaviour, independent of the level of perceived organizational politics. This study also seems to suggest that traits are to some degree contextualized, although these findings could equally be

interpreted through the lens of interactionism (i.e., demonstrating joint effects of honesty-humility and workplace contexts on work behaviour).

Finally, in an intriguing study of non-human animal personality, contextualized feeding behaviour was found. Sinn and Moltschaniwskyj (2005) measured squids' personality expressions (e.g., shy avoidance–bold aggression, active, and reactive etc.) in feeding versus threat conditions. It was found that, bold/aggressive squids responded quicker to the first food item, initiated more feeding strikes, and spent less time per item than did shy/avoidant squids. Squids high on reactivity jetted away from threat more quickly, inked more, and required fewer threatening touches to trigger these behaviours than squids low on reactivity. Moreover, the same behaviour correlated only moderately across context, suggesting these trait-behaviour patterns are relatively context specific. That is, bold squids in the feeding condition were not necessarily bold in the threat condition. Inactive squids in the threat condition would not necessarily be inactive in the feeding condition.

1.4.2 Mixed Evidence for the Contextualized View from Recent ESM Studies

While early studies discussed in the previous section provided direct or indirect evidence for the contextualized conceptualization of traits, more recent studies with a larger sample size, using more robust and comprehensive measures, seem to provide either mixed findings or a lack of clear evidence for the contextualized view. For example, Lucas & Dyrenforth (2008) tested whether trait extraversion moderates the within-person effect of social activity on positive affect, using one week of momentary state reports and two weeks of daily-diary. They found that, although extraverts were more social, more outgoing, and experienced higher level of positive affect than introverts in general, extraverts did not act or feel more positively than introverts, when they were engaging in social activity compared to when they were alone. These results remain significant, even when specific interaction partner and specific types of social activities were examined.

More recently, Wilt and Revelle (2018) examined the possible moderation effect of traits on a comprehensive range of affective states. They investigated whether the Big Five traits interact with daily life context (i.e., people's current company and activity), predicting a range of momentary affective experience. Specifically, affect here refers to energetic arousal (ranging from energetic to sluggish), tense arousal (ranging from tense to relaxed), and hedonic tone (ranging from pleasant to unpleasant). Aligned with Lucas and Dyrenforth (2008), they found little to no evidence for Person $\times$ Situation interactions predicting momentary affect.

A similar pattern was found by Sherman, Rauthmann, Brown, Serfass, & Jones (2015), who examined the joint influence of seven personality traits (i.e., trait Subjective Happiness and traits in the HEXACO model) and eight situation dimensions from the DIAMONDS (i.e., a taxonomy of situations; Rauthmann et al., 2014) on real life behaviour and experience. They tested fourteen models examining whether the relations between traits and their corresponding state expressions varied as a function of putatively relevant situations. For example, three situation dimensions (i.e., adversity, sociability, and mating) were mapped onto trait extraversion, and two situation dimensions (i.e., adversity and negativity) were mapped onto trait neuroticism. Again, among all the interaction models, they did not find any strong Person $\times$ Situation interactions predicting personality states. For example, extraverts did not increase their extraverted or dominant behaviour more than introverts did in the hypothesised situations (i.e., those characterised by sociability, adversity, and mating). Likewise, neurotic individuals also did not experience a larger increase in negative feelings than less neurotic individuals in the hypothesised situations (i.e., those characterised by adversity and negativity). These findings are consistent with Lucas and Dyrenforth (2008) and Wilt and Revelle (2018).

Conversely, other experience sampling studies found slightly different results. For example, Yao and Moskowitz (2015) found that workplace communal behaviour—a particular expression of trait agreeableness—is weakly contextualized in work environment. In their study, agreeableness-related work context was operationalized as perceived levels of warmth of one's co-workers. Participants high on trait agreeableness behaved more agreeably regardless of this variable, compared to those low on agreeableness. They were also less reactive to co-worker's disagreeable behaviour. In contrast, although all participants behaved more agreeably when faced with a warm co-worker (versus cold co-worker), participants low on agreeableness displayed a larger increase in their agreeable behaviour than participants high on agreeableness did. In essence, it is the larger increase in agreeable behaviour observed in participants low on trait agreeableness that drives the significant interaction between trait agreeableness and agreeableness-related work context. Although this study provided preliminary evidence for contextualized agreeable behaviour, these findings should be treated with some caution. This is because momentary agreeable behaviour was assessed using self-reports, and people seem to have particularly poor self-insight when it comes to rating their own *momentary* agreeableness relative to other states (e.g., state extraversion, state neuroticism; Sun & Vazire, 2018). Future study may explore this further by using third-party rated state agreeableness.

In addition to contextualized agreeable behaviour, some evidence was found for contextualized social behaviour as well. Breil et al. (2019) investigated whether extraversion interacts with certain situations (e.g., situations characterised by positivity, negativity, adversity, sociability, and low duty) predicting social behaviour (i.e., '*outgoing*' and '*sociable*'). Inconsistent with Sherman et al. (2015), Breil et al. (2019) found that, situations that are positive, less effortful, and with a low level of duty, seem to boost extraverts' social behaviour slightly more for extraverts compared to introverts. It is worth noting that, one

major difference between Breil et al. (2019) and Sherman et al. (2015) is the way situations were measured. That is, while both studies used the same situation measures (i.e. DIAMONDS; Rauthmann et al., 2014), Sherman et al. (2015) used self-reported context ratings, whereas Breil et al. (2019) used informant-coded context ratings. This methodological difference may have contributed to the difference in their results.

Similar to Breil et al. (2019), Sandstrom, Lathia, Mascolo, & Rentfrow (2017) found a weak moderation effect of context on the affective manifestation of personality. What makes this study unique is that, in addition to collecting self-reports of momentary location (i.e., being at home, at work, or in a social type of situation), they also tracked people's physical locations using mobile phone sensor to sample a more complete set of locations with as little user intervention as possible. Their results suggested that, while people who were more agreeable, more extraverted, and less neurotic experienced more positive mood across contexts, people who were less agreeable, less extraverted, and more neurotic experienced a larger boost in positive mood in social situations vs. being at home. Moreover, people who were less agreeable experienced a larger boost in positive mood being at home vs. being at work. In other words, trait $\times$ context interactions found in this study were driven by larger boosts in positive mood experienced by participants who were less sensitive to trait-relevant cues when they were exposed to situations with more salient trait-relevant stimuli. However, the authors advised that these results should be treated with some caution as the results vary at times between the self-reported locations and the sensed locations. For example, the mood benefits associated with being at home vs. being at work was larger for low openness people when using mobile sensed location and larger for high openness people when using self-reported location. It appears that different methods of measuring situations have again led to somewhat divergent findings.

Overall, the results of the studies that have looked at the moderating role of context in trait-state relations seem very inconsistent. A series of studies appear to support the idea of contextualized traits, but these results may not be generalizable for a few reasons. Firstly, most of them have focused on clinically relevant traits (e.g., anxiety and anger). Some used clinical samples and some used participants at the extreme end of a spectrum. Secondly, most of these studies were conducted decades ago, usually with a small sample size. Thirdly, similar experimental studies fail to replicate their results (e.g., Mauss, Wilhelm, & Gross, 2004). Lastly, most recent studies that used more rigorous methods (i.e., experience sampling) have shown the opposite pattern. This leaves us mixed evidence for the contextualized conceptualization of traits.

It is unclear whether these mixed results are because clinical aspects of personality (e.g., social evaluation anxiety) are more contextualized than the broad domains (i.e., the Big Five traits), or because different situation measures were used (e.g., roles, locations, and situation characteristics), or because situations were assessed by different sources (e.g., self-reported, machine sensed, informant-rated), or because situations observed in the studies varied significantly in strength (e.g., exams/contest/public speaking vs. routine activities). Of these various factors, one potentially important problem is that there has, until recently, been relatively little consensus regarding how to measure or manipulate situations. Therefore, it is important to assess situations more closely with more rigorous methods to get a clearer definition of traits in relation to context.

1.5 How Should We Assess Situations to Evaluate the Contextualized View of Traits?

Thus, to evaluate the contextualized view of traits, it is critical to attend to the right situations and measure them in the right way. This section briefly reviews the various methods that psychologists have used to assess situations and the progress they have made in

developing situation taxonomies, which leads to the rationale of how contexts are operationalized in this thesis.

1.5.1 How were Situations Assessed in Previous Research?

Historically the studies that have assessed trait relevant situations have done so in a rather ad hoc, and potentially circular manner. They started by picking situations that appeared to differ in terms of the demands the situations make (Shoda, Mischel, & Wright, 1993), the emotions they elicit (Pervin, 1977; Tomkins, 1962), the behaviours deemed appropriate in them (Price & Bouffard, 1974), the degree to which they satisfy personal needs or specific goals (Lord, 1982; Pace & Stern, 1958), and their manifesting behaviour and then try to analyse the situations into their psychological characteristics.

For example, Funder & Colvin (1991) suggested that if a situation provides an opportunity for someone to behave aggressively toward someone else, then it is considered relevant to trait “aggression”. Similarly, parties seem to produce more extraverted behavior than do lectures, so lack of structure, the friendliness of others, and the degree of interaction might be the active characteristics behind this (Fleeson, 2007). These examples demonstrated how past researchers assessed situations in terms of their effects on people’s behaviour and experience. Other studies have organized situations according to the social role that the individual is fulfilling (e.g., friend, partner, colleague, etc.; Donahue & Harary, 1998), the degree of freedom an individual had in choosing his or her behaviour in the situation (e.g., Moskowitz, 1982; Rose, Blank, & Spalter, 1975), or individuals’ abilities to deal with them (e.g., a situation in which one has to make a decision is relevant to trait autonomy; La Guardia & Ryan, 2007; Ten Berge & De Raad, 2002).

Although the reviewed methods of measuring situations all have their merits and appear useful, they were not coherently organized across different areas of situational research. Across these studies, the term “context” has been used rather loosely to refer a lot

of different constructs to suit each individual study's needs. Some psychologists have conceptualized contexts as objective phenomena (e.g., roles, parties), while others treat contexts as subjective phenomena (e.g., opportunity to behave aggressively towards someone else). There seems to be little consensus among psychologists regarding how contexts should be assessed (Rauthmann et al., 2015). Because of these limitations, despite the interesting effects of situational factors that have been found, it has been difficult to achieve a clear picture of the interplay of persons and situations (Fur & Funder, 2019). This also has clear implications for evaluating the contextualized view of traits—the central focus of this thesis.

1.5.2 The Development of Situation Taxonomies

To improve on these limitations, many researchers tried to develop a taxonomy of situations (e.g., Hunt & Rosenstein, 1962; Price & Blashfield, 1975; Van Heck, 1984). Some early work focused on contexts relevant to a particular trait. For example, Hunt and Rosenstein (1962) constructed a taxonomy of anxiety evoking situations consisting three types of situations: (1) interpersonal situations (e.g., at an interview), (2) personal danger situations (e.g., alone in the woods at night), and (3) ambiguous situations (e.g., a long automobile trip). Although this scale seems a reasonable attempt to identify situations that would be anxiety provoking, some domains seem overly broad (e.g., interpersonal situations) and some domains seem rather narrow (e.g., personal danger), and the overall set of situations is obviously not comprehensive.

Other efforts toward a taxonomy achieved a broader sampling of situations. For example, Price and Blashfield (1975) studied 455 behaviour settings of a small midwestern town (Barker & Gump, 1964), and grouped these into 12 clusters of settings (such as religious settings and business settings; Price & Blashfield, 1975). Even more comprehensively, Van Heck (1984, 1989) classified all objective situational characteristics situations into ten dimensions: (1) interpersonal conflict, (2) joint working, (3) interpersonal

relations, (4) recreating, (5) travelling, (6) rituals, (7) sport, (8) excesses, (9) serving, and (10) trading. Among the early taxonomies, Van Heck's (1984, 1989) taxonomy was found most useful because it comprises a broad range of situational domains, however it still does not reveal which situations are relevant to which traits' manifestations (Berge & Raad, 1999).

Researchers acknowledged that what is needed is a taxonomy of situations that systematically maps onto individual differences so that traits can be investigated in the kind of context that might facilitate their expressions (Berge & Raad, 1999). In recent years, much more progress has been made toward the development of such taxonomies. For instance, the International Situations Project has expanded beyond 20 countries, and an integrated psychology of situations has begun to take shape (Rauthmann et al., 2014). These include the development of Riverside Situational Q-Sort (RSQ; Sherman, Nave, & Funder, 2010; Wagerman & Funder, 2009) and the Situational Eight DIAMONDS (Rauthmann et al., 2014).

The **RSQ** (Sherman, et al., 2010; Wagerman & Funder, 2009) is a very comprehensive situation taxonomy, comprising 81 diverse characteristics of situations. These include: "Talking is permitted, invited, or conventionally expected"; "Context is potentially anxiety-inducing". These items were not built on any explicit theory about situation characteristics but were derived from the California Adult Q-Sort (CAQ; Block, 1978), a behavioural personality measure. Specifically, items in RSQ are descriptions of contexts, in which personality characteristics described in CAQ items might be expressed (Wagerman & Funder, 2009). For example, "affords an opportunity to demonstrate intellectual capacity" (RSQ item) describes contexts that facilitate the manifestation of personality characteristics such as "appears to have a high degree of intellectual capacity" (CAQ item).

Although **RSQ** has demonstrated its usefulness in a variety of empirical studies (e.g., Sherman et al., 2010, 2012, 2013), it is a lengthy instrument that can be inefficient in some

research contexts (e.g., experience sampling). To assess situations more efficiently, researchers summarised the RSQ items into eight key dimensions, coined as the DIAMONDS (Rauthmann et al., 2014). These are: *Duty* (Does work need to be done?), *Intellect* (Is deep cognitive processing relevant?), *Adversity* (Are there overt threats from external forces?), *Mating* (Is there potential to attract or court sexual/romantic mates?), *pOsitivity* (Are there positive aspects to the situation?), *Negativity* (Could the situation entail negative feelings?), *Deception* (Is dishonesty or mistrust an issue?), and *Sociality* (Is meaningful social interaction possible?).

The RSQ and DIAMONDS are valuable tools for research into situations, including the interplay of personality traits and situational characteristics. In general, they provide a framework within which the psychological characteristics of situations can be systematically organized. In relation to the goals of the present thesis, they provided a good starting point for evaluating the contextualized view of traits. On the other hand, it is not clear to what degree the structure of situations aligns with the structure of personality. That is, there is no reason we might expect the RSQ or the DIAMONDS to identify trait-relevant situations for each of the Big Five. For instance, as mentioned earlier, Sherman et al. (2015) and Breil et al. (2019) both used the DIAMONDS model, but they did not map trait extraversion to the exact same contexts. Specifically, Sherman and colleagues mapped trait extraversion to situations characterised by adversity, sociability, and mating, whereas Breil and colleagues mapped trait extraversion to situations characterised by positivity, negativity, sociability, and duty. Moreover, within Sherman et al. (2015), situation adversity was mapped onto two traits, Extraversion and Neuroticism, which are strongly negatively correlated. It may be that there is no unambiguous mapping between the major dimensions of personality (i.e., the Big Five) and the major dimensions of situations (i.e., the DIAMONDS). This might explain why

recent experience sampling studies using these situation taxonomies have so far failed to support the contextualized view of traits. Thus, a different approach may be worthwhile.

1.5.3 Identifying Trait-Relevant Situations Based on Personality Theory

According to the contextualized view of traits, a given trait's manifestation is systematically linked to the psychologically meaningful stimuli present in the environment. That is, the talkativeness in the extravert may be linked to the presence of others; the anxious feelings of the neurotic person may be linked to the presence of threat. However, the field still has little knowledge of which situation characteristics are most relevant to eliciting expressions of which traits (Bem & Funder, 1978; Funder, 1991; Fleeson, 2007). General personality inventories provide relatively little specific information about the kinds of situations that may elicit any given trait (Fleeson, 2007; Roberts, 2007; Wood & Roberts 2006).

Allport (1937) suggested to identify the situation characteristics, which when present make certain states more effective for the kinds of goals individuals are motivated to pursue. This suggestion, at the infancy of personality, is echoed by a major theory within personality neuroscience concerning the motivational processes underlying broad level traits: extraversion and neuroticism. Extraversion describes people's tendency to be gregarious, assertive, and enthusiastic, whereas neuroticism describes people's tendency to experience negative and unstable emotions. Over the last 40 years, a number of theorists, beginning with Jeffrey Gray (1973), have proposed that the manifestation of extraversion and neuroticism (i.e., the affective, behavioural, and cognitive expressions) is driven by different motivational mechanisms— rewards approaching and threat avoiding processes, respectively. This proposal, widely known as Reinforcement Sensitivity Theory, has led to the description of around 2-3 bio-behavioural systems that mediate the effects of rewarding and punitive stimuli on emotion and motivation (Corr, 2004; Depue & Collins, 1999; Gray, 1973; Pickering,

2008; Smillie, Pickering, & Jackson, 2006; Smillie, 2008). Crucially, individual differences in the functioning of these systems have been proposed to underlie individual differences in extraversion and neuroticism. In what follows, I will review the theoretical information and empirical evidence concerning these mechanisms proposed to underlie extraversion and neuroticism, based on which the hypotheses for the present thesis were generated, and the studies described over the subsequent chapters were designed.

Extraversion relevant situations—the presence of rewards. In Reinforcement Sensitivity Theory (RST), the underlying mechanism of extraversion is termed the Behavioural Approach System (BAS). The BAS is activated by rewarding stimuli and serves to generate approach motivation, positive affect, and pursuit of reward. Rewards are broadly referred to anything an individual will value, pay a cost for, or expend effort to obtain, or approach (Elliot & Thrash, 2002; Elliot, 2008). Thus, this theory suggests that in the presence of rewards, extraversion manifests as behavioural exploration (i.e., approach rewards), engagement with specific rewards (i.e., consumption of rewards), and positive affect (e.g., excitement, satisfaction, etc.). If so, then the degree to which a situation is likely to elicit expressions of trait extraversion depends on the degree to which the situation affords possibilities for pursuing or attaining desired rewards.

Some rewards are strongly conditioned by innate predispositions, such as food, sex, and physical comfort. Some rewards are more complicated and agentic in nature such as money and power. Even though the reward sensitivity theory of extraversion is described in relation to rewards in general, many important rewards are social, including attention, affection, affiliation, dominance, status, influence, praise, which have been associated with

extraversion in previous literature (e.g, Ashton Lee & Paunonen, 2002; Depue & Collins, 1999; DeYoung, 2013, 2015; Fishman & Ng, 2012).¹

The theory that extraversion reflects reward sensitivity is reasonably well supported (Depue & Collins, 1999; Smillie, 2013). A few studies have found extraversion to moderate the effects of pharmacological manipulation of dopamine that is centrally involved in reward sensitivity in both humans and non-humans (Depue et al., 1994; Depue & Fu, 2013; DeYoung, 2015; Rammsayer, 1998; Wacker, Chavanon, & Stemmler, 2006; Wacker & Stemmler, 2006; Wacker & Smillie, 2015). Moreover, a range of neurobiological studies have linked extraversion to the brain's reward processing system and the volume of ventromedial prefrontal cortex, a region that is crucial for representing the rewarding value of stimuli (DeYoung et al., 2010; Omura, Constable, & Canli, 2005; Rauch et al., 2005).

Several fMRI and EEG studies have shown that extraversion is related to brain activity in response to monetary rewards or pleasant emotional stimuli, though these findings should be interpreted with caution given their small sample sizes (Canli, Sivers, Whitfield, Gotlib, & Gabrieli, 2002; Cohen, Young, Baek, Kessler, & Ranganath, 2005; Mobbs, Hagan, Azim, Menon, & Reiss, 2005; Schaefer, Knuth, & Rumpel, 2011; Smillie, Cooper, & Pickering, 2011). Fortunately, adequately powered studies in this area are beginning to appear (e.g., Smillie, Jach, et al., 2019; Wu et al., 2014).

Extraversion has also been associated with approach behaviour to short-term goals in daily life, greater positive affect induced by positive vignettes, and faster response to positive stimuli after positive affect priming (Heller, Komar, & Lee, 2007; Larsen & Ketelaar, 1991; Robinson, Moeller, & Ode, 2010; Smillie, Cooper, Wilt, & Revelle, 2012). Finally, a few

¹ It is worth noting that, one type of reward—information—is not linked to Extraversion but Openness/Intellect, which reflects individual differences in cognitive exploration and engagement with information (DeYoung, 2013, 2015).

studies have shown that extraversion predicts learning under conditions of reward in reinforcement learning paradigms (Pickering, 2004; Smillie, Dalgleish & Jackson, 2007).

Neuroticism relevant situations—the presence of threats. Neuroticism describes individual differences in the tendency to experience negative emotions, such as anxiety, depression, irritability, anger, shame, etc. It reflects the sensitivity and reactivity of our threat detection systems, referred to by Gray and McNaughton (2000) as the Behavioural Inhibition System (BIS) and Fight Flight Freeze System (FFFS). These systems are activated by goal conflict and punishment respectively (Depue & Collins, 1999; Pickering & Gray, 1999). Here a punishment can be defined as anything an individual will expend effort to avoid (Elliot, 2008), such as pain, financial loss, or even social evaluation. Punishment and conflict stimuli are often intertwined. For example, the possibility of a punishment (e.g., overspending one's budget) can elicit approach-avoidance conflict (e.g., whether one should cancel a holiday or risk financial ruin).

According to RST, the extent to which a situation is theoretically relevant to trait neuroticism depends on the degree to which the situation contains signals or cues of threats (i.e., punishment, conflict, or uncertainty). Just as many important rewards are social, many threats are social in nature, such as negative evaluation, bullying, social exclusion, social rejection, stereotyping, and competition (e.g., Eisenberger, Lieberman & Williams, 2003; Hinduja & Patchin, 2010; Moore, Wilson, Vine, Coussens & Freeman, 2013; Schmader, 2002; Somerville, Kelley, & Heatherton, 2010).

The evidence supporting the link between Neuroticism and threat sensitivity is considerable. Neuroimaging studies showed that Neuroticism is associated with volume in brain regions involved in emotional deregulation, error detection, and pain processing (DeYoung, 2010; Omura et al., 2005). Neuroticism is also associated with neural responses to financial loss and emotionally negative, threatening, or punishing stimuli (Cremers et al.,

2010; Etkin et al., 2004; Haas, Omura, Constable, & Canli, 2007; Hirsh & Inzlicht, 2008; Wu et al., 2014). Moreover, neuroticism predicts greater negative affect in response to negative-mood inductions (Larsen & Ketelaar, 1991), avoidance behaviour in daily life (Heller, Komar, & Lee, 2007), increased processing of negative information in emotional categorization and memory (Chan, Goodwin, & Harmer, 2007), and sensitivity to error feedback in cognitive tasks (Amodio, Master, Yee, & Taylor, 2008; Moeller & Robinson, 2010; Robinson, Moeller, & Fetterman, 2010).

1.6 The Present Thesis

Despite nearly a century of research in personality psychology helping to hone our understanding of personality traits, there is some ambiguity concerning the meaning of a trait. Specifically, the contextualized view of traits has not been directly evaluated in a program of empirical research. Given the extensive theory and research, informing the identification of eliciting stimuli for extraversion and neuroticism, the focus of the present research is restricted to just these two broad domains of personality.

The broad goal of this thesis is to test the hypothesis that traits are contextualized. Based on the contextualized view, I expected that personality traits would predict their corresponding expressions most strongly within contexts containing trait-relevant eliciting stimuli. To identify those stimuli, I drew on the insights from Reinforcement Sensitivity Theory. Specifically, based on extraversion and neuroticism's putative basis in reward and threat sensitivity, respectively, I expected that trait extraversion would correspond most strongly to its state expressions in contexts characterized by reward, whereas trait neuroticism would correspond most strongly to its state expressions in contexts characterized by threat.

I evaluated these predictions using four studies: a self-report survey, a laboratory experiment, and two daily-life experience sampling studies. In the self-report survey (Chapter 2), participants reflected on the degree to which they would express state extraversion and

state neuroticism in various rewarding and threatening contexts. In the laboratory experiment (Chapter 3), participants took part in an interactive task, prior to which they were randomly assigned to two conditions designed to elicit reward expectation and threat expectation respectively, versus a neutral control condition. Following the task, all participants rated their own as well as each other's extraverted states and neurotic states during the task. In the experience sampling studies (Chapters 4 and 5), participants reported the degree to which their current context was characterised by reward and/or threat, as well as the extent to which they were expressing state extraversion and neuroticism, six times per day for 7 days. Whereas the first experience sampling study used subjective ratings of situations, the second experience sampling study extended this by including objectively coded ratings of rewarding and threatening contexts. In all four studies, I expected that both extraversion and neuroticism would interact with context in the prediction of their state expressions, such that the relation between trait extraversion and state extraversion would be strongest in rewarding contexts, and the relation between trait neuroticism and state neuroticism would be strongest in threatening contexts.

Chapter 2

Are Traits Contextualized? An Initial Examination Based on Prospective Self-reports

2.1 Overview

This first study in this thesis provides an initial test of the contextualized view of traits, simply by asking participants the degree to which they would express different traits in different contexts, depending on whether or not these contexts were characterised by theoretically relevant stimuli. To the author's awareness, this is the first such study conducted for this specific purpose. As for previous studies, Tett & Guterman (2000) showed that the correlations between a few narrow traits (i.e., sociability, risk taking, and organization) and corresponding behavioural intentions were higher in scenarios considered trait-relevant by proficient judges. Moreover, there is also a clear link to be drawn with past research attempting to assess personality using "context specific" personality questionnaires. This research suggests that context-specific personality items provide respondents with a common frame of reference (Bing, Whanger, Davison, & Vanhook, 2004; Schmit, Ryan, Stierwalt, & Powell, 1995). This standardises item interpretation, reduces measurement error, and increases validity in comparison to non-contextualized items. For example, personality questionnaires referring specifically to a work context (e.g., How anxious do you generally feel at work?) predict relevant work outcomes and experiences more strongly than a standard non-contextualized personality questionnaire (Heller, Ferris, Brown, & Watson, 2009; Bowling, & Burns, 2010). This may hint at support for a contextualized view of personality. However, rather than compare the predictive validity of contextualized and de-contextualized personality questionnaires, this study will examine whether personality questionnaires predict their associated state expressions in some contexts more strongly than in others.

As described in the general introduction, this thesis focuses on the manifestations of trait extraversion and neuroticism in rewarding and threatening contexts. For this study, I

therefore assessed these traits, and asked participants to forecast the degree to which they would exhibit their state expressions in a range of rewarding and threatening contexts. I expected that extraverts, relative to introverts, would report higher levels of state extraversion across contexts, and that those higher versus lower on trait neuroticism would report higher levels of state neuroticism respectively across contexts. That is, I expected to find a main effect of each trait on its corresponding average state (H1), as has been well established in the literature (e.g., Fleeson & Gallagher, 2009). I also expected that levels of reported state extraversion would be higher for rewarding contexts relative to threatening contexts, whereas levels of reported state neuroticism would be higher for threatening contexts relative to rewarding contexts. In other words, I expected to find a main effect of context on extraverted and neurotic personality states (H2). Most importantly, in line with the contextualized view of traits, I expected that the relation between trait extraversion and state extraversion would be stronger in rewarding (versus threatening) contexts, whereas the relation between trait neuroticism and state neuroticism would be stronger in threatening (versus rewarding) contexts. That is, I expected to find an interaction between traits and contexts in the prediction of state expressions of personality, suggesting that these traits are contextualized (H3).

2.2 Method

Participants

A target sample size of 300 participants was set based on budget constraints. Power analysis revealed that this sample size enables around 90% power to detect a small interaction effect (Cohen's $f = .20$) as significant at α levels adjusted for multiple testing (Bonferroni corrected) within a 2 x 2 x 2 ANOVA design. The final sample consisted of 305 members of the public based in the USA (53.1% female, 46.6% male, 0.3% undisclosed/other), recruited through Amazon's Mechanical Turk (Mturk), an online

crowdsourcing marketplace. Participants were aged between 19 and 73 years ($M = 36.66$, $SD = 11.22$), and received \$2.00 each for their participation. All methods received ethical approval at The University of Melbourne.

Procedure

Participants were informed that they would be taking part in a study focussed on how people describe themselves in general, but also in specific contexts. After providing informed consent, participants answered a contextualized personality questionnaire, a demographic survey, and then a number of general personality questionnaires (described next). Participants also completed some other measures that were not related to any stated hypotheses (see supplementary materials in Appendix B2 for details). On average, participants took around 30 minutes to complete the whole survey.

Measures

Standard personality trait questionnaires. Participants completed measures of extraversion and neuroticism from two well-validated Big Five inventories: The Big Five Aspects Scales (BFAS; DeYoung et al., 2007) and the Big Five Inventory version 2 (BFI-2; (Soto & John, 2016). The BFAS is a 100-item measure that uses phrase-based descriptions of personality (e.g., for extraversion: *'Make friends easily'*), whereas the BFI-2 is a more recently developed 60-item measure that combines trait adjectives with concise phrases (e.g., for neuroticism: *'is relaxed, handles stress well'*). Participants responded to items on both questionnaires by indicating the extent to which they agree that each item describes them well, using a 1 (*strongly disagree*) to 5 (*strongly agree*) Likert-type rating scale.

Contextualized state-expression questionnaire. A novel measure was developed to assess state expressions of extraversion and neuroticism across different contexts. Participants rated their agreement with twelve personality trait adjectives (selected from Hofstee, De Raad, & Goldber, 1992) using 5-point scales (1 = *not at all*, 5 = *extremely*). Half

described expressions of extraversion (i.e., *talkative, bold, assertive, sociable, enthusiastic, outgoing*), and the other half described expressions of neuroticism (i.e., *calm* [reversed], *irritable, anxious, self-conscious, worried, stable* [reversed]). Participants responded to each of these adjectives in reference to a specific context. This was achieved by generating twelve descriptions of a variety of rewarding and threatening contexts. Some were adapted from a previous study of trait expressions in daily life (Heller, Komar, & Lee, 2007), whereas others were derived from the Reinforcement Sensitivity Theory, and related perspectives in the literature, reviewed in chapter 1. This resulted in six descriptors of contexts concerned with reward, gain, approach motivation, enjoyable activities, and social-power/dominance, and a further six descriptors of contexts characterized by threat, loss, goals conflict, and avoidance motivation.

An example item referring to a rewarding context is “*To what extent would you behave or feel in these ways, when you are in a situation where you have an opportunity to gain some kind of reward? Reward here refers to anything that is rewarding to you. For example: praise, love, friendship, social status, bonus, a prize/award, etc.*” An example item referring to a threatening context is “*To what extent would you behave or feel in these ways, when you are in a situation or apprehensive about getting into a situation where you are likely to be judged or evaluated? For example: a job interview, a blind date, or giving a presentation.*” Each item was then followed by all of the twelve trait adjectives described above, such that all participants rated how talkative, bold, irritable, anxious etc. they would behave or feel in all twelve contexts, yielding a total of 144 items in the contextualized state-expression questionnaire.

Data Analysis

The design comprised two within-person factors of personality state (extraverted vs. neurotic state) and context (rewarding vs. threatening), along with two between-person traits

(extraversion, neuroticism). Traits and states were measured as continuous variables whereas context was manipulated and coded as a categorical dummy variable. For improved measurement and for parsimony, the two measures of extraversion and neuroticism (i.e., from the BFAS and BFI-2) were reduced to single factors using exploratory factor analysis.

Hierarchical multiple regression was used to test the association between each trait and its corresponding state expressions across contexts. A two-way mixed between-within subjects ANCOVA was used to test the association between traits and the corresponding state in different contexts (H1). A two-way repeated measures ANOVA was used to examine whether the differences in state expressions of extraversion and neuroticism are associated with contexts (H2). Two-way ANCOVAs tested the within-person effects of contexts on personality states, including trait extraversion and neuroticism as covariates (H3). ANCOVA was used to test whether the association between contexts and states was moderated by the relevant trait (H3). SPSS Version 25 was used to compute descriptive statistics, correlations, ANOVA, ANCOVA, and factor analysis.

2.3 Results

Preliminary Analyses

Two Exploratory Factor Analyses via Principal Axis Factoring (PAF) were deployed to reduce multiple measures of trait extraversion and neuroticism to two factors. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was suitable for factor analysis ($KMO_E = .500$, $KMO_N = .500$). The number of factors to be retained was guided by Kaiser's criterion (eigenvalues above 1) and inspection of the scree plot. The PAF of extraversion measures revealed one eigenvalue exceeding 1, explaining 88.38% of the variance. Similarly, the PAF of neuroticism measures revealed one eigenvalue exceeding 1, explaining 94.13% of the variance. An inspection of the scree-plots

revealed a clear break after the first factor in each PAF analysis. The factor scores of Extraversion and Neuroticism were saved using the regression method.

Table 2.1 shows descriptive statistics, reliabilities, and inter-correlations for all variables. The extraversion factor was strongly correlated with state extraversion in rewarding contexts, and to a lesser extent in threatening contexts. The neuroticism factor was strongly correlated with state neuroticism in both threatening and rewarding contexts (in fact, slightly more strongly in rewarding contexts than in threatening contexts). The large negative correlations between extraversion and neuroticism, both at the state and trait levels, are perhaps surprising. On the other hand, extraversion and neuroticism do tend to be negatively associated, and may in part reflect the incompatibility of extraverted expressions (e.g., bold, assertive, talkative) with neurotic expressions (e.g., worried, self-conscious, anxious).

Table 2.1

Descriptive Statistics, Correlations, and Reliabilities for All Variables

Variables	1	2	3	4	5	6
1. Extraversion	(0.96)					
2. State Extraversion (RC)	.59**	(0.94)				
3. State Extraversion (TC)	.40**	.63**	(0.94)			
4. Neuroticism	-.59**	-.25**	-.18**	(0.97)		
5. State Neuroticism (RC)	-.52**	-.34**	-0.06	.67**	(0.89)	
6. State Neuroticism (TC)	-.34**	-0.03	-.33**	.58**	.56**	(0.92)
Means	0.00	3.35	2.14	0.00	2.27	3.29
Standard Deviations	1.00	0.69	0.69	1.00	0.6	0.77

Note. ** $p < .01$, * $p < .05$ (2-tailed). Sample size $N = 305$. McDonald's ω^2 for all variables are presented in parentheses on the diagonal of the correlation matrix. Extraversion and neuroticism are extracted factors from the corresponding BFAS and BFI-2 scales. (RC) = Rewarding Contexts. (TC) = Threatening Contexts.

To inspect this further, hierarchical multiple regression was used to assess the extent to which state extraversion in rewarding and threatening contexts are uniquely associated with trait extraversion. At step 1, state extraversion in rewarding contexts was entered into the model, explaining 34.8% of the variance in trait extraversion. At step 2, after entry of

state extraversion in threatening contexts, the total variance explained by the model was 34.9%, $R^2_{ch} = .01$, $F_{ch}(2, 302) = .72$, $p = .40$. In this final model, only state extraversion in rewarding contexts was statistically significant, with a much higher beta value ($\beta = .56$, $p < .0005$) than state extraversion in threatening contexts ($\beta = .05$, $p = .49$). This revealed that the relation between trait Extraversion and state Extraversion in threatening contexts is not independent of state Extraversion in rewarding contexts.

Turning to neuroticism, hierarchical multiple regression was again used to assess the extent to which the relation between trait neuroticism and state neuroticism in threatening context was independent of this relation within rewarding contexts. State neuroticism in threatening contexts was first entered into the model, explaining 44.8% of the variance in trait neuroticism. Then, after entry of state neuroticism in rewarding contexts, the total variance explained by the model as a whole was 50.8%, $R^2_{change} = .06$, $F_{change}(2, 302) = 36.78$, $p < .0005$. In the final model, state neuroticism in threatening contexts significantly predicted trait neuroticism ($\beta = .50$, $p < .0005$), as did state neuroticism in rewarding contexts ($\beta = .30$, $p < .0005$). This revealed that trait neuroticism is related to state neuroticism in rewarding contexts even after accounting for this relation within threatening contexts.

What is the Association between Contexts and States?

A two-way repeated measures ANOVA was then used to compare two different states (extraverted vs. neurotic state) across contexts (rewarding vs. threatening). The means and standard deviations are presented in Table 2.1. Given the multiple tests being performed in this model (i.e., state, context, and state $\times$ context), a Bonferroni correction was applied, resulting in a critical α level of .017. Results of the analysis revealed that there was no significant main effect of state, $F(1, 302) = 0.33$, $p = .57$, $\eta_p^2 = .001$, which indicates that the mean level of state extraversion did not differ from the mean level of state neuroticism across

contexts. This simply means that comparable levels of extraversion and neuroticism were being prospectively reported, on average.

Next, the main effect of context was significant, $F(1, 302) = 48.90, p < .0005, \eta_p^2 = .14$, which indicates that higher levels of personality states, averaging across both state extraversion and state neuroticism, were prospectively reported in the rewarding contexts relative to the threatening contexts. Of more interest, the main effects of context were qualified by a state $\times$ context interaction, $F(1, 302) = 1,119.74, p < .0005, \eta_p^2 = .79$. Post-hoc comparisons using the Tukey HSD test indicated that the mean level of state extraversion was significantly higher in the rewarding contexts ($M = 3.35, SD = 0.70$) than threatening contexts ($M = 2.14, SD = 0.69$), whereas the mean level of state neuroticism was significantly higher in threatening contexts ($M = 3.29, SD = 0.77$) than rewarding contexts ($M = 2.27, SD = 0.60$). Figure 2.1 depicted the state $\times$ context interaction, showing that personality states were most strongly expressed when the relevant stimuli were present (supporting H1).

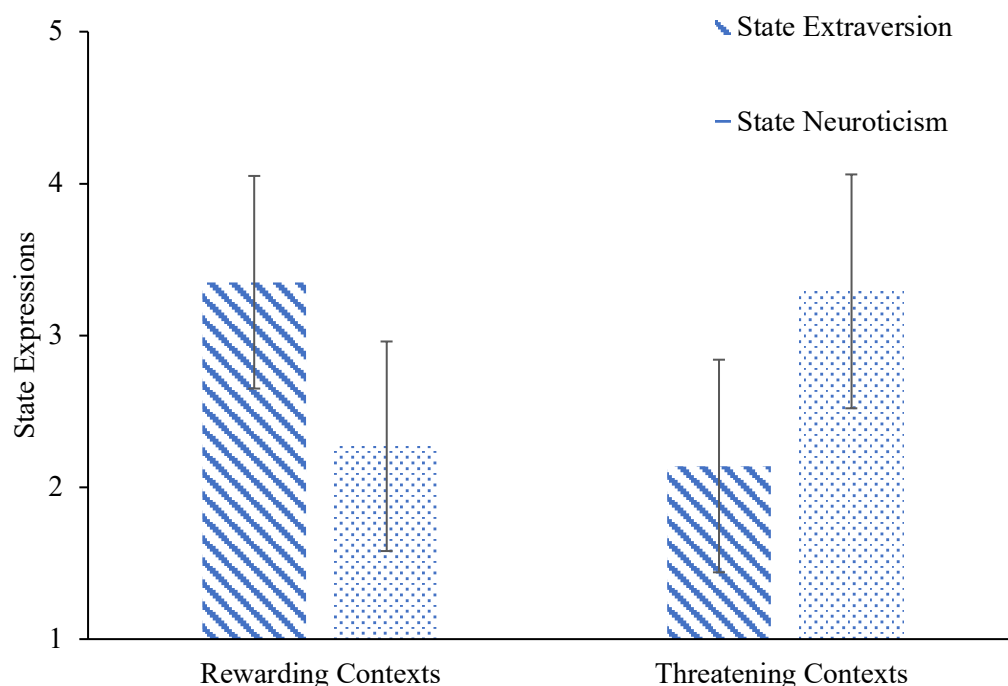


Figure 2.1. Mean state expressions in rewarding and threatening contexts. Mean state extraversion was most announced in rewarding contexts, while mean state neuroticism was most strongly expressed in threatening contexts.

What is the Association between Traits and States?

To examine the association that extraversion and neuroticism each have with their associated state expressions across contexts, a two-way mixed between-within subjects ANCOVA was deployed, with extraversion and neuroticism factors entered as covariates but included in the full design. Because eleven significance tests were included in this model (i.e., extraversion, neuroticism, state, context, state $\times$ context, state $\times$ extraversion, state $\times$ neuroticism, context $\times$ extraversion, context $\times$ neuroticism, state $\times$ context $\times$ extraversion, state $\times$ context $\times$ neuroticism), a Bonferroni correction was applied, resulting in an α level of .005.

As in the previous model, there was again a significant main effect for context, $F(1, 302) = 50.61, p < .0005, \eta_p^2 = .14$, no main effect for state, $F(1, 302) = 0.64, p = .43, \eta_p^2 = .002$, and a significant state $\times$ context interaction, $F(1, 302) = 1153.33, p < .0005, \eta_p^2 = .79$. In addition, the main effects of both between-person factors—extraversion and neuroticism—were significant, with extraversion explaining 14% variance, $F(1, 302) = 50.38, p < .0005$, and neuroticism explaining 25% variance, $F(1, 302) = 101.14, p < .0005, \eta_p^2 = .25$, in personality states across contexts.

Moreover, the main effects of extraversion and neuroticism factors were qualified by a significant state $\times$ extraversion interaction, $F(1, 302) = 82.98, p < .0005, \eta_p^2 = .22$, and a state $\times$ neuroticism interaction, $F(1, 302) = 39.39, p < .0005, \eta_p^2 = .12$. This indicated that extraversion was more strongly associated with extraverted states and neuroticism was more strongly associated with neurotic states, as revealed in earlier descriptive analyses (see Table 2.1).

In addition, both the context $\times$ extraversion interaction, $F(1, 302) = 1.01, p = .32, \eta_p^2 = .003$, and the context $\times$ neuroticism interaction, $F(1, 302) = 4.62, p = .03, \eta_p^2 = .02$, were non-significant, indicating that extraversion and neuroticism's association with the mean

level of states—collapsing across extraverted and neurotic states—does not depend on context. Since it does not make sense to compare the mean level of mixed states between contexts, these interactions are not of interest.

Rather, what is of most interest is that the three-way interaction of state $\times$ context $\times$ neuroticism was not significant, $F(1, 302) = 3.61, p = .058, \eta_p^2 = .01$ s. On the other hand, the three-way interaction of state $\times$ context $\times$ extraversion was significant, $F(1, 302) = 11.11, p < .005, \eta_p^2 = .04$, indicating that the relations between extraversion and states (extraverted vs. neurotic state) did differ across rewarding and threatening contexts. This interaction was then probed further in post hoc tests.

Is the Association between Trait and State Extraversion Stronger for Rewarding Contexts?

To evaluate how trait extraversion moderates the state $\times$ context interaction, a two-way ANCOVA was used to examine the within-person effects of contexts on personality states, including trait extraversion and neuroticism as covariates (standardized, see Delaney & Maxwell, 1981). Five effects were examined in this model (i.e., context, extraversion, neuroticism, context $\times$ neuroticism, context $\times$ extraversion), and thus a Bonferroni correction was again applied, resulting in an α level of .01.

The first model examined joint effects of contexts (rewarding vs. threatening) and traits (extraversion, neuroticism) on state extraversion. As expected, a significant main effect of context was found, $F(1, 302) = 1310.11, p < .0005, \eta_p^2 = .81$. This confirms that, on average, participants reported behaving more extraverted in rewarding contexts relative to threatening contexts. There was also a significant effect of extraversion, $F(1, 302) = 112.18, p < .0005, \eta_p^2 = .27$, but not neuroticism, $F(1, 302) = 4.96, p = .03, \eta_p^2 = .02$, indicating that, irrespective of context, extraverts reported behaving more extraverted relative to introverts. Moreover, the model also yielded a significant interaction for extraversion $\times$ context, $F(1,$

302) = 13.53, $p < .0005$, $\eta_p^2 = .04$. To inspect this further, partial correlations between extraversion and state extraversion in one context was examined while controlling for state extraversion in the other context. This revealed that the relation between extraversion and state extraversion (see Figures 2.2 and 2.3) was stronger in rewarding contexts, $r = .47$, $p < .0005$, compared to threatening contexts ($r = .05$, $p = .40$). On the other hand, the neuroticism $\times$ context interaction did not have a significant effect on state extraversion, $F(1, 302) = 0.96$, $p = .33$, $\eta_p^2 = .003$.

Mirroring the model above, the joint effects of contexts (rewarding vs. threatening) and traits (extraversion, neuroticism) on state neuroticism was examined. Again, there was a main effect of context, $F(1, 302) = 733.27$, $p < .0005$, $\eta_p^2 = .71$, confirming that, on average, participants anticipated themselves to behave in a more neurotic way in threatening contexts relative to rewarding contexts. Moreover, there was a main effect of trait neuroticism on state neuroticism, $F(1, 302) = 160.26$, $p < .0005$, $\eta_p^2 = .35$, confirming that individuals high vs. low on neuroticism anticipated themselves feeling more negative across contexts. As expected, there was no significant effect of extraversion on state neuroticism, $F(1, 302) = 3.42$, $p = .07$, $\eta_p^2 = .01$. Furthermore, the extraversion $\times$ context interaction was not significant, $F(1, 302) = 6.49$, $p = .011$, $\eta_p^2 = .02$. However, the neuroticism $\times$ context interaction was also non-significant, $F(1, 302) = 5.99$, $p = .15$, $\eta_p^2 = .02$.

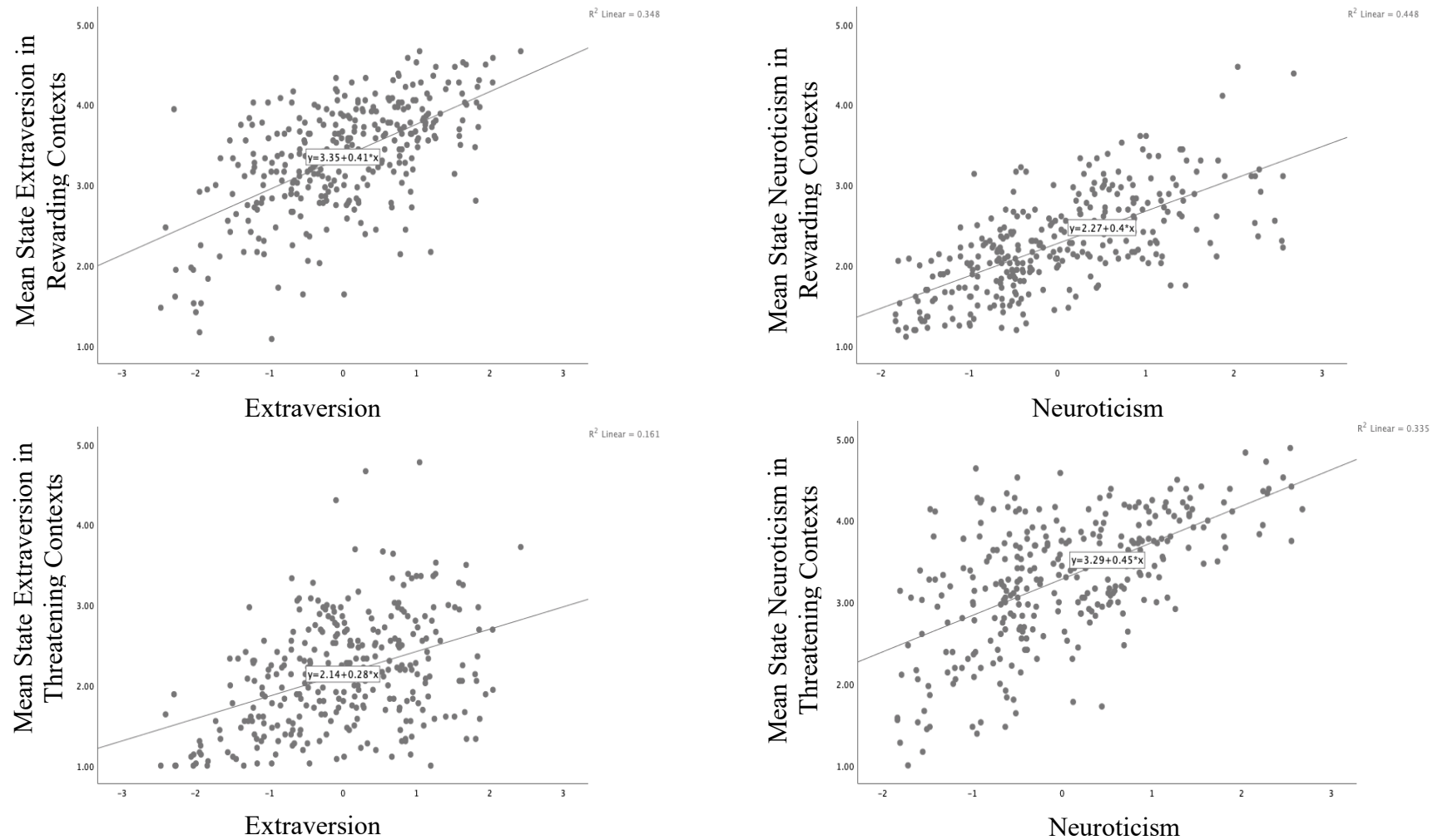


Figure 2.2. Plots depicting correlations between traits and mean levels of state expressions.

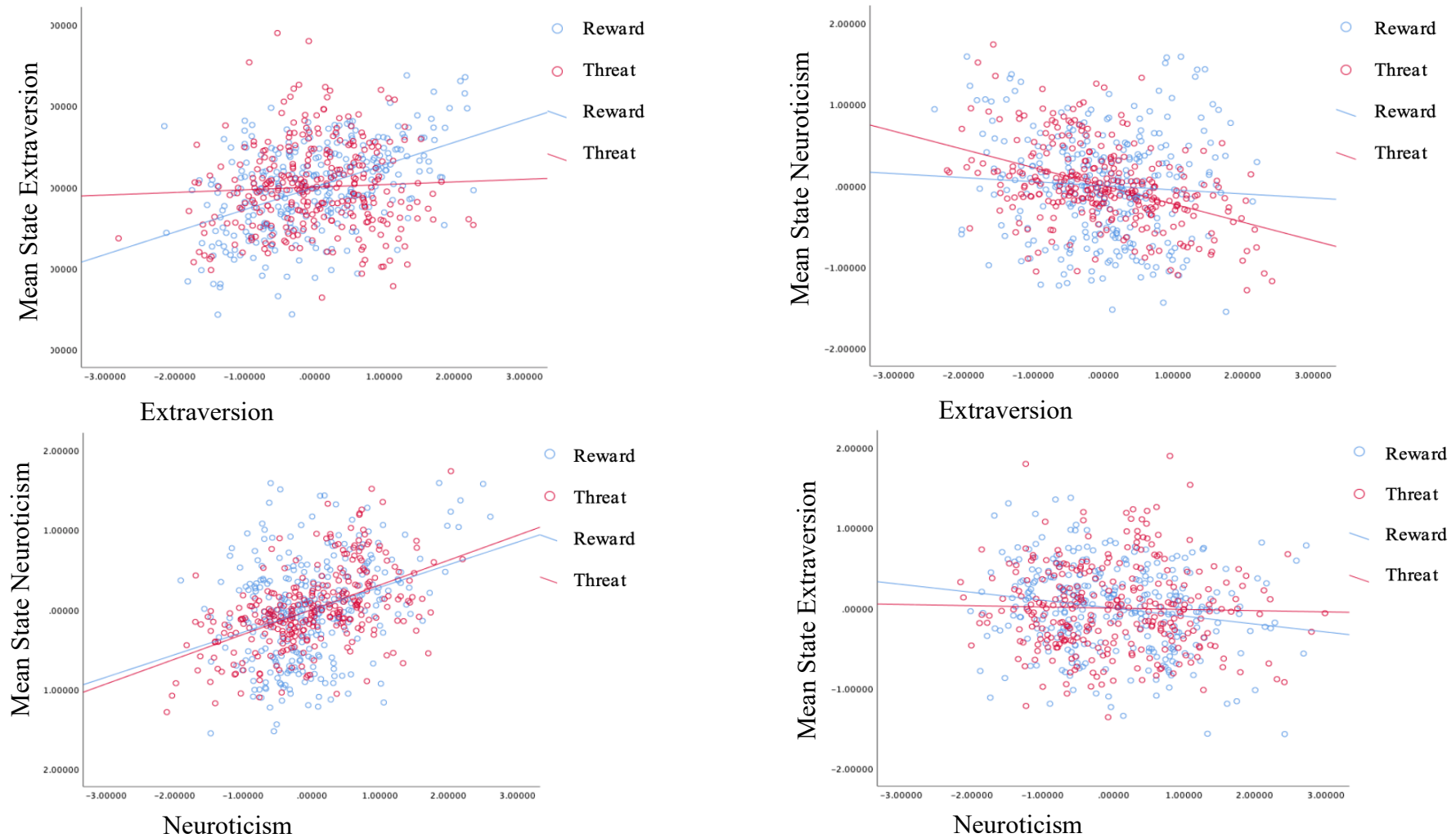


Figure 2.3. Plots depicting partial correlations between traits and mean levels of state expressions

2.4 Discussion

This study provided an initial test of the contextualized view of traits by asking participants to prospectively report the degree to which they would express extraversion and neuroticism in a range of hypothetical rewarding and threatening contexts. The aim was to examine how each trait, their relevant context, and the interactions between them would affect the trait's state expressions.

First, it was hypothesized that extraverts, relative to introverts, would report higher levels of state extraversion across contexts, and that neurotic individuals, relative to stable individuals, would report higher levels of state neuroticism across contexts. This is strongly supported by the results. Consistent with the robustly established links between traits and their average state expressions (e.g., Fleeson & Gallagher, 2009; Sherman et al., 2015), individuals high vs. low on extraversion anticipated themselves behaving more extraverted across contexts, and individuals high vs. low on neuroticism anticipated themselves feeling more neurotic across contexts.

Second, it was hypothesized that levels of reported state extraversion would be higher for rewarding contexts relative to threatening contexts, whereas levels of reported state neuroticism would be higher for threatening contexts relative to rewarding contexts. This hypothesis was also supported. That is, context (rewarding vs. threatening) had a significant effect on state extraversion and/or state neuroticism. This was further clarified by a significant interaction between state and context, revealing that on average, participants anticipated themselves behaving more extraverted in rewarding contexts relative to threatening contexts and feeling more neurotic in threatening contexts relative to rewarding contexts. This is broadly consistent with Reinforcement Sensitivity Theory, to the extent that it identifies rewards as most relevant to expressions of trait extraversion and threats as most relevant to expressions of trait neuroticism.

Third, I expected to find an interaction between traits and contexts in the prediction of state expressions of personality. This prediction was partly supported. On the one hand, there was no evidence that the relation between trait and state neuroticism was stronger in threatening (versus rewarding) contexts. Conversely, there was evidence that the relation between trait and state extraversion was stronger in rewarding (versus threatening) contexts. This suggests that when we describe someone as high on extraversion (e.g., by assessing their extraversion with a big five questionnaire), we are describing a pattern of behaviour and experience that is somewhat specific to particular situations.

As can be seen in Figure 2.3, individuals who score high versus low on trait extraversion did not differ greatly in terms of how extraverted they believe they would behave in a threatening context. Conversely, extraverts forecast much more extraverted behaviour when imagining themselves in a rewarding context compared to introverts. This result echoes previous findings that, in hypothetical situations, the correlations between trait levels and behavioural intentions were higher in trait-relevant situations (Tett & Guterman, 2000). The finding is again aligned with the Reinforcement Sensitivity Theory, which posits that extraverts are most responsive to reward. The manifestation of extraversion in rewarding context versus non-rewarding context (i.e., threatening context in the current study) corresponds most strongly to the functional outcomes of the BAS, reflecting the underlying reward system's sensitivity (Smillie, 2008). Conversely, individual differences in reward system's sensitivity did not manifest in threatening contexts, where rewards—extraversion-specific eliciting stimuli—were absent or not salient.

On the other hand, this pattern of findings was not symmetric for neuroticism, which was strongly correlated with state neuroticism in both threatening and rewarding contexts. This suggests that when we describe someone as high on neuroticism, we are describing a pattern of behaviour and experience that transcends even rather different situations. As can be

seen in Figure 2.3, individuals who score high versus low on trait neuroticism differ to the same extent in terms of how neurotic they believe they would feel in both threatening and rewarding contexts. This finding is at odds with the contextualized view of traits, as well as related perspectives. For instance, Trait Activation Theory predicts that neuroticism would be expressed more strongly in neuroticism-relevant situations (Tett & Guterman, 2000), and Reinforcement Sensitivity Theory suggests that people who score high on neuroticism are more responsive to threats (Smillie, 2008).

There are a few possible explanations for this unexpected null finding. First, threatening situations that participants imagined in the study may not be threatening enough to elicit strong differences in state neuroticism between those high versus low on trait neuroticism. This is possible because people don't usually experience highly threatening situations in everyday life. The kind of threatening situations that participants may have imagined in the context of an online study may not be able to elicit a strong response from highly neurotic individuals. Second, it seems likely that participants high on neuroticism may have underestimated their negative feelings in threatening contexts, just as introverts underestimate the positive affect and overestimate the negative affect they would experience when entering an extraversion-conducive situation (Zelenski et al., 2013).

Alternatively, the findings from this study may indicate that neuroticism is not as contextualized as extraversion is. That is, the results may offer a clear picture of reality. Trait neuroticism may represent people's general tendency to experience negative emotions (e.g., anxiety, depression, and anger) *across all situations*. This may explain why the association between trait and state neuroticism was stronger in rewarding versus threatening contexts, while the mean level of state neuroticism was significantly lower in the rewarding versus threatening contexts. This effect may have been driven by highly neurotic participants, who are highly sensitive to threats, detecting weak threatening cues in a rewarding context.

One potential limitation of the current study concerns the hypothetical situations that participants have imagined according to the descriptors of context. Even though they were trait-relevant and well manipulated, they were not well-controlled. Specifically, although trait extraversion dominates the rewarding contexts and trait neuroticism dominates the threatening contexts that participants mentally place themselves into, cues relevant to other traits may interfere, potentially confounding responses in these situations. In addition, rewarding and threatening contexts were compared to each other directly, such that each served as a control condition for the other. Although this design is not uncommon, it does have the limitation that positive effects of a reward context cannot be distinguished from negative effects of a threatening context. Thus, it would have been useful to compare effects of both of these contexts to a neutral situation (an approach that is adopted in study 2 of this thesis).

Moreover, the rewarding and threatening contexts that participants thought about may vary in the degree of rewarding and threatening characteristics. For example, participants were asked to imagine *“To what extent would you behave or feel in these ways, when you are in a situation or apprehensive about getting into a situation where you are likely to be judged or evaluated?”*. While it should be easy to imagine an evaluative context, participants likely thought about different kinds of evaluative situations (e.g., a job interview, a blind date, or giving a presentation), with some more evaluative and threatening than the others.

Another limitation of the current study is that, while it focused on prospected behavioural and affective expressions of trait extraversion and neuroticism, it is uncertain whether the reported findings could extend to actual behaviour and emotions in real-world context. For example, even though most people might say that they would feel scared if they walk alone in the woods at night, they might not be able to accurately estimate how fearful they would feel in that situation. In other words, the level of fear that participants believe

they would experience may not be the same as the actual level of fear that they would experience.

The same logic applies to extraversion-related behavioural intention. Even though it seems like extraverts would get a bigger boost in state extraversion than introverts in rewarding situations, it may not be the case in reality. This interaction effect may have been driven by introverts' under-forecast of their intention to behave in a more extraverted way. After all, introverts reported enjoying acting extraverted as much as extraverts did in real context, while under-forecasting the benefit associated with extraverted behaviour (Zelenski et al., 2013). However, a major difference between Zelenski et al. (2013) and the current study is that, the former asked participants to forecast affect (e.g., excited, interested, and happy) associated with acting extraverted, while the later focused on behavioural intention to act extraverted in rewarding situations. The interaction effect could still be valid assuming that participants might be more accurate in predicting behaviours than affect. Regardless of the facts concerning any of these issues, the findings in the current study are certainly not conclusive.

In sum, the hypotheses on the main effects of traits and contexts were well supported, that is, by prospect, traits and contexts both strongly and independently affected the state expressions of traits. However, there was mixed evidence for the contextualized view of traits: some support for the contextualized nature of extraversion but not for neuroticism. The following studies in this thesis address the potential limitations of the present study by using a laboratory design including a neutral condition (Chapter 3) and momentary sampling of actual state expressions—behaviours and experiences in real-life contexts (Chapters 4 and 5).

Chapter 3

Are Traits Contextualized? Manipulating Context in the Lab

3.1 Overview

Study 1 allowed for a preliminary test of the contextualized view of traits but was limited by its reliance on hypothetical situations within which participants had to imagine how they would feel or behave. To improve on this, study 2 employs a laboratory-based experiment in which participants were directly exposed to a threatening or rewarding situation, and during which they reported on their state expressions. Study 1 also relied entirely on a self-report measure of correlations among traits and states, which may be inflated by common method variance (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To address this, study 2 assessed state expressions using both self- and informant-ratings.

As discussed in the introduction, the Reinforcement Sensitivity Theory of extraversion and neuroticism is generally understood in terms of all forms of rewards and threats (Elliot, 2008; DeYoung et al., 2015; Smillie et al., 2006). Although extraversion is typically evaluated using monetary reward (e.g., Smillie et al., 2011; Wu et al., 2014), many important rewards are social (e.g., social attention, affiliation, feedback, status, influence, and agency; Ashton, Lee & Paunonen, 2002; Depue & Collins, 1999; DeYoung, 2013, 2015; Fishman & Ng, 2012). Similarly, many threats are social in nature (e.g., including evaluation, bullying, social exclusion, social rejection, stereotyping, and competition; Eisenberger, Lieberman & Williams, 2003; Hinduja & Patchin, 2010; Moore, Wilson, Vine, Coussens & Freeman, 2013; Somerville, Kelley, & Heatherton, 2010; Schmader, 2001).

Given this projects' theoretical grounding in Reinforcement Sensitivity Theory, it is also worth noting that a number of studies have demonstrated that social feedback can be used as powerful stimuli to deliver positive (e.g., experimenter saying “good”, “very good”, “excellent”; a smiling face) and negative (e.g., experimenter saying “bad”, “very bad”,

“*terrible*”; a frowning face) reinforcement (e.g., Boddy, Carver & Rowley, 1986; Carver & White 1994; Derryberry, 1987; Doherty & Walker, 1965; Getter, 1965). Indeed, one of the first rigorous programs of research evaluating Reinforcement Sensitivity was the ‘verbal operant conditioning’ studies undertaken by a team of researchers in India known as the Gupta group (e.g., Gupta, 1976; Gupta & Nagpal, 1978; Nagpal & Gupta, 1979). This offers further encouragement for operationalizing situation-based reward and threat in the context of a social interaction during which negative feedback (threat condition) or positive feedback (reward condition) was anticipated.

The hypotheses for this study are the same as those stated for study 1: First, I expected to find a main effect of trait extraversion and trait neuroticism on state extraversion and state neuroticism, respectively (H1). Specifically, I expected that, across conditions (reward condition, threat condition, and control condition), extraverts would report higher levels of state extraversion than introverts, whereas those higher on trait neuroticism would report higher levels of state neuroticism than those lower on trait neuroticism. I also expected to find a main effect of context on the two focal personality states (H2). Specifically, I expected levels of reported state extraversion to be higher for participants anticipating positive feedback relative to participants anticipating negative feedback and control participants. Conversely, I expected the levels of reported state neuroticism to be higher for participants anticipating negative social feedback relative to participants anticipating positive social feedback and control participants. Finally, I expected to find an interaction between traits and contexts in the prediction of state expressions of personality (H3). That is, I expected that the relation between trait extraversion and state extraversion would be strongest in the context where participants anticipated positive feedback (versus negative feedback), whereas the relation between trait neuroticism and state neuroticism would be strongest in the context where participants anticipated negative feedback (versus positive feedback).

3.2 Method

Participants

Participants were 174 first-year psychology students from The University of Melbourne (74% female, 26% male), aged between 17 and 54 years old ($M = 20.14$, $SD = 4.62$). They were recruited through a Research Experience Program and received 1 course credit for their participation. Based on well-known correlations of .20-.30 in personality and social psychology (Richard et al., 2001), a sample size of 111 to 244 is required. Based on the effect size of interactions between personality and context found in previous studies (e.g., Sherman et al., 2015), a sample of 967 is needed. However, the final target sample size was determined not only by these power analyses but also by constraints on testing resources. It was determined that as many participants as possible would be recruited during the study semester. All methods received ethical approval at The University of Melbourne.

Procedure

Participants were tested in groups of three in laboratory conditions. Upon arrival, participants gave informed consent and were randomly—but unknowingly—assigned to one of three conditions: reward, threat, and control. They then completed measures of personality and baseline affect (described below) at separate computers. Participants then received information about a problem-solving task that they would work on as a group. Critically, this information varied by condition, as described below. Participants then spent 10-15 minutes completing the interactive task. Immediately after the task was finished, they completed a series of state measures to rate on their own as well as other group members' behaviours and affect (i.e., state extraversion, state PA, state neuroticism, and state NA; description follows) during the task. They were then debriefed and given an opportunity to discuss the experiment with the researcher.

Design and Materials

Discussion task. The task was a hypothetical “survival” exercise adapted from previous studies (Fleeson, Malanos, & Achille, 2002; Smillie, Wilt, Kabbani, Garratt, & Revelle, 2015). Participants were instructed to imagine that they were astronauts stranding on the moon, and to rank order the usefulness of 15 items (e.g., food concentrate) for helping them return to base.

Reward/Threat manipulation. Prior to the written task instructions, participants received information specific to their condition that comprised the manipulation of reward vs. threat. Specifically, participants assigned to the reward condition read that “*At the end of the task you will receive feedback from the other members of your group regarding areas of strength in your performance during the task*” (reward expectation). In contrast, participants assigned to the threat condition read that “*At the end of the task you will receive feedback from the other members of your group regarding areas of weakness in your performance during the task*” (threat expectation). Participants in the control condition received no additional instructions, and all participants were unaware that they had received different sets of instructions.

Measures

Trait Extraversion and Neuroticism. Prior to the social interaction task, participants completed the BFAS (DeYoung et al., 2007), and BFI-2 (Soto & John, 2016), described in Study 1. They additionally completed the Big Five Mini Markers (MM; Saucier, 1994), a 40-item questionnaire that uses trait adjectives only (e.g., ‘*bold*’, ‘*talkative*’), providing an alternative to the entirely or partly phrase-based approaches of the BFAS and BFI-2. Participants rated the extent to which each MM item described them accurately, using a 1 (*extremely inaccurate*) to 9 (*extremely accurate*) Likert-type rating scale.

State Extraversion and Neuroticism. Following the social interaction task, participants described their behaviour during the task in terms of five adjectives concerning state extraversion (*talkative, bold, assertive, active, reserved* [reversed score], and *shy* [reversed score]) and six adjectives concerning state neuroticism (*self-critical, fretful, anxious, worried, relax* [reversed score], and *unself-conscious* [reversed score]). Six filler items concerning other traits (e.g., *imaginative, creative*) were presented alongside the primary state items. All items were drawn from Hofstee et al. (1992). Participants rated how well these adjectives described their own behaviour during the discussion task on a scale of 1 (*not at all*) to 7 (*very well*).

They also completed identical ratings of their fellow group members' behaviour, resulting in two informant-ratings and one self-rating of each participant's personality states during the task. In addition to state extraversion and neuroticism, participants also described their own and their fellow group members' affective states (i.e., positive affect and negative affect) using PANAS (Watson, Clark & Tellegen, 1988) prior to the task and immediately after the task. Results regarding affective states are not directly relevant to the stated hypotheses and are thus reported separately, in Appendix C8. Participants completed all these measures before finding out that they no longer are going to be evaluated.

Data Analyses

SPSS Version 25 was used to compute descriptive statistics, correlations, inter-rater reliability, interclass correlations, and to deploy analyses of variance and covariance. ANOVAs were used for manipulation test analysis, examining whether conditions differed in their rewarding and threatening characteristics. ANCOVAs tested the main effect of traits (H1) and context (H2) on personality states (state extraversion, state neuroticism)². I ran separate ANCOVA for state extraversion and state neuroticism. In each ANCOVA, condition

² For alternative analyses based on MANOVA, please refer to Appendix C10.

was entered as the main predictor and both extraversion and neuroticism factors were entered as covariate. The PROCESS Macro ³(Hayes, 2018) for SPSS was used to conduct moderated regression analyses (with reward condition, threat condition, and control condition coded as 1, 2, and 3) to test hypothesized interaction between traits and contexts in the prediction of state expressions (H3). I constructed separate predictive models for state extraversion and state neuroticism. For each model, condition and traits (extraversion factor, neuroticism factor) were first entered. Next, the trait $\times$ condition interaction was added —trait extraversion was entered when modelling state extraversion; trait neuroticism was entered when modelling state neuroticism. This last step examined whether the trait-state relation varied across conditions, which would indicate that traits are contextualized. Given the multiple tests being performed in these models (i.e., condition, extraversion, neuroticism, and the interaction between condition and extraversion or neuroticism), a Bonferroni correction was applied, resulting in a critical α level of .017 in the first model and .013 in the second model.

3.3 Results

Preliminary Analyses

Regarding measures of trait extraversion and neuroticism, two Exploratory Factor Analyses via Principal Axis Factoring (PAF) were deployed to reduce multiple measures of trait extraversion and neuroticism to two factors. The Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable ($KMO_E = .770$, $KMO_N = .735$). The number of factors to be retained was guided by Kaiser's criterion (eigenvalues above 1) and inspection of the scree plot. The PAF of the three extraversion measures revealed one

³ PROCESS is a path analysis modelling tool used for estimating two- and three-way interactions in moderation models, producing simple slopes and regions of significance for probing interactions. The use of PROCESS is described and documented in Hayes (2018).

eigenvalue exceeding 1, explaining 87.50% of the variance. Similarly, the PAF of the three neuroticism measures revealed one eigenvalue exceeding 1, explaining 80.57% of the variance. An inspection of the scree-plots revealed a clear break after the first factor in each PAF analysis. The factor scores of Extraversion and Neuroticism were thus saved using regression method.

Regarding measures of state extraversion and neuroticism, interclass correlations (Shrout & Fleiss, 1979) among the self-other reports of the dependent variables were reported in Table 3.1. The inter-rater reliability was good for ratings of state extraversion ($ICC = .74$) but not as good for state neuroticism ($ICC = .23$). This is not very surprising. Since state expressions of neuroticism are much less visible than state extraversion (Wilt & Revelle, 2015), it is relatively difficult for strangers to judge state neuroticism relative to state extraversion (Beer & Watson, 2008; Funder & Colvin, 1988; Funder & Dobroth, 1987; Spain, Eaton & Funder, 2001). However, informant reports of negative state provide an additional and meaningful perspective on individuals' personality and state expressions (Breil et al., 2019; Lieberman et al., 2016). They also reduce inflation in correlations among self-reported traits and states caused by common method variance (Breil et al., 2019; Lieberman et al., 2016; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Thus, self-other ratings⁴ were combined for each dependent variable to provide a single estimate, with the aim to improve the reliability of the measurement (Schlenker & Leary, 1982; Shrout, 1998; Hendriks, 1996).

Table 3.1 Interclass Correlation Coefficients of Multi-measures of State Expressions

Variables	ICC	LL	UL	F (2, 171)	P
State Extraversion	0.74	0.66	0.80	3.79	<.001
State Neuroticism	0.23	0.01	0.41	1.29	0.023

⁴ Compared to results obtained using combined ratings, traits were more strongly correlated with self-rated states but results from inferential analyses addressing hypotheses remained the same. When using control ratings, traits were less strongly correlated with control-rated states. Moreover, control-rated state extraversion and state neuroticism differed significantly between conditions. See Appendices C6 and C7 for more details.

Note. LL and UL represent lower limits for 95% confidence intervals respectively based on $K = 500$ bootstrap resamples.

Table 3.2 displays means, standard deviations, reliabilities (McDonald's ω_i ; McDonald, 1999), and inter-correlations between states (average ratings of self-ratings and other-ratings) and traits (standardized extracted factors) across three conditions. Overall, trait extraversion was positively correlated with the mean level of state extraversion and trait neuroticism was positively correlated with the mean level of state neuroticism across conditions.

Tables 3.3, 3.4, 3.5 show means, standard deviations, reliabilities, and inter-correlations between states (averaged ratings) and traits (standardized extracted factors) in the reward condition (i.e., anticipation of positive feedback), threat condition (i.e., anticipation of negative feedback), and control condition, respectively. Although trait extraversion was positively correlated with state extraversion across conditions, the correlation is much stronger in the control and reward condition than in the threat condition. In contrast, trait neuroticism was only positively correlated with state neuroticism in the threat condition, but not in the reward condition nor control condition.

Table 3.2
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Key Variables (across conditions)

Variables	1	2	3	4
1. Extraversion	(0.96)			
2. Neuroticism	-.32**	(0.93)		
3. State extraversion	.40**	-0.10	(0.95)	
4. State neuroticism	-.34**	-.52**	.25**	(0.83)
Mean	0.00	0.00	27.64	15.18
Standard Deviation	0.98	0.97	5.47	3.19

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Sample size $N = 174$. McDonald's ω for all variables are presented in parentheses on the diagonal of the correlation matrix. Extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State expressions are the average ratings of self-ratings and other-ratings across conditions.

Table 3.3
Means, Standard Deviations, and Intercorrelations Among Key Variables (Reward Condition)

Variables	1	2	3	4
1. Extraversion	-			
2. Neuroticism	-0.17	-		
3. State extraversion	.42**	-0.08	-	
4. State neuroticism	-.30*	0.21	-.58**	-
Mean	-0.09	0.12	28.44	15.11
Standard Deviation	0.97	0.89	4.90	3.01

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Sample size of the reward condition $N = 58$. Extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State expressions are the average ratings of self-ratings and other-ratings in the reward condition.

Table 3.4
Means, Standard Deviations, and Intercorrelations Among Key Variables (Threat Condition)

Variables	1	2	3	4
1. Extraversion	-			
2. Neuroticism	-.37**	-		
3. State extraversion	.32*	-0.11	-	
4. State neuroticism	-.26*	.29*	-.43**	-
Mean	0.14	-0.10	27.26	15.36
Standard Deviation	1.02	0.97	5.68	3.38

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Sample size of the threat condition $N = 58$. Extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State expressions are the average ratings of self-ratings and other-ratings in the threat condition.

Table 3.5
Means, Standard Deviations, and Intercorrelations Among Key Variables (Control Condition)

Variables	1	2	3	4
1. Extraversion	-			
2. Neuroticism	-.38**	-		
3. State extraversion	.48**	-0.13	-	
4. State neuroticism	-.47**	0.26	-.57**	-
Mean	-0.04	-0.01	27.23	15.06
Standard Deviation	1.02	1.12	5.78	3.21

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Sample size of the control condition $N = 58$. Extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State expressions are the average ratings of self-ratings and other-ratings in the control condition.

Manipulation Checks

Manipulation check. Evaluations of the interactive task were initially collected from participants at the end of the study in order to confirm that the three conditions were perceived as expected. Surprisingly, there were no differences in these evaluations between the three conditions. However, it was decided in hindsight that it may have been ineffective to ask participants to retrospect on responses to anticipated threat and reward, 20 minutes after the exposure to the crucial stimuli. This is particularly the case given that *expectations of threat and reward* was elicited *before the task*, but *no threats or rewards* was actually delivered *during the task*. Thus, it is not surprising that the task was experienced similarly by the end of the 20-minute period. Therefore, expectation ratings of the reward and threat scenarios were collected from a separate sample, where participants responded on their anticipated responses to the threatening and rewarding conditions immediately after reading the task instructions. This approach is specifically recommended by Lonati, Quiroga, Zehnder, and Antonakis (2018) as a means to enhance the rigor of experiments. This seems likely to provide a much more effective check on the validity of manipulation, but the details of initial manipulation check in the main sample were also reported for transparency (see Appendix C1).

The separate sample used for the manipulation check comprised 96 Mturk workers (52.1% female, 47.9% male), aged between 20 and 71 years old ($M = 35.66$, $SD = 10.82$). They were randomly assigned to view one of the two main conditions in this study (i.e., reward expectation/threat expectation). Participants then rated the described situations using 12 items adapted from the scenarios presented in study 1. Thus, the two situations were contrasted in terms of rewarding characteristics (e.g., “*In the described hypothetical situation, to what extent would you feel you have an opportunity to engage in a POSITIVE social interaction?*”) and threatening characteristics (e.g., “*In the described hypothetical situation,*

to what extent would you perceive some sort of potential threat?”). These items were again responded to using a 5-point Likert scale. Additional items required participants to rate the described situation in terms of anticipated enjoyableness (i.e., *“I would find the task enjoyable”*) and stressfulness (i.e., *“I would find the task stressful”*), using a 5-point Likert scale (1 = *Disagree Strongly*, 5 = *Agree Strongly*). They also rated the situation in terms of anticipated valence (i.e., *“Please indicate the extent to which you may find the discussion task positive or negative?”*), on a 10-point sliding scale (1 = *very negative*, 10 = *very positive*). Lastly, they completed the BFAS (DeYoung et al., 2007), a personality measure (described earlier).

ANOVAs were conducted to examine whether Mturk participants perceived the hypothetical conditions to be significantly different from each other. As expected, participants indicated that they anticipated the positive feedback to be significantly more enjoyable, $F(1, 95) = 13.45, p < .0005$, and more rewarding, $F(1, 95) = 5.87, p < .05$, relative to the anticipated negative feedback. They also rated the anticipatory negative feedback as more threatening, $F(1, 302) = 8.17, p < .01$, and more negative, $F(1, 302) = 14.40, p < .0005$, they did not anticipate it to be more stressful, $F(1, 302) = 2.25, p = .14$, relative to the anticipated positive feedback. Figure 3.1 displays the means and standard deviations for these manipulation check variables between conditions.

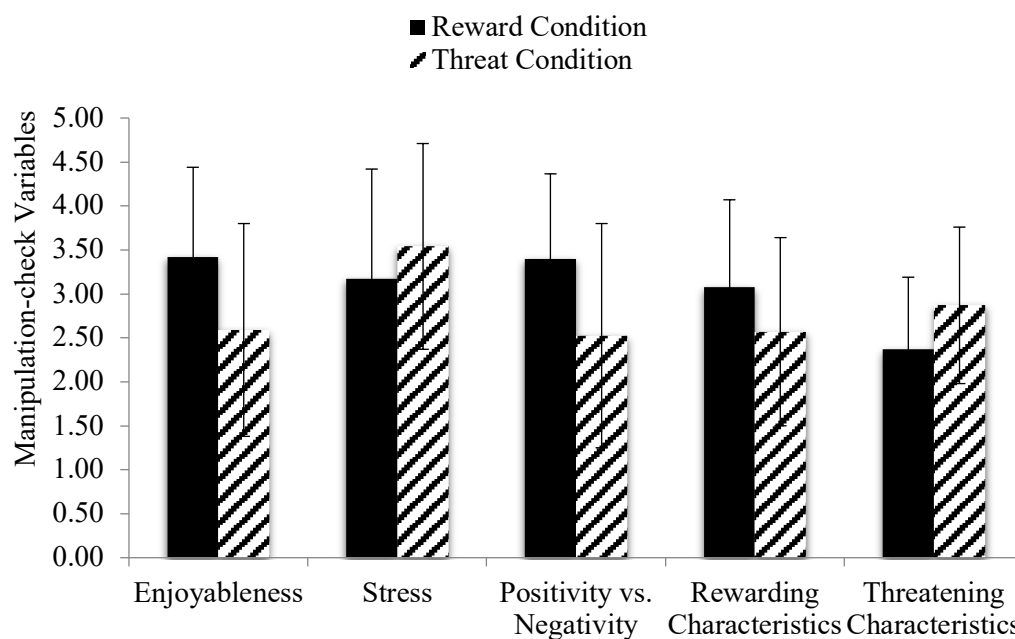


Figure 3.1. Means and standard deviations for five manipulation-check variables between conditions

Tables 3.6 and 3.7 show means, standard deviations, reliabilities (McDonald's ω_i ; McDonald, 1999), and intercorrelations among all variables in the reward (i.e., anticipation of positive feedback) and threat condition (i.e., anticipation of negative feedback), respectively. Across both conditions, trait extraversion was positively correlated with perceived enjoyableness, perceived rewards, and perceived valence (positivity minus negativity), while trait neuroticism was positively correlated with perceived threat and stress. This provides potential evidence of strong situation perception effects, which will be discussed further throughout this thesis.

To confirm that the manipulation was effective even when controlling for these potential situation perception effects, I then conducted ANCOVAs with trait extraversion and neuroticism entered as a covariate in each model. After controlling for trait extraversion and neuroticism, the reward condition was still anticipated to be significantly more enjoyable, $F(1, 95) = 15.13, p < .0005, \eta_p^2 = .14$, and more rewarding, $F(1, 95) = 6.35, p = .013, \eta_p^2 = .07$. Similarly, the threat condition was still anticipated to be more negative, $F(1, 95) = 16.11, p$

$< .0005$, $\eta_p^2 = .15$, and more threatening $F(1, 95) = 7.53$, $p = .007$, $\eta_p^2 = .08$, but not more stressful, $F(1, 95) = 1.78$, $p = .19$, $\eta_p^2 = .02$. Thus, it might be presumed that expectations of reward and threat were effectively manipulated in this study and were robust to the fact that these perceptions were strongly related to the personality traits of focal interest.

Table 3.6
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Key Variables (Reward Condition)

Variables	1	2	3	4	5	6	7
1. Extraversion	(0.94)						
2. Neuroticism	-.65**	(0.96)					
3. Perceived task enjoyableness	.48**	-.38**	-				
4. Perceived task stressfulness	-.47**	.51**	-.62**	-			
5. Perceived task valence	.38**	-.29*	.74**	-.53**	-		
6. Perceived rewards	.43**	-.29*	.62**	-.30*	.60**	(0.92)	
7. Perceived threats	-.51**	.48**	-.48**	.73**	-.38**	-0.13	(0.91)
Mean	3.12	2.67	3.42	3.17	6.79	3.08	2.37
Standard Deviation	0.76	0.92	1.02	1.25	1.94	0.99	0.82

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Mturk sample size $N = 44$. Extraversion and neuroticism are BFAS scores.

Table 3.7
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Key Variables (Threat Condition)

Variables	1	2	3	4	5	6	7
1. Extraversion	(0.94)						
2. Neuroticism	-.58**	(0.96)					
3. Perceived task enjoyableness	.40**	-.31*	-				
4. Perceived task stressfulness	-.31*	.37*	-.69**	-			
5. Perceived task valence	.49**	-.43**	.83**	-.76**	-		
6. Perceived rewards	.38*	-0.30	.77**	-.65**	.81**	(0.92)	
7. Perceived threats	-0.11	.37*	-.45**	.62**	-.46**	-.32*	(0.91)
Mean	3.11	2.84	2.59	3.55	5.05	2.57	2.87
Standard Deviation	0.75	0.85	1.21	1.17	2.55	1.07	0.89

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Mturk sample size $N = 44$. Extraversion and neuroticism are BFAS scores.

Does the Association between Traits and States Depend on Context?

Supporting the first hypothesis, ANCOVAs showed that the main effects of extraversion and neuroticism on their corresponding states were significant, as follows: That is, extraversion significantly and positively predicted the average rating of state extraversion, $F(2, 171) = 33.18, p < .0005, \eta_p^2 = .17$, while neuroticism significantly and positively predicted the average rating of state neuroticism, $F(2, 171) = 11.27, p < .01, \eta_p^2 = .06$. Surprisingly, extraversion also significantly predicted the average rating of state neuroticism, $F(2, 171) = 15.49, p < .0005, \eta_p^2 = .08$. Surprisingly, and contrary to the second hypothesis, ANOVAs showed no differences between conditions for both state extraversion, $F(2, 171) = 1.64, p = .20, \eta_p^2 = .02$, and state neuroticism, $F(2, 171) = .61, p = .54, \eta_p^2 = .01$. Finally, contrary to the third hypothesis, the moderated regression analyses revealed neither the extraversion $\times$ condition interaction, $F(2, 171) = .56, p = .57, \eta_p^2 = .01$, nor the neuroticism $\times$ condition interaction $F(2, 171) = .41, p = .67, \eta_p^2 = .01$, were significant for the models of state extraversion and neuroticism.

3.4 Discussion

This study aimed to build on study 1, improving on the limitations specific to that study (i.e., lack of control over participants' imagined context, participants' forecasting of their state expressions), by employing a laboratory-based experiment and exposing participants directly to a threatening or rewarding situation. Situation-based reward and threat were operationalized in the context of a social interaction during which negative feedback (threat condition) or positive feedback (reward condition) was anticipated.

As predicted, the main effect of traits on state expressions was supported. Across conditions, participants higher on trait extraversion reported higher levels of state extraversion than those lower on trait extraversion, whereas those higher on trait neuroticism reported higher levels of state neuroticism than those lower on trait neuroticism. These results

are consistent with findings in study 1 and previous findings in the literature demonstrating the correspondence between trait level and average state expression (e.g., Fleeson & Gallagher, 2009).

Surprisingly, the hypotheses regarding the main effect of condition on state expressions was not supported. Although conditions varied significantly from each other in terms of the rewarding and threatening characteristics, these differences did not have a significant impact on state expressions. However, notably, there was a clear trend that the mean level of state extraversion was higher in the reward condition (i.e., positive feedback anticipated), than the control (i.e., no anticipation) and threat (i.e., negative feedback anticipated) conditions. Similarly, the mean level of state neuroticism was higher in the threat condition, than the reward and control conditions. In other words, the differences in state expressions between conditions were as hypothesised, but just not significant. There are a few factors that may have contributed to the null effect of condition on state expressions, which will be discussed below.

One potential reason that state extraversion did not differ significantly between conditions is that the mere presence of other participants and the opportunity to do something fun with others is rewarding enough for extraverts. Therefore, although the inclusion of anticipated positive feedback may have boosted extraverts' state extraversion more, it may not be enough to produce a significant difference in state extraversion between reward condition and the other two conditions.

Regarding state neuroticism, there are a few possibilities why it did not differ significantly between conditions. First, although participants perceived impending negative feedback as threatening, they may have considered it as unimportant because the feedback is artificial and inconsequential, thus it may have not had a real impact on participants' emotional state. Indeed, most of the past studies that have found significant effect of

threatening context on anxiety (an expression of state neuroticism) were conducted in real threatening situation, such as exams vs. non-stressful situations (Endler & Magnusson, 1977), public speaking vs. normal situation (Muller et al., 1990), and training vs. competition (Flood & Endler, 1980). Possibly, impending artificial negative feedback, despite being perceived as more threatening than rewarding feedback, was not threatening enough to have the same effect on state neuroticism as real life threats. This is aligned with the fact that participants rated the condition with anticipated negative feedback as more threatening and more negative but not more stressful than the other two conditions, suggesting artificial negative feedback was not as powerful as planned.

Second, state neuroticism was unexpectedly predicted by trait extraversion as well. Given the context of group discussion, it is likely that extraverts' talkativeness may have been perceived as a sign of nervousness by informants, therefore confounding the ratings of state neuroticism to some extent. Another possibility is that, participants in the threat condition may have experienced a spike of negative affect when reading the manipulative message about pending negative feedback at the beginning of the experiment, but then they may have forgotten about it after getting involved in the task. Again, because the aim was to manipulate expectations of threat and reward, not actually administer threatening or rewarding stimuli, any effects of threat on state neuroticism may have been a fairly fleeting experience. Future studies may benefit from constructing interactions which actually vary in how rewarding or threatening they are (although this may have ethical implications). Perhaps it is also worthwhile measuring it repeatedly throughout the experiment to get a better understanding of the manifestation of trait expressions in a threatening situation through time.

The appearance of potential situation perception effects may also help to explain the null effect of context on extraverted and neurotic states. That is, in the manipulation check ratings, extraverts perceived more enjoyment, more rewards, and more positivity than

introverts, regardless which condition they were in. In other words, extraverts perceived the same situation—whether there is a pending positive feedback or a pending negative feedback—in more positive light than introverts did. Conversely, participants high on neuroticism perceived more threats in both conditions as well, compared to participants low on neuroticism. In fact, the correlation between trait neuroticism and perceived threat was stronger in the condition with anticipated *positive* feedback than in the condition with anticipated *negative* feedback. This is similar to what was found in Study 1, in which trait and state neuroticism was more strongly correlated in rewarding contexts than in threatening contexts. The difference between study 1 and this manipulation test is that, participants in study 1 were free to mentally place themselves in any sort of neuroticism provoking contexts that fit the descriptions, whereas participants in the manipulation test could only think about the specific hypothetical situation with pending negative feedback. I initially suspected that, the pattern in study 1 was driven by highly neurotic participants readily detecting weak threatening cues in rewarding contexts. While this could still be a meaningful explanation, another possibility is that participants high versus low on neuroticism may have experienced more negative affect in the presence of rewards, due to their internal conflict between approaching rewards and avoiding threats associated with approaching behaviour or due to the uncertainty of attaining a desired outcome (e.g., the prospect that none of their team members would give them any positive feedback).

The manipulation check showed that, although the situations in the current study were classified as rewarding and threatening from the researcher's perspective and participants seem to have perceived the manipulated context more or less in the same way, there were significant individual differences in how participants perceive the different conditions. This is consistent with findings from Morse, Sauerberger, Todd, and Funder (2015), in which participants were paired with different interaction partners in three distinctive conditions (i.e.

unstructured, cooperative and competitive interactions) at three time points each occurring about a week apart. Despite the differences among their conditions, participants' personality is reliably related to how they perceive them. Specifically, across conditions, extraversion was positively related to how one perceived a situation normally (i.e., construe a situation similarly to others experiencing the same situation). In contrast, neuroticism was negatively related to how one construed a situation normally, especially in the unstructured interaction condition. It appears that the effect of experimentally manipulated conditions on people's behaviours/experiences may vary depending on how participants perceive them. Potentially, this could be another reason why state expressions of traits did not differ significantly between conditions in the current study.

Lastly, contrary to the expectation, the moderation effect of context on trait-state relation was not supported. Although the correlation between trait and state extraversion appeared to vary somewhat across conditions, the fact that there was no interaction between trait extraversion and condition in the prediction of state extraversion suggests these associations did not differ significantly. Similarly, although the correlation between trait and state neuroticism was somewhat different across conditions, again, the fact that there was no interaction indicates that these differences were not significant. Thus, this second study provides no evidence in support of the contextualized view of traits. These findings have to be treated with caution, given some of the potential issues described above, such as the possibility that the manipulation of contexts was not strong enough (i.e., artificial threat was not threatening enough). In addition, as data collection was constrained by time and resources, it is possible that this study was likely underpowered to detect the predicted effect. In any case, each of these possibilities are only speculation, and the null findings should therefore be accepted at face value.

One final issue to discuss concerns the association between self-reported and control-rated state measures. Across two experimental conditions (i.e., rewarding and threatening conditions), the self- and control-rated measures of state extraversion correlated moderately, $r = .50$, but those of state neuroticism correlated very weakly, $r = .13$. This is consistent with previous research that extraversion is expressed more behaviourally (e.g., talkative, assertive, and enthusiastic), thus more visible to others and easier to judge, whereas neuroticism is expressed more as an internal emotional state (e.g., anxious, conflicted, and irritated feelings), thus hard for others to observe and evaluate (Funder & Dobroth 1987; Funder, Kolar, & Blackman, 1995; Beer & Watson, 2008). Specifically, self-reported and other-rated state neuroticism showed no relation in the reward condition ($r = .03$), whereas they correlated moderately in the threat ($r = .24$) and control conditions ($r = .26$). This potentially provides a glimpse of evidence in favour of the contextualized nature of trait neuroticism and encourages further investigation of the contextualized view of traits in this thesis.

In contrast, self-reported and other-rated state extraversion were strongly associated in the threat ($r = .59$) and control conditions ($r = .58$), but less so in the reward condition ($r = .40$). At first glance, this finding seems counter-intuitive as it does not fit neatly with the contextualized view of extraversion, but it may have been due to observers found it difficult to tell extraverts from introverts in the reward condition, where everyone expressed higher levels of extraversion. In contrast, it might be easier for observers to separate extraverts out in the control and threat conditions, where extraverted behaviour is more heterogeneous among participants. Together, regarding other-reported state measures, these findings suggest that participants are better at rating traits of high visibility than traits of low visibility in situations where trait's eliciting stimuli are present but not too strong. This is broadly in line with models of personality judgement in the literature (Funder, 2006; Vazire, 2010).

In conclusion, the hypothesised main effect of traits was well supported whereas the hypothesised main effect of context was not. That is, state expressions were strongly predicted by traits across contexts (i.e., positive feedback anticipated, negative feedback anticipated, and control), but they did not vary significantly depending on the context. There was no clear evidence for the contextualized nature of extraversion nor neuroticism. While constraining the situations to the lab provided more objectivity than imagined situations, artificial rewards and threats do not seem to elicit strong enough trait expressions. The following studies address the limitations of the current study by investigating real behaviour over daily life contexts that are characterised by real and more consequential rewards (Chapters 4 and 5).

Chapter 4

Are Traits Contextualized? Sampling Real-World Contexts over Time

4.1 Overview

In study 1, participants were asked to report on their imagined future behaviour and affects in contexts characterized by rewarding or threatening stimuli. While prospection is an efficient way to get a sense of participants' state expressions of trait extraversion and neuroticism, various biases (e.g., affective forecasting, lack of reference point, etc.) may compromise the degree to which participants can do this accurately. To overcome these limitations, participants in study 2 were asked to report their actual personality states in experimental conditions of expected reward versus expected threat. Although experimental design enabled us to carefully control the context, the artificial environment offered relatively low ecological validity, which means the findings might not generalise to real life scenarios. To address this shortcoming, study 3 assessed trait expressions across different real-world contexts as participants went about their daily lives, using Experience Sampling Methods (ESM).

ESMs are a broad family of methods for measuring behaviours and experiences in their natural settings in real time (or close to real time) on repeated occasions (Kubiak, Krog, Mehl, & Conner, 2011). They involve repeated collection of short reports using smartphone platforms (ESM mobile app), across many days or even weeks. The semi-longitudinal aspect to ESMs makes them an ideal means to assess within-person variations in personality states (i.e., state extraversion and state neuroticism) across different situations, and thus test the contextualized view of personality traits. In the present study participants will report on their momentary personality traits and current situational characteristics, six times per day for a total of seven days. Prior to the ESM component of the study, they will complete a comprehensive personality assessment.

The hypotheses for this study are the same as those stated in study 1 and 2: First, a main effect of trait extraversion and neuroticism on their corresponding state was expected (H1). Specifically, it was expected that extraverts would report higher levels of state extraversion on average than introverts, and that those higher on trait neuroticism would report higher levels of state neuroticism on average relative to those lower on trait neuroticism. Second, a main effect of everyday life contexts on these personality states was predicted (H2). That is, at the between-person level, levels of state extraversion were expected to be higher for people who experienced contexts that were more rewarding on average and levels of state neuroticism were expected to be higher for people who experienced contexts that were more threatening on average. Moreover, at the within-person level, it was predicted that levels of state extraversion would be higher when people experienced contexts that were rewarding and levels of state neuroticism would be higher when people experienced contexts that were threatening. Finally, it was hypothesised that there would be a significant interaction between traits and contexts in the prediction of state expressions of personality in natural settings (H3). That is, the within-person relation between rewarding context and state extraversion would be stronger for people higher on trait extraversion than those lower on trait extraversion, whereas the within-person relation between threatening context and state neuroticism would be stronger for people higher on trait neuroticism than those lower on trait neuroticism.

4.2 Method

Participants

A minimum target sample size of 140 was set based on funding and resources constraints, and in order to achieve a sample size that was comparable to similar studies in the literature (e.g., Fleeson, 2001, 2007; Sherman, 2015), and in line with published sample size recommendations (e.g., Kreft & De Leeuw, 1998; Maas & Hox, 2005). Oversampling

was necessary to replace unusable data (e.g., due to technical difficulties or voluntary withdrawal). Thus, a total of 163 participants were recruited from the general public via flyers placed on the notice boards around the campus of The University of Melbourne and from online websites (e.g., Facebook, Gumtree). All participants received \$15 cash (~USD\$12) as a show up fee. Additionally, those who completed at least 75% of the ESM surveys received an additional \$20 (~USD\$16) and were entered into a prize draw worth \$100 (~USD\$80). All methods received ethical approval at The University of Melbourne.

Procedures and Design

The study comprised two phases. In phase 1 (lab component, day 0), participants attended a 45-minute information session at The University of Melbourne. Upon arrival, the researcher greeted participants and provided them with a general overview of the study and its aims. After participants read the plain language statement and gave consent, each was given an anonymous code and a unique Dropbox link, through which they could download their own personality profiles after completing the study. Participants then completed a number of personality questionnaires (described below), downloaded an ESM app (*MetricWire*TM; see Figure 4.1) onto their smartphones, and familiarised themselves with the app so that they could accurately report on their states during the ESM phase of the study (described below).

The researcher emphasised the importance of the quality of surveys to the participants—asking them to complete as many surveys as they can, but that it was most important that the surveys they provide are accurate. The researcher also reminded participants that they should not avoid answering surveys in any particular contexts (e.g., working, socializing), to help ensure that a wide range of contexts were sampled. To minimize the impact of possible context-related missing surveys, participants were incentivised by receiving a report on their personality profile based on their survey responses,

including their scores on the Big Five personality traits and a chart of their personality states across the study week. Participants understood that they need to complete at least 75% of the ESM surveys and also not to avoid answering surveys in any particular contexts in order to have an accurate and representative report of their state patterns across the week. To minimise the possible risks of answering ESM surveys, the researcher reassured participants that they should also not complete any surveys at dangerous or inconvenient times (e.g., sleeping, driving).

Phase 2 (ESM component, days 1 to 7) began on the day immediately following the information session. For the seven-day period, participants were prompted six times per day, via notifications and sound alerts, to complete momentary surveys about their current context and their behaviour and experiences (i.e., personality state expressions), as described below. Each survey comprised 25 items, displayed in a fixed order with one item per page (see Figure 4.1). Each survey took around 2 minutes to complete, sent between 9 a.m. and 10 p.m. at variable 60–120-minute intervals. Participants had a 30-minute window to complete each survey. If a survey was not completed 15 minutes after the initial alert, then a second alert was sent; if a survey was not completed within the 30-min window, it would become unavailable. The researcher sent text messages to each participant each day during the ESM component, to provide an update on progress (i.e., overall survey completion rate in percentage) and encourage high completion rates. On the last day, participants were given a debriefing statement by email and offered the opportunity to discuss the study and their experiences over the phone or face to face with the researcher.

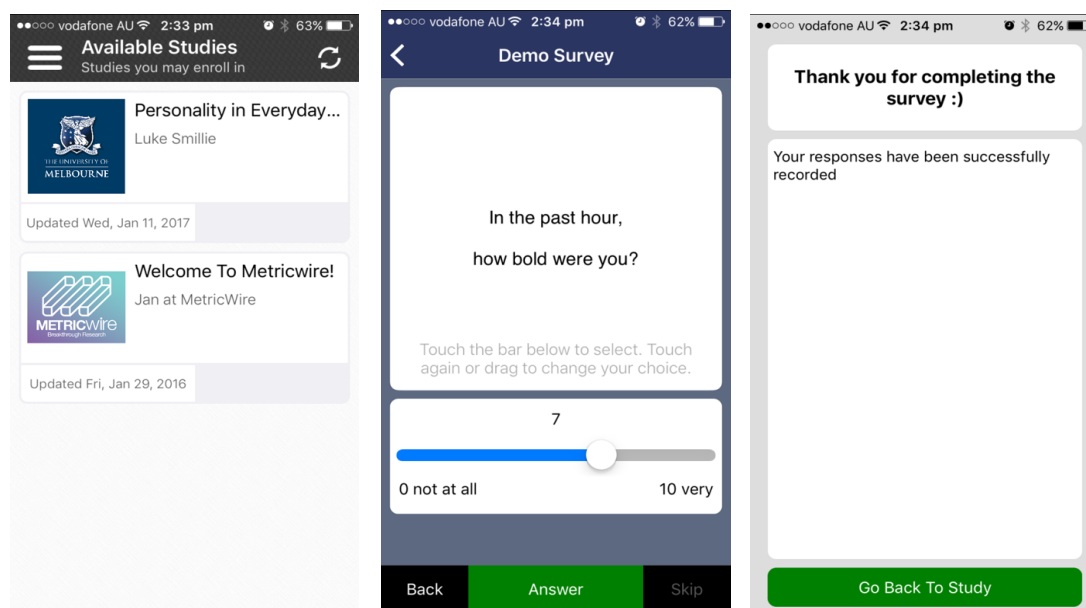


Figure 4.1. Print screens of survey on app MetricWire™

Measures

Personality questionnaires. Personality questionnaires were completed during the initial lab session, prior to the ESM phase of the study. Participants completed the BFAS (DeYoung et al., 2007), BFI-2 (Soto & John, 2016), and Big Five Mini Markers (Saucier, 1994), as described in Studies 1 and 2.

State expressions. The same 12 items from study 1 were used to assess participants' extraverted and neurotic states in the past hour. Thus, for state extraversion, participants were asked "*In the past hour, how [talkative, bold, assertive, sociable, enthusiastic, outgoing] were you?*" For state neuroticism, participants were asked "*In the past hour, how [calm, stable, irritable, anxious, self-conscious, worried] were you?*" Each item was rated on a 1 (*not at all*) to 10 (*extremely*) Likert-type scale.

Context ratings. The context measures from studies 1 and 2 were drawn on to assess trait-relevant contextual characteristics. Specifically, participants were asked, "*To what extent do the below items describe your situation over the past hour?* (0 = *not at all*, 10 = *very much*). Participants were then presented with 12 items sequentially in a fixed order, six of

which described rewarding contexts (e.g., “*Were you in a situation where you had an opportunity to gain some kind of reward?*”), and six of which described threatening contexts (e.g., “*Were you in a situation with some degree of potential threat?*”). One additional item, “*Were you learning about something new (e.g., reading, attending a lecture, or visiting a gallery/museum)?*”, was included as a filler. Full details of all items are contained in the supplementary materials (see Appendix D).

Participant Exclusions

Among the initial 163 participants recruited, three withdrew from the study and a further three experienced technical problems resulting from smartphone-software compatibility issues. The remaining 157 participants completed 5,276 out of 6,594 possible surveys (80.01%) over the seven-day period. To ensure the validity of these data, a total number of 98 surveys were removed, which comprised more than 85% identical responses (e.g., responding “1” for at least 21 of the 25 items within a single survey). Most of the 38 participants who had surveys removed for this reason had responded this way on only one or two surveys, whereas one participant responded in this way for 11 surveys. Next, nine participants were removed, who completed fewer than 15 valid surveys each. These steps reduced the sample size to 133 participants, who completed 4,750 surveys out of a possible 6216, representing a retention rate of 82.14% and an average of 35.7 surveys per person (SD = 4.52, Min = 17, Max = 46).

Data Analysis

Because data had a multilevel structure—i.e., personality states and contexts (Level 1) were nested within individuals (Level 2)—multilevel models were used for all analyses. SPSS Version 25 was used to compute descriptive statistics and correlations for both Level 1 and 2 measures and to factor analytically reduce the multiple measures of trait Extraversion and Neuroticism (Level 1) to two factors, as in studies 1 and 2. Mplus Version 7 (Muthén &

Muthén, 1998–2012) was used to compute omega reliability coefficients for level 1 variables (personality states and contexts; McDonald, 1999), based on a multilevel confirmatory factor analysis framework (Bolger & Laurenceau, 2013; Geldhof, Preacher, & Zyphur, 2014; Shrout & Lane, 2012). R was used to compute omega reliability coefficients for level 2 variables (trait extraversion and neuroticism; R Core Team, 2018). The hypothesized main effects of traits and contexts as well as the interaction between traits and contexts in the prediction of state expressions was examined in R (R Core Team, 2018) via multilevel structural equation models using the *lme4* package (Bates, Maechler, Bolker, & Walker, 2014).

4.3 Results

Preliminary Statistics

Exploratory Factor Analyses via Principal Axis Factoring (PAF) analyses were used to reduce multiple measures of trait extraversion and neuroticism to two factors. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable ($KMO_E = .744$, $KMO_N = .734$). The number of factors to be retained was guided by Kaiser's criterion (eigenvalues above 1) and inspection of the scree plot. The PAF of the three extraversion measures revealed one eigenvalue exceeding 1, explaining 81.08% of the variance. Similarly, the PAF of the three neuroticism measures revealed one eigenvalue exceeding 1, explaining 81.88% of the variance. An inspection of the scree-plots revealed a clear break after the first factor in each PAF analysis. The factor scores of Extraversion and Neuroticism were saved using regression method.

Table 4.1 shows means, standard deviations, reliabilities (McDonald's ω ; McDonald, 1999), and inter-correlations between traits (extracted factors), states (mean scores), and context measures (mean scores). As expected, trait extraversion was positively correlated with aggregated state extraversion, whereas trait neuroticism was positively correlated with aggregated state neuroticism. The raw correlation between trait and the corresponding state

aggregate (trait-state manifestation) is around .50, indicating a good level of convergent validity. At the aggregate level, state extraversion was strongly correlated with ratings of how rewarding contexts were, and weakly correlated with ratings of how threatening contexts were. Similarly, state neuroticism was strongly correlated with ratings of how threatening contexts were and weakly correlated with ratings of how rewarding contexts were.

Table 4.1
Descriptive Statistics and Correlations for Between-Person Variables

	1	2	3	4	5	6
1. Extraversion	-					
2. Neuroticism	-0.02	-				
3. State extraversion	.50**	-0.05	-			
4. State neuroticism	-0.08	.49**	.18**	-		
5. Rewarding Context	.33**	0.04	.76**	.28**	-	
6. Threatening Context	-0.01	.32**	.36**	.80**	.55**	-
Means	0.00	0.00	4.42	3.10	4.16	3.07
Standard Deviations	1.00	1.00	1.29	1.29	1.44	1.56

Note. ** $p < .01$, * $p < .05$. Ns are 133 for all variables. Trait extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State expressions and context ratings are aggregate scores.

Table 4.2 reports both within- and between-person variances in state expressions and context ratings, as well as the reliabilities of these variables. State extraversion displayed substantial between-person variance and even larger within-person variance (see ICCs: the amount of variation attributable to between-person effects). State neuroticism also displayed sizable between-person variance and comparable within-person variance. Context ratings also showed substantial between- and within-person variation: The ICCs for rewarding and threatening contexts indicated that approximately half of the variance in reported contexts occurred within-persons. Omega coefficients (McDonald, 1999) indicated that participant ratings of rewarding and threatening contexts were highly consistent ($\omega_s \geq .70$), justifying the use of composite scores.

Table 4.2**Variance Components, ICCs, Intercepts, and Reliabilities for Personality States and Contexts**

Momentary Measures	τ_{00}	σ	ICC	Intercept	$w\Omega$	$b\Omega$
State Extraversion	1.90	3.41	0.35	4.42	0.86	0.93
State Neuroticism	1.61	1.67	0.49	3.10	0.75	0.95
Rewarding Context	1.99	2.84	0.41	4.16	0.70	0.91
Threatening Context	2.36	2.46	0.49	3.07	0.73	0.95

Note. τ_{00} = Variance between intercepts (between-person variance); σ = Variance around intercepts (within-person variance); ICC proportion of variance between persons divided by total variance. Intercept is from unconditional cell means model (approximately the average rating on the construct). $w\Omega$ = within-person Omega, $b\Omega$ = between-person omega. All variables in this table were measured on a 0 to 10 scale.

Description of Moderation Models

To address the main research questions, separate predictive models were used for state extraversion and state neuroticism. For each model of state expressions, I first entered the relevant trait and context while controlling for the other trait (e.g., when modelling state extraversion, extraversion and rewarding context were entered as the main predictors, and neuroticism was entered as a control variable). In order to easily interpret the effects of between-person traits on state expressions, trait scores were centred around group means (Level 2). As personality states may vary as a function of both within-person and between-person variations in contexts, context ratings were centred around each individual's mean (Level 1) and around the group mean (Level 2). The effect of Level 1 context on state expression was modeled as random slopes to allow variation in the within-person state-context relation. Next, the cross-level interaction of Level 2 trait $\times$ Level 1 context was added to test whether the trait-state relation varies systematically across contexts. Finally, the fixed effect of Level 1 order within participants (i.e., the order in which surveys were completed) was added to statistically control for any effect of elapsed time on responses (see Bolger & Laurenceau, 2013).

Thus, the final model for state extraversion consisted of extraversion, ratings of how rewarding contexts were at both levels, the extraversion $\times$ Level 1 rewarding context

interaction, and survey order. Similarly, the final model for state neuroticism comprised neuroticism, ratings of how threatening contexts were at both levels, the neuroticism $\times$ Level 1 threatening context interaction, and survey order. Overall, the models for each state expression had a good fit to the data (see Table 4.3), as indicated by $R^2_{\text{GLMM}(c)}$ (R_c ; models' overall fit) and $R^2_{\text{GLMM}(m)}$ (R_m ; the fitness for model's fixed effects). Values for R_c and R_m range between zero and one with values closer to one indicating good fit.

Does the Association between Traits and States Depend on Context?

Table 4.3 shows the fixed effects for the two models. Since it is difficult to obtain meaningful standardised effect sizes for multilevel modelling, unstandardized coefficients are reported here. The unstandardized regression coefficients indicated that the average participant expressed somewhat higher levels of state extraversion relative to state neuroticism throughout the study week. In the model for state extraversion, there were statistically significant effects of trait extraversion and between-person differences in ratings of how rewarding contexts were. This indicates that participants who are high on trait extraversion, and participants who tended to report being in more rewarding contexts, tended to express higher levels of extraversion throughout the study week. There was also a significant effect of within-person variations in rewarding context ratings, indicating that participants acted and felt more extraverted when they were in rewarding contexts. Contrary to the main hypothesis, however, the extraversion $\times$ within-person rewarding context interaction was not significant (see Figure 4.2), indicating that the within-person effect of rewarding context on state extraversion was just as strong for extraverts as for introverts. That is, all participants acted and felt more extraverted when they were in rewarding contexts, regardless of their level of trait extraversion.

In the model of state neuroticism, there were large and statistically significant effects of trait neuroticism and between-person differences in ratings of how threatening contexts

were. This indicates that participants who are high on trait neuroticism, and participants who tended to report being in more threatening contexts, tended to act and feel more neurotic throughout the study week. There was also a significant within-person effect of threatening context ratings, indicating that participants acted and felt more neurotic when they were in threatening contexts. Also contrary to the main hypothesis, however, the neuroticism $\times$ within-person threatening context on state neuroticism was not significant (see Figure 4.2). Thus, the within-person effect of threatening context on state neuroticism was no stronger for neurotic individuals relative to stable individuals. That is, all participants acted and felt more neurotic when they were in threatening contexts, regardless of their level of trait neuroticism.

Table 4.3**Fixed Effects for Multilevel Models of State Extraversion and State Neuroticism**

Personality Expressions	b	LL	UL	t	P	R _m	R _c
State Extraversion	4.39	4.23	4.55	53.14	< .001	0.69	0.79
Extraversion (b)	0.43	0.27	0.59	5.30	< .001		
Rewarding Context (w)	0.68	0.64	0.72	31.86	< .001		
Rewarding Context (b)	0.64	0.54	0.75	11.76	< .001		
Neuroticism (b; control variable)	0.10	-0.05	0.25	1.30	0.19		
Survey Order (w; control variable)	0.00	0.00	0.01	1.13	0.26		
Extraversion (b) $\times$ Rewarding Context (w)	0.00	-0.04	0.05	0.18	0.86		
State Neuroticism	3.06	2.93	3.19	45.74	< .001	0.71	0.81
Neuroticism (b)	0.36	0.23	0.49	5.35	< .001		
Threatening Context (w)	0.45	0.41	0.48	24.94	< .001		
Threatening Context (b)	0.57	0.48	0.65	13.94	< .001		
Extraversion (b; control variable)	-0.03	-0.16	0.09	-0.54	0.59		
Survey Order (w; control variable)	0.00	0.00	0.01	1.67	0.10		
Neuroticism (b) $\times$ Threatening Context (w)	0.02	-0.01	0.06	1.26	0.21		

Note. Self-reported state extraversion and state neuroticism (DV, within-person), scale 0 to 10. *bs* are unstandardized multilevel regression coefficients. LL and UL represent lower and upper limits for 95% confidence intervals respectively based on $K = 500$ bootstrap resamples. R_m and R_c are Marginal and Conditional Multiple Rs (Nakagawa & Schielzeth, 2013). (w) = within-person. (b) = between-person. Extraversion and neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales.

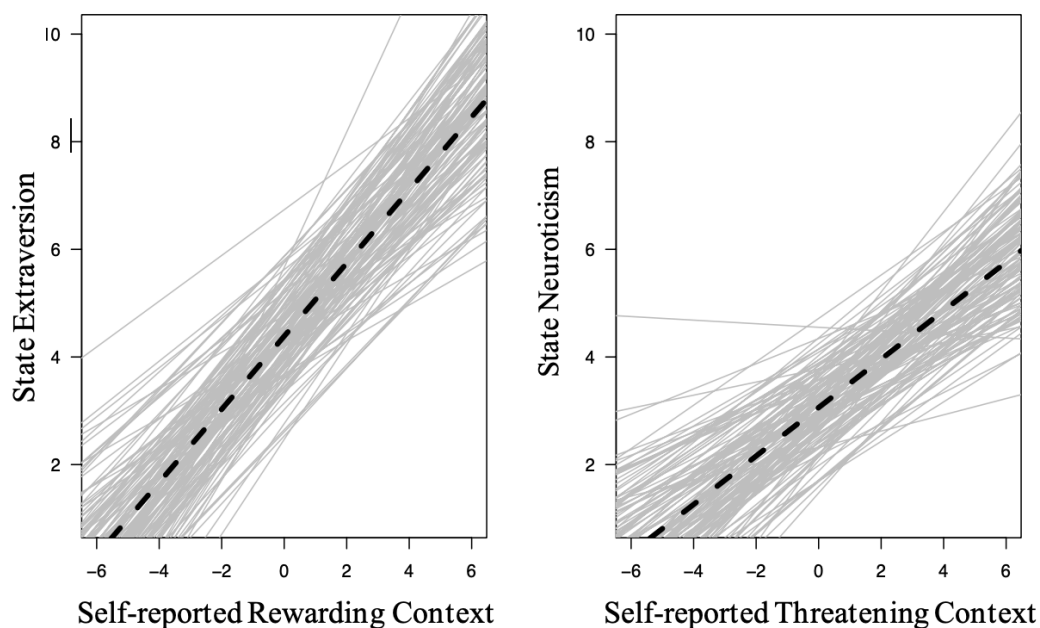


Figure 4.2. Spaghetti plots of within-person context-state relations using self-reported contexts ratings. *Note.* Solid grey lines represent estimated regression lines for each participant. Dashed black lines represent the average regression lines. Contexts (x-axes) are within-person centred.

Does the Association between Traits and States depend on Context?

Table 4.4 reports the random effects of two separate models for state extraversion and state neuroticism. Although these results are not directly related to the hypotheses being tested, they are relevant more broadly and reported here for completeness. Specifically, Table 4.4 shows the remaining variation in state extraversion and state neuroticism at between-person level (intercepts), at within-person level (residuals), and in the relation between state expression and within-person context (slopes), after accounting for the fixed effects. For example, the *SDs* of the intercept and residual in state extraversion model were both significant, indicating that there was still a significant amount of variation in state extraversion at both between- and within-person levels, after controlling for the fixed effects discussed above. Moreover, the *SD* of the slope was also significant, indicating that the relation between state extraversion and within-person extraversion-conductive context significantly varied across individuals. However, the magnitude of this relation was not significantly moderated by trait extraversion (see Table 4.4). The same pattern applies to state

neuroticism, which exhibited a significant amount of variation at both between- and within-person levels after controlling for the fixed effects. The relation between state neuroticism and within-person neuroticism-conductive context significantly varied across individuals, though it was not significantly moderated by trait neuroticism (see Table 4.4). Furthermore, the within-person state-context relation also reliably differed across individuals, the reliability of which was estimated by dividing the variance in slopes from the models by the variance in slopes from least square regression for each participant. In these models, only ratings of within-person contexts were used to predict state expressions. If the study were to be replicated on the same participants, the expected correlation between the slopes (i.e., within-person state-context relation) in the existing dataset and the slopes in a new dataset would be more than .50, as revealed by Rel in the last column of Table 4.4.

Table 4.4**Random Effects of Multilevel Models**

Personality Expressions	<i>SD</i>	LL	UL	<i>r</i>	Rel
State Extraversion	0.81	0.71	0.92		
Rewarding Context (w)	0.19	0.15	0.22	-0.03	0.53
Residual	1.43	1.40	1.46		
State Neuroticism	0.68	0.59	0.77		
Threatening Context (w)	0.16	0.13	0.19	-0.24	0.52
Residual	1.05	1.03	1.07		

Note. *SD* = standard deviation of random effect scores. LL and UL represent lower and upper limits for 95% confidence intervals, respectively, based on *K* = 500 bootstrap resamples. *r* = correlations among random effects (i.e., correlations between intercepts and slopes). Rel = reliability of individual differences in within-person context-state relation for models containing only the within-person centred context predictor. All predictors were entered simultaneously.

Are Traits Associated with Contexts?

Table 4.1 suggests that personality traits were associated with the degree to which participants experienced rewarding and threatening contexts in daily life. To understand how personality traits were related to the contexts that participants reported experiencing, two separate predictive models were constructed for the rewarding and threatening contexts. For the model of reward context, trait extraversion was entered as the predictor while controlling

for trait neuroticism. Similarly, for the model of threatening context, trait neuroticism was entered as the predictor while controlling for trait extraversion.

Table 4.5 displays the results for these two models. In the model for rewarding context, there was a significant effect of trait extraversion, indicating that participants high on trait extraversion tended to rate contexts as significantly more rewarding. There was no significant effect of trait neuroticism in this model. Conversely, in the model for threatening context, there was a significant effect of trait neuroticism, indicating that participants high on trait neuroticism tended to rate contexts as significantly more threatening. There was no significant effect of trait extraversion in this model. Overall, both predictive models showed good overall fit to the data (see R_c) but relatively poor fit for just the fixed effects (see R_m), nonetheless they were around the same levels of fitness as what were found in previous studies with similar models (e.g., Sherman et al., 2015).

Table 4.5

Model Parameters for Predicting Context Experiences from Personality Traits

Context characteristics	<i>b</i>	LL	UL	<i>t</i>	<i>R_m</i>	<i>R_c</i>
Rewarding Context	4.16	3.94	4.43		0.22	0.64
Extraversion (predictor)	0.50	0.24	0.76	4.11		
Neuroticism (control variable)	0.12	-0.15	0.35	0.95		
SD in intercepts	1.33	1.15	1.48			
SD in residuals	1.68	1.65	1.72			
Threatening Context	3.07	2.82	3.30		0.22	0.70
Neuroticism (predictor)	0.50	0.25	0.81	3.72		
Extraversion (control variable)	0.10	-0.17	0.35	0.76		
SD in intercepts	1.47	1.28	1.66			
SD in residuals	1.57	1.54	1.60			

Note. $N = 4750$. *bs* are unstandardized multilevel regression. Traits were mean-centered and measured on a 1 to 5 scale. Context characteristics were measured on a 0 to 10 scale. LL and UL represent lower and upper limits for 95% confidence intervals, respectively, based on K 500 bootstrap resamples. *R_m* and *R_c* Marginal and Conditional Multiple Rs (Nakagawa & Schielzeth, 2013).

4.4 Discussion

The purpose of the current study was to extend and improve upon studies 1 and 2, by examining the contextualized view of traits in a naturally occurring environment. By measuring participants' behaviours and experiences as they go about their daily lives, the current study is less prone to belief bias and higher in ecological validity and generalizability (Conner & Barrett, 2012; Conner & Lehman, 2011; Mehl & Conner, 2011). It also went beyond studies 1 and 2 by sampling participants' behaviours and experiences repeatedly in numerous contexts. By aggregating personality states in similar contexts, it decreased measurement error and improved construct reliability as well. It was hypothesised that momentary state expressions of traits would be significantly predicted by the corresponding trait, trait-relevant contexts at both within- and between-person levels, and the interaction between traits and trait conducive contexts.

The first hypothesis that trait extraversion and neuroticism would significantly predict their corresponding state was supported. Specifically, across contexts, participants high on trait extraversion expressed higher levels of state extraversion on average (e.g., *talkative* and *outgoing*) while participants high on trait neuroticism experienced higher levels of state neuroticism on average (e.g., *anxious* and *self-conscious*) throughout the study week. This finding is consistent with the large amount of empirical evidence from previous experience sampling studies, in which personality traits predict average levels of state expressions (e.g., Breil et al., 2019; Ching et al., 2014; Fleeson, 2001, 2004, 2007; Fleeson & Gallagher, 2009; Mercer-Lynn et al., 2014; Sherman et al., 2015; Sun & Vazire, 2019; Wilt & Revelle, 2019).

The second hypothesis that rewarding and threatening contexts would significantly predict state extraversion and state neuroticism respectively was also supported. At the within-person level, participants acted more extraverted when they were in rewarding contexts and felt more neurotic when they were in threatening contexts. At the between-

person level, participants who experienced contexts that were more rewarding on average expressed higher levels of state extraversion and those who experienced contexts that were more threatening on average experienced higher levels of state neuroticism. Overall, these results demonstrated that momentary manifestations of extraversion and neuroticism were robustly activated by a broad range of rewarding and threatening contexts in daily life, respectively, at both within- and between-person levels. These findings provided further support to the Reinforcement Sensitivity Theory (Corr, 2004; Gray, 1970; Smillie, 2008), extending the existing literature in which experimental and hypothetical rewarding and threatening stimuli (e.g., imagining winning a lottery, receive monetary reward or punishment in a game) were often used to elicit state extraversion and neuroticism (e.g., Smillie, 2008; Smillie, et al. 2012; Smillie, et al., 2015).

These results were also consistent with previous studies that examined particular forms of state extraversion (i.e., social behaviour) in particular kinds of rewarding contexts (i.e., social contexts). Specifically, extraverted behaviours have usually been associated with social situations only (Denissen & Penke 2008). Breil et al. (2019) and Sherman et al. (2015) found that situations characterized by sociability (i.e., *social interaction and relation formation is possible, required, or desired*) significantly influenced social behaviour (a single item measure: *outgoing, sociable—reserved, quiet*). Although the current study is aligned with these previous findings, it is worth noting some key differences. First, these studies measured a particular expression of extraversion—social behavior—whereas the current study also assessed other forms of state extraversion, including enthusiasm, boldness, and assertiveness, thus covering a broader range of extraverted behaviour. Second, past studies considered all social contexts as relevant to social behaviour, the current study deemed a social context as extraversion-conducive only when it is desired and considered rewarding by the person in that situation. According to RST, it is the rewards embedded in social

situations, not the ‘social’ aspect of situations per se, that drive extraverted behaviour.

Although most social situations that people come across contain rewards (e.g., opportunities to form friendships, attract attention, have fun, etc.), not all social situations are rewarding (e.g., having an argument with someone, having to work with a disliked colleague, etc.). It is therefore encouraging that a main effect of rewarding contexts on extraverted behaviour was consistently observed across these different operationalizations of state extraversion and extraversion-conducive contexts across this and past studies.

The main effect of threatening context on state neuroticism was also consistent with some, though not all, of the findings reported by Sherman et al. (2015). Sherman and his colleagues expected state emotionality (*nervous, emotional—calm, unemotional*) to be significantly predicted by situations high on negativity (i.e., *the situation elicits unpleasant feelings*) and adversity (i.e., *Someone is being threatened, blamed, or criticized*). While the effects of negativity were significant at both the between- and within-person levels in Sherman et al.’s (2015) study, consistent with the effects of threat ratings in the present study, the effect of adversity were only significant at the within-person level and was also very small. This makes sense because negativity is more aligned with how the neuroticism-conducive context is operationalised in the current study. Specifically, according to RST, it is not the presence of adversity per se, but threats to the individual themselves that is most likely to elicit state neuroticism. As a caveat, it is difficult to capture neuroticism relevant contexts in a comprehensive and also nuanced manner. In an attempt to do so, the current study measured situations where unpleasant feelings were obviously present (e.g., nervous, angry, etc.) and also situations where unpleasant feelings were less obvious, such as receiving two job offers (multiple options), waiting for lottery results (uncertainty), or being tempted to have an illicit affair (conflicted goals). Although these situations may not be seen as negative or adverse at first glance, they can be neuroticism conducive. Future research could benefit

from the more sophisticated examples of threatening and conflict-provoking contexts generated in this thesis.

In contrast, the third hypothesis that traits would interact with psychologically relevant contexts to predict their corresponding state expressions was not supported (H3). Specifically, extraverts did not get a bigger boost in state extraversion (e.g., talkative, outgoing, bold, etc.) than do introverts in rewarding contexts. Although surprising, the results were consistent with some previous studies, which found that extraverts did not react a lot more positively (Lucas et al., 2008) nor behaved much more socially (Breil et al. 2019; Sherman et al., 2015) than introverts in situations characterised by sociability. Similarly, threatening contexts had no stronger effect on state neuroticism for neurotic participants than less-neurotic participants. This is consistent with previous finding that people high on neuroticism did not respond much more negatively to situations characterized by adversity and negativity than people low on neuroticism (Sherman et al., 2015). On the other hand, these findings contradict some recent experience sampling studies (i.e., Breil et al., 2019; Sandstrom et al., 2017), which report significant interactions between traits (e.g., extraversion and neuroticism) and contexts predicting trait-relevant states (i.e., social behaviour, positive affect, and negative affect). As reviewed in Chapter 1, these studies have operationalized situations in a more objective manner. That is, Breil et al. (2019) used informant-coded rather than self-reported situation characteristics. Sandstrom et al. (2017) operationalized situations as a mixture of physical locations and situation characteristics (i.e., at home, at work, in a social type of situation), assessed using self-reports and mobile sensors. The use of more objective measures of situation characteristics may account for the discrepancy between these findings, and will therefore be incorporated into study 4, in the next chapter.

Beyond the main findings addressed above regarding each hypothesis, it is interesting and potentially relevant to note the strong correlations between personality traits and ratings

of contexts. This suggests that personality traits play a role in the situations that participants find themselves in. First, participants scoring higher on trait extraversion were more likely to report experiencing rewarding contexts. This is consistent with findings from study 2, in which trait extraversion was strongly associated with perceiving all conditions (i.e., anticipatory of positive feedback, anticipatory of negative feedback, and control) as more positive and rewarding (in both the lab sample and Mturk sample). However, this is inconsistent with Sherman et al. (2015), in which extraverts were not more likely to report being in situations characterized by sociability. This potentially suggests that trait extraversion may not be associated with situations characterized by sociability per se, but with contexts characterized by rewards. On the other hand, the current study also found that participants scoring higher on trait neuroticism were more likely to report experiencing threatening contexts. This is also consistent with findings in study 2, in which trait neuroticism was strongly associated with perceiving all conditions (i.e., anticipatory of positive feedback, anticipatory of negative feedback, and control) as more negative and threatening (in both the lab sample and Mturk sample). Conversely, Sherman and colleagues' (2015) findings were more mixed: They reported that emotionally unstable people were more likely to experience negative situations but not aversive situations, although both situations were hypothesized to link to trait neuroticism. This echoes the discussion above regarding which context is more relevant to extraversion (rewarding context vs. social context), confirming the proposal that it is not adversity or negativity as such, but threats associated with aversive and negative situations that may trigger manifestations of neuroticism.

The correlations between personality traits and ratings of contexts found in this study most likely reflect effects of *situation perception* and *situation selection/evocation*. That is, the positive association between extraversion and rewarding contexts might be due to extraverts perceiving the contexts they were in as more rewarding or extraverts tend to seek

out rewarding contexts (e.g., go to parties, catch up with friends). On the other hand, the positive association between neuroticism and threatening contexts may be due to neurotic individuals perceiving the contexts they were in as more threatening or more likely to evoke negative events in their environment or negative reactions from people around them.

To summarize: In this study the hypothesized main effects of traits and psychologically relevant contexts on corresponding momentary trait expressions were well supported. Trait extraversion and real-life rewarding contexts (within- and between-person) strongly and independently predicted state extraversion. Likewise, trait neuroticism and real-life threatening contexts (within- and between-person) strongly and independently predicted state neuroticism. In contrast, no evidence was found for the contextualized nature of extraversion and neuroticism, which is consistent with some previous findings (Lucas et al., 2008; Sherman et al., 2015) but conflicted with others (Breil et al., 2019; Sandstrom et al., 2017). As Breil et al. (2019) argued, self-reported ratings of context may have masked the moderation effect of trait on within-person context-state relation. Study 4 addresses this possibility by using informant-coded situation characteristics. Through comparing the results using self-reported versus informant-coded situation characteristics, Study 4 may be able to clarify, to some extent, how traits are associated with particular characteristics of daily life context, and whether these associations are contributed by potential processes including *situation perception* and *situation selection/evocation* (Funder, 2016; Furr & Funder, 2018)

Chapter 5

Are Traits Contextualized? Sampling Real-World Contexts over Time

Using ‘Objective’ Measures of Context

5.1 Overview

The aim of study 4 was to provide a close replication and extension of study 3, in particular, clarifying one interesting but unexpected observation. Specifically, study 3 found that participants’ personality traits significantly predicted situations they experienced in daily life: Extraverts were more likely to report being in situations characterised broadly by reward (e.g., with opportunities for social interactions, having fun, taking a leadership role, etc.), while neurotic individuals were more likely to report being in situations characterised broadly by threat (e.g., involving negative or conflicted states, or difficult choices). The high correlations between the two predictors of personality states in this study—traits and situational ratings—may have prevented the predicted interaction from emerging.

It is unclear from study 3 why participants’ traits were associated with their daily life contexts, but the most likely possibilities concern *situation selection/evocation* and *situation perception* (Funder, 2016; Furr & Funder, 2019). Situation selection/evocation refers to the tendency for people to seek out or create situations that are compatible with their personality and allow them to act on their behavioural tendencies. For instance, extraverts may go out of their way to find opportunities for socialisation (e.g., seeking conversation with colleagues), or try to increase the rewarding nature of a situation (e.g., suggesting to a colleague that they continue their conversation in a bar). Situation perception refers to the tendency for people to subjectively appraise situations in ways that are more related to their personality than to the objective features of the situation. For example, a highly neurotic person may experience an ambiguous situation as much more threatening than a less neurotic person.

Previous research attests that extraverts are likely to seek out rewarding situations, particularly of a social nature (DeYoung, 2013; Nettle, 2006; Wrzus, Wagner, & Riediger, 2015). For example, extraverts are more likely to initiate social behaviour (Buchanan, Johnson, & Goldberg, 2005), spend more time talking to friends and recreating socially (Diener, Larsen, & Emmons, 1984; Mehl, Gosling, & Pennebaker, 2006), and visit more places and travel more distances on daily basis (Perlin, Liu, & Zhao, 2019). Also, older extraverts tend to choose to live in areas offering opportunities for social interaction and numerous cultural facilities (Carp & Carp, 1980; Murray et al., 2005). This suggests that situation selection might be a plausible explanation for why extraversion was positively associated with rating one's present situation as more rewarding in study 3.

There is also some evidence for situation perception effects relating to extraversion. For example, extraverts are more likely to perceive themselves as being the centre of attention in social situations (Sherman et al., 2013). They also tend to perceive pleasant situations—both social and non-social—as more positive than introverts do (Lucas & Diener, 2001). Conversely, introverts tend to underpredict the hedonic rewards (i.e., activated positive and pleasant affect) associated with social situations, and may therefore be less likely to seek out social situations (Zelenski et al., 2013). Furthermore, some evidence even suggests that extraverts create their own social world by modifying their interaction partner's behaviour through their own positivity and by creating a social press for positivity in return (Eaton & Funder, 2003). This suggests that situation selection/evocation and situation perception may work together, influencing extraverts' more rewarding situational experience.

In contrast to the plausibility that extraverts may seek-out rewarding situations, it seems far less likely that people high on neuroticism would intentionally seek out threatening situations. In fact, some research suggests that highly neurotic individuals tend to prefer to be alone (Nestler, Back, & Egloff, 2011). It seems potentially more likely that people high on

neuroticism might experience negative situations through situation perception and situation evocation. In one notable study of situation perception, neurotic individuals perceived situations as more threatening in general than individuals low on neuroticism (Sherman et al., 2013). Similarly, people high on rejection sensitivity (likely related to neuroticism) were more likely to perceive intentional rejection in others' ambiguous behaviour in experimental settings, and also more likely to perceive intentional rejection in their new romantic partners' insensitive behaviour in real life (Downey & Feldman, 1996). Moreover, people high on social anxiety (again, related to neuroticism) tend to interpret ambiguous interpersonal events (Constans, Penn, Ihen, & Hope, 1999) and ambiguous facial expressions (Yoon & Zinbarg, 2006) in a more threatening manner compared to people low on this facet. Perhaps, due to neuroticism's effect on negative perception, people high on neuroticism (as measured by 'personal negativity') were more likely to display maladaptive social behaviour, and elicited negative behavioural responses from others, further complicating their social environment (Furr & Funder, 1998; Lazarus & Folkman, 1984). Consequently, high neuroticism is associated with increased involvement in interpersonal conflict (Buss, Gomes, Higgins, & Lauterbach, 1987). This suggests that situation evocation and situation perception may work together, influencing neurotic individuals' more threatening situational experiences.

In study 3, potential situation selection/evocation and situation perception effects may have made it more difficult to detect a trait by situation interaction in the prediction of personality states—the key effect predicted by the contextualized view of traits. This is because they may work to inflate the correlation between the predictor (i.e., extraversion and neuroticism) and the hypothesised moderator (i.e., rewarding and threatening context). That is, extraverts may seek out rewarding situations, create rewarding situations, and perceive situations as more rewarding in general than introverts; similarly, people high on neuroticism may evocate more threatening situations and perceive situations as more threatening in

general than people low on neuroticism, thus, increasing the associations between personality traits and relevant situations through personality-driven situation selection/evocation and perception (Funder, 2008; Sherman et al., 2013). As the predictor and the hypothesised moderator become more highly correlated, instances of discordant cases (e.g., extraverts in non-rewarding situations, or introverts in rewarding situations) become rarer, making it less likely for an interaction to emerge.

This interpretation is plausible considering the conflicting results obtained from study 3 (Chapter 4) and some previous studies (i.e., Breil, et al., 2019; Sherman et al., 2015). All these studies have investigated the relation between extraversion and state extraversion (either a broad range of state extraversion or a particular form of state extraversion, depending on the study) in psychologically relevant situations. In study 3, extraverts did not express higher levels of state extraversion in rewarding contexts any more than introverts did. Similarly, Sherman et al. (2015) found that the relation between extraversion and social behaviour was no stronger in more versus less social situations. That is, both of these studies failed to find an interaction. Conversely, Breil et al. (2019) predicted that the relation between social behaviour and social/hedonic/positive/low-duty situations would be stronger for extraverts than introverts. They found that, except for social situation, all other interactions significantly predicted social behaviour. Critically, whereas study 3 of the current thesis and the previous study by Sherman et al. (2015) assessed situations using self-reports, Breil et al. (2019) used informant-coded context ratings to provide a more ‘objective’ measure of contextual features. Such objective measures should not be impacted upon by situation perception, because the participant’s perceptions do not influence how the situation is rated.

Closer inspection of the data from these three studies provides some encouragement for the idea that effects of situation perception may be at play here. Specifically, the

association between extraversion and informant-coded social context was much weaker ($r = .08$; Breil et al., 2019) than that between extraversion and self-reported social context ($r = .16$; Sherman et al., 2015) and that between extraversion and self-reported rewarding context ($r = .28$; study 3, Chapter 4). Put in differently, since the relation between traits (extraversion, neuroticism) and self-reported contexts are stronger than that between traits and informant-coded contexts, it is possible that situation perception may have inflated the trait-context relation, making an interaction effect less likely to surface.

Another possibility is that lack of significant interactions between traits and context in study 3 is simply owing to these effects being much smaller than expected. Previous studies that have found significant Person $\times$ Situations have had considerably larger samples than those reported here, providing more power to detect a small effect size (i.e., Breil et al., 2019; Sandstrom et al., 2017; Yao & Moskowitz, 2015). Most notably, Sandstrom et al. (2017) had a huge sample of 12,310 participants, while Breil et al. (2019) also had a much larger sample ($N = 494$) compared with Sherman et al. (2015; $N = 218$) and study 3 in this thesis ($N = 148$). Even though Yao and Moskowitz (2015) had an average-sized sample ($N = 130$), they collected 6 to 7 surveys each day from each participant for 20 days, much longer than study 3 and Sherman et al. (2015) which sampled for 7 days, potentially providing more power to detect a weak interaction as well.

Given the above considerations, study 4 aimed to replicate and extend study 3 using a larger sample and including an open-ended question for participants to describe their contexts. These open-ended responses would then be used by informants to provide a relatively more objective view of situation characteristics. The present study has four hypotheses, three of which are the same as those stated in the previous studies in this thesis. First, a main effect of trait extraversion and neuroticism on their corresponding state was expected (H1). Specifically, extraverts would report higher levels of state extraversion than

introverts, and those higher on trait neuroticism would report higher levels of state neuroticism relative to those lower on trait neuroticism. Second, a main effect of everyday life contexts on state extraversion and state neuroticism was predicted, both for self-reported context (H2a) and informant-coded context (H2b). That is, levels of state extraversion were expected to be higher for participants who either reported being in, or were rated as being in, more rewarding contexts on average. Similarly, levels of state neuroticism were expected to be higher for participants who either reported being in, or were rated as being in, more threatening contexts on average. Third, it was hypothesised that there would be a significant interaction between traits and context ratings in the prediction of state expressions of personality in natural settings (H3). That is, at the within-person level, the relation between rewarding context and state extraversion would be stronger for people higher on trait extraversion than those lower on trait extraversion, whereas the relation between threatening context and state neuroticism would be stronger for people higher on trait neuroticism than those lower on trait neuroticism. Finally, as an extension to study 3, it was hypothesised that the relation between traits and self-reported context would be notably stronger than the relation between traits and informant-coded context (H4).

5.2 Method

Participants

As for Study 3, sample size considerations were informed by published recommendations (Kreft & De Leeuw, 1998; Maas & Hox, 2005) and other similar studies (e.g., Fleeson, 2001, 2007; Sherman, 2015). However, given the aforementioned concern about potential limitations in power, a much larger sample was sought in study 4 relative to study 3. The maximum sample size was again constrained, in this case, by the total amount of course credits that the researcher was assigned to give participants in the experiment. All participants received 2.5 course credits for taking part in the study. They also received a

report on their personality profile based on their survey responses, including their scores on the BFAS and their levels of extraverted states and neurotic states across the study week.

The full sample consisted 227 first-year psychology students (74% female, 25% male, 1% unknown), between 18 and 58 years old ($M = 20.25$, $SD = 5.30$), from The University of Melbourne. After exclusions (described below), the final sample comprised 184 participants—138 (75%) females, 43 (23%) males, and 3 unknowns (1.6%), aged between 18 and 58 years ($M_{age} = 20.09$, $SD_{age} = 5.21$). This sample provided 5,960 valid surveys, with an average of 32.4 usable surveys per participant.

Procedures and Design

The procedures and design are the same as study 3, except that a different ESM app, *Instant Survey*, was used. This is a free Android and iOS app developed for collecting intensive longitudinal data (e.g. experience sampling, ecological momentary assessment). One difference between these two apps is that *Instant Survey* displays all questions on one page in a fixed order (see Figure 5.1), while *MetricWire* shows one survey question per page in a fixed order. Another difference is that, on *Instant Survey*'s home page, participants could view how many surveys they have done out of all the surveys they received for the day. They could also view their total survey completion rate for the whole study period. For example, as displayed in Figure 5.1, the information on the home page indicated that participants were on the fourth day of their study period (seven days in total), they have completed two out of the three surveys that they have received by the time of the day, and their total completion rate for the study was 50% by that time. There was also a red arrow, pointing down, indicating that their survey completion rate has declined compared to the days before.

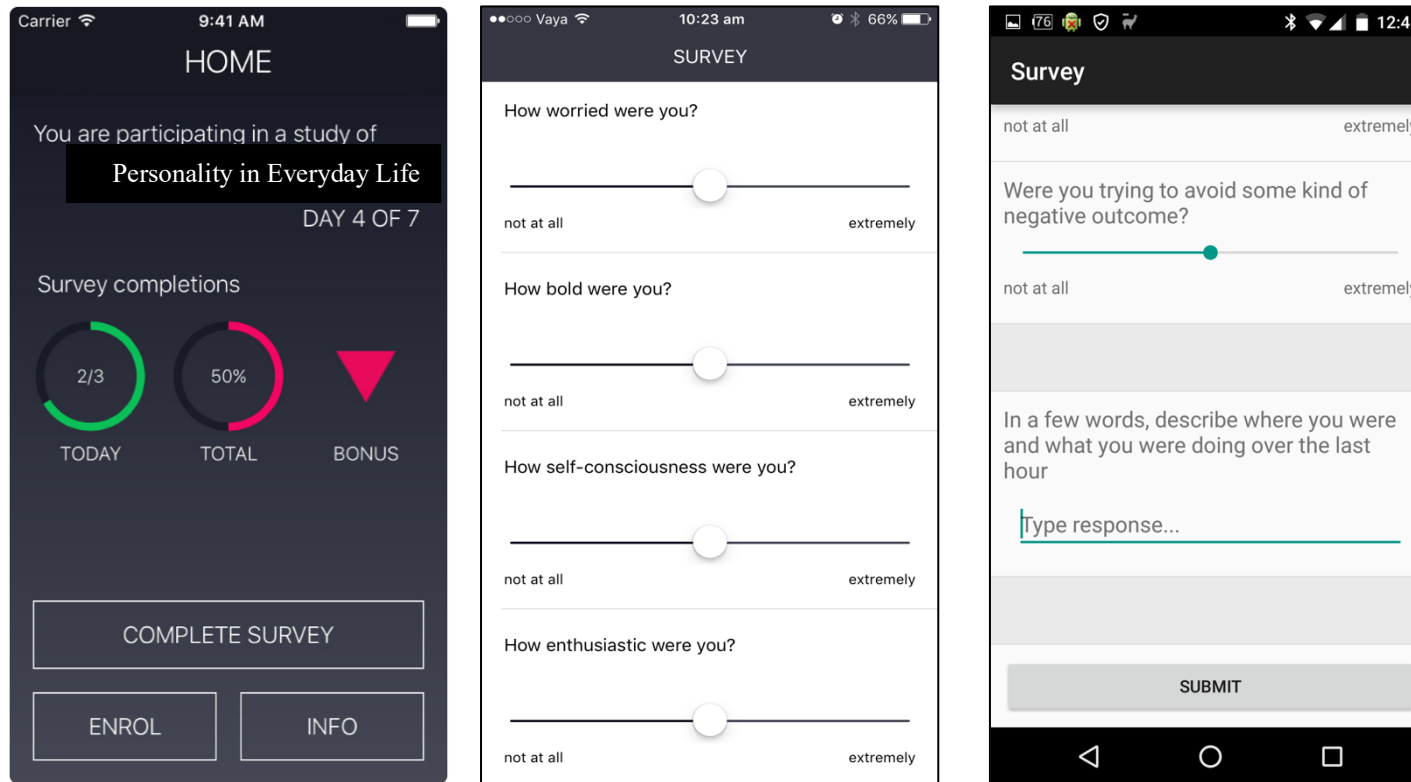


Figure 4.1. Print screens of survey on app InstantSurvey.

Measures

Personality questionnaires. As was the case in study 3, participants completed several personality questionnaires during the initial lab session, prior to the ESM phase of the study. Specifically, the BFAS (DeYoung et al., 2007), BFI-2 (Soto & John, 2016), and Big Five Mini Markers (Saucier, 1994) were administered, and were described in studies 2 and 3.

State expressions. The same 12 items as described in study 1 and 3 were used to assess participants' extraverted and neurotic states in the past hour. For *State Extraversion*, participants were asked "*In the past hour, how [talkative, bold, assertive, sociable, enthusiastic, outgoing] were you?*" For *State Neuroticism*, participants were asked "*In the past hour, how [calm, stable, irritable, anxious, self-conscious, worried] were you?*" Each item was rated on a 1 (*not at all*) to 10 (*extremely*) Likert-type scale.

Context measures. The same context measures as described in study 1 and 3 were used to assess trait-relevant contextual characteristics. Specifically, participants were asked, "*To what extent do the below items describe your situation over the past hour?* (0 = not at all, 10 = very much). Participants were then presented with 12 items sequentially in a fixed order, six of which described extraversion-conducive contexts (e.g., "*Were you in a situation where you had an opportunity to gain some kind of reward?*"), and six of which described neuroticism-conducive contexts (e.g., "*Were you in a situation with some degree of potential threat?*"). In addition, there were a couple of minor changes. Firstly, the filler item in study 3 was removed (i.e., "*Were you learning about something new?*"). Secondly, a new context measure was added to the end of each survey, which is an open-ended question— "*In a few words, describe where you were and what you were doing over the last hour?*". Full details of all the items are contained in the supplementary materials (Appendix E).

Participant Exclusions

From the initial 227 participants, one participant's personality questionnaire was not usable, five reported having psychiatric illness, three withdrew prior to completing the study, and a further seven experienced technical problems (i.e., smartphone compatibility issues). The remaining 211 participants completed 6,641 out of 8,904 possible surveys (74.58%) over the seven-day period. To ensure the validity of these data, a total of 87 surveys were removed, which comprised more than 85% identical responses (e.g., responding "1" for at least 21 of the 25 items within a single survey). A total of 43 participants had some surveys removed for this reason, but most of them had responded this way on only one or two surveys. Next, nine participants were removed because they completed fewer than 15 valid surveys each, and 18 participants were removed because they failed attention checks embedded in the personality questionnaires. These steps reduced the sample size to 184 participants, who completed 5,960 surveys out of a possible 7,728, representing a retention rate of 76.71% and an average of 32.22 surveys per person ($SD = 4.87$, $Min = 16$, $Max = 41$).

Data Analysis

The same data analysis protocol from study 3 was deployed for study 4, except that the open-ended question regarding context were coded by trained independent coders. All answers to these questions were coded by the experimenter, whose ratings were used in all analyses. Three interns were recruited for the coding task, who were 2nd and 3rd year psychology students from the University of Melbourne. For the whole duration of working on this project, interns were unaware of the procedures, designs, and results of the study.

All interns attended a one-hour training session conducted by the experimenter, during which the coding task was explained and examples of participants' descriptions of their context were provided. They were instructed to interpret the context information as objectively as possible. The "objective" nature of situations was defined in terms of

consensus or common sense, as how it was addressed in previous literature that either discussed or used objective measures of situation characteristics (Funder, 2016; Sherman et al., 2013; Leung et al., 2002).

For example, informants were asked to consider the degree to which participants' descriptions of their context contained (potential) rewards and threats, from all or most observers' perspective, for all intents and purposes. Although, in theory, participants' descriptions of their context were filtered through their perceptions, because of the way the question was framed—*"In a few words, describe where you were and what you were doing over the last hour?"*—most answers typically included simple and objective situational characteristics, such as "cooking at home", "commuting to university", "studying in the library with friends", or "having dinner with family". Therefore, these descriptions seemed to provide a promising basis for rating the objective features of situations.

After the training session, interns coded 100 randomly selected surveys as a practice, based on which inter-rater reliability among coders was assessed. Discrepancies were resolved through discussions, and then the interns were given a new set of 1,500 randomly selected surveys (~25% of all surveys) to code independently. All context ratings were returned at the end of this period, which were then used to calculate the inter-rater reliability among the four independent coders—one experimenter and three interns.

Coders rated the context information on six situational dimensions—reward, threat, duty, positivity, negativity, and sociality. Among these dimensions, reward and threat were used in the main analyses of hypotheses stated above. For each of the reward and threat dimensions, three descriptive items were generated for informants to use, which served as a concise version of the questionnaire participants answered in the surveys to provide self-reported context ratings. Specifically, when coding the reward dimension, informants were asked to consider to what extent the context contained opportunities to attend a positive

social activity (item 1), to lead/influence others or to have power/control over others (item 2), and to pursue desirable rewards (agentic/affiliative) or something fun/adventurous (item 3). When coding the threat dimension, informants were asked to assess the degree to which the context contained possibilities to be judged or evaluated (item 1), something negative/threatening/stressful that needed to be controlled or avoided (item 2), and incompatible goals or difficult choices (item 3). All these items were rated on a 0 to 3 Likert scale (0 = none, 1 = a little, 2 = some, 3 = a lot).

The informant ratings of three items as per dimension were added up to give a sum score for each dimension, which ranged from 0 to 9. Example ratings of responses on the rewarding context dimension were: “Eating breakfast at home by myself” (awarded a score of 1), “Came home and had dinner with parents also a little chat” (awarded a score of 5), and “Having a few drinks with the girls it is lots of fun” (awarded a score of 9). Example ratings of responses on the threatening context dimension were: “At home reading in my room alone.” (awarded a score of 0), “deciding whether to study or see friends” (awarded a score of 4), and “I was experiencing a horrible breakup” (awarded a score of 9).

Remaining dimensions from the DIAMONDS framework—duty, positivity, negativity, sociality—were not the focus of this study and included here to compare the current study’s findings with those of Breil and colleagues’ (2019). These authors reported that trait extraversion predicted social behaviour (analogous to state extraversion) more strongly in high-valence and low-duty situations. Coding process for these dimensions followed the instructions used in Breil et al. (2019). Specifically, coders rated context information focusing on four of the eight dimensions—sociality (i.e., social interactions are possible or required), duty (i.e., work has to be done), positivity (i.e., the situation is pleasant), and negativity (the situation contains negative feelings)—using the S8-II short

version DIAMONDS questionnaire (Rauthmann & Sherman, 2015) on a 1 to 7 Likert scales (1 = does not apply at all, to 7 = applies perfectly).

5.3 Results

Preliminary Statistics

As for the previous studies in this thesis, two Exploratory Factor Analyses via Principal Axis Factoring (PAF) analyses were conducted to reduce multiple measures of trait extraversion and neuroticism to two factors. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable ($KMO_E = .743$, $KMO_N = .725$). The number of factors to be retained was guided by Kaiser's criterion (eigenvalues above 1) and inspection of the scree plot. The PAF of extraversion measures revealed one eigenvalue exceeding 1, explaining 88.46% of the variance. Similarly, the PAF of neuroticism measures revealed one eigenvalue exceeding 1, explaining 79.98% of the variance. An inspection of the scree-plots revealed a clear break after the first factor in each PAF analysis. The factor scores of Extraversion and Neuroticism were saved using regression method.

Table 5.1 shows means, standard deviations, and inter-correlations between traits (extracted factors), states (mean scores), self-reported context measures (mean scores), and informant-coded context measures (mean scores). Consistent with study 3 (Chapter 4), trait extraversion and neuroticism were positively correlated with state extraversion and neuroticism, respectively. The raw correlation between trait and the corresponding state aggregate (trait-state manifestation) ranges from .42 to .49, showing a good level of convergent validity. At the aggregate level, aligned with study 3, trait extraversion was positively correlated with participants' ratings of how rewarding contexts were and trait neuroticism was positively correlated with participants' ratings of how threatening contexts were. On the other hand, whereas trait extraversion was positively and strongly correlated

with informants' ratings of how rewarding contexts were, trait neuroticism was much less strongly correlated with informants' ratings of how threatening contexts were. In addition to the above-mentioned main context measures, trait extraversion was also positively correlated with informants' ratings of two DIAMONDS dimensions (i.e., positive and social context), whereas trait neuroticism was correlated with just one DIAMONDS dimension (i.e., negativity).

Table 5.2 reports both within- and between-person variances in state expressions and contexts ratings, as well as the reliabilities of these measures (McDonald's ω_i ; McDonald, 1999). Consistent with study 3, self-reported states and contexts displayed a large amount of between-person variance and even larger within-person variance. The ICCs of self-reported states and contexts are similar to previous findings (ICCs range from 14% to 38%; Breil et al., 2019; Fleeson & Gallagher, 2007; Sherman, et al., 2015). However, the between-person variance in self-reported states and contexts in the current study is smaller than what was found in study 3 (ICC = .49). Unlike self-reported context ratings, most of the variance in informant ratings of context is within-person (ICCs ranged from 6% to 10%). The consistency among four independent raters was excellent (ranging from .85 to .96) for six context dimensions, revealed by a two-way random single measure reliability check. Omega reliability coefficients (McDonald, 1999) indicated that state expressions and context ratings (both self-reported and informant-coded) were highly consistent ($\omega_s \geq .70$) at both within- and between- person levels, justifying the use of composite scores for these measures.

Table 5.1
Descriptive Statistics and Correlations for Between-Person Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Extraversion	-											
2. Neuroticism	-0.02	-										
3. State Extraversion	.49**	-.17*	-									
4. State Neuroticism	-.17*	.42**	-0.08	-								
5. Self-reported Rewarding Context	.28**	-0.04	.61**	0.07	-							
6. Self-reported Threatening Context	-0.03	.23**	0.13	.57**	.58**	-						
7. Informant-coded Rewarding Context	.35**	0.00	.51**	-.18*	.38**	-0.05	-					
8. Informant-coded Threatening Context	0.12	.18*	0.13	.32**	0.14	.32**	.39**	-				
9. Informant-coded Duty	-0.01	-0.03	0.05	0.10	0.00	0.07	0.05	.39**	-			
10. Informant-coded Sociability	.26**	0.04	.39**	-0.14	.22**	-0.08	.91**	.38**	0.02	-		
11. Informant-coded Positivity	.17*	-0.06	.45**	-.27**	.33**	-.15*	.83**	0.06	-.18*	.78**	-	
12. Informant-coded Negativity	0.10	.18*	-0.01	.28**	0.04	.26**	.16*	.85**	.19**	.16*	-0.11	-
Means	0.00	0.00	4.29	3.24	3.97	3.43	3.98	2.97	3.24	3.52	4.00	2.29
Standard Deviations	1.00	1.00	1.18	1.15	1.26	1.36	0.69	0.50	0.56	0.51	0.42	0.36

Note. ** $p < .01$ and * $p < .05$ (2-tailed). Ns are 184 for all variables. Extraversion and Neuroticism are extracted factors from the corresponding BFAS, BFI-2, and Big Five Mini scales. State and self-reported context variables were measured on a 0 to 10 scale. Informant-coded extraversion and neuroticism contexts were measured on a 0 to 9 scale. Informant-rated DIAMONDS variables (i.e., Duty, Sociability, Positivity, and Negativity; Rauthmann et al., 2014) were measured on a 1 to 7 scale. All contexts and states measures are mean scores.

Table 5.2**Variance Components, ICCs, Intercepts, and Reliabilities for Personality States and Context Ratings**

Momentary Measures	τ_{00}	σ	ICC	Intercept	$w\Omega$	$b\Omega$	n	IRR
State Extraversion (s)	1.26	4.36	0.22	4.29	0.90	0.90	5914	-
State Neuroticism (s)	1.25	2.28	0.35	3.24	0.79	0.88	5914	-
Rewarding Context (s)	1.50	2.67	0.36	3.96	0.66	0.86	5914	-
Threatening Context (s)	1.76	2.65	0.40	3.43	0.72	0.90	5914	-
Rewarding Context (i)	0.32	4.77	0.06	3.97	0.85	0.88	5914	0.93
Threatening Context (i)	0.17	2.18	0.07	2.96	0.78	0.92	5914	0.87
Duty Context (i)	0.29	4.86	0.06	3.51	-	-	5914	0.96
Social Context (i)	0.17	2.47	0.06	3.95	-	-	5914	0.94
Positive Context (i)	0.13	1.73	0.07	4.35	-	-	5914	0.90
Negative Context (i)	0.10	0.92	0.10	2.27	-	-	5914	0.87

Note. $N = 184$. Number of observations = 5914. (s) = self-reported rating. (i) = informant-coded rating. τ_{00} = Variance between intercepts (between-person variance); σ = Variance around intercepts (within-person variance). ICC is proportion of variance between persons divided by total variance. Intercept is from unconditional cell means model (approximately the average rating on the construct). $w\Omega$ = within-person Omega, $b\Omega$ = between-person omega. IRR = inter-rater reliability across four coders for 25% of the surveys. Self-reported variables were measured on a 0 to 10 scale. Informant-coded rewarding and threatening contexts were measured on a 0 to 9 scale. Other informant-coded contexts (i.e., duty, social, positive, and negative contexts; Rauthmann et al., 2014) were measured using one-item each, on a 1 to 7 scale.

Does the Association between Traits and States Depend on Context?

To address whether context moderates the relation between traits and state expressions, the same predictive models were used as specified in study 3, first using self-reported context ratings and then using informant-coded context ratings.

The moderating role of self-reported context. Table 5.3 reports the fixed effects for state extraversion and state neuroticism models using self-reported context ratings. As in study 3, both models showed good fit to the data (see R_m and R_c in the last two columns of Table 5.3). Consistent with study 3, there were significant main effects of traits and context—both within- and between-persons—on the relevant state expression. Specifically, extraverts and participants who reported experiencing more rewarding contexts on average throughout the study week tend to express higher levels of state extraversion. In contrast, participants higher on neuroticism and participants who reported experiencing more threatening contexts on average throughout the study week tend to report higher mean levels of state neuroticism. Moreover, the average participant acted more extraverted when they were in self-reported rewarding contexts and felt more neurotic when they were in self-reported threatening contexts. Consistent with the main hypothesis but contrary to study 3, a small yet significant extraversion $\times$ reward context interaction was found (see Figures 5.2 and 5.3), indicating that the within-person effect of self-reported rewarding context on state extraversion was slightly stronger for extraverts than for introverts⁵. Contrary to the main hypothesis, but consistent with study 3, the neuroticism $\times$ threat context interaction was again non-significant (see Figure 5.2). Thus, the within-person effect of self-reported threatening context on state extraversion was no stronger for participants high on neuroticism than those low on neuroticism.

⁵ When I explored further using individual trait measures, I found the extraversion $\times$ reward context was non-significant when using the BFAS or Mini Markers, though it was significant when using the BFI-2, see appendix E for these supplementary analyses.

Table 5.3**Fixed Effects for Multilevel Models Using Self-Reported Rewarding and Threatening Contexts**

Personality Expressions	<i>b</i>	LL	UL	<i>t</i>	<i>P</i>	<i>R_m</i>	<i>R_c</i>
State Extraversion	4.23	4.09	4.37	58.74	< .0001	0.65	0.74
Extraversion (b)	0.40	0.26	0.54	5.72	< .0001		
Self-reported Rewarding Context (w)	0.80	0.77	0.84	42.57	< .0001		
Self-reported Rewarding Context (b)	0.48	0.38	0.58	10.80	< .0001		
Neuroticism (b; control variable)	-0.08	-0.21	0.05	-1.17	0.24		
Survey Order (w; control variable)	0.00	0.00	0.01	1.21	0.23		
Extraversion (b) × Rewarding Context (w)	0.04	0.00	0.08	2.15	0.03		
State Neuroticism	3.26	3.13	3.40	46.65	< .0001	0.59	0.75
Neuroticism (b)	0.37	0.23	0.51	6.11	< .0001		
Self-reported Threatening Context (w)	0.51	0.48	0.55	32.06	< .0001		
Self-reported Threatening Context (b)	0.41	0.31	0.50	8.35	< .0001		
Extraversion (b; control variable)	-0.08	-0.21	0.06	-1.09	0.28		
Survey Order (w; control variable)	0.00	-0.01	0.00	-1.73	0.28		
Neuroticism (b) × threatening Context (w)	-0.01	-0.04	0.02	-0.55	0.58		

Note. *N* = 184. Number of observations = 5914. Self-reported state extraversion and state neuroticism (DV, within-person), scale 0 to 10. (w) = within-person. (b) = between-person. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. *bs* = unstandardized multilevel regression coefficients. LL and UL represent lower limits for 95% confidence intervals respectively based on *K* = 500 bootstrap resamples. *R_m* and *R_c* are Marginal and Conditional Multiple Rs (Nakagawa & Schielzeth, 2013). ECC = Extraversion-conductive Context. NCC = Neuroticism-conductive Context.

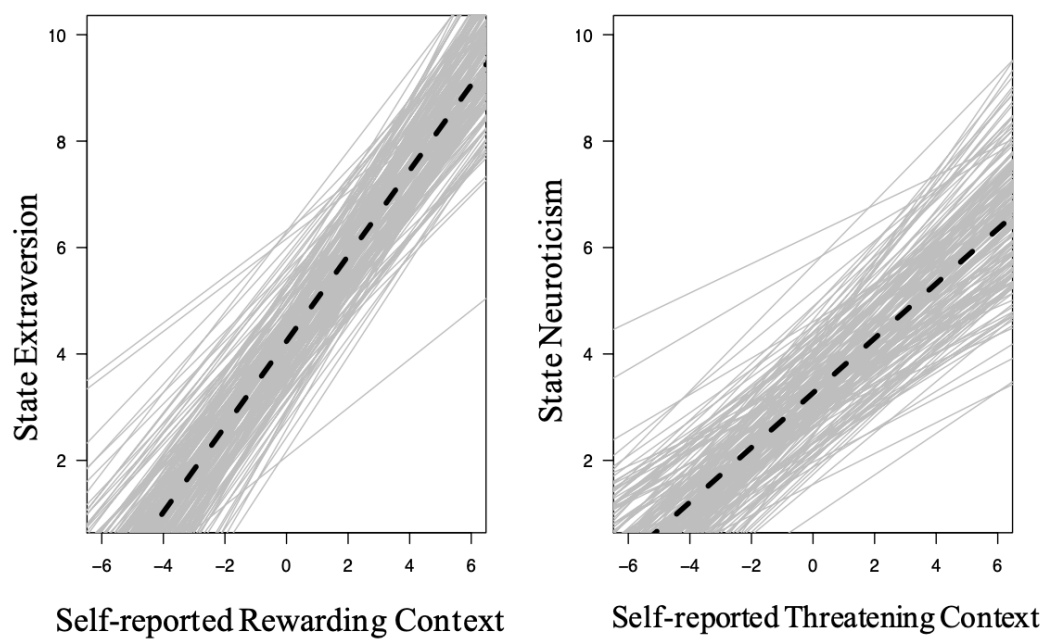


Figure 5.2. Spaghetti plots of within-person context-state relations using self-reported contexts ratings. Note. Solid grey lines represent estimated regression lines for each participant. Dashed black lines represent the average regression lines. Context (x-axes) are within-person centered.

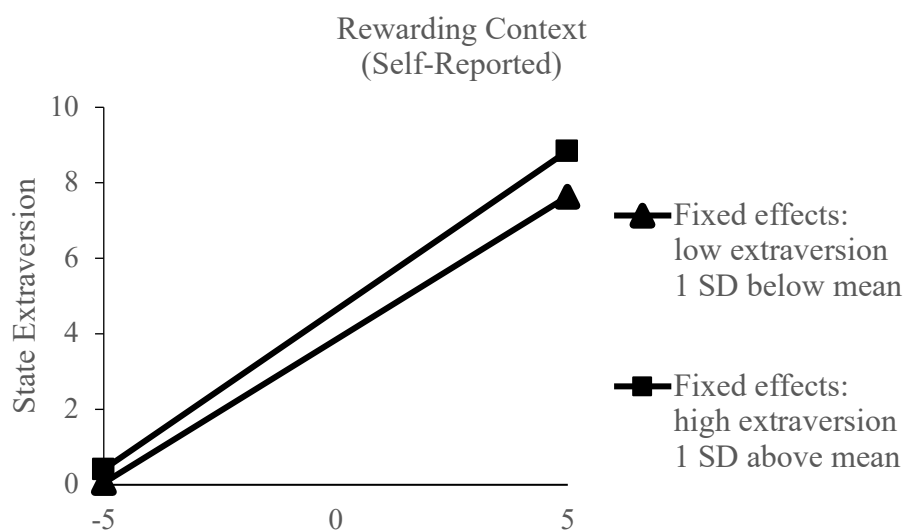


Figure 5.3. Interaction Effect: Trait Extraversion × Self-Reported Rewarding Context

Next, Table 5.4 shows random effects for both models (state extraversion, state neuroticism), replicating study 3. The random effects are reported here for completeness as these results are not directly related to the predictions. After accounting for fixed effects, there was significant amount of remaining variation in state expressions both within-person (*SDs of residuals*) and between-person (*SDs of intercepts*), as well as variation in within-person relation between state and context (*SDs of slopes*). Consistent with study 3, individual differences in within-person context-state relation remain reliable and stable as indicated by *Rel* in the last column of Table 5.4.

Table 5.4
Random Effects for Models Using Self-Reported Rewarding and Threatening Contexts

Personality Expressions	<i>SD</i>	LL	UL	<i>r</i>	<i>Rel</i>
State Extraversion	0.79	0.7	0.88		
Rewarding Context (w)	0.18	0.14	0.21	-0.22	0.45
Residual	1.6	1.57	1.63		
State Neuroticism	0.84	0.75	0.93		
Threatening Context (w)	0.16	0.13	0.19	0.13	0.45
Residual	1.24	1.22	1.26		

Note. *SD* = standard deviation of random effect scores. LL and UL represent lower and upper limits for 95% confidence intervals, respectively, based on *K* = 500 bootstrap resamples. *r* = correlations among random effects (i.e., correlations between intercepts and slopes). *Rel* = reliability of individual differences in within-person context-state relation for models containing only the within-person centred context predictor. All predictors were entered simultaneously.

The moderating role of informant-coded context. Table 5.5 shows the fixed effects for state extraversion and state neuroticism models using informant-coded context ratings. In terms of models' overall fit, the state extraversion model that uses informant ratings fits the data just as well as the model using self-ratings. In contrast, although the state neuroticism model that uses informant ratings also had an acceptable fit to the data, fit was somewhat poorer than the equivalent self-ratings model.

As predicted, both models revealed significant main effects of traits, within-person context, and between-person context on the relevant state expression. Specifically, the

average participant acted and felt more extraverted in informant-coded rewarding contexts, whereas the average participant acted and felt more neurotic in informant-coded threatening contexts. Moreover, extraverts and participants who experienced more informant-coded rewarding contexts on average tend to express higher levels of state extraversion throughout the study week. Similarly, participants high on neuroticism or who experienced more informant-coded threatening contexts on average tend to experience higher levels of state neuroticism. Interestingly, the effect size of informant-coded context ratings was slightly smaller at the within-person level but larger at the between-person level, relative to self-reported context ratings.

Most importantly, as predicted, both the extraversion $\times$ rewarding context interaction and the neuroticism $\times$ threatening context interaction were significant (see Figures 5.4, 5.5, and 5.6). This indicates that the within-person effect of informant-coded rewarding context on state extraversion was stronger for extraverts relative to introverts. The within-person effect of informant-coded threatening context on state neuroticism was stronger for participants high on neuroticism than those low on neuroticism. However, the effect sizes of these trait $\times$ context interactions were again very small.

Lastly, for the purpose of completeness, Table 5.6 reports random effects not directly linked to the hypotheses. The random effects for models using informant-coded context ratings were consistent with that for models using self-reported context ratings. That is, after accounting for fixed effects, there was still significant amount of remaining variation in state expressions both within-person and between-persons. There were also significant and reliable individual differences in within-person relation between state and context, indicated by *Rel* in the last column of Table 5.6.

Table 5.5**Fixed Effects for Multilevel Models Using Informant-Coded Rewarding and Threatening Contexts**

Personality Expressions	<i>b</i>	LL	UL	<i>t</i>	<i>P</i>	Rm	Rc
State Extraversion	4.29	4.14	4.44	55.70	< .0001	0.63	0.75
Extraversion (b)	0.42	0.26	0.57	5.33	< .0001		
Informant-coded Rewarding Context (w)	0.60	0.57	0.63	36.15	< .0001		
Informant-coded Rewarding Context (b)	0.72	0.52	0.91	7.15	< .0001		
Neuroticism (b; control variable)	-0.05	-0.19	0.09	-0.74	0.46		
Survey Order (w; control variable)	0.00	0.00	0.00	-0.06	0.95		
Extraversion (b) × Rewarding Context (w)	0.04	0.00	0.07	2.26	0.02		
State Neuroticism	3.26	3.11	3.41	42.22	< .0001	0.46	0.69
Neuroticism (b)	0.43	0.28	0.59	5.42	< .0001		
Informant-coded Threatening Context (w)	0.41	0.37	0.44	22.59	< .0001		
Informant-coded Threatening Context (b)	0.71	0.41	1.01	4.78	< .0001		
Extraversion (b; control variable)	-0.11	-0.26	0.05	-1.36	0.18		
Survey Order (w; control variable)	0.00	-0.01	0.00	-1.21	0.23		
Neuroticism (b) × Threatening Context (w)	0.04	0.01	0.08	2.28	0.02		

Note. *N* = 184. Number of observations = 5914. Self-reported state extraversion and state neuroticism (DV, within-person), scale 0 to 10. (w) = within-person. (b) = between-person. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. *bs* = unstandardized multilevel regression coefficients. LL and UL represent lower limits for 95% confidence intervals respectively based on *K* = 500 bootstrap resamples. Rm and Rc are Marginal and Conditional Multiple Rs (Nakagawa & Schielzeth, 2013). ECC = Extraversion-conductive Context. NCC = Neuroticism-conductive Context.

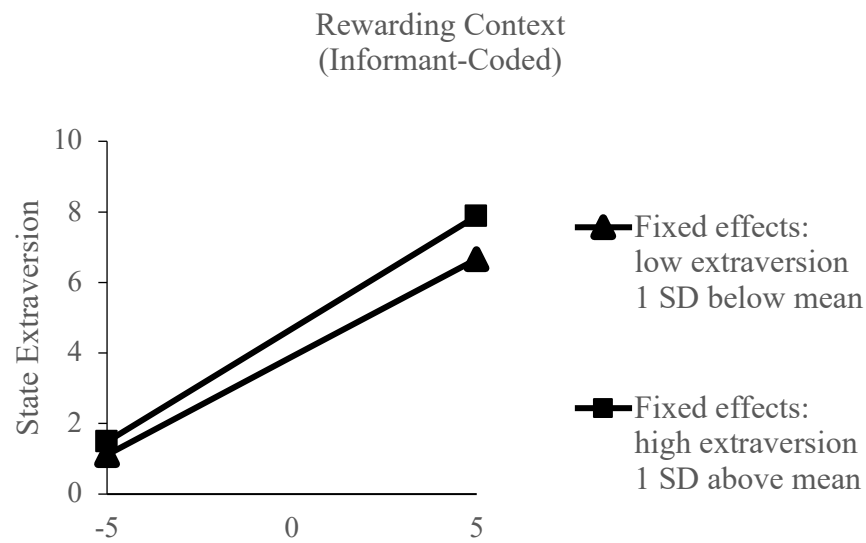


Figure 5.4. Interaction Effect: Trait Extraversion $\times$ Informant-Coded Rewarding Context.

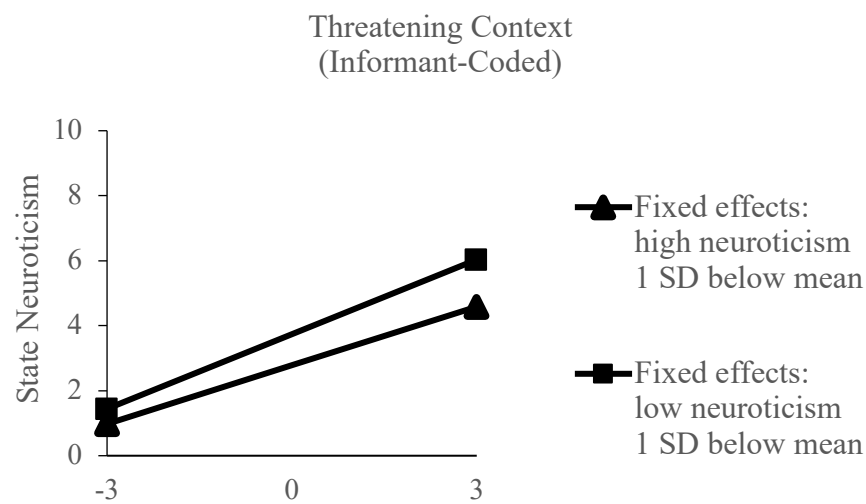


Figure 5.5. Interaction Effect: Trait Neuroticism $\times$ Informant-Coded Threatening Context

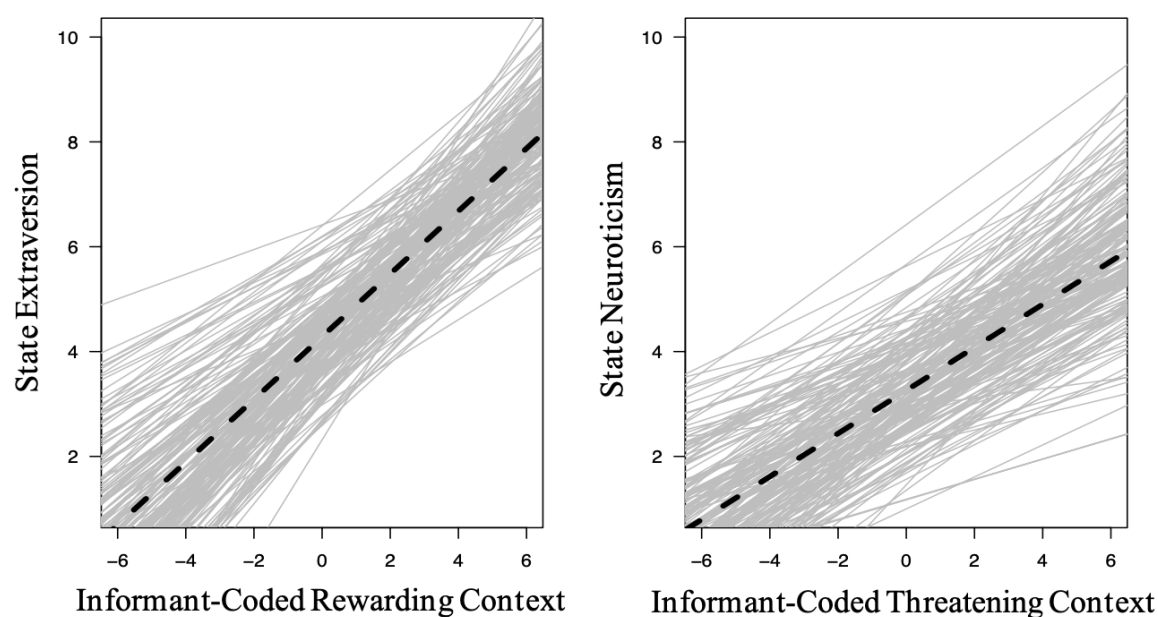


Figure 5.6. Spaghetti plots of within-person context-state relations using informant-coded contexts ratings. *Note.* Solid grey lines represent estimated regression lines for each participant. Dashed black lines represent the average regression lines. Context (x-axes) are within-person centred.

Table 5.6

Random Effects for Models Using Informant Coded Rewarding and Threatening Contexts

Personality Expressions	<i>SD</i>	LL	UL	<i>r</i>	Rel
State Extraversion	0.88	0.78	0.98		
Rewarding Context (w)	0.18	0.15	0.21	-0.41	0.47
Residual	1.58	1.55	1.61		
State Neuroticism	0.93	0.83	1.03		
Threatening Situation (w)	0.18	0.14	0.21	0.00	0.58
Residual	1.36	1.33	1.38		

Note. *SD* = standard deviation of random effect scores. LL and UL represent lower and upper limits for 95% confidence intervals, respectively, based on *K* = 500 bootstrap resamples. *r* = correlations among random effects (i.e., correlations between intercepts and slopes). Rel = reliability of individual differences in context contingency for models containing only the within-person centred context predictor. All predictors were entered simultaneously.

The moderating role of context: Partial Replication of Breil et al. (2019).

In addition to tests of the main hypotheses, the present data also allowed for confirmation of the findings reported by Breil et al. (2019). Specifically, Breil et al. (2019) investigated whether extraversion predicts higher levels of social behaviour in situations characterised by sociability, high-valence, and low-duty using four DIAMONDS dimensions—sociality, positivity, negativity, and duty (Rauthmann et al., 2014). Valence was calculated by subtracting negativity ratings from positivity ratings. Replicating their models, three independent analyses were conducted, one with each of the informant-coded context ratings—duty, sociality, and valence. Additionally, a separate model was constructed using informant-coded positivity as context variable predicting social behaviour. Even though Breil et al. (2019) did not make such prediction, previous literature suggested that social behaviour is strongly associated with positive affect and pleasant situations (e.g., Diener, Larson, & Emmons, 1984; Lucas & Diener, 2001; Wilt et al., 2012). Thus, it would be interesting to see whether situation positivity interacts with extraversion predicting social behaviour in the current dataset. Table 5.7 shows the fixed effects for all four models. At the within-person level, state extraversion was significantly predicted by contexts characterized by sociality, positivity, and high valence, which is consistent with Breil et al. (2019). At the between-person level, state extraversion was significantly predicted by extraversion factor as well as contexts characterized by sociality, which replicates Breil et al. (2019) as well. Additionally, state extraversion was also significantly predicted by individual differences in contexts characterized by low-duty, positivity, and high-valence, which were not found in Breil et al. (2019). Furthermore, the current study found significant extraversion $\times$ high-valence situation interaction predicting social behaviour, echoing Breil et al. (2019). However, different from Breil et al. (2019), the current study also found significant extraversion $\times$ sociability/positivity situation interactions (see Figure 5.7).

Table 5.7**Fixed Effects for Multilevel Models Using Informant-coded Relevant DIAMONDS Dimensions**

Context	Variables	<i>b</i>	<i>SE</i>	<i>LL</i>	<i>UL</i>	<i>t</i>	<i>P</i>
Duty	Intercept	4.28	0.08	4.13	4.43	56.71	< .0001
	Extraversion (b)	0.60	0.07	0.45	0.74	7.96	< .0001
	Context (b)	0.12	0.13	-0.14	0.39	0.93	0.36
	Context (w)	0.01	0.02	-0.03	0.04	0.31	0.76
	Context (w) × Extraversion (b)	0.01	0.02	-0.02	0.05	0.73	0.46
Sociality	Intercept	4.28	0.07	4.14	4.42	60.11	< .0001
	Extraversion (b)	0.51	0.07	0.37	0.65	6.99	< .0001
	Context (b)	0.73	0.14	0.45	1.01	5.16	< .0001
	Context (w)	0.76	0.02	0.72	0.80	34.57	< .0001
	Context (w) × Extraversion (b)	0.05	0.02	0.01	0.10	2.48	0.01
Positivity	Intercept	4.28	0.07	4.15	4.42	62.88	< .0001
	Extraversion (b)	0.52	0.07	0.39	0.66	7.65	< .0001
	Context (b)	1.08	0.16	0.76	1.40	6.58	< .0001
	Context (w)	0.81	0.02	0.77	0.85	35.83	< .0001
	Context (w) × Extraversion (b)	0.06	0.02	0.01	0.10	2.46	0.02
Positivity vs. Negativity	Intercept	4.29	0.07	4.15	4.42	60.32	< .0001
	Extraversion (b)	0.57	0.07	0.43	0.71	8.10	< .0001
	Context (b)	0.65	0.12	0.41	0.90	5.38	< .0001
	Context (w)	0.46	0.02	0.43	0.49	28.80	< .0001
	Context (w) × Extraversion (b)	0.03	0.02	0.00	0.06	1.99	0.05

Note. N = 184. Number of observations = 5914. Self-reported state extraversion was the DV, measured on a 0 to 10 scale. Situations ratings were done by informants based on participants' open-ended descriptions about their contexts. (w) = within-person. (b) = between-person. Extraversion = standardized composite scores from different measures of trait extraversion. *bs* = unstandardized multilevel regression coefficients. *SE* = standard error. *LL* and *UL* represent lower limits for 95% confidence intervals respectively based on K = 500 bootstrap resamples.

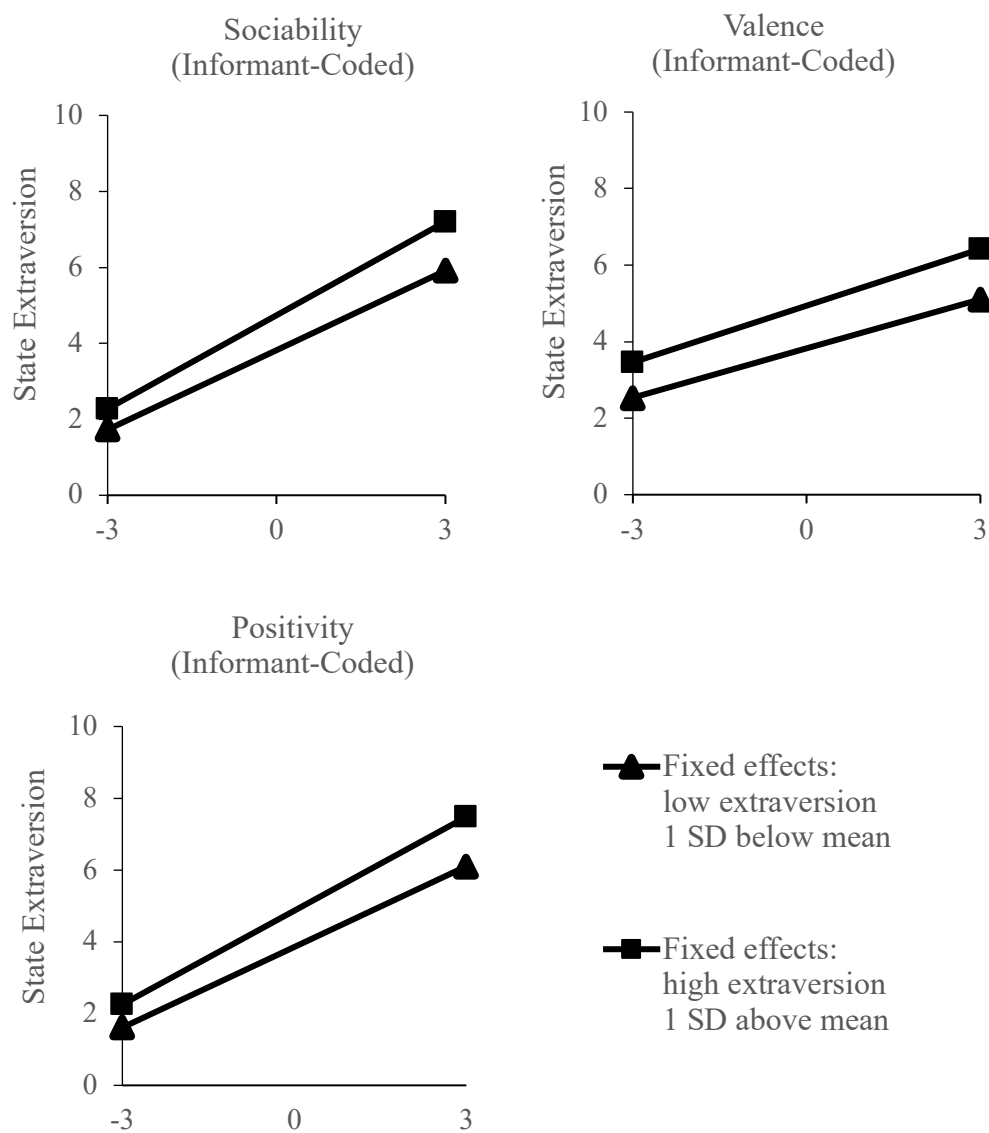


Figure 5.7. Interaction Effect: Trait Extraversion $\times$ Informant-coded DIAMONDS Dimensions (i.e., Positivity, Sociability, and Valence).

Are Traits Associated with Contexts?

Two separate predictive models, as specified in study 3, were constructed to address how trait extraversion is related to rewarding context and how neuroticism is related to threatening contexts, respectively. To predict rewarding context, trait extraversion was entered as the independent variable while controlling for trait neuroticism. Similarly, to predict threatening context, trait neuroticism was entered as the independent variable while controlling for trait extraversion. Table 5.8 presents how trait extraversion and neuroticism were related to rewarding and threatening contexts (self-reported and informant coded), respectively.

Models using self-reported context ratings. Consistent with study 3, there was a significant effect of trait extraversion on rewarding contexts and there was a significant effect of trait neuroticism on threatening contexts. However, the effect sizes of trait extraversion and neuroticism on the relevant context was slightly smaller in study 4 relative to the effect sizes found in study 3. Specifically, every 1-unit increase in trait (extraversion, neuroticism) leads to around .30-unit increase in trait relevant context in study 4 versus .50-unit increase in study 3. The goodness of fit of the overall models (see R_c) and fix effects (see R_m) statistics were consistent with study 3 but marginally weaker. Whether the discrepancy in these results is likely to reflect situation selection is considered in the discussion.

Models using informant-coded context ratings. Not surprisingly, both models showed a much better fit to the data when using self-reported context ratings relative to informant-coded context ratings, especially with the threatening context model (see R_c and R_m). Although extraversion significantly predicted informant-coded rewarding context and neuroticism significantly predicted informant-coded threatening context, the effect sizes were much smaller than that of self-reported context ratings, and this is especially the case for the informant-coded threatening context. Whether these results are most likely to reflect situation construal is considered in the discussion.

Table 5.8**Model Parameters for Predicting Contexts from Personality Traits**

Situation characteristics	<i>b</i>	LL	UL	<i>t</i>	Rm	Rc
Self-Reported Rewarding Context	3.95	3.77	4.12		0.16	0.60
Extraversion	0.35	0.16	0.51	3.53		
Neuroticism	0.03	-0.17	0.22			
SD in intercepts	1.18	1.06	1.31			
SD in residuals	1.64	1.61	1.67			
Self-Reported Threatening Context	3.41	3.22	3.60		0.15	0.63
Neuroticism	0.35	0.12	0.51	3.24		
Extraversion	0.08	-0.13	0.29			
SD in intercepts	1.29	1.16	1.43			
SD in residuals	1.63	1.60	1.66			
Informant-Coded Rewarding Context	3.98	3.88	4.07		0.10	0.25
Extraversion	0.24	0.13	0.32	4.49		
Neuroticism	0.03	-0.07	0.14			
SD in intercepts	0.52	0.44	0.61			
SD in residuals	2.19	2.15	2.23			
Informant-Coded Threatening Context	2.97	2.90	3.04		0.07	0.27
Neuroticism	0.11	0.03	0.19	2.81		
Extraversion	0.09	0.02	0.17			
SD in intercepts	0.40	0.34	0.46			
SD in residuals	1.48	1.45	1.51			

Note. $N = 5914$. bs are unstandardized multilevel regression. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. Context characteristics were measured on a 0 to 10 scale. bs = unstandardized multilevel regression coefficients. LL and UL represent lower and upper limits for 95% confidence intervals, respectively, based on K 500 bootstrap resamples. Rm and Rc represent Marginal and Conditional Multiple Rs (Nakagawa & Schielzeth, 2013).

5.4 Discussion

The purpose of the current study was to replicate and extend study 3 to examine the contextualized view of traits in real time and in naturally occurring environment, using both self-reported and informant-coded context ratings. By including both subjective and relatively ‘objective’ ratings of context, the current study provided a two-pronged test of the main hypothesis for this thesis. In addition, the data could shed light on whether self-reported context ratings may mask the moderation effect of trait on within-person relation between

context and state, and whether situation selection and situation perception may drive the association between traits and contexts that participants experience in everyday life.

First, the hypothesis regarding main effects of extraversion and neuroticism on their corresponding state was supported. Consistent with previous literature (e.g., Fleeson & Gallagher, 2009; Sherman et al., 2015), and with studies 1-3, extraversion significantly predicted momentary expressions of state extraversion and neuroticism significantly predicted momentary expressions of state neuroticism—across situations, throughout the study period, with similar effect size as what was found in study 3.

Second, the hypotheses regarding the main effects of rewarding and threatening contexts—both self-reported and informant-coded—on state extraversion and neuroticism, were also supported. Specifically, regardless of which context rating was used (self-reported vs. informant-coded context ratings), levels of state extraversion were higher for participants who experienced contexts that were more rewarding on average, whereas levels of state neuroticism were higher for participants who experienced contexts that were more threatening on average. Similarly, at the within-person level, regardless of which context rating was used, the average participant acted and felt more extraverted in more rewarding contexts, whereas they acted and felt more neurotic in more threatening contexts.

Although the main effect of self-reported context ratings in the present study were in line with study 3, the effect sizes diverged somewhat at different levels of analysis (i.e., within person, between persons). Specifically, the effect size of self-reported context was larger at the within-person level and smaller at the between-person level in the current study compared to study 3. In other words, less variance in state expression is explained by between-person differences in context and more variance is explained by within-person difference in context in the current study relative to study 3. This is not very surprising given that there was more variance in self-reported context ratings at the between-person level in study 3 (average ICC = .46) than the current study (average ICC = .38).

This pattern in the data potentially suggests that participants in the current study have experienced more similar context among themselves than did participants in study 3. This is plausible because the current study recruited first-year psychology students during semesters. They shared many similar contexts as part of university life throughout the study week (i.e., attend lectures and tutorials, work on assignments, prepare for tests, etc.). In contrast, participants in study 3 were members of the general public recruited via flyers, social websites, and job websites. Although some participants in study 3 also happened to be students, the study was conducted out of class times during the semester break. Thus, participants in study 3 may have had more freedom in choosing what context to be in compared to participants in the current study (students recruited during semester). The differences in results between study 3 and the current study, in terms of ICCs of context and the amount of variation in state expressions explained by between- versus with-person context, are important because it gives a further glimpse of how broad personality factors may influence experiences in daily life through the process of situation selection.

Next, the main effect of informant-coded context ratings was consistent with the main effect of self-reported context ratings in the current study and study 3. However, informant-coded context ratings explained more between-person variance than within-person variance in state expressions, whereas self-reported context ratings showed the opposite pattern. This may have been due to self-reported contexts ratings captured much more variance (average ICC = .38) in between-person context than informant-coded context ratings did (average ICC = .07). These results indicate that, from an objective point of view (as revealed by informant-coded context ratings), there is little between-person variation in rewarding and threatening contexts participants described. However, from participants' perspectives (as revealed by self-reported context ratings), there is a lot of between-person variation in rewarding and threatening situations they experienced. Consistent with past literature (Funder, 2016; Furr &

Funder, 2019), it is likely that individual differences may have inflated the amount of variance in self-reported context ratings between individuals through situation perception.

As an example of this last point, consider the context description “*I am cooking at home with my housemates*”. From an objective perspective, this situation might be described as moderately rewarding (i.e., opportunity to socialise and have delicious food). But from a subjective perspective, if the person in this situation loves cooking and socializing, then this context might be seen as highly rewarding. Equally, it may be not at all rewarding for a person who dislikes cooking and does not get on well with their housemates. The difference in context ratings (subjective vs. objective) do not necessarily imply one rating is better than the other. Both context ratings are meaningful and useful in different ways. While informant-coded context ratings may better capture the objective characteristics of situations, self-reported context ratings may better capture each individual’s personal experience, emerging from complex person-situation dynamics.

Consistent with study 3, the present data showed that trait extraversion significantly predicted subjective rewarding context ratings, whereas trait neuroticism significantly predicted subjective threatening context ratings. Moreover, traits were also significantly associated with the corresponding objective context ratings, though to a lesser degree. Specifically, trait extraversion was associated somewhat more strongly with subjective rewarding context than objective rewarding context. This implies that extraversion may influence people’s experience of rewarding situations through situation perception process as well as other processes including situation selection and/or situation transformation, given that the subjective and objective ratings of rewarding context were in agreement to a great extent. Admittedly, this data cannot speak directly to how extraversion may shape one’s environment through situation selection and/or situation transformation. For neuroticism—as observed in study 3, trait neuroticism again predicted subjective threatening context ratings, but was much more weakly associated with informant-coded threatening context ratings. This

suggests that situation perception may play a stronger role in neurotic individuals' more threatening situational experience. This finding is consistent with previous research that found neurotic individuals are more likely to interpret ambiguous stimuli more negatively (e.g., perceiving facial expressions as more threatening, and ambiguous social behaviour as intentional rejection, see Constans, Penn, Ihen, & Hope, 1999; Yoon & Zinbarg, 2006). Overall, the findings concerning main effects of context suggest that, although self-reported context ratings explained more variance in state expressions, informant-coded context ratings were more independent from trait ratings. Thus, both self-reported and informant-coded context ratings were arguably useful in explaining unique and meaningful component of variance in trait's state expressions.

The hypothesis that traits would interact with psychologically relevant contexts predicting corresponding state expressions received more support in the current study than in study 3. Specifically, trait extraversion was most strongly related to state extraversion in rewarding contexts (according to both self-reported and informant-coded context ratings). Similarly, trait neuroticism was most strongly related to state neuroticism in threatening contexts (according to informant-coded ratings only). It should be acknowledged, however, the effects of all interactions were very small, regardless of how context was measured. The results obtained using subjective measure of rewarding context echo findings in study 1 (Chapter 2) while conflicting with findings in studies 2 and 3 (Chapters 3 and 4). These seemingly inconsistent results can potentially be explained in terms of differences among these four studies. For example, the significant extraversion $\times$ reward context interaction may have emerged in studies 1 and 4 because they had the largest sample sizes, and enough power to detect a small effect size. And once again, the use of an objective context rating in study 4 may have de-confounded the influence of neuroticism on perceptions of threat within situations. This may have made the neuroticism $\times$ threat context interaction easier to observe by filtering out situation perception effect.

For exploratory purposes, in addition to the hypotheses related findings discussed above, this study also examined whether some results noted in Breil et al. (2019) could be replicated in the current dataset. Specifically, Breil et al. (2019) found extraverts exhibited more social behaviour in low-duty and high-valence situations, relative to their introverted counterparts. In the present data, these effects were only partially replicated. Specifically, the relation between state extraversion and trait extraversion was stronger in contexts characterized by sociability, positivity, and high valence. These findings make good conceptual and theoretical sense. Moreover, the slight differences in findings compared to Breil and colleagues may be due to slight methodological differences in the present study. For example, Breil et al. (2019) focused on social behaviour, a specific expression of state extraversion, whereas the current study looked at a broad range of state expressions of extraversion (boldness, assertiveness, enthusiasm, etc.). Moreover, Breil et al. (2019) measured trait extraversion by averaging the self- and the informant-ratings, whereas the current study measured extraversion by extracting a latent factor from self-ratings across three different personality inventories. Despite the discrepancy, the current study's results acquired using the DIAMONDS dimensions are nonetheless meaningful and broadly consistent with the main findings obtained using theoretically derived extraversion-conducive context measures discussed above.

To sum up, the present findings replicate key findings from study 3, but additionally provide some evidence for the contextualized view of traits. Specifically, evidence for the contextualized nature of neuroticism was found when informant-coded context ratings were used, but not when self-reported context ratings were used. In addition, evidence for the contextualized nature of extraversion was found, regardless of whether self-reported or informant-coded context ratings were used. This study also revealed that personality traits are more strongly related to self-reported context ratings than informant-coded context ratings, suggesting personality may influence situational experience via situation perception.

Unfortunately, the data in this study could not address other influences of personality on situational experience, including situation selection, situation evocation, and situation transformation. Future studies should further explore whether extraversion leads to more experience of rewarding contexts through situation selection and/or situation transformation and whether neuroticism leads to more experience of threatening contexts through situation evocation.

Chapter 6 General Discussion

6.1 Overview

The aim of this thesis was to investigate whether traits are contextualized—specifically, whether the relation between personality traits and their state expressions is strongest within trait-relevant contexts. These studies were designed to be theory-driven approaches, each testing the same research question across a range of methods—questionnaire, laboratory experiment, and experience sampling methods. This was intended to overcome the limitations of different research methods. These studies also integrated comprehensive measurement to provide a broad range of data—traits assessed with multiple personality inventories, state expressions measured by self-reports and informant-reports, context characteristics captured by subjective and objective ratings.

In this final Chapter, the findings of all four studies, which are summarized in Table 6.1, are reviewed and discussed. The conclusions and major themes linking the studies together are then considered, as well as broader implications for the conceptualization of personality traits, person-situation transactions, and broad applications of situation perception in personality transformation and applied areas of psychology. Finally, I consider some limitations and strengths and provide suggestions for future research on person situation dynamics.

Table 6.1 Summary of Findings across All Studies.

Models	Study 1 (Survey)	Study 2 (Lab)	Study 3 (ESM)	Study 4 (ESM)
State Extraversion Model				
Extraversion (E)	✓	✓	✓	✓
Subjective Rewarding Context (w)	✓	-	✓	✓
Subjective Rewarding Context (b)	-	-	✓	✓
Subjective Rewarding Context × E	✓	-	×	✓
Objective Rewarding Context (w)	-	-	-	✓
Objective Rewarding Context (b)	-	×	-	✓
Objective Rewarding Context × E	-	×	-	✓
State Neuroticism Model				
Neuroticism (N)	✓	✓	✓	✓
Subjective Threatening Context (w)	✓	-	✓	✓
Subjective Threatening Context (b)	-	-	✓	✓
Subjective Threatening Context × N	×	-	×	×
Objective Threatening Context (w)	-	-	-	✓
Objective Threatening Context (b)	-	×	-	✓
Objective Threatening Context × N	-	×	-	✓

Note: E = Trait Extraversion. N = Trait Neuroticism. (b) = Between-person. (w) = Within-person. ✓ = significant effect, × = non-significant effect. Dash = the effect was not tested in the study.

6.2 Review of Findings

The opening chapter of this thesis reviewed historical conceptualizations of traits and consolidated the limited amount of literature examining the moderating role of contexts in the relation between traits and their state expressions. This revealed mixed evidence as to whether traits are, to some degree, contextualized. The findings highlighted that the operation of context and the mapping between traits and contexts were all quite different across previous studies, which could be associated with the mixed results. This informed the specific approach taken to studying contexts in this thesis—by linking traits to their theoretically relevant contexts and eliciting stimuli. Extraversion and neuroticism were chosen to be the focus of the thesis as the putative mechanisms underlying these traits were arguably best understood among all traits, as informed by many theories in personality psychology (e.g., the Reinforcement Sensitivity Theory; Corr, 2004; Gray, 1970; Smillie, 2008).

Building on this, chapter 2 provided an initial test of the contextualised view of traits by asking participants to prospect the degree to which they would behave or feel in a range of hypothetical contexts (Study 1). This allowed us to investigate how the two target traits' (extraversion, neuroticism) associations with their state manifestations (extraverted versus neurotic state) differed across two kinds of contexts (rewarding versus threatening). Consistent with robust findings in previous research linking traits to their average state expressions (e.g., Fleeson & Gallagher, 2009), extraversion and neuroticism significantly predicted their corresponding state across contexts. Moreover, the average participant behaved more extraverted in rewarding contexts and more neurotic in threatening contexts. However, the findings concerning the contextualized view of traits were mixed. Whereas extraversion significantly moderated the relation between rewarding context and state extraversion, this pattern did not emerge in the model of trait neuroticism.

The mixed findings in study 1 may have been due to lacking strict control over the contexts that participants mentally placed themselves into. Another possibility is that anticipated state expressions in hypothetical situations may not be as accurate as real time measurement of actual behaviour and experience. These limitations were addressed in study 2 (Chapter 3), where rewarding and threatening situations were created within controlled laboratory-based experimental conditions. Specifically, participants engaged in a social interaction task while anticipating positive feedback (reward condition) or negative feedback (threat condition). This once again provided evidence that extraversion and neuroticism predict their relevant state expressions across conditions. Surprisingly, however, there was no evidence for the main effect of condition on state expressions, despite a trend towards state extraversion being higher in the reward condition and state neuroticism being higher in the threat condition. Contrary to the main hypothesis, the trait $\times$ condition interactions did not predict corresponding state expressions for extraversion nor for neuroticism.

Although it is difficult to draw firm conclusions from results in study 2, the artificial environment may not have the same impact on people's states as real-life environment. This would explain the lack of a main effect of the conditions on personality states. There was also some doubt as to whether the effects of the manipulation were sustained throughout the interactive task. This limitation was addressed in study 3 (Chapter 4), which assessed trait expressions as participants went about their daily lives using experience sampling method. This again revealed strong effects of self-reported traits on their corresponding state expressions. Also, matching the findings of study 1, real-life rewarding and threatening contexts had the expected effects on state expressions. However, in line with study 2, the relation that extraversion and neuroticism had with their corresponding state expressions was not moderated by context.

The findings from study 3 were congruent with some previous ESM studies (e.g., Sherman et al., 2015; Wilt & Revelle, 2018), but they contradicted some others (e.g., Breil et al., 2019; Sandstorm et al., 2017). Closer inspection of the results from these studies suggest that the discrepancy might be owing to the sample size or the way in which situations were measured. Specifically, compared to study 3, the studies that have found significant interactions between personality and context used much larger sample and assessed situations in a more objective manner (i.e., informant coded contexts or mobile sensed locations). Conversely, studies with somewhat smaller samples and which assessed situations more subjectively (e.g., by participant ratings of situational characteristics), yielded non-significant trait $\times$ context interactions, as found in study 3 (e.g., Lucas et al. 2008, Sherman et al., 2015; Wilt & Revelle, 2018). One potential problem at play here is that subjective ratings of situations, in study 3 and in previous studies, were highly related to key personality traits. This may be a function of traits' effects on self-reported situations through situation perception, situation selection, or situation evocation/transformation. In any case, the strong

association between traits and situation ratings may have compromised the expected trait $\times$ context interactions.

With these considerations in mind, study 4 comprised a replication of study 3 in a larger sample of participants, and using both subjective (i.e., self-reports) and objective (i.e., informant coding) context measures. Consistent with previous studies that used objective ratings of context (i.e., Breil et al., 2019; Sandstorm et al., 2017), objective ratings of threatening and rewarding context moderated neuroticism and extraversion's trait-state relation, respectively. Moreover, consistent with Sherman et al. (2015) and studies 1 and 3 in this thesis, subjective ratings of threatening context did not moderate neuroticism's trait-state relation. On the other hand, diverging from study 3 but consistent with study 1, subjective ratings of rewarding context moderated extraversion's trait-state relation in study 4. This was potentially owing to the larger sample size, providing more power to detect a relatively weak interaction. Indeed, when the relative strengths of all four studies are considered, study 4 is arguably the most compelling, given that it has a large sample size, real-time measures of state expressions, and both subjective and objective measures of everyday life contexts.

The general picture emerging from these studies could be described by three themes. Firstly, there were consistent findings for traits' effects on their corresponding state expressions. In every study, trait extraversion and neuroticism predicted self-reported state extraversion and state neuroticism, respectively, across contexts. A slight exception to this finding was observed in study 2, where expressions were measured using the average ratings of self-reports and informant-reports. Consistently, trait extraversion predicted self-reported as well as the average of self- and informant-reported state extraversion, across three distinctive experimental conditions (i.e., rewarding, threatening, and control). However, trait neuroticism did not predict informant-reported state neuroticism nor the average ratings of state neuroticism. As discussed in Chapter 3, this is possibly due to state neuroticism being difficult to observe by others, thus the relation between neuroticism and the average ratings

of state neuroticism is weaker than that between neuroticism and self-reported state neuroticism (see Appendix C for results with self-reported measures).

Secondly, theoretically relevant contexts were generally strong predictors of personality state expressions, independent of the effects of corresponding traits. That is, the average participant reported acting more actively and enthusiastically in rewarding contexts and feeling more anxious and nervous in threatening contexts. This pattern was observed in hypothetical situations (Study 1) and naturally occurring situations (Study 3 and 4), whether these situations were subjectively perceived (Studies 1, 3, and 4) or objectively coded (Study 4). However, this finding was not consistent across all studies and did not emerge for either trait in study 2, where experimentally manipulated threatening and rewarding situations yielded non-significant effects on state extraversion and neuroticism. Interestingly, Morse et al. (2015) observed similar patterns in their study and concluded that the effect of experimentally manipulated distinctive conditions on people's behaviours/experiences may vary depend on how participants perceive them. This point connects with the potential situation perception effect observed in study 3.

Finally, and of most relevance to the central question posed in this thesis: **Although we cannot conclude positive proof that personality traits are *not* contextualised, the evidence gathered supported the contextualized view of traits only weakly or not at all.** The strength and significance of the anticipated trait $\times$ context interactions differed slightly across studies depending on the trait, sample size, and the operation of context, but overall the evidence for this interaction was weak. More specifically, the extraversion $\times$ reward context interaction only emerged in the larger samples (studies 1 and 4) or when contexts were measured objectively using informant coding (study 4 compared to study 3). On the other hand, the neuroticism $\times$ threat context interaction emerged only when contexts were measured objectively (study 4). As noted above, it is possible that individual differences in situation

perception may have inflated the relation between each trait (predictor) and the trait-relevant context (moderator), making the trait $\times$ context interaction more difficult to detect.

This may be especially likely for trait neuroticism because neuroticism predicted subjective ratings of threatening context much better than objective ratings of threatening context, whereas extraversion predicted both subjective and objective ratings of rewarding context very well. Moreover, there is a lot more agreement between subjective and objective ratings of rewarding contexts relative to threatening contexts. Furthermore, as noted above, unlike extraversion that showed significant interaction with subjectively rated rewarding context in larger samples predicting state extraversion (studies 1 and 4), neuroticism never interacted with subjective ratings of threatening context (studies 1, 3, and 4) but only interacted with objectively-coded threatening context in the prediction of state neuroticism (study 4). Thus, situation perception may not mask the trait-state relation as much for extraversion, consistent with previous evidence that extraversion is relatively weakly associated with distinctive perceptions of situations, compared to other Big Five traits (Sherman et al., 2013). However, situation perception may not entirely explain the weak or non-significant trait $\times$ context interactions found across these studies, because even when objective ratings of context were used, the effect sizes of significant interactions were very small, consistent with previous studies (Breil et al., 2019; Sandstrom et al., 2017; Yao & Moskowitz 2015).

Taken together, the present research suggests that the variation in participants' behaviour and experience was mostly explained by variation in both traits and contexts, but that these effects were for the most part independent. Although some trait $\times$ context interactions were found, effect sizes for these tended to be very small, offering minimal qualification to conclusions drawn just from the main effects. These small effect sizes may shed some light on why there is relatively little empirical research examining trait $\times$ context interactions, despite the long history of conceptualizing traits as contextualized behavioural

tendencies (e.g., Wiggins, 1997; Michelle & Shoda, 1995; Tett & Guterman, 2000). It is possible that previous researchers have attempted to investigate person by situation interactions but struggled to find any because the main effects have dominated, as was the case in the studies within this thesis.

Taken together, the present research suggests that traits may not be as strongly contextualized as is often assumed or directly asserted. This may be particularly the case for neuroticism, which was revealed in this thesis to be strongly related to the perception of situations as more threatening. As a result, people high on neuroticism may tend to view most contexts through a more negative or threatening lens. In contrast, there was more evidence that extraversion is to some degree contextualized, though this evidence was inconsistent and associated with small effect sizes. Overall, contrary to the main hypothesis in this thesis, the findings are more in line with the ‘relatively de-contextualized’ view of traits, suggesting that traits describe generalised patterns of behaviour and experience *across contexts* (e.g., McAdams & Pals, 2006). Of course, this thesis only focused on two of the big five traits, and there are many traits (and facets) housed within the big five—as well as constructs outside the purview of big five. In addition, the failure to detect a significant effect does not constitute evidence for a null effect. Therefore, these data do not definitively disprove the contextualized nature of all traits, or personality more broadly.

6.3 Implications

There has been a long debate in personality and social psychology on whether or not personality and situations interact to predict behaviours. The findings in this thesis provide a useful account of how traits and contexts may independently predict personality state expressions. These findings also provide insight into how traits may shape our experiences of situations in everyday life through situation perception and situation selection processes. In the next section, I discuss the theoretical implications of these findings around the conceptualization of personality traits, before offering some broader potential implications of

these findings for person-situation dynamics on volitional personality transformation in personality-clinical interface more generally.

6.3.1 Implications for the Conceptualization of Traits

Some conceptualisations of personality traits emphasised the decontextualized nature of traits, whereas other conceptualisations suggest that traits are fundamentally bound to particular situations. Overall, the findings reported in this thesis are more consistent with the former view, suggesting that the patterns of behaviour and experience described by a personality trait are relatively ‘context free’. The findings are also in general alignment with a number of theories of models in personality psychology, including Five Factor Theory (FFT; McCrae & Costa, 2008), Whole Trait Theory (WTT; Fleeson & Jayawickreme, 2015), and CAPS (Cognitive Affective Personality Systems; Mischel, 1973; Mischel & Shoda, 1995, 2008). On the other hand, they are less consistent with some other models of personality, including the Trait Activation Theory (TAT; Tett & Guterman, 2000) and Cybernetic Big Five Theory (CB5T; DeYoung, 2015).

The findings that traits consistently predicted mean levels of behaviour and experience over time and across contexts is in line with the Five Factor Theory, and with findings from a number of previous studies (e.g., Back et al., 2009; Borkenau et al., 2004; Ching et al., 2014; Eaton & Funder, 2003; Fleeson & Gallagher, 2009; Judge et al., 2014; Mehl et al., 2006; Sherman et al., 2015). Moreover, as suggested by the Whole Trait Theory (Fleeson & Gallagher, 2009), traits were strongly associated with the mean levels of state expressions, **deviations from which seems to be at least partly a function of changes in the strength of situations.** In addition, as implied by the CAPS model (Mischel, 1973; Mischel & Shoda, 1995, 2008), the within-person relations between situations and states showed stable individual differences over time (i.e., situation-based contingencies), though these relations were only weakly predicted by the relevant trait, aligned with findings from Sherman et al. (2015).

In contrast, findings in this thesis are also inconsistent with the predictions of TAT (Tett & Guterman, 2000), which posits that much variation in behaviour and experience results from Personality $\times$ Situation interactions. Although some trait $\times$ context interactions significantly predicted the relevant behaviour and experience, these interactions only explained a small proportion of individual differences in state expressions and were only intermittently observed across the four studies in this thesis.

Furthermore, the finding that traits are not strongly contextualized is inconsistent with the definition of traits proposed in CB5T (DeYoung, 2015). As a caveat, CB5T does emphasise that broad traits such as extraversion and neuroticism may *seem* decontextualized because their eliciting stimuli are present in most situations if not all (Funder, 1991; DeYoung, 2015). With this in mind, the studies in this thesis were designed to capture a broad range of rewarding and threatening contexts in everyday life. It is nevertheless possible that the eliciting stimuli of extraversion and neuroticism—rewards and threats—are so fundamental to survival and day-to-day functioning that they are present in all contexts, making extraversion and neuroticism (seemingly) de-contextualized. A rebuttal to this interpretation would be to note that this tenant of CB5T risks non-falsifiability, as positive evidence for the contextualization of traits would be impossible if trait-relevant stimuli are present in (literally) all contexts.

For the same reason, it would probably be challenging to find evidence that supports the interpersonal paradigm as well (Sullivan, 1948; Gill, 1983), according to which traits that are fundamentally social in nature (i.e., extraversion and agreeableness) only emerge in social contexts. For instance, two robust field studies reviewed earlier (Breil et al., 2019; Sherman et al., 2015) did not find interaction effect regarding social context and extraversion in the prediction of social behaviour. This may be because the distinction between social and non-social contexts is perhaps less sharp than one might expect. For instance, one can be alone at home but interacting with his/her pet(s). Is this a social context? Similarly, one can sit in a

room meditating alone while thinking all sorts of loving and kind things about other people. Conversely, one can be at a lively party but have no one to talk to, and thus feel that they are all alone. Potentially any context could be ‘social’ or ‘non-social’, especially when taking into account that people can create social context in their mind by imagining or remembering other people when no one is around. This relates to the idea discussed earlier regarding rewarding and threatening situations being extremely broad in nature. Because the contexts that could elicit traits’ manifestations are so broad, traits may seem decontextualized empirically.

It seems counter-intuitive to think of traits as de-contextualized, especially given that participants did report behaving and feeling differently across contexts. This, however, reflects the main effect of context, not the moderating effect of context on trait-state relations. More explicitly, the main effect of context indicates simply that specific instances of behaviour and experience are expressed to different degrees in different situations. The average person is more talkative at a party than when in a library, and more nervous during a PhD examination than during an afternoon nap. In contrast, the moderating effect of context entails that high scores on a particular trait describe the tendency to express specific instances of behaviour and experience *in particular situations*. It would suggest that being a ‘talkative’ person describes what a person is like only when in gregarious situations such as a party, or that being a ‘nervous person’ describes what a person is like only when in stressful situations such as an examination. In contrast, the results of the present thesis suggest that a ‘talkative’ person is more talkative and a ‘nervous’ person more nervous across a wide range of situations.

6.3.2 Implications for Measuring Situations

An important caveat to the veracity of the present findings concerns some lingering questions relating to optimal measurement of situations. In testing the main research question in this thesis, an implicit assumption was that different participants would perceive a given

context in more or less the same way but may respond to it differently. However, data from both experience sampling studies revealed that individual differences in self-reported threatening situations were as consistent as individual differences in self-reported state neuroticism. This is aligned with Sherman and colleagues' (2015) finding that individual differences in self-reported adverse and negative situations were as consistent as individual differences in self-reported state emotionality. Turning to extraversion, Sherman and colleagues' (2015) observed that individual differences in self-reported extraversion-conducive situations were again as consistent as individual differences in self-reported state extraversion. Although state extraversion measured in the current thesis revealed somewhat less consistent individual differences than self-reported rewarding context, they were mostly aligned. Crucially, in both experience sampling studies reported in this thesis, trait extraversion predicted the self-reported experience of rewarding situations, and trait neuroticism predicted the self-reported experience of threatening situations. Thus, between-person variation in state extraversion and neuroticism tended to go hand in hand with between-person variation in participants' perception of rewards and threats, potentially making it difficult to observe trait $\times$ context interactions when subjective ratings of context were used.

Further evidence of potential situation perception effects in this thesis include, for instance, the fact that extraversion was associated with perceiving distinct experimental conditions (i.e., both when expecting positive feedback and when expecting negative feedback) as more positive (study 2). Conversely, neuroticism was associated with perceiving these same experimental conditions as more negative (study 2). These patterns also align with previous studies reviewed before (e.g., Morse et al., 2015; Sherman et al., 2015). These findings seem to speak to Allport's (1961) observation that "*... most people do a good deal to create the situation to which they respond*" (p. 179).

6.3.3 Practical Implications of Personality-Situation Transactions

As discussed above, participants higher on extraversion rated their daily life context as more rewarding on average and experienced higher levels of state extraversion than participants lower on extraversion, whereas participants higher on neuroticism rated their daily life context as more threatening on average and experienced higher levels of state neuroticism than participants lower on neuroticism. These results suggest that personality traits not only capture patterns of behaviour and experience, but also individual differences in how situations are experienced in everyday life. Although not at all a new discovery, and not the main focus of this thesis, these observations may have important practical implications for quality of people's lives.

Consider an example from an educational context: A tutorial setting often involves group work and public speaking. Extraverted students are more likely to perceive this as a more rewarding context, perhaps because it offers opportunities to interact with others and be the centre of attention. Lead by this positive perception, extraverted students may then engage more in group discussions, ask more questions, and receive more feedback from the tutor and other students. In contrast, neurotic students are more likely to perceive this tutorial setting as more threatening, perhaps because of the possibilities of being negatively evaluated and critically judged by others. Lead by this negative perception, neurotic students may then be less likely to engage with others, more likely to reserve their opinions, and perhaps less likely to benefit from the situation overall. In this example, focusing on the rewarding rather than the threatening aspects of a tutorial setting seems to be advantageous.

There is extensive research linking extraversion to positive affect and higher wellbeing and neuroticism to negative affect and lower wellbeing (e.g., Morse et al., 2015; Steel et al., 2008; Sun, Kaufman, & Smillie, 2018). Neuroticism is also associated with susceptibility to mental illness (e.g., Furnham & Cheng, 1999; Lee, Joo, & Choi, 2013; McFarlane, 1989). Although there are already several candidate theories that attempt to explain these associations, the findings from the current thesis suggest that changing how

people perceive rewards and threats in their environment may be beneficial. This implication is essentially the same strategy as reappraisal, an emotion regulation strategy advocated by proponents of cognitive behavioural therapy (CBT; Beck, 2011). This strategy works through challenging people's maladaptive beliefs and helping them to form more adaptive thoughts that could potentially solve their current problems. DeYoung and Krueger (2018) recently made an inference along these lines, in suggesting that, through normalizing people's perception of threats and negative experiences, those high on neuroticism may be able to pursue their life goals effectively, despite of their natural negative tendencies. Also relevant is a recent meta-analysis suggesting that various forms of clinical intervention can affect personality change, with the strongest effect being observed for reduced neuroticism (Roberts et al., 2019). Although different forms of clinical intervention were similarly effective, the effect size for CBT was larger than that for almost all other intervention types.

In summary, understanding individual differences in situation perception may have important practical implications given the well-established links between personality and wellbeing. To encourage people to act extraverted more often and to help people experience more positive affect and less negative affect, it may help to guide them to see more rewards in their environment and normalize their perception of threatening experience. Some scholars have argued that if people do this often enough and for a long period of time, this can result in enduring personality change (Burke, 2006; Magidson et al., 2012; Roberts & Jackson, 2008), which may be a promising strategy for improving people's wellbeing in the long run.

6.4 Limitations, Strengths, and Future Directions

Previous chapters have outlined the limitations and recommendations that are particular to each study. This section will address some broader limitations of the program of research reported in this thesis and provide recommendations for future studies into the contextualised nature of traits, as well as in the field of person-situation transactions.

6.4.1 Narrow Focus on Extraversion and Neuroticism

The studies in this thesis provided a starting point for comprehensive investigation of the contextualized nature of personality, concentrated on two of the Big Five Traits (i.e., extraversion and neuroticism). These traits were selected because of their relatively stronger theoretical foundations. It is worth noting that the remaining big five traits—agreeableness, conscientiousness, and openness—were not included as covariates in any analyses across all studies. One reason is that big five traits are reliably inter-correlated. Although this may seem to be a potential issue not controlling for the effects of remaining big five traits on state extraversion and neuroticism, including all of them in one model may lead to multicollinearity and cause problems when trying to fit the model and interpret the results. Although not ideal, the current approach has been adopted in previous literature (e.g., Sherman et al., 2016) on which this thesis was built on and consistent with other similar studies in the field (e.g., Breil et al., 2019).

Although the results of the four studies in this thesis did not strongly support the contextualized nature of extraversion and neuroticism, it is still possible that other Big Five domains could be more contextualized. Indeed, there are some clues in the literature offering some encouragement to this possibility. For example, Big Five agreeableness describes people's tendency to be sympathetic in response to the suffering of others and cooperative as opposed to being selfish and exploitative (DeYoung, 2015; Graziano, Habashi, Sheese, & Tobin, 2007). One study reported that agreeable people are less likely to decrease their communal behavior when perceiving their interaction partner as being disagreeable (Yao & Moskowitz 2015). Future research could explore whether people high in trait agreeableness would express higher levels of compassion, politeness, trust, sympathy, etc., *in specific situations*—that is, context in which there are opportunities to help others and maintain positive interpersonal relations (Graziano & Eisenberg, 1997; Graziano, Habashi, Sheese, & Tobin, 2007).

It should also be remembered that the Big Five traits are just one level in a hierarchical system, and that they are one of the broadest levels of description (DeYoung et al., 2007). Moreover, there are reasons to examine the contextualized nature of traits at lower levels in this hierarchy. Specifically, facets and sub-facets may be more contextualized than traits because they are much more concrete rather than highly abstracted. For example, neuroticism's aspects (volatility and withdrawal) and facets (i.e., anxiety, depression, self-consciousness, vulnerability, anger, impulsiveness) are much narrower, and focus on more specific behaviours and experiences than the broad neuroticism domain, and such content may be more likely to be contextualized.

Indeed, some previous studies reporting a significant interaction between traits and contexts in the prediction of trait expressions focused on sub-components of neuroticism, such as social evaluation and ambiguity related anxiety (e.g., Flood & Endler, 1980; Muller et al, 1990). Perhaps expressions of these narrower trait components are more contingent upon situational cues, such that they are more contextualized. Although all measures of extraversion and neuroticism in this thesis were based on measures with facets (i.e., BFAS, BFI-2), post-hoc analyses with facet scores could not be run due to the fact that situation measures used do not map perfectly onto lower-order facets of extraversion (e.g., enthusiasm and assertiveness) and neuroticism (e.g., volatility and withdrawal). It is possible that different results may have been found had narrower measures of rewarding characteristics (i.e., enthusiasm-specific rewards) and threatening characteristics (i.e., volatility-specific threats) been used.

Importantly, whether extending the present research to other traits within the Big Five hierarchy, either horizontally (i.e., to other domains) or vertically (i.e., to aspects and facets), it is critical to identify trait-relevant stimuli by drawing on relevant personality theory and research. Additionally, future research could also explore higher levels of personality descriptions such as characteristic adaptations and life narratives (McAdams & Pals, 2006).

Indeed, these levels of personality provide rich descriptions of a person that we would expect to be much more contextualized—indeed, characteristic adaptations describe, by definition, how one *adapts to their circumstances*. For example, we could imagine a martial arts instructor who is very disciplined and formal, displaying hierarchical behaviors and expectations in her teaching environment in a manner which is very characteristic for her as a person. But we probably would not expect her to behave in this way at home with her family members. Conversely, traits are the lowest level of personality description—concerning general tendencies toward being social, anxious, hard-working, kind, and so on—and it would not be surprising if this level was much less contextualized. In sum, it should be emphasized that this thesis only focused on two personality traits at one level of the trait hierarchy, and thus it cannot be concluded from the findings that all traits nor all levels of personality are decontextualized.

6.4.2 Reliance on Self-Reported Personality Traits

All studies in this thesis used self-reports to assess personality traits, which is the most common practice in personality assessment. Compared to alternative methods (e.g., personality reports by knowledgeable acquaintances), self-reports have several persuasive advantages, such as richness in information, motivation to report, and practicality (Paulhus & Vazire, 2007). In addition, to assess personality more rigorously, each participant completed two (Study 1) to three (Studies 2, 3, and 4) well-established personality inventories, the scores of which were aggregated to provide more robust measures of personality traits.

However, there are also some limitations to self-report measures. Firstly, they may be influenced by the potential self-enhancement and self-enfacement effects in traits of evaluative nature (Paulhus & Vazire, 2007). For example, Kim et al. (2019) found that individuals on the low end of the agreeableness scale tend to self-enhance whereas individuals on the high end of the agreeableness scale tend to self-enface. Secondly, they are subject to the “better than average effect” that often occurs when people are asked to compare

themselves with an average peer (Alicke et al., 1995). Fortunately, these particular limitations seem less likely to apply to traits examined in this thesis—extraversion and neuroticism—which are not of particularly evaluative nature. Moreover, there is typically high consistency between self- and other-ratings of extraversion because it is a highly visible trait, which is less true for neuroticism (Vazire, 2010). Nevertheless, combining self-reports with reports from knowledgeable others would combine both self-perceptions and others' impressions of what a person is like, thus providing a more sophisticated and balanced view of personality (Samuel & Connelly, 2016; Vazire, 2010; Vazire & Solomon, 2015).

6.4.3 The Generalizability of Contexts Sampled in Daily Life

Studies 3 and 4 used experiences sampling methods to track participant's personality expressions in daily life, and also to track the degree of reward and threat present in the contexts they encountered. Although the situation measures successfully captured variation in context both within-person and between-persons, it is unclear whether the contexts captured are generalizable. This is a common and potential validity threat to experience sampling design.

Due to the intensive design of repeated measurement, it is difficult for participants to answer all the surveys sent to them, while they are busy engaging in daily life. The missing reports rate was about 15% in these studies, which represents a relatively high response rate for studies of this kind. Moreover, if missing reports occurred relatively randomly, then it could be assumed that the contexts captured would be representative. However, if missing reports were due to non-random reasons, then it is unknown whether the patterns found in the results could be generalized to all contexts. For example, if participants systematically decided not to respond to surveys when they were having fun socializing or when they were in a threatening situation then, even with the best situation measure, the results won't be representative, and the conclusions drawn from these two studies might not be robust.

To minimize the impact of possible context-related missing surveys, I took the precaution of reminding participants of this issue at the beginning of the study. Participants were also incentivised by receiving a personality state report at the end of the study period based on their daily reports, which would display their state patterns in relevance to their peers. They were made aware that, if they choose to answer or not answer surveys in particular contexts, then their state reports won't be accurate.

Reassuringly findings from a recent study suggest that missing reports should not threaten experience sampling studies' validity (Sun, Rhemtulla, & Vazire, 2019). In this study, experience sampling reports were collected alongside random sampling of sound clips using the Electronically Activated Recorder (EAR). The study authors could thus use the data from the EAR to code what participants were doing when they missed or completed reports. A total of 47 context-based variables could be coded from the EAR data (e.g., socializing, negative emotion), and were then used to predict missingness. Reassuringly, the results of this analyses indicated that missing surveys were not associated with any of these variables, suggesting that that non-random missing data in studies of this kind might not be a serious concern.

6.4.4 Notable Strengths of the Study

Despite the above limitations, there were several strengths of this research program that should be noted. First, by focussing on a single research question throughout the program, conclusions drawn from these studies are reasonably robust. This is because each subsequent study serves as a conceptual replication of the other. Second, as noted above, all personality traits were measured multiple times and a latent factor was extracted, optimising measurement precision. Third, a combination of methodologies was employed, meaning that the limitations of some studies (e.g., low ecological validity in the lab experiment) can be balanced by the strengths of other studies (e.g., high ecological validity in the ESM studies). Fourth, the situation measures developed in this study were guided by an extensive body of

theory and research relating to the Reinforcement Sensitivity Theory. This allowed these measures to be highly targeted and theoretically driven. Finally, although all studies were mostly reliant on self-report measurement (as discussed above), observer ratings of personality states were included in the lab experiment (study 2), and objective coding of situation characteristics, provided by multiple trained raters, was included in the second ESM study (Study 4).

Of all of these strengths, perhaps the theoretically-derived measures of situational characteristics is worth highlighting as the most novel. To my knowledge, the situation items constructed in this thesis were the first attempt to specifically measure the situational characteristics that are most theoretically relevant to trait extraversion and neuroticism. This approach diverges from methods that have often been used to assess situations, which tend to be post-hoc or empirically derived. They may thus add value to the existing situation literature by providing an additional approach to assessing trait-relevant contexts. Future studies may also follow this path by generating more trait-specific situation measures, derived from personality theories and empirical studies.

6.4.5 An Interwoven View of Person and Situation

On a more philosophical note, but with clear pragmatic implications, a question that arises in this research context relates to how we should conceptualize situations. Is a situation the actual ‘objective’ environment, or is it the filtered mental representation of this actual environment? What is likely to be the more important focus from a psychologist’s perspective? It seems certain that results concerning the effect of situations on behaviour and experience will differ depending on how we think about and measure situations. In recognition of these considerations, some studies in this thesis constructed (study 1) and measured (study 3 and 4) situations from participants’ (subjective) perspectives, while others constructed (study 2) and measured (study 4) situations from researchers’ or informants’ (objective) perspectives.

As has already been discussed, moderate to strong associations between traits and daily experiences of situations observed in study 3 prompted the inclusion of objective ratings of contexts in study 4. This addition seemed to be an ‘improvement’ in terms of providing more support for the central hypothesis examined in this thesis: Small but significant interactions between traits and contexts were detected for both extraversion and neuroticism when predicting their state expressions, providing evidence for the contextualised view of traits. On the other hand, one might argue that this is not necessarily an ‘improvement’, or a better way to test our central hypotheses. Strictly speaking, the informant’s coding of a situation’s characteristics is not objective either, and by definition may not adequately capture the situation *as experienced by the participant*. Consider also that in study 2, where objectively different situations were created artificially in the laboratory, their effect on state expressions was non-significant. Moreover, perceptions of these objective situations were again related to the participants’ personality traits. Thus, even in strictly controlled environment, people’s perceptions of conditions may have influenced their behaviours and experiences, more so than the objective environment.

From these considerations, it may make sense from a psychological perspective to conceive of “the situation” as part of “the person”, rather than existing outside of it. That is, rather than thinking of persons and situations as hermetically separate competitive units, as exemplified by thinking during the person-situation debate (Mischel, 1968), we should perhaps view these units as interlinked and overlapping. This helps to explain why the studies in this thesis were not able to fully disentangle situations from traits, and why situations and traits seemed to have *joint* effects on traits expressions, each exerting similar effects in a similar way, rather than interactive or *conditional* effects.

Given all the strengths and limitations discussed earlier, perhaps the most useful first step in following-up the present research would be as follows: Building on studies 3 and 4, a follow up EMS study could investigate the contextualized nature of lower-order traits (e.g.,

aspects and facets). One interesting lower-order trait for future research to examine is dispositional awe—a facet of openness under the broader domain openness/intellect (DeYoung et al., 2007). The state expression of dispositional awe is the experience of awe, which is often described as a sense of overwhelming wonder and amazement (Keltner & Haidt, 2003; Silvia, Fayn, Nusbaum, & Beaty, 2015). It seems plausible that people higher on dispositional awe may be more sensitive to awe-inspiring stimuli and have a stronger experience of awe *in specific situations*, such as when exposed to arts and natural beauty, compared to those lower on dispositional awe. Another lower-order trait that would be interesting to investigate is anger—a facet of volatility under the broader domain neuroticism. It is likely that people higher on trait anger would be more sensitive to anger-provoking stimuli and experience anger more strongly *in specific situations*, such as when exposed to conflicts and harm, compared to those lower on trait anger. The rationale is that situations that correspond to lower-order traits (e.g., anger and dispositional-awe) are probably much narrower than situations correspond to broad domains (e.g., extraversion and neuroticism).

In addition to focusing on lower-order facets that might be more contextualized than higher-level domains, a range of methods could be employed in future studies to capture situation characteristics more objectively and measure states more accurately. This may further the investigation of situation selection and situation perception effects. For example, mobile phone sensed locations would be particularly useful in detecting how frequently a person visits awe-inspiring places such as galleries, museums, and national parks. Similarly, the EAR (described earlier) may help to capture state anger more objectively when combined with informant ratings on people's tones and the language they use.

There are of course many further questions to answer *in future studies* in relation to this interwoven view of persons and situations. Specifically, it is of great interest to investigate how people shape their environment through situation selection, situation evocation, and situation transformation (Funder, 2016; Furr & Funder, 2019)? Future

research should further our understanding of these processes by studying a diverse range of daily environments, by employing more comprehensive measurement of situations, and by making use of the increasing range of methods that are now available for researchers in this area (mobile phone sensed locations, electronically activated recorder, plug-ins to track online behaviour through different online ‘environments’, and so on).

6.5 Concluding Remarks

This thesis was sparked by a fundamental question concerning the conceptualization of personality traits in relation to context. When we describe a person as high on a particular trait, are we describing what they are like *in general* or rather *in specific situations*. For almost a century personality theorists and researchers have expressed diverging views on what we mean exactly when we describe someone as high or low on a personality trait. The four empirical studies in this thesis are, to my knowledge, the first to systematically and directly evaluate the contextualized view of traits, focussing on the two major trait domains of extraversion and neuroticism.

From the findings of these studies, it can be concluded that the relation between trait extraversion and expressions of state extraversion does not strongly depend on context. Thus, when we describe someone as an ‘extravert’, we are saying that, across a range of situations, he or she tends to be more bold, talkative, enthusiastic, and gregarious than the average person. Similarly, the relation between trait neuroticism and expressions of state neuroticism does not strongly depend on context. Thus, when we describe someone as neurotic we are saying that, across a range of situations, he or she tends to be more anxious, volatile, depressed, and worried than the average person. The results were reasonably consistent across multiple samples using multiple methodologies, suggesting that the contextualized view of traits may not be tenable. In addition, some insights emerged from these situations relating to the interplay of traits and situations, and how traits may fundamentally shape one’s experience of situations through situation selection and situation perception.

Despite providing some answers to longstanding questions, the present research has also raised new questions to be investigated in future research. This includes the need to further examine the contextualized view of traits across other Big Five traits as well as their lower-level aspects and facets, and to continue to explore for optimal ways of conceptualising and operationalising situational variables. Such efforts will hopefully shed more light on our understanding of such processes as situation perception, situation selection, situation evocation, and situation transformation, all of which will lead to better knowledge of what people are like in relation to the world they live in.

References

- Adorno Theodor, W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, N. (1950). The authoritarian personality. *New York: Harpers.*
- Ai, P., Liu, Y., & Zhao, X. (2019). Big Five personality traits predict daily spatial behavior: Evidence from smartphone data. *Personality and Individual Differences, 147*, 285-291.
- Alicke, M. D., Klotz, M. L., Breitenbecher, D. L., Yurak, T. J., & Vredenburg, D. S. (1995). Personal contact, individuation, and the better-than-average effect. *Journal of Personality and Social Psychology, 68*(5), 804.
- Allemand, M., Steiger, A. E., & Hill, P. L. (2013). Stability of personality traits in adulthood. *GeroPsych, 26*, pp. 5-13.
- Allport, G. W. (1927). Concepts of trait and personality. *Psychological Bulletin, 24*(5), 284.
- Allport, G. W. (1937). *Personality: a psychological interpretation*. Oxford, England: Holt.
- Allport, G. W. (1961). *Pattern and growth in personality*. Oxford, England: Holt, Reinhart & Winston.
- Amodio, D. M., Master, S. L., Yee, C. M., & Taylor, S. E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self-regulation. *Psychophysiology, 45*(1), 11-19.
- Ashton, M. C., Lee, K., & Paunonen, S. V. (2002). What is the central feature of extraversion? Social attention versus reward sensitivity. *Journal of Personality and Social Psychology, 83*(1), 245.
- Back, M. D., & Egloff, B. (2009). Yes we can! A plea for direct behavioral observation in personality research. *European Journal of Personality, 23*(5), 403-405.
- Barker, R. G., & Gump, P. V. (1964). *Big school, small school: high school size and student behaviour*. Stanford University Press.

- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. *arXiv preprint arXiv:1406.5823*.
- Beaty Jr, J. C., Cleveland, J. N., & Murphy, K. R. (2001). The relation between personality and contextual performance in "strong" versus "weak" situations. *Human Performance, 14*(2), 125-148.
- Beck, J. S. (2011). Cognitive-behavioral therapy. *Clinical textbook of addictive disorders, 491*, 474-501.
- Beer, A., & Watson, D. (2008). Personality judgment at zero acquaintance: Agreement, assumed similarity, and implicit simplicity. *Journal of Personality Assessment, 90*(3), 250-260.
- Bem, D. J., & Funder, D. C. (1978). Predicting more of the people more of the time: Assessing the personality of situations. *Psychological Review, 85*(6), 485.
- Bing, M. N., Whanger, J. C., Davison, H. K., & VanHook, J. B. (2004). Incremental validity of the frame-of-reference effect in personality scale scores: a replication and extension. *Journal of Applied Psychology, 89*(1), 150.
- Blass, T. (1999). The Milgram Paradigm After 35 Years: Some Things We Now Know About Obedience to Authority. *Journal of Applied Social Psychology, 29*(5), 955-978.
- Block, J. (1978). *The Q-sort method in personality assessment and psychiatric research*. Palo Alto, CA: Consulting Psychologists Press. (Original work published 1961)
- Boddy, J., Carver, A., & Rowley, K. (1986). Effects of positive and negative verbal reinforcement on performance as a function of extraversion-introversion: Some tests of Gray's theory. *Personality and Individual Differences, 7*(1), 81-88.
- Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. Guilford Press.
- Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. Guilford Press.

- Borkenau, P., Mauer, N., Riemann, R., Spinath, F. M., & Angleitner, A. (2004). Thin slices of behavior as cues of personality and intelligence. *Journal of Personality and Social Psychology, 86*(4), 599-614.
- Bowling, N. A., & Burns, G. N. (2010). A comparison of work-specific and general personality measures as predictors of work and non-work criteria. *Personality and Individual Differences, 49*(2), 95-101.
- Breil, S. M., Geukes, K., Wilson, R. E., Nestler, S., Vazire, S., & Back, M. D. (2019). Zooming into real-life extraversion—How personality and situation shape sociability in social interactions. *Collabra: Psychology, 5*(1).
- Buchanan, T., Johnson, J. A., & Goldberg, L. R. (2005). Implementing a five-factor personality inventory for use on the internet. *European Journal of Psychological Assessment, 21*(2), 115-127.
- Burke, P. J. (2006). Identity change. *Social Psychology Quarterly, 69*, 81–96.
<http://dx.doi.org/10.1177/019027250606900106>
- Buss, D. M., Gomes, M., Higgins, D. S., & Lauterbach, K. (1987). Tactics of manipulation. *Journal of Personality and Social Psychology, 52*(6), 1219.
- Carson, R. C. (2019). *Interaction concepts of personality*. Allen and Unwin. Routledge.
- Campion, M. A., & Lord, R. G. (1982). A control systems conceptualization of the goal-setting and changing process. *Organizational Behavior and Human Performance, 30*(2), 265-287.
- Canli, T., Sivers, H., Whitfield, S. L., Gotlib, I. H., & Gabrieli, J. D. (2002). Amygdala response to happy faces as a function of extraversion. *Science, 296*(5576), 2191-2191.
- Carnap, R. (1956). The methodological character of theoretical concepts. *The foundations of science and the concepts of psychology and psychoanalysis, 1*, 38-76.
- Carp, F. M., & Carp, A. (1980). Person-environment congruence and sociability. *Research on Aging, 2*, 395–415. <http://dx.doi.org/10.1177/016402758024001>

- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of Personality and Social Psychology*, 67(2), 319.
- Cattell, R. B. (1979). The structure of personality in its environment (1)., *Personality and Learning Theory*, Springer Pub. Co.
- Ching, C. M., Church, A. T., Katigbak, M. S., Reyes, J. A. S., Tanaka-Matsumi, J., Takaoka, S., ... & Ortiz, F. A. (2014). The manifestation of traits in everyday behavior and affect: A five-culture study. *Journal of Research in Personality*, 48, 1-16.
- Cohen, M. X., Young, J., Baek, J. M., Kessler, C., & Ranganath, C. (2005). Individual differences in extraversion and dopamine genetics predict neural reward responses. *Cognitive Brain Research*, 25(3), 851-861.
- Conner, T. S., & Barrett, L. F. (2012). Trends in ambulatory self-report: the role of momentary experience in psychosomatic medicine. *Psychosomatic Medicine*, 74(4), 327.
- Conner, T. S., & Lehman, B. (2012). Getting started: Launching a study in daily life. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 89–107). New York: Guilford Press.
- Constans, J. I., Penn, D. L., Ihen, G. H., & Hope, D. A. (1999). Interpretive biases for ambiguous stimuli in social anxiety. *Behaviour Research and Therapy*, 37(7), 643-651.
- Corr, P. J. (2004). Reinforcement sensitivity theory and personallity. *Neuroscience and Biobehavioral Reviews*, 28, 317-332. doi:10.1016/j.neubiorev.2004.01.005
- Costa, P. T., & McCrae, R. R. (1984). Personality as a lifelong determinant of well-being. *Emotion in Adult Development*, 141-157.

- Cremers, H. R., Demenescu, L. R., Aleman, A., Renken, R., van Tol, M. J., van der Wee, N. J., et al. (2010). Neuroticism modulates amygdala—Prefrontal connectivity in response to negative emotional facial expressions. *Neuroimage*, 49, 963–970.
- Delaney, H. D., & Maxwell, S. E. (1981). On using analysis of covariance in repeated measures designs. *Multivariate Behavioral Research*, 16(1), 105-123.
- Denissen, J. J., & Penke, L. (2008). Motivational individual reaction norms underlying the Five-Factor model of personality: First steps towards a theory-based conceptual framework. *Journal of Research in Personality*, 42(5), 1285-1302.
- Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences*, 22, 491-569.
- Depue, R. A., Luciana, M., Arbisi, P., Collins, P., & Leon, A. (1994). Dopamine and the structure of personality: Relation of agonist-induced dopamine activity to positive emotionality. *Journal of Personality and Social Psychology*, 67(3), 485.
- Derryberry, D. (1987). Incentive and feedback effects on target detection: A chronometric analysis of Gray's model of temperament. *Personality and Individual Differences*, 8(6), 855-865.
- DeYoung, C. G. (2010). Personality neuroscience and the biology of traits *Social and Personality. Psychology Compass*, 4(12), 1165-1180.
- DeYoung, C. G. (2013). The neuromodulator of exploration: A unifying theory of the role of dopamine in personality. *Frontiers in Human Neuroscience*, 7, 762.
- DeYoung, C. G. (2015). Cybernetic Big Five Theory. *Journal of Research in Personality*, 56, 33-58. doi:10.1016/j.jrp.2014.07.004
- DeYoung, C. G., & Krueger, R. F. (2018). A cybernetic theory of psychopathology. *Psychological Inquiry*, 29(3), 117-138.

DeYoung, C. G., Hirsh, J. B., Shane, M. S., Papademetris, X., Rajeevan, N., & Gray, J. R.

(2010). Testing predictions from personality neuroscience: Brain structure and the big five. *Psychological Science*, 21(6), 820-828.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology*, 93(5), 880-896. doi:10.1037/0022-3514.93.5.880

Diener, E., Larsen, R. J., & Emmons, R. A. (1984). Person $\times$ Situation interactions: Choice of situations and congruence response models. *Journal of Personality and Social Psychology*, 47(3), 580.

Doherty, M. A., & Walker R. E. (1965). *The relationship of personality characteristics, awareness, and attitude in a verbal conditioning situation* (Unpublished master thesis). Loyola University Chicago, Chicago, USA

Donahue, E. M., & Harary, K. (1998). The patterned inconsistency of traits: Mapping the differential effects of social roles on self-perceptions of the Big Five. *Personality and Social Psychology Bulletin*, 24(6), 610-619.

Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327.

Eaton, L. G., & Funder, D. C. (2003). The creation and consequences of the social world: An interactional analysis of extraversion. *European Journal of Personality*, 17(5), 375-395.

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science*, 302(5643), 290-292.

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology*, 82, 804-818.

- Elliot, A.J. (2008). *Handbook of approach and avoidance motivation*. New York: Taylor and Francis.
- Endler, N. S., & Magnusson, D. (1977). The interaction model of anxiety: An empirical test in an examination situation. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 9(2), 101.
- Endler, N. S., Hunt, J. M. C. V., & Rosenstein, A. J. (1962). An SR inventory of anxiousness. *Psychological Monographs: General and Applied*, 76(17), 1.
- Etkin, A., Klemenhagen, K. C., Dudman, J. T., Rogan, M. T., Hen, R., Kandel, E. R., et al. (2004). Individual differences in trait anxiety predict the response of the basolateral amygdala to unconsciously processed fearful faces. *Neuron*, 44(6), 1043–1055.
- Fishman, I., Ng, R., & Bellugi, U. (2012). Neural processing of race by individuals with Williams syndrome: Do they show the other-race effect? (And why it matters). *Social Neuroscience*, 7(4), 373-384.
- Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, 80(6), 1011-1027.
- Fleeson, W. (2004). Moving personality beyond the person-situation debate: The challenge and the opportunity of within-person variability. *Current Directions in Psychological Science*, 13(2), 83-87.
- Fleeson, W. (2007). Situation-based contingencies underlying trait-content manifestation in behavior. *Journal of Personality*, 75(4), 825-862.
- Fleeson, W., & Gallagher, P. (2009). The implications of the big five standing for the distribution of trait manifestation in behavior: Fifteen experience-sampling studies and a meta analysis. *Journal of Personality and Social Psychology*, 97(6), 1097-1114.
doi:10.1037/a0016786

- Fleeson, W., & Jayawickreme, E. (2015). Whole trait theory. *Journal of Research in Personality*, 56, 82-92.
- Fleeson, W., Malanos, A. B., & Achille, N. M. (2002). An intraindividual process approach to the relationship between extraversion and positive affect: Is acting extraverted as "good" as being extraverted?. *Journal of Personality and Social Psychology*, 83(6), 1409-1422. doi:10.1037/0022-3514.83.6.1409
- Flood, M., & Endler, N. S. (1980). The interaction model of anxiety: An empirical test in an athletic competition situation. *Journal of Research in Personality*, 14(3), 329-339.
- Fu, Y. (2013). On the nature of extraversion: variation in conditioned contextual activation of dopamine-facilitated affective, cognitive, and motor processes. *Frontiers in Human Neuroscience*, 7, 288.
- Funder, D. C. (1991). Global traits: A neo-Allportian approach to personality. *Psychological Science*, 2(1), 31-39.
- Funder, D. C. (2006). Towards a resolution of the personality triad: Persons, situations, and behaviors. *Journal of Research in Personality*, 40(1), 21-34.
- Funder, D. C. (2008). Persons, situations, and person-situation interactions. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 568-580). New York, NY, US: The Guilford Press.
- Funder, D. C. (2016). Taking situations seriously: The situation construal model and the Riverside Situational Q-Sort. *Current Directions in Psychological Science*, 25(3), 203-208.
- Funder, D. C., & Colvin, C. R. (1988). Friends and strangers: Acquaintanceship, agreement, and the accuracy of personality judgment. *Journal of Personality and Social Psychology*, 55(1), 149.

- Funder, D. C., & Colvin, C. R. (1991). Explorations in behavioral consistency: properties of persons, situations, and behaviors. *Journal of Personality and Social Psychology*, 60(5), 773.
- Funder, D. C., & Dobroth, K. M. (1987). Differences between traits: Properties associated with interjudge agreement. *Journal of Personality and Social Psychology*, 52(2), 409.
- Funder, D. C., & Ozer, D. J. (1983). Behavior as a function of the situation. *Journal of Personality and Social Psychology*, 44(1), 107.
- Funder, D. C., Kolar, D. C., & Blackman, M. C. (1995). Agreement among judges of personality: Interpersonal relations, similarity, and acquaintanceship. *Journal of Personality and Social Psychology*, 69(4), 656.
- Furnham, A., & Cheng, H. (1999). Personality as predictor of mental health and happiness in the East and West. *Personality and Individual Differences*, 27(3), 395-403.
- Furr, R. M., & Funder, D. C. (1998). A multimodal analysis of personal negativity. *Journal of Personality and Social Psychology*, 74(6), 1580.
- Furr, R. M., & Funder, D. C. (2018). Persons, situations, and person-situation interactions. *Handbook of personality: Theory and research*.
- Geldhof, G. J., Preacher, K. J., & Zyphur, M. J. (2014). Reliability estimation in a multilevel confirmatory factor analysis framework. *Psychological methods*, 19(1), 72.
- Getter, H. (1966). A personality determinant of verbal conditioning. *Journal of Personality*, 34(3), 397-405.
- Gill, M. M. (1983). The interpersonal paradigm and the degree of the therapist's involvement. *Contemporary Psychoanalysis*, 19(2), 200-237.
- Goldberg, L. R. (1990). An alternative" description of personality": The big-five factor structure. *Journal of Personality and Social Psychology*, 59(6), 1216.
- Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, 8, 249-266.

- Gray, J. A. (1973). Causal models of personality and how to test them. In J. R. Royce (Ed.), *Multivariate analysis and psycho- logical theory* (pp. 409–463). London: Academic Press.
- Gray, J. A. (1982). Précis of The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system. *Behavioral and Brain Sciences*, 5(3), 469-484.
- Gray, J. A., & McNaughton, N. (2000). Fundamentals of the septo-hippocampal system. *The Neuropsychology of Anxiety: An Enquiry into the Functions of Septo-hippocampal System*, 2nd ed. Oxford University Press, Oxford, 204-232.
- Graziano, W. G., & Eisenberg, N. (1997). Agreeableness: A dimension of personality. In *Handbook of Personality Psychology* (pp. 795-824). Academic Press.
- Graziano, W. G., Habashi, M. M., Sheese, B. E., & Tobin, R. M. (2007). Agreeableness, empathy, and helping: A person× situation perspective. *Journal of Personality and Social Psychology*, 93(4), 583.
- Gupta, B. S. (1976). Extraversion and reinforcement in verbal operant conditioning. *British Journal of Psychology*, 67(1), 47-52.
- Gupta, B. S., & Nagpal, M. (1978). Impulsivity/sociability and reinforcement in verbal operant conditioning. *British Journal of Psychology*, 69(2), 203-206.
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd edition). New York: The Guilford Press.
- Haaland, S., & Christiansen, N. D. (2002). Implications of trait-activation theory for evaluating the construct validity of assessment center ratings. *Personnel Psychology*, 55(1), 137-163.
- Haas, B. W., Omura, K., Constable, R. T., & Canli, T. (2007). Emotional conflict and neuroticism: personality-dependent activation in the amygdala and subgenual anterior cingulate. *Behavioral Neuroscience*, 121(2), 249.
- Hartshorne, H., & May, M. A. *Studies in deceit*. New York: Macmillan, 1928.

- Heller, D., Ferris, D. L., Brown, D., & Watson, D. (2009). The influence of work personality on job satisfaction: Incremental validity and mediation effects. *Journal of Personality*, 77(4), 1051-1084.
- Heller, D., Komar, J., & Lee, W. B. (2007). The dynamics of personality states, goals, and well-being. *Personality and Social Psychology Bulletin*, 33(6), 898-910.
- Hendriks, A. A. J. (1996). The Big Five as tendencies in situations: A replication study. *Personality and Individual Differences*, 21(4), 527-535.
- Higgins, E. T., & Scholer, A. A. (2008). When is personality revealed? A motivated cognition approach. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 182-207). New York, NY, US: The Guilford Press.
- Hinduja, S., & Patchin, J. W. (2010). Bullying, cyberbullying, and suicide. *Archives of Suicide Research*, 14(3), 206-221.
- Hirsh, J. B., & Inzlicht, M. (2008). The devil you know: Neuroticism predicts neural response to uncertainty. *Psychological Science*, 19, 962-967.
- Hofstee, W. K., De Raad, B., & Goldberg, L. R. (1992). Integration of the Big five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, 63(1), 146-163.
- Imada, T., & Ellsworth, P. C. (2011). Proud Americans and lucky Japanese: Cultural differences in appraisal and corresponding emotion. *Emotion*, 11(2), 329.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of Personality: Theory and Research*, 2(1999), 102-138.
- Judge, T. A., Simon, L. S., Hurst, C., & Kelley, K. (2014). What I experienced yesterday is who I am today: Relationship of work motivations and behaviors to within-individual

- variation in the Five-Factor model of personality. *Journal of Applied Psychology*, 99(2), 199-221.
- Kell, H. J., Rittmayer, A. D., Crook, A. E., & Motowidlo, S. J. (2010). Situational content moderates the association between the Big Five personality traits and behavioral effectiveness. *Human Performance*, 23(3), 213-228.
- Kelly, G. A. (1955). *The psychology of personal constructs*. New York: Norton.
- Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition and emotion*, 17(2), 297-314.
- Kim, H., Di Domenico, S. I., & Connelly, B. S. (2019). Self–Other Agreement in Personality Reports: A Meta-Analytic Comparison of Self-and Informant-Report Means. *Psychological Science*, 30(1), 129-138.
- Kreft, I. G., & De Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks, Ca: Sage.
- Kubiak, T., Krog, K., Mehl, M., & Conner, T. (2011). *Handbook of research methods for studying daily life*. New York: The Guilford Press.
- La Guardia, J. G., & Ryan, R. M. (2007). Why identities fluctuate: Variability in traits as a function of situational variations in autonomy support. *Journal of Personality*, 75(6), 1205-1228.
- Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. *Journal of Personality and Social Psychology*, 61(1), 132.
- Lazarus, R. S., & Folkman, S. (1986). Coping and adaptation. *The handbook of behavioral medicine*. NY: Guilford, 282-325.
- Lee, J. S., Joo, E. J., & Choi, K. S. (2013). Perceived stress and self-esteem mediate the effects of work-related stress on depression. *Stress and Health*, 29(1), 75-81.
- Leung, K., Bond, M. H., de Carrasquel, S. R., Munoz, C., Hernández, M., Murakami, F., . . . Singelis, T. M. (2002). Social axioms: The search for universal dimensions of general

beliefs about how the world functions. *Journal of Cross-Cultural Psychology*, 33, 286–302.

Lewin, K. (1948). *Resolving social conflicts: Selected papers on group dynamics*. New York: Harper.

Lieberman, L., Liu, H., Huggins, A. A., Katz, A. C., Zvolensky, M. J., & Shankman, S. A. (2016). Comparing the validity of informant and self-reports of personality using laboratory indices of emotional responding as criterion variables. *Psychophysiology*, 53(9), 1386-1397.

Lievens, F., Chasteen, C. S., Day, E. A., & Christiansen, N. D. (2006). Large-scale investigation of the role of trait activation theory for understanding assessment center convergent and discriminant validity. *Journal of Applied Psychology*, 91(2), 247.

Lievens, F., De Koster, L., & Schollaert, E. (2008). Current theory and practice of assessment centers: The importance of trait activation. *Oxford Handbook of Personnel Psychology*, 233-245.

Lonati, S., Quiroga, B. F., Zehnder, C., & Antonakis, J. (2018). On doing relevant and rigorous experiments: Review and recommendations. *Journal of Operations Management*, 64, 19-40.

Lucas, R. E., & Diener, E. (2001). Understanding extraverts' enjoyment of social situations: The importance of pleasantness. *Journal of Personality and Social Psychology*, 81(2), 343.

Lucas, R. E., Le, K., & Dyrenforth, P. S. (2008). Explaining the extraversion/positive affect relation: Sociability cannot account for extraverts' greater happiness. *Journal of Personality*, 76(3), 385-414.

Maas, C. J., & Hox, J. (2005). Sufficient sample sizes for multilevel modeling. *Journal of Research Methods for the Behavioral and Social Sciences*, 1(3), 86–92.

- Magidson, J. F., Roberts, B. W., Collado-Rodriguez, A., & Lejuez, C. W. (2014). Theory-driven intervention for changing personality: Expectancy value theory, behavioral activation, and conscientiousness. *Developmental Psychology*, 50(5), 1442-1450
- Magnusson, D., & Endler, N. S. (1977). *Personality at the crossroads: Current Issues in Interactional Psychology*. Hillsdale, NJ: Lawrence Erlbaum Associates; New York; Toronto.
- Mauss, I., Wilhelm, F., & Gross, J. (2004). Is there less to social anxiety than meets the eye? Emotion experience, expression, and bodily responding. *Cognition and Emotion*, 18(5), 631-642.
- Mazure, C. M., Maciejewski, P. K., Jacobs, S. C., & Bruce, M. L. (2002). Stressful life events interacting with cognitive/personality styles to predict late-onset major depression. *The American Journal of Geriatric Psychiatry*, 10(3), 297-304.
- McAbee, S. T., & Connelly, B. S. (2016). A multi-rater framework for studying personality: The trait-reputation-identity model. *Psychological Review*, 123(5), 569.
- McAdams, D. P., & Pals, J. L. (2006). A new Big Five: Fundamental principles for an integrative science of personality. *American Psychologist*, 61(3), 204.
- McAdams, D. P., Anyidoho, N. A., Brown, C., Huang, Y. T., Kaplan, B., & Machado, M. A. (2004). Traits and stories: Links between dispositional and narrative features of personality. *Journal of Personality*, 72(4), 761-784.
- McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52(1), 81.
- McCrae, R. R., & Costa, P. T., Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 159-181). New York, NY, US: The Guilford Press.

- McCrae, R. R., Costa, P. T., Hrebickova, M., Ostendorf, F., Angleitner, A., Avia, M. D., . . . Smith, P. B. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology*, 78(1), 173-186.
- McDonald, R. P. (1999). *Test theory: A unified treatment*. L. Erlbaum Associates, Mahwah, N.J.
- McFarlane, A. C. (1989). The treatment of post-traumatic stress disorder. *British Journal of Medical Psychology*, 62(1), 81-90.
- McWilliams, N. (2011). *Psychoanalytic diagnosis: Understanding personality structure in the clinical process*. Guilford Press.
- Mehl, M. R., Gosling, S. D., & Pennebaker, J. W. (2006). Personality in its natural habitat: Manifestations and implicit folk theories of personality in daily life. *Journal of Personality and Social Psychology*, 90(5), 862.
- Mehl, M., & Conner, T. (2011). *Handbook Of research methods for studying daily life*. New York: Guilford Publications.
- Mercer-Lynn, K. B., Bar, R. J., & Eastwood, J. D. (2014). Causes of boredom: The person, the situation, or both?. *Personality and Individual Differences*, 56, 122-126.
- Mischel, W. (1968). *Personality and Assessment*. London: Wiley.
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 80, 252-283.
- Mischel, W. (1977). The interaction of person and situation. In D. Magnusson & N. S. Endler (Eds.), *Personality at the crossroads: Current Issues in Interactional Psychology* (pp. 333-352). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review*, 102(2), 246-268.

- Mischel, W., & Shoda, Y. (1998). Reconciling processing dynamics and personality dispositions. *Annual Review of Psychology*, 49, 229-258.
- Mischel, W., & Shoda, Y. (2008). Toward a unified theory of personality. *Handbook of personality: Theory and research*, 3, 208-241.
- Mobbs, D., Hagan, C. C., Azim, E., Menon, V., & Reiss, A. L. (2005). Personality predicts activity in reward and emotional regions associated with humor. *Proceedings of the National Academy of Sciences*, 102(45), 16502-16506.
- Moore, L. J., Wilson, M. R., Vine, S. J., Coussens, A. H., & Freeman, P. (2013). Champ or chump?: Challenge and threat states during pressurized competition. *Journal of Sport and Exercise Psychology*, 35(6), 551-562.
- Morrell, D. L., & Korsgaard, M. A. (2011). Training in context: Toward a person-by-situation view of voluntary training. *Human Resource Development Quarterly*, 22(3), 323-342.
- Morse, P. J., Sauerberger, K. S., Todd, E., & Funder, D. (2015). Relationships among personality, situational construal and social outcomes. *European Journal of Personality*, 29(2), 97-106.
- Moskowitz, D. S. (1982). Coherence and cross-situational generality in personality: A new analysis of old problems. *Journal of Personality and Social Psychology*, 43(4), 754.
- Muller, R. T., Endler, N. S., & Parker, J. D. (1990). The interaction model of anxiety assessed in two public speaking situations. *Personality and Individual Differences*, 11(4), 371-377.
- Murray, G., Judd, F., Jackson, H., Fraser, C., Komiti, A., Hodgins, G., . . . Robins, G. (2005). The five factor model and accessibility/remoteness: Novel evidence for person–environment interaction. *Personality and Individual Differences*, 39, 715–725.
<http://dx.doi.org/10.1016/j.paid.2005.02.007>

- Murray, H. A. (1938). *Explorations in personality: A clinical and experimental study of fifty men of college age*. Oxford, UK: Oxford University Press.
- Muthén, L. K., & Muthén, B. O. (2012). Mplus user's guide (1998–2012). *Los Angeles, CA: Muthén & Muthén*, 6.
- Nagpal, M., & Gupta, B. S. (1979). Personality, reinforcement and verbal operant conditioning. *British Journal of Psychology*, 70, 471-476.
- Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R² from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, 4(2), 133-142.
- Neisser, U. (1967). *Cognitive psychology*. New York: Appleton-Century-Crofts.
- Nestler, S., Back, M. D., & Egloff, B. (2011). Psychometric properties of the two scales for assessing individual differences in preference for solitude. *Diagnostica*, 57(2), 57-67.
- Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist*, 61(6), 622.
- Omura, K., Constable, R. T., & Canli, T. (2005). Amygdala gray matter concentration is associated with extraversion and neuroticism. *Neuroreport*, 16(17), 1905-1908.
- Ozer, D. J., & Benet-Martinez, V. (2006). Personality and the prediction of consequential outcomes. *Annu. Rev. Psychol.*, 57, 401-421.
- Pace, C. R., & Stern, G. G. (1958). An approach to the measurement of psychological characteristics of college environments. *Journal of Educational Psychology*, 49(5), 269.
- Paulhus, D. L., & Vazire, S. (2007). The self-report method. *Handbook of research methods in personality psychology*, 1, 224-239.
- Pervin, L. A. (1977). The representative design of person-situation research. *Personality at the crossroads: Current Issues in Interactional Psychology*, 371-384.

- Pickering, A. D. (2004). The neuropsychology of impulsive antisocial sensation seeking personality traits: From dopamine to hippocampal function? In R. M. Stelmack (Ed.), *On the psychobiology of personality: Essays in honor of Marvin Zuckerman* (pp. 453–477). New York: Elsevier.
- Pickering, A. D. (2008). Formal and computational models of Reinforcement Sensitivity Theory. In P. J. Corr (Ed.), *The reinforcement sensitivity theory of personality* (pp. 453-481). New York, NY, US: Cambridge University Press.
- Pickering, A. D., & Gray, J. A. (1999). The neuroscience of personality. *Handbook of Personality: Theory and Research*, 2, 277-299.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879.
- Price, R. H., & Blashfield, R. K. (1975). Explorations in the taxonomy of behavior settings: Analysis of dimensions and classification of settings. *American Journal of Community Psychology*, 3(4), 335-351.
- Rammsayer, T. H. (1998). Extraversion and dopamine: Individual differences in response to changes in dopaminergic activity as a possible biological basis of extraversion. *European Psychologist*, 3(1), 37-50.
- Rauch, S. L., Milad, M. R., Orr, S. P., Quinn, B. T., Fischl, B., & Pitman, R. K. (2005). Orbitofrontal thickness, retention of fear extinction, and extraversion. *NeuroReport*, 16, 1909–1912.
- Rauthmann, J. F., & Sherman, R. A. (2015). Ultra-brief measures for the situational eight DIAMONDS domains. *European Journal of Psychological Assessment*, (2), 165.
- Rauthmann, J. F., Gallardo-Pujol, D., Guillaume, E. M., Todd, E., Nave, C. S., Sherman, R. A., ... & Funder, D. C. (2014). The Situational Eight DIAMONDS: A taxonomy of

- major dimensions of situation characteristics. *Journal of Personality and Social Psychology*, 107(4), 677.
- Rauthmann, J. F., Sherman, R. A., Nave, C. S., & Funder, D. C. (2015). Personality-driven situation experience, contact, and construal: How people's personality traits predict characteristics of their situations in daily life. *Journal of Research in Personality*, 55, 98-111.
- Revelle, W. (1995). Personality processes. *Annual Review of Psychology*, 46(1), 295-328.
- Richard, F. D., Bond Jr, C. F., & Stokes-Zoota, J. J. (2001). "That's completely obvious... and important": Lay judgments of social psychological findings. *Personality and Social Psychology Bulletin*, 27(4), 497-505.
- Roberts, B. W. (2007). Contextualizing personality psychology. *Journal of Personality*, 75(6), 1071-1082.
- Roberts, B. W. (2009). Back to the Future: Personality and assessment and personality development. *Journal of Research in Personality*, 43(2), 137-145.
doi:10.1016/j.jrp.2008.12.015
- Roberts, B. W., & Jackson, J. J. (2008). Sociogenomic personality psychology. *Journal of Personality*, 76, 1523-1544.
- Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science*, 2(4), 313-345.
- Roberts, B. W., Luo, J., Briley, D. A., Chow, P. I., Su, R., & Hill, P. L. (2017). A Systematic Review of Personality Trait Change Through Intervention. *Psychological Bulletin*, 143 (2), 117

- Robinson, M. D., Moeller, S. K., & Fetterman, A. K. (2010). Neuroticism and responsiveness to error feedback: Adaptive self-regulation versus affective reactivity. *Journal of Personality, 78*(5), 1469-1496.
- Robinson, M. D., Moeller, S. K., & Ode, S. (2010). Extraversion and reward-related processing: Probing incentive motivation in affective priming tasks. *Emotion, 10*(5), 615.
- Rose, S. A., Blank, M., & Spalter, I. (1975). Situational specificity of behavior in young children. *Child Development, 46*, 464-469.
- Sandstrom, G. M., Lathia, N., Mascolo, C., & Rentfrow, P. J. (2017). Putting mood in context: Using smartphones to examine how people feel in different locations. *Journal of Research in Personality, 69*, 96-101.
- Santee, R. T., & Maslach, C. (1982). To agree or not to agree: Personal dissent amid social pressure to conform. *Journal of Personality and Social Psychology, 42*(4), 690.
- Saucier, G. (1994). Mini-Markers: A brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment, 63*(3), 506-516.
- Schaefer, M., Knuth, M., & Rumpel, F. (2011). Striatal response to favorite brands as a function of neuroticism and extraversion. *Brain research, 1425*, 83-89.
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological Bulletin, 92*(3), 641.
- Schmader, T. (2002). Gender identification moderates stereotype threat effects on women's math performance. *Journal of Experimental Social Psychology, 38*(2), 194-201.
- Schmit, M. J., Ryan, A. M., Stierwalt, S. L., & Powell, A. B. (1995). Frame-of-reference effects on personality scale scores and criterion-related validity. *Journal of Applied Psychology, 80*(5), 607.

- Sherman, R. A., Nave, C. N., & Funder, D. C. (2010). Situational similarity and personality predict behavioral consistency. *Journal of Personality and Social Psychology*, 99, 330–343. doi:10.1037/a0019796
- Sherman, R. A., Nave, C. S., & Funder, D. C. (2012). Properties of persons and situations related to overall and distinctive personality-behavior congruence. *Journal of Research in Personality*, 46, 87–101. doi: 10.1016/j.jrp.2011.12.006
- Sherman, R. A., Nave, C. S., & Funder, D. C. (2013). Situational construal is related to personality and gender. *Journal of Research in Personality*, 47(1), 1-14.
- Sherman, R. A., Rauthmann, J. F., Brown, N. A., Serfass, D. G., & Jones, A. B. (2015). The independent effects of personality and situations on real-time expressions of behavior and emotion. *Journal of Personality and Social Psychology*, 109(5), 872-888. doi:10.1037/pspp0000036
- Shoda, Y., Mischel, W., & Wright, J. C. (1993). Links between personality judgments and contextualized behavior patterns: Situation-behavior profiles of personality prototypes. *Social Cognition*, 11(4), 399-429.
- Shrout, P. E. (1998). Measurement reliability and agreement in psychiatry. *Statistical Methods in Medical Research*, 7(3), 301-317.
- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, 86(2), 420.
- Shrout, P. E., & Lane, S. P. (2012). Psychometrics. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 302–320). New York: Guilford Press.
- Silvia, P. J., Fayn, K., Nusbaum, E. C., & Beaty, R. E. (2015). Openness to experience and awe in response to nature and music: Personality and profound aesthetic experiences. *Psychology of Aesthetics, Creativity, and the Arts*, 9(4), 376.

- Simpson, J. A., & Winterheld, H. A. (2012). 20 Person-by-Situation Perspectives on Close Relationships. *The Oxford Handbook of Personality and Social Psychology*.
<https://www.oxfordhandbooks.com>.
- Sinn, D. L., & Moltschaniwskyj, N. A. (2005). Personality traits in dumpling squid (*Euprymna tasmanica*): Context-specific traits and their correlation with biological characteristics. *Journal of Comparative Psychology*, 119(1), 99-110.
doi:10.1037/0735-7036.119.1.99
- Smillie, L. D. (2008). What is reinforcement sensitivity? Neuroscience paradigms for approach-avoidance process theories of personality. *European Journal of Personality*, 22, 359-384. doi:10.1002/per.674
- Smillie, L. D. (2013). Extraversion and reward processing. *Psychological Science*, 23(3), 167-172. doi:10.1177/0963721412470133
- Smillie, L. D., Cooper, A. J., Wilt, J., & Revelle, W. (2012). Do extraverts get more bang for the buck? Refining the affective-reactivity hypothesis of extraversion. *Journal of Personality and Social Psychology*, 103(2), 306.
- Smillie, L. D., Cooper, A., & Pickering, A. D. (2011). Variation in Event Related Potential (ERP) index of dopamine signaling as a function of extraverted personality. *Social Cognitive and Affective Neuroscience*, 6.
- Smillie, L. D., Dalgleish, L. I., & Jackson, C. J. (2007). Distinguishing between learning and motivation in behavioral tests of the reinforcement sensitivity theory of personality. *Personality and Social Psychology Bulletin*, 33(4), 476-489.
- Smillie, L. D., Jach, H. K., Hughes, D. M., Wacker, J., Cooper, A. J., & Pickering, A. D. (2019). Extraversion and reward-processing: Consolidating evidence from an electroencephalographic index of reward-prediction-error. *Biological Psychology*, 146, 107735.

- Smillie, L. D., Pickering, A. D., & Jackson, C. J. (2006). The new reinforcement sensitivity theory: Implications for personality measurement. *Personality and Social Psychology Review, 10*(4), 320-335.
- Smillie, L. D., Wilt, J., Kabbani, R., Garratt, C., & Revelle, W. (2015). Quality of social experience explains the relation between extraversion and positive affect. *Emotion, 15*(3), 339-349. doi:10.1037/emo0000047
- Smillie, L. D., Zhao, K., & Barford, K. A. (2014). Avoiding "greedy reductionism" in personality theory comment on "Personality from a cognitive-biological perspective" by Y. Neuman. *Pshysics of Life Review*(11), 697-698.
doi:10.1016/j.plrev.2014.09.002
- Somerville, L. H., Kelley, W. M., & Heatherton, T. F. (2010). Self-esteem modulates medial prefrontal cortical responses to evaluative social feedback. *Cerebral Cortex, 20*(12), 3005-3013.
- Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes? The Life Outcomes of Personality Replication Project. *Psychological Science, 30*(5), 711-727.
- Soto, C. J., & John, O. P. (2016). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology, 2*-27.
doi:10.1037/pspp0000096
- Spain, J. S., Eaton, L. G., & Funder, D. C. (2000). Perspective on personality: The relative accuracy of self versus others for the prediction of emotion and behavior. *Journal of Personality, 68*(5), 837-867.
- Steel, P., Schmidt, J., & Shultz, J. (2008). Refining the relationship between personality and subjective well-being. *Psychological Bulletin, 134*(1), 138.

Sullivan, H. S. (1948). The meaning of anxiety in psychiatry and in life. *Psychiatry*, 11(1), 1-

13.

Sun, J., & Vazire, S. (2019). Do people know what they're like in the moment?

Psychological Science, 30(3), 405-414.

Sun, J., Kaufman, S. B., & Smillie, L. D. (2018). Unique associations between big five personality aspects and multiple dimensions of well-being. *Journal of*

Personality, 86(2), 158-172.

Sun, J., Rhemtulla, M., & Vazire, S. (2019). Eavesdropping on Missing Data: What Are People Doing When They Miss Experience Sampling Reports?.

<https://doi.org/10.31234/osf.io/5tcwd>

Team, R. C. (2018). R: A language and environment for statistical computing; 2015.

Tellegen, A. (1981). Practicing the two disciplines for relaxation and enlightenment:

Comment on “Role of feedback signal in electromyograph feedback: The relevance of attention” by Qualls and Sheehan. *Journal of Experimental Psychology: General*, 110, 217–226.

Ten Berge, M. A., & De Raad, B. (1999). Taxonomies of situations from a trait psychological perspective. A review. *European Journal of Personality*, 13(5), 337-360.

Ten Berge, M. A., & De Raad, B. (2002). The structure of situations from a personality perspective. *European Journal of Personality*, 16(2), 81-102.

Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied psychology*, 88(3), 500.

Tett, R. P., & Guterman, H. A. (2000). Situation trait relevance, trait expression, and cross-situational consistency: Testing a principle of trait activation. *Journal of Research in Personality*, 34(4), 397-423.

Tomkins, S. S. (1962). *Affect imagery consciousness: Volume I: The positive affects* (Vol. 1). Springer publishing company.

- Van Heck, G. L. (1984). The construction of a general taxonomy of situations. *Personality psychology in Europe: Theoretical and empirical developments, 1*, 149-164.
- Vazire, S. (2010). Who knows what about a person? The self–other knowledge asymmetry (SOKA) model. *Journal of Personality and Social Psychology*, 98(2), 281.
- Vazire, S., & Solomon, B. C. (2015). Self- and other-knowledge of personality. In M. Mikulincer, P. R. Shaver, M. L. Cooper, & R. J. Larsen (Eds.), *APA handbooks in psychology®. APA handbook of personality and social psychology, Vol. 4. Personality processes and individual differences* (pp. 261-281). Washington, DC, US: American Psychological Association.
- Wacker, J., & Smillie, L. D. (2015). Trait extraversion and dopamine function. *Social and Personality Psychology Compass*, 9(6), 225-238.
- Wacker, J., & Stemmler, G. (2006). Agentic extraversion modulates the cardiovascular effects of the dopamine D2 agonist bromocriptine. *Psychophysiology*, 43(4), 372-381.
- Wacker, J., Chavanon, M. L., & Stemmler, G. (2006). Investigating the dopaminergic basis of extraversion in humans: A multilevel approach. *Journal of Personality and Social Psychology*, 91(1), 171.
- Wagerman, S. A., & Funder, D. C. (2009). Personality psychology of situations. In P. J. Corr & G. Matthews (Eds.), *The Cambridge handbook of personality psychology* (pp. 27-42). New York, NY, US: Cambridge University Press.
- Wallin, D. J. (2007). *Attachment in psychotherapy*. Guilford press.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063.
- Watson, J. B. (1930). *Der Behaviorismus [Behaviorism]*. Oxford, England: Deutsche Verlags-Anstalt.

Wiggins, J. S., & Trapnell, P. D. (1997). Personality structure: The return of the Big Five.

In *Handbook of Personality Psychology* (pp. 737-765). Academic Press.

Wilt, J., & Revelle, W. (2009). Extraversion. In M. Leary & R. Hoyle (Eds.), *Handbook of Individual Differences in Social Behavior*. New York: Guilford.

Wilt, J., & Revelle, W. (2015). Affect, behaviour, cognition and desire in the Big Five: An analysis of item content and structure. *European Journal of Personality*, 29(4), 478-497.

Wilt, J., & Revelle, W. (2019). The Big Five, everyday contexts and activities, and affective experience. *Personality and Individual Differences*, 136, 140-147.

Wilt, J., Oehlberg, K., & Revelle, W. (2011). Anxiety in personality. *Personality and Individual Differences*, 50(7), 987-993. doi:10.1016/j.paid.2010.11.014

Wood, D., & Roberts, B. W. (2006). Cross-sectional and longitudinal tests of the Personality and Role Identity Structural Model (PRISM). *Journal of Personality*, 74(3), 779-810.

Wright, J. C., & Mischel, W. (1987). A conditional approach to dispositional constructs: the local predictability of social behavior. *Journal of Personality and Social Psychology*, 53(6), 1159.

Wrzus, C., Wagner, G. G., & Riediger, M. (2016). Personality-situation transactions from adolescence to old age. *Journal of Personality and Social Psychology*, 110(5), 782.

Wu, C. C., Samanez-Larkin, G. R., Katovich, K., & Knutson, B. (2014). Affective traits link to reliable neural markers of incentive anticipation. *Neuroimage*, 84, 279-289.

Yao, Q., & Moskowitz, D. S. (2015). Trait agreeableness and social status moderate behavioral responsiveness to communal behavior. *Journal of Personality*, 83(2), 191-201.

Yoon, K. L., & Zinbarg, R. E. (2007). Threat is in the eye of the beholder: Social anxiety and the interpretation of ambiguous facial expressions. *Behaviour Research and Therapy*, 45(4), 839-847.

Zelenski, J. M., Whelan, D. C., Nealis, L. J., Besner, C. M., Santoro, M. S., & Wynn, J. E.

(2013). Personality and affective forecasting: Trait introverts underpredict the hedonic benefits of acting extraverted. *Journal of Personality and Social Psychology*, 104(6), 1092.

Zettler, I., & Hilbig, B. E. (2010). Honesty–humility and a person–situation interaction at work. *European Journal of Personality*, 24(7), 569-582.

Zhao, K., Ferguson, E., & Smillie, L. D. (2016). Prosocial personality traits differentially predict egalitarianism, generosity, and reciprocity in economic games. *Frontiers in Psychology*, 7, 1137.

Appendices

Appendix A. Personality Questionnaires (Studies 1 to 4)

Appendix A1. Big Five Aspect Scales (DeYoung et al., 2007)

Here are a number of characteristics that may or may not describe you. For example, do you agree that you seldom feel blue, compared to most other people? Please fill in the number that best indicates the extent to which you agree or disagree with each statement listed below. Be as honest as possible, but rely on your initial feeling and do not think too much about each item. Use the following scale: 1 ----- 2 ----- 3 -----
-- 4 ----- 5

Disagree	Strongly Disagree	Neither Agree Nor
Strongly Agree		

1. ___ Seldom feel blue.
2. ___ Am not interested in other people's problems.
3. ___ Carry out my plans.
4. ___ Make friends easily.
5. ___ Am quick to understand things.
6. ___ Get angry easily.
7. ___ Respect authority.
8. ___ Leave my belongings around.
9. ___ Take charge.
10. ___ Enjoy the beauty of nature.
11. ___ Am filled with doubts about things.
12. ___ Feel others' emotions.
13. ___ Waste my time.
14. ___ Am hard to get to know.
15. ___ Have difficulty understanding abstract ideas.
16. ___ Rarely get irritated.
17. ___ Believe that I am better than others.
18. ___ Like order.
19. ___ Have a strong personality.
20. ___ Believe in the importance of art.
21. ___ Feel comfortable with myself.
22. ___ Inquire about others' well-being.
23. ___ Find it difficult to get down to work.
24. ___ Keep others at a distance.
25. ___ Can handle a lot of information.
26. ___ Get upset easily.
27. ___ Hate to seem pushy.
28. ___ Keep things tidy.
29. ___ Lack the talent for influencing people.
30. ___ Love to reflect on things.
31. ___ Feel threatened easily.
32. ___ Can't be bothered with other's needs.
33. ___ Mess things up.
34. ___ Reveal little about myself.
35. ___ Like to solve complex problems.
36. ___ Keep my emotions under control.

37. ___ Take advantage of others.
38. ___ Follow a schedule.
39. ___ Know how to captivate people.
40. ___ Get deeply immersed in music.
41. ___ Rarely feel depressed.
42. ___ Sympathize with others' feelings.
43. ___ Finish what I start.
44. ___ Warm up quickly to others.
45. ___ Avoid philosophical discussions.
46. ___ Change my mood a lot.
47. ___ Avoid imposing my will on others.
48. ___ Am not bothered by messy people.
49. ___ Wait for others to lead the way.
50. ___ Do not like poetry.
51. ___ Worry about things.
52. ___ Am indifferent to the feelings of others.
53. ___ Don't put my mind on the task at hand.
54. ___ Rarely get caught up in the excitement.
55. ___ Avoid difficult reading material.
56. ___ Rarely lose my composure.
57. ___ Rarely put people under pressure.
58. ___ Want everything to be "just right."
59. ___ See myself as a good leader.
60. ___ Seldom notice the emotional aspects of
paintings and pictures.
61. ___ Am easily discouraged.
62. ___ Take no time for others.
63. ___ Get things done quickly.
64. ___ Am not a very enthusiastic person.
65. ___ Have a rich vocabulary.
66. ___ Am a person whose moods go up and down easily.
67. ___ Insult people.
68. ___ Am not bothered by disorder.
69. ___ Can talk others into doing things.
70. ___ Need a creative outlet.
71. ___ Am not embarrassed easily.
72. ___ Take an interest in other people's lives.
73. ___ Always know what I am doing.
74. ___ Show my feelings when I'm happy.
75. ___ Think quickly.
76. ___ Am not easily annoyed.
77. ___ Seek conflict.
78. ___ Dislike routine.
79. ___ Hold back my opinions.
80. ___ Seldom get lost in thought.
81. ___ Become overwhelmed by events.
82. ___ Don't have a soft side.
83. ___ Postpone decisions.
84. ___ Have a lot of fun.
85. ___ Learn things slowly.

86. ___ Get easily agitated.
87. ___ Love a good fight.
88. ___ See that rules are observed.
89. ___ Am the first to act.
90. ___ Seldom daydream.
91. ___ Am afraid of many things.
92. ___ Like to do things for others.
93. ___ Am easily distracted.
94. ___ Laugh a lot.
95. ___ Formulate ideas clearly.
96. ___ Can be stirred up easily.
97. ___ Am out for my own personal gain.
98. ___ Want every detail taken care of.
99. ___ Do not have an assertive personality.
100. ___ See beauty in things that others

Scoring

Neuroticism

Withdrawal: 1R, 11, 21R, 31, 41R, 51, 61, 71R, 81, 91

Volatility: 6, 16R, 26, 36R, 46, 56R, 66, 76R, 86, 96

Agreeableness

Compassion: 2R, 12, 22, 32R, 42, 52R, 62R, 72, 82R, 92

Politeness: 7, 17R, 27, 37R, 47, 57, 67R, 77R, 87R, 97R

Conscientiousness

Industriousness: 3, 13R, 23R, 33R, 43, 53R, 63, 73, 83R, 93R

Orderliness: 8R, 18, 28, 38, 48R, 58, 68R, 78R, 88, 98

Extraversion

Enthusiasm: 4, 14R, 24R, 34R, 44, 54R, 64R, 74, 84, 94

Assertiveness: 9, 19, 29R, 39, 49R, 59, 69, 79R, 89, 99R

Openness/Intellect

Intellect: 5, 15R, 25, 35, 45R, 55R, 65, 75, 85R, 95

Openness: 10, 20, 30, 40, 50R, 60R, 70, 80R, 90R, 100

Reverse response scores for items followed by “R” (i.e. 1=5, 2=4, 4=2, 5=1). To compute scale scores, average completed items within each scale. To compute Big Five scores, average scores for the two aspects within each domain.

Appendix A2. The Big Five Inventory-2 (John & Soto, 2016)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

1 Disagree strongly	2 Disagree a little	3 Neutral; no opinion	4 Agree a little	5 Agree strongly
<i>I am someone who . . .</i>				
1. ☐ Is outgoing, sociable				31. ☐ Is sometimes shy, introverted
2. ☐ Is compassionate, has a soft heart				32. ☐ Is helpful and unselfish with others
3. ☐ Tends to be disorganized				33. ☐ Keeps things neat and tidy
4. ☐ Is relaxed, handles stress well				34. ☐ Worries a lot
5. ☐ Has few artistic interests				35. ☐ Values art and beauty
6. ☐ Has an assertive personality				36. ☐ Finds it hard to influence people
7. ☐ Is respectful, treats others with respect				37. ☐ Is sometimes rude to others
8. ☐ Tends to be lazy				38. ☐ Is efficient, gets things done
9. ☐ Stays optimistic after experiencing a setback				39. ☐ Often feels sad
10. ☐ Is curious about many different things				40. ☐ Is complex, a deep thinker
11. ☐ Rarely feels excited or eager				41. ☐ Is full of energy
12. ☐ Tends to find fault with others				42. ☐ Is suspicious of others' intentions
13. ☐ Is dependable, steady				43. ☐ Is reliable, can always be counted on
14. ☐ Is moody, has up and down mood swings				44. ☐ Keeps their emotions under control
15. ☐ Is inventive, finds clever ways to do things				45. ☐ Has difficulty imagining things
16. ☐ Tends to be quiet				46. ☐ Is talkative
17. ☐ Feels little sympathy for others				47. ☐ Can be cold and uncaring
18. ☐ Is systematic, likes to keep things in order				48. ☐ Leaves a mess, doesn't clean up
19. ☐ Can be tense				49. ☐ Rarely feels anxious or afraid
20. ☐ Is fascinated by art, music, or literature				50. ☐ Thinks poetry and plays are boring
21. ☐ Is dominant, acts as a leader				51. ☐ Prefers to have others take charge
22. ☐ Starts arguments with others				52. ☐ Is polite, courteous to others
23. ☐ Has difficulty getting started on tasks				53. ☐ Is persistent, works until the task is finished
24. ☐ Feels secure, comfortable with self				54. ☐ Tends to feel depressed, blue
25. ☐ Avoids intellectual, philosophical discussions				55. ☐ Has little interest in abstract Ideas
26. ☐ Is less active than other people				56. ☐ Shows a lot of Enthusiasm
27. ☐ Has a forgiving nature				57. ☐ Assumes the best about people
28. ☐ Can be somewhat careless				58. ☐ Sometimes behaves irresponsibly
29. ☐ Is emotionally stable, not easily upset				59. ☐ Is temperamental, gets emotional easily
30. ☐ Has little creativity				60. ☐ Is original, comes up with new Ideas

Please check: Did you write a number in front of each statement?

Note. BFI-2 items copyright 2016 by Oliver P. John and Christopher J. Soto. Reprinted with permission.

Scoring Key

Item numbers for the BFI-2 domain and facet scales are presented below. False-keyed items are denoted by "R." SPSS syntax for scoring the scales is available from the first author. To download or get more information about the BFI-2, visit the Colby Personality Lab website (<http://www.colby.edu/psych/personality-lab/>).

BFI-2 Domain Scales

Extraversion: 1, 6, 11R, 16R, 21, 26R, 31R, 36R, 41, 46, 51R, 56
 Agreeableness: 2, 7, 12R, 17R, 22R, 27, 32, 37R, 42R, 47R, 52, 57
 Conscientiousness: 3R, 8R, 13, 18, 23R, 28R, 33, 38, 43, 48R, 53, 58R
 Negative Emotionality: 4R, 9R, 14, 19, 24R, 29R, 34, 39, 44R, 49R, 54, 59
 Open-Mindedness: 5R, 10, 15, 20, 25R, 30R, 35, 40, 45R, 50R, 55R, 60

BFI-2 Facet Scales

Sociability: 1, 16R, 31R, 46
 Assertiveness: 6, 21, 36R, 51R
 Energy Level: 11R, 26R, 41, 56
 Compassion: 2, 17R, 32, 47R
 Respectfulness: 7, 22R, 37R, 52
 Trust: 12R, 27, 42R, 57
 Organization: 3R, 18, 33, 48R
 Productiveness: 8R, 23R, 38, 53
 Responsibility: 13, 28R, 43, 58R
 Anxiety: 4R, 19, 34, 49R
 Depression: 9R, 24R, 39, 54
 Emotional Volatility: 14, 29R, 44R, 59
 Intellectual Curiosity: 10, 25R, 40, 55R
 Aesthetic Sensitivity: 5R, 20, 35, 50R
 Creative Imagination: 15, 30R, 45R, 60

Appendix A3. The Big Five Mini Marker (Saucier,1994)

Please use this list of common human traits to describe yourself as accurately as possible. 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. For each trait, please select the item that best indicates how accurately that trait describes you.

<i>Inaccurate</i>				<i>?</i>	<i>Accurate</i>			
<i>Extremely</i>	<i>Very</i>	<i>Moderately</i>	<i>Slightly</i>		<i>Slightly</i>	<i>Moderately</i>	<i>Very</i>	<i>Extremely</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
___ Bashful		___ Energetic			___ Moody		___ Systematic	
___ Bold		___ Envious			___ Organized		___ Talkative	
___ Careless		___ Extraverted			___ Philosophical		___ Temperamental	
___ Cold		___ Fretful			___ Practical		___ Touchy	
___ Complex		___ Harsh			___ Quiet		___ Uncreative	
___ Cooperative		___ Imaginative			___ Relaxed		___ Unenvious	
___ Creative		___ Inefficient			___ Rude		___ Unintellectual	
___ Deep		___ Intellectual			___ Shy		___ Unsympathetic	
___ Disorganized		___ Jealous			___ Sloppy		___ Warm	
___ Efficient		___ Kind			___ Sympathetic		___ Withdrawn	

Appendix A4. The Big Five Dimensional Circumplex Facets (Hofstee, De Raad, & Goldberg, 1992)

Instructions refer to the Big Five Mini Markers.

Facet	Projection	Term	Facet	Projection	Term
Factor I					
I+I+	.68	talkative	I-I-	.75	shy
	.65	extraverted		.72	quiet
	.60	aggressive		.71	introverted
	.58	verbal		.69	silent
	.54	assertive		.69	untalkative
	.50	unrestrained		.68	bashful
	.47	forward		.67	withdrawn
	.47	outspoken		.55	inhibited
	.45	daring			
	.32	flamboyant			
I+II+	.62	sociable	I-II-	.58	unsociable
	.61	social		.53	uncommunicative
	.52	enthusiastic		.49	seclusive
	.51	communicative		.36	glum
	.51	spirited		.36	detached
	.50	energetic		.29	skeptical
	.49	vibrant		.28	aloof
	.48	magnetic		.25	wary
	.48	zestful			
		(+8 others)			
I+II-	.52	dominant	I-II+	.68	timid
	.52	domineering		.60	unaggressive
	.49	forceful		.44	submissive
	.40	bossy		.42	modest
	.35	boastful		.29	naive
	.30	opinionated		.22	compliant
	.27	cunning			
I+III+	.47	active	I-III-	.48	unenergetic
	.33	competitive		.37	uncompetitive
	.28	persistent		.36	sluggish
	.20	proud		.33	nonpersistent
				.32	indirect
				.32	vague
				.30	lethargic
				.29	helpless
I+III-	.39	boisterous	I-III+	.68	reserved
	.36	mischievous		.50	restrained
	.34	exhibitionistic		.41	serious
	.32	immodest		.34	conservative
	.29	gregarious		.30	discreet
	.24	demonstrative		.26	prudish
I+IV+	.60	confident	I-IV-	.48	lonely
	.58	bold		.44	weak
	.55	assured		.43	cowardly
	.44	uninhibited		.42	pessimistic
	.42	courageous		.41	melancholic
	.41	brave		.31	guarded
	.40	self-satisfied		.25	secretive
	.40	vigorous			
	.39	strong			
		(+6 others)			
I+IV-	.36	flirtatious	I-IV+	.38	tranquil
	.34	explosive		.36	sedate
	.30	wordy		.36	placid
	.23	extravagant		.26	ethical
				.24	impartial
				.21	acquiescent

Facet	Projection	Term	Facet	Projection	Term
Factor I (<i>continued</i>)					
I+V+	.41	expressive	I-V-	.51	passive
	.37	adventurous		.49	meek
	.35	dramatic		.48	dull
	.32	spontaneous		.46	bland
	.30	opportunistic		.42	unadventurous
	.29	witty		.38	somber
	.27	independent		.29	docile
	.20	candid		.24	apathetic
				.23	blasé
				.20	prideless
I+V-	.22	verbose	I-V+	.23	inner-directed
Factor II					
II+II+	.66	sympathetic	II-II-	.59	unsympathetic
	.64	kind		.52	unkind
	.60	warm		.49	harsh
	.56	understanding		.45	insincere
	.49	sincere		.40	cruel
	.48	compassionate		.36	unforgiving
	.38	cordial		.27	smug
	.31	accommodating		.26	prejudiced
II+I+	.54	merry	II-I-	.63	cold
	.53	cheerful		.49	unfriendly
	.50	happy		.45	impersonal
	.49	friendly		.34	joyless
	.46	effervescent		.33	cynical
	.42	jovial		.23	miserly
	.33	humorous			
II+I-	.55	soft-hearted	II-I+	.38	rough
	.47	agreeable		.37	abrupt
	.38	obliging		.33	crude
	.37	humble		.33	combative
	.30	lenient		.32	bullheaded
	.29	homespun		.31	sly
				.30	manipulative
				.28	gruff
				.27	devious
					(+2 others)
II+III+	.58	helpful	II-III-	.54	inconsiderate
	.57	cooperative		.51	rude
	.56	considerate		.45	impolite
	.54	respectful		.43	distrustful
	.50	polite		.43	uncooperative
	.47	reasonable		.42	abusive
	.45	courteous		.41	disrespectful
	.43	thoughtful		.41	thoughtless
	.43	loyal		.39	egotistical
	.33	moral			(+7 others)
II+III-			II-III+	.42	hard
				.29	rigid
II+IV+	.56	trustful	II-IV-	.47	demanding
	.53	pleasant		.46	selfish
	.49	tolerant		.44	ill-tempered
	.46	peaceful		.43	antagonistic
	.45	generous		.43	bitter
	.43	easy-going		.42	scornful
	.41	fair		.40	greedy
	.41	charitable		.40	critical
	.40	flexible		.38	disagreeable
		(+15 others)			(+9 others)

Facet	Projection	Term	Facet	Projection	Term
Factor II (<i>continued</i>)					
II+IV-	.53	sentimental	II-IV+	.51	insensitive
	.52	affectionate		.42	unaffectionate
	.51	sensitive		.40	passionless
	.43	soft			
	.42	passionate			
	.41	romantic			
	.35	feminine			
II+V+	.28	genial	II-V-	.43	uncharitable
	.24	tactful		.35	ruthless
				.35	coarse
				.34	narrow-minded
				.33	callous
				.33	tactless
				.31	curt
				.31	bigoted
				.28	vindictive (+3 others)
II+V-			II-V+	.40	shrewd
Factor III					
III+III+	.77	organized	III-III-	.76	disorganized
	.67	neat		.62	disorderly
	.67	orderly		.61	careless
	.63	systematic		.60	unsystematic
	.62	efficient		.57	sloppy
	.58	precise		.49	impractical
	.54	practical		.45	absent-minded
	.50	prompt		.32	wasteful
	.46	exacting			
	.44	meticulous			
	.23	fastidious			
III+I+	.43	alert	III-I-	.61	inefficient
	.38	ambitious		.47	lazy
	.34	firm		.42	indecisive
	.33	purposeful		.34	aimless
				.34	wishy-washy
				.30	noncommittal
				.27	unambitious
III+I-	.52	careful	III-I+	.43	reckless
	.50	cautious		.33	unruly
	.43	punctual		.33	devil-may-care
	.34	formal			
	.34	thrifty			
	.24	principled			
	.21	circumspect			
III+II+	.62	responsible	III-II-	.53	unreliable
	.60	dependable		.49	negligent
	.58	reliable		.49	undependable
	.47	mannerly		.28	rash
	.36	conscientious			
	.36	mature			
III+II-	.33	stern	III-II+		
	.32	strict			
	.20	deliberate			

Facet	Projection	Term	Facet	Projection	Term
Factor III (<i>continued</i>)					
III+IV+	.62	thorough	III-IV-	.55	inconsistent
	.55	steady		.41	scatterbrained
	.50	consistent		.40	unstable
	.50	self-disciplined		.40	erratic
	.44	logical		.39	forgetful
	.43	decisive		.34	impulsive
	.41	economical		.28	frivolous
	.40	controlled			
	.40	concise			
		(+5 others)			
III+IV-			III-IV+		
III+V+	.42	industrious	III-V-	.55	haphazard
	.38	perfectionistic		.38	illogical
	.33	sophisticated		.35	immature
	.30	dignified		.34	foolhardy
	.29	refined		.31	lax
	.29	cultured		.31	unconscientious
	.28	progressive		.30	unprogressive
	.25	foresighted		.23	flippant
III+V-	.36	conventional	III-V+	.34	unconventional
	.30	traditional			
Factor IV					
IV+IV+	.60	unenvious	IV-IV-	.59	moody
				.55	jealous
				.44	possessive
				.44	anxious
				.37	fidgety
IV+I+	.49	unselfconscious	IV-I-	.59	self-pitying
	.29	weariless		.55	insecure
	.22	indefatigable		.54	fretful
				.53	touchy
				.53	envious
				.51	nervous
				.46	fearful
				.42	negativistic
				.31	self-critical
IV+I-	.52	unexcitable	IV-I+	.45	high-strung
	.28	unassuming		.37	excitable
				.28	meddlesome
				.22	volatile
IV+II+	.54	patient	IV-II-	.60	irritable
	.53	relaxed		.60	temperamental
	.50	undemanding		.48	defensive
	.42	uncritical		.47	quarrelsome
	.39	optimistic		.47	faultfinding
	.34	conceitless		.46	impatient
	.31	down-to-earth		.45	grumpy
	.20	unpretentious		.44	crabby
				.44	cranky
					(+6 others)
IV+II-	.61	unemotional	IV-II+	.62	emotional
	.38	masculine		.37	gullible

Facet	Projection	Term	Facet	Projection	Term
Factor IV (<i>continued</i>)					
IV+III+			IV-III-	.32	hypocritical
				.32	compulsive
				.31	nosey
				.31	gossipy
				.23	lustful
				.20	self-indulgent
IV+III-	.35	informal	IV-III+	.31	particular
IV+V+	.23	versatile	IV-V-	.23	contemptuous
IV+V-	.40	imperturbable	IV-V+		
Factor V					
V+V+	.63	creative	V-V-	.60	uncreative
	.54	imaginative		.52	unintellectual
	.53	philosophical		.50	unintelligent
	.50	complex			
	.50	artistic			
V+I+	.33	theatrical	V-I-	.59	unimaginative
	.27	worldly		.38	uninquisitive
	.26	eloquent		.26	inarticulate
	.24	inquisitive		.26	predictable
	.24	intense			
V+I-	.44	introspective	V-I+	.22	unscrupulous
	.41	meditative		.20	pompous
	.36	contemplating			
	.27	self-examining			
V+II+	.48	deep	V-II-	.42	shallow
	.26	diplomatic		.22	terse
	.22	idealistic			
V+II-	.32	individualistic	V-II+	.43	simple
	.21	eccentric		.30	dependent
				.23	servile
V+III+	.37	analytical	V-III-	.36	shortsighted
	.34	perceptive		.35	unobservant
	.26	informative		.24	ignorant
	.24	articulate		.24	indiscreet
V+III-			V-III+		
V+IV+	.55	intellectual	V-IV-		
	.52	inventive			
	.50	intelligent			
	.49	brilliant			
	.48	innovative			
	.47	smart			
	.47	knowledgeable			
	.43	bright			
	.43	ingenious			
		(+5 others)			
V+IV-	.21	sensual	V-IV+	.42	unreflective
				.41	unsophisticated
				.40	imperceptive
				.21	provincial

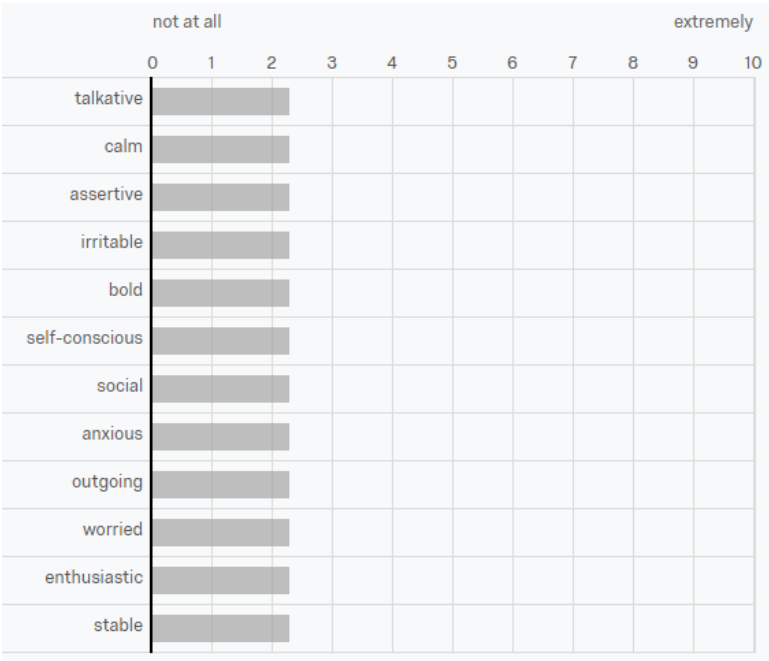
Appendix B. Chapter 2 (Study 1)

Appendix B1. Contextualized State Measures

Contextualized Extraverted State Measures

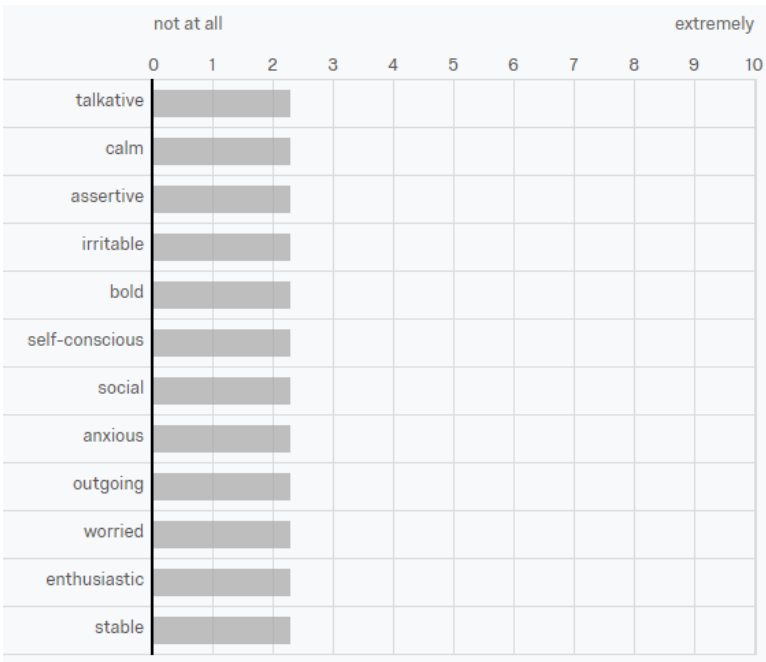
1. To what extent would you behave or feel in these ways, when you are in a situation where you have an opportunity to gain some kind of reward?

Reward here refers to anything that is rewarding to you. For example: praise/worship, love/friendships, social status, bonus, a prize/an award, etc.



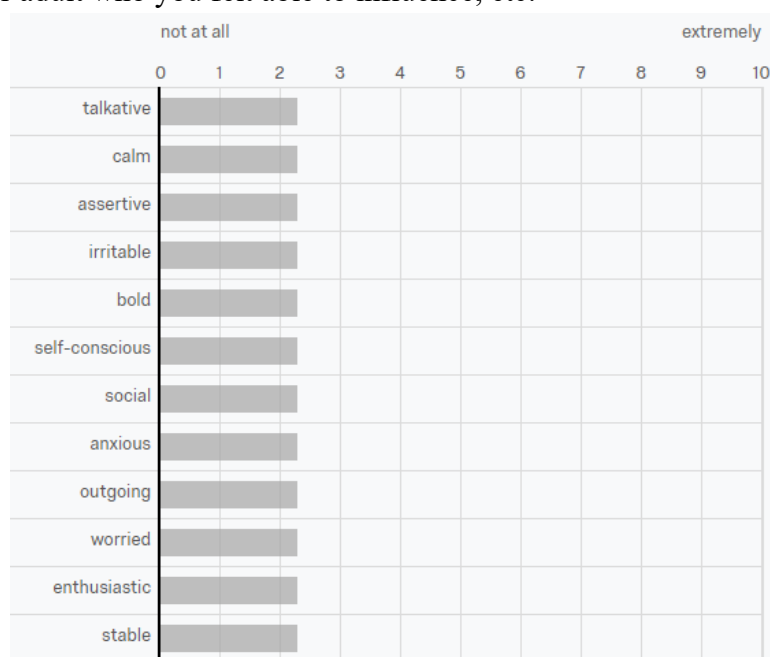
2. To what extent would you behave or feel in these ways, when you are in a situation where you have opportunities to lead or influence others?

For example, delegating work to others, people asking you for advice, giving feedback to others, etc.



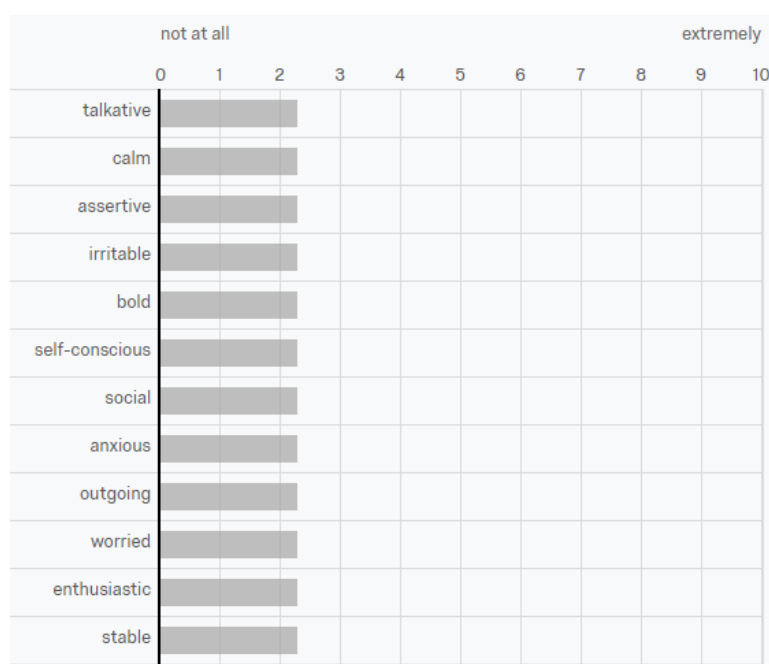
3. To what extent would you behave or feel in these ways, when you are in a situation where you have some degree of power or control over others?

For example, when with a student of yours, a subordinate, or perhaps a child of yours, or even with another adult who you felt able to influence, etc.

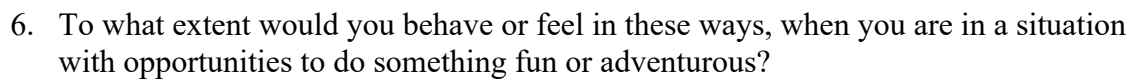


4. To what extent would you behave or feel in these ways, when you are in or looking forward to attending a positive social activity?

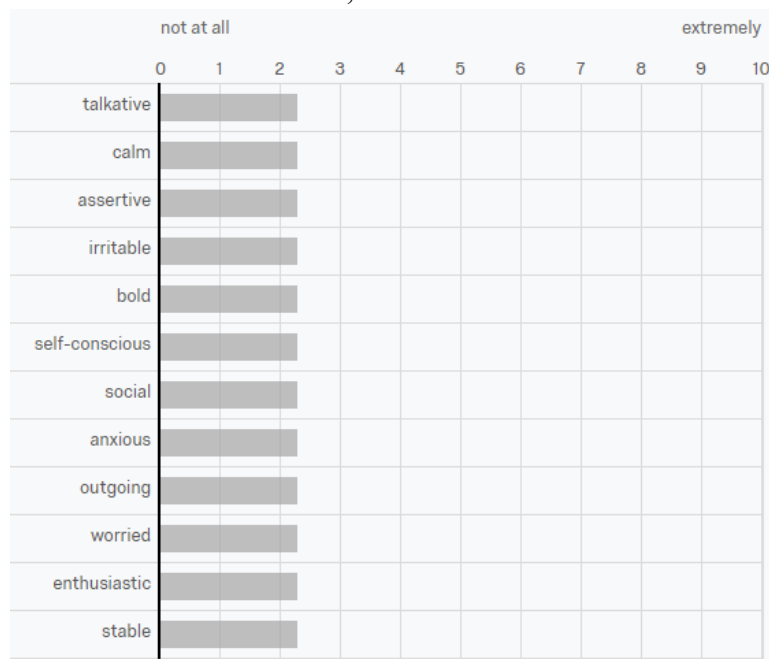
For example: when catching up with a friend, when you are looking forward to attending a party, when you are in or looking forward a date with someone you like, etc.



- For example, trying to impress someone, trying to achieve a fitness goal, shopping for a much desired object.



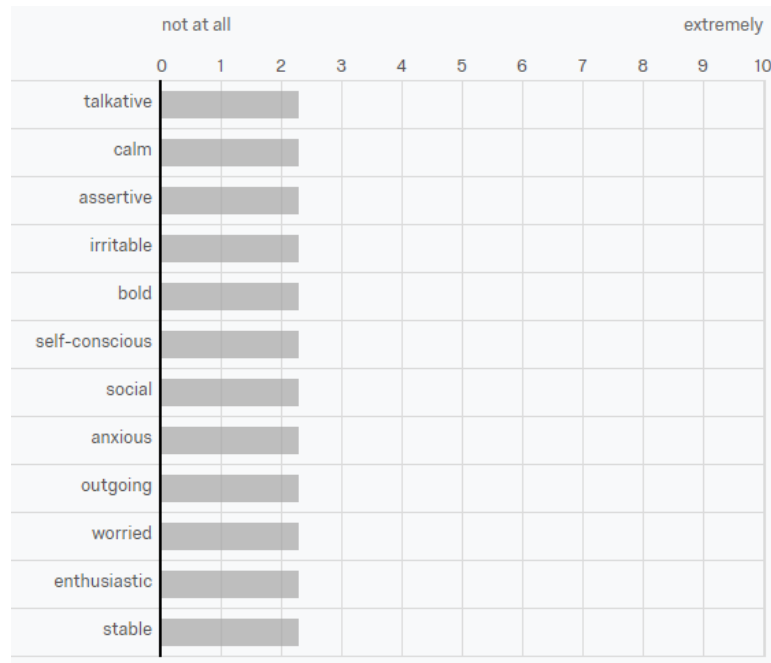
For example, something adventurous like playing an extreme sports, something fun like attending the show “America's Got Talent”, etc.



Contextualized Neurotic State Measures

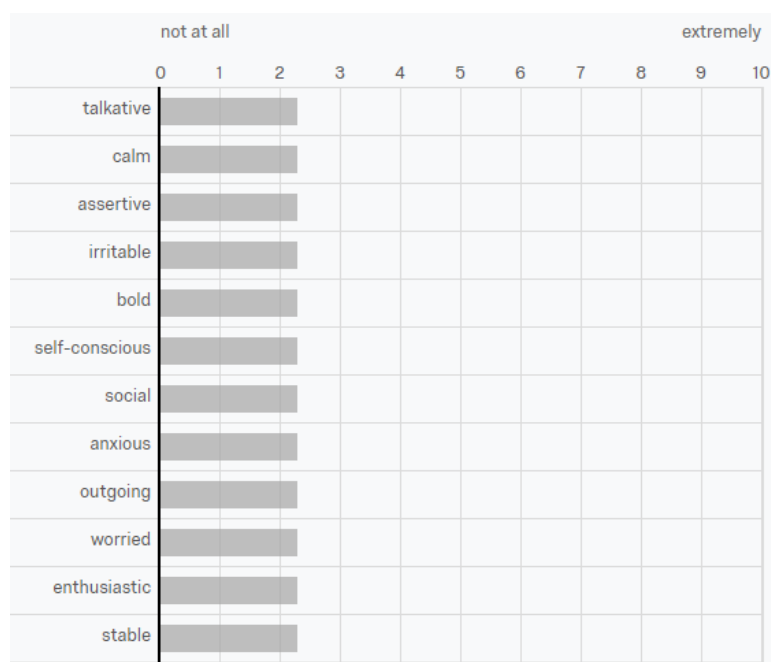
1. To what extent would you behave or feel in these ways, when you are in a situation trying to avoid some kind of negative outcome?

For example, trying to avoid being late for work, trying to avoid seeing someone with whom you have a disagreement, trying to get back to your car before your parking ticket expires, etc.



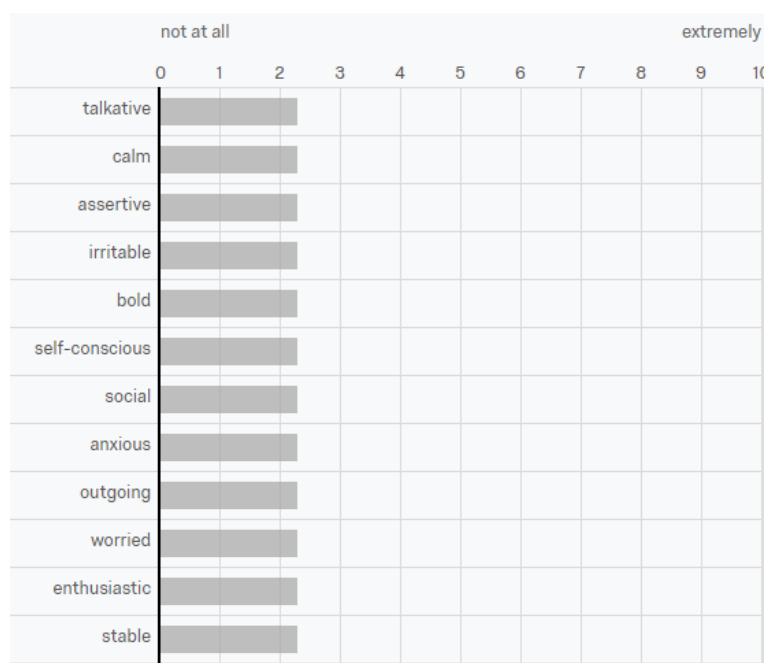
2. To what extent would you behave or feel in these ways, when you are in a situation with some degree of potential threat?

For example, walking alone in a dangerous area at night, feeling uncertain about whether your work contract would be renewed, trying to defend yourself over a legal matter, etc.



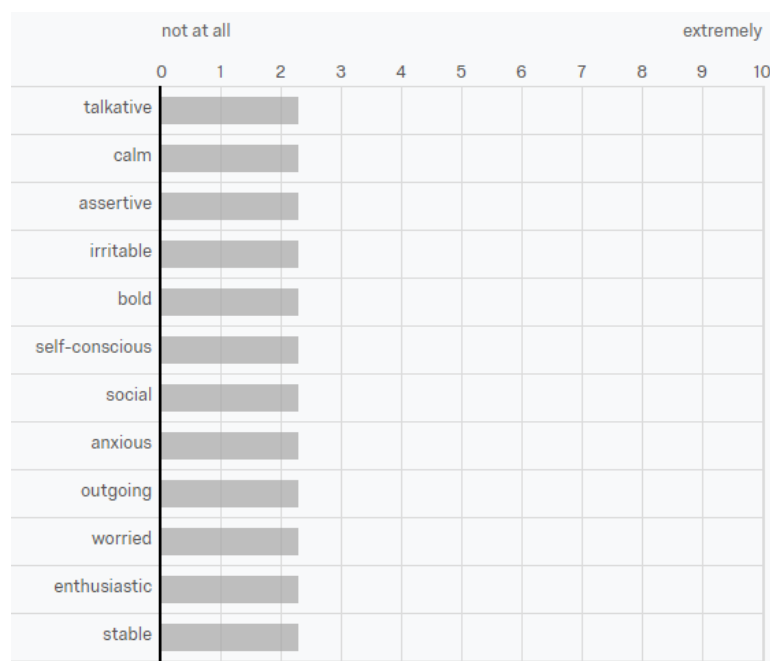
3. To what extent would you behave or feel in these ways, when you are in a situation where you need to make a difficult choice between two or more alternatives?

For example, deciding whether to undergo a beneficial but painful medical procedure, deciding which birthday party to attend when invited to both on the same night, or deciding which job offer to take when both have some clear drawbacks, etc.



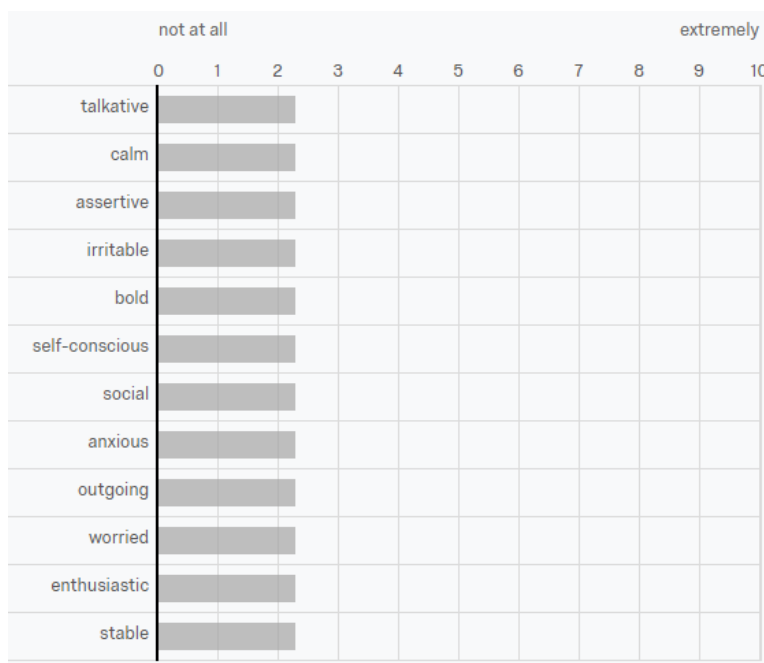
4. To what extent would you behave or feel in these ways, when you are trying to avoid or control something aversive or stressful?

For example, trying to avoid saying no to someone's request; trying to avoid seeing someone you have had an argument with; trying to control your urge to make a complaint, etc.



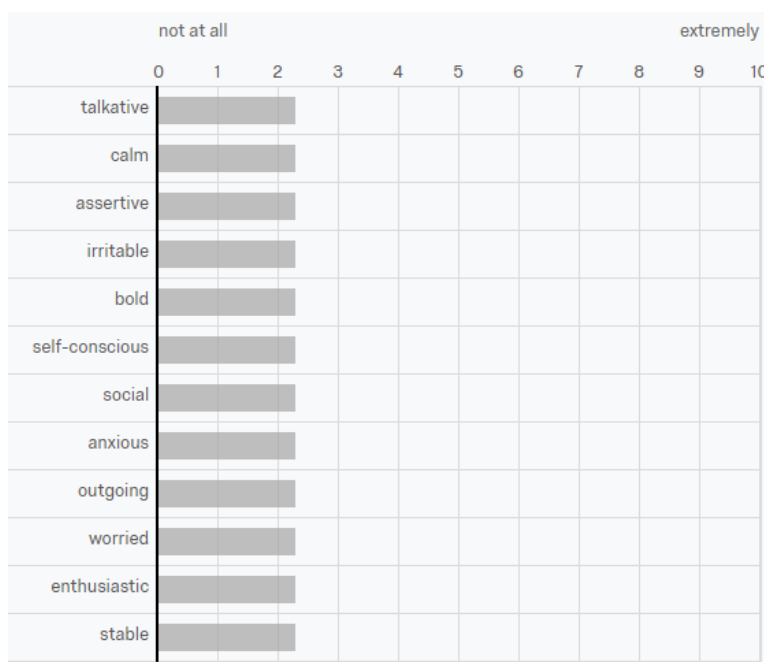
5. To what extent would you behave or feel in these ways, when you are in a situation feeling torn between two or more incompatible goals?

For example, torn between your fitness goal and your desire for delicious food, torn between purchasing a desired object versus saving your money to pay your bills, etc.



6. To what extent would you behave or feel in these ways, when you are in a situation or apprehensive about getting into a situation where you are likely to be judged or evaluated?

For example: a job interview, a blind date, or giving a presentation.



Appendix B2. Additional Statements for Exploratory Scale Development

I always think of the number of calories in the food I'm eating I favour natural medicines and health products A <u>low fat</u> diet is a way of life for me Health food is not necessary if you eat properly I try to buy additive free food I love to do as many sports as possible I'm eating less red meat these days I would like to be able to lose weight I'm concerned about my cholesterol level I try to get enough calcium in my diet I'm feeling well and in good health I wear clothes that will get me noticed I try to look stylish It's important to look fashionable I'm a bit of an intellectual I'm a 'Mr Fix It' type of person I'm more extrovert than introvert I'm not very good with mechanical things I need to have security in my job It is important to have a full social life I like to be with a crowd of people I go out less now than I used to It is important that I have responsibility in my job I find it difficult to switch off from work Success is important to me I sometimes use force to get things done I'm security conscious I like tough physical activity I believe in taking risks Freedom is more important than the law I'm shy in social situations I live a full and busy life There are not enough hours in the day I look for new experiences every day I don't enjoy taking risks I like things to stay the same I consider myself a leader more than a follower I regularly go to church or my place of worship I would have difficulty coping with a demanding job or career I don't like to know too much about what's going on in the world these days I really want to enjoy things now because I just don't know what the future will bring I feel less safe than I used to The fundamental values of our society are under serious threat	'Environmentally friendly' products are overpriced I try to recycle everything I can I worry about getting skin cancer The Government is doing a good job running the country At heart I'm an environmentalist When I'm at home, I like to shut myself off from the rest of the world Obedience and respect for authority are the most important virtues children should learn Threats to the environment are exaggerated Most secondary schools today place too little emphasis on academic achievements I think it is the Government's duty to support those who can't find work Homosexual couples should be allowed to adopt children I'm optimistic about the future There's too much change going on these days I believe a percentage of everyone's income should go to charities Crime is a growing problem in my community If I had an accident, the local hospital would provide me with adequate treatment I think the gap between rich and poor is growing Globalisation brings more problems than it solves Terrorists deserve the same rights as other criminals If we don't act <u>now</u> we'll never control our environmental problems When dealing with charities I respond more with my heart than my head I prefer to support longer term development aid projects rather than crisis/emergency appeals Helping others is an important part of who I am I tend to make decisions based on logic rather than emotions Corruption is one of the major problems facing this country I use coupons I find in magazines or on packets I record TV programs if I can't watch them I always watch the news on TV to keep me <u>up-to-date</u> I always read the business section of the newspaper I listen to the radio in the car I often enter competitions run by newspapers, magazines or radio stations I often enter competitions which are on packets or labels on products	I often redeem coupons to get discounts or special offers I don't read the ads in newspapers and magazines I can't help noticing advertising on buses I enjoy buying magazines I can't miss seeing those big billboard signs I find TV advertising interesting TV advertising often gives me something to talk about Nearly all TV advertising annoys me Some TV advertising is devious Quite often I find TV advertising more entertaining than the programs I often take advantage of the special offers on the back of my supermarket shopping docket I usually notice the advertisements on shopping trolleys when I go grocery shopping I often notice the advertisements on the tops and backs of taxis Advertising posters in shopping centres and malls don't interest me My letterbox <u>says</u> 'no junk mail' (or similar) Expensive restaurants are not worth the money I don't buy luxuries anymore I believe quality is more important than price I was born to shop I choose a car mainly on its looks You can tell a type of person by the type of car they drive I buy more store's own products than <u>well known</u> brands I enjoy clothes shopping I will buy a product because of the label I trust <u>well known</u> brands better than the stores' own I have favourite brands for most things I <u>buy</u> and I tend to stick to them I am always ready to try new and different products I enjoy grocery shopping I like to try the free samples they offer in supermarkets I'll go out of my way in search of a bargain I enjoy food from all over the world I buy the same food every week If I see a new type of <u>food</u> I will try it I'm constantly watching my weight I like to have traditional meals at home My pet is a fussy eater I don't have time to spend cooking
---	--	---

I like to eat healthily but don't want to compromise on taste
 The food I eat is all, or almost all, vegetarian
 I often buy take away food to eat at home
 I buy much more fresh or chilled foods than I used to
 I try to buy organic food whenever I can
 I won't buy genetically modified food if I can help it
 I often buy frozen or chilled ready prepared meals
 People often compliment me on my cooking
 I seldom have time for breakfast
 I tend to snack throughout the day
 I prefer to eat healthy snacks
 I like to drink wine with my meals
 Taste is more important than ingredients
 I avoid dairy foods whenever possible
 I restrict how much fattening food I eat
 Credit enables me to buy the things that I want
 I like to be well insured
 Recently I've cut down my spending
 I feel financially stable at the moment
 I'm worried about interest rates at the moment
 It would be ideal if I could conduct all my banking without ever having to go to a branch
 I prefer to invest in something with a safe return
 I feel confident about managing my finances
 I'm always very active on holidays
 I like to go away on weekends
 I like to take my holidays away from crowds

I enjoy holidays where everything is organised for you
 On holidays I like to do as little as possible
 I prefer the bright lights and big cities when I travel
 I prefer to holiday where I can see nature or be in a natural setting
 I usually book and arrange all my holiday travel details myself
 I sometimes organise holidays on behalf of my family and friends
 I usually leave holiday arrangements to someone else
 I avoid staying at accommodation that does not have genuine environmental policies
 For my next holiday, I'd really like a total ecotourism experience
 I'd like to holiday where I can experience the local culture
 I love to cook
 I would rather clean than cook any day
 I can't relax until I know the house is clean & tidy
 If I could afford to eat out every night I would
 I keep up-to-date with new ideas to improve my home
 I like to entertain spontaneously
 I try to give my kids as few sweets as possible
 I'm more interested in my job than my house
 I am very proud of my family
 I go out of my way to learn everything I can about new technology
 I'm worried about invasion of my privacy through new technology
 I find technology is changing so fast, it's difficult to keep up with
 Computers and technology give me more control over my life
 Would like to use the Internet, but am intimidated by the complexity of it all

To me the Internet is far more an information tool than an entertainment tool
 It's important for me to control appropriate Internet content for my family
 I really enjoy going online to chat
 I feel comfortable giving my credit card details over the Internet
 I'd consider doing some of my grocery shopping on the Internet in the next 12 months
 I need a mobile phone to access the Internet
 I am interested in being able to access the internet wherever I am
 I drink alcohol mostly at home
 I prefer beer to wine
 I drink more wine now than I used to
 If I hear of a new alcoholic drink I will try it
 Imported beer is a waste of money
 Beer is often a good way to start the night
 I prefer pre-mixed spirits to spirits in a glass
 I like promotions that offer free gifts with a purchase of alcohol
 I like my drinks strong
 You need a few drinks to get a party going
 I don't like drinking in pubs
 I drink less beer than I used to
 I normally buy my favourite brand regardless of price
 I drink more premium beer now than I used to
 Pre-mixed spirits are good value for money
 I prefer to drink spirits than beer
 When I am ordering a drink, I always ask for the brand I want
 When I'm in a nightclub/bar/pub I prefer pre-mixed spirits in a bottle

Appendix C. Chapter 3 (Study 2)

Appendix C1. Interaction Task Material

NASA Exercise: Survival on the Moon

Scenario:

You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. However, due to mechanical difficulties, your ship was forced to land at a spot some 200 miles from the rendezvous point. During reentry and landing, much of the equipment aboard was damaged and, since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200-mile trip. Below are listed the 15 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance for your crew in allowing them to reach the rendezvous point. Place the number **1** by the most important item, the number **2** by the second most important, and so on through number **15** for the least important.

Your Ranking

NASA Ranking

- | | |
|---|--|
| _____ Box of matches _____ | |
| _____ Food concentrate _____ | |
| _____ 50 feet of nylon rope _____ | |
| _____ Parachute silk _____ | |
| _____ Portable heating unit _____ | |
| _____ Two .45 caliber pistols _____ | |
| _____ One case of dehydrated milk _____ | |
| _____ Two 100 lb. tanks of oxygen _____ | |
| _____ Stellar map _____ | |
| _____ Self-inflating life raft _____ | |
| _____ Magnetic compass _____ | |
| _____ 20 liters of water _____ | |
| _____ Signal flares _____ | |
| _____ First aid kit, including injection needle _____ | |
| _____ Solar-powered FM receiver-transmitter _____ | |

Appendix C2. Affect Measurement

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. Indicate to what extent you feel this way right now, that is, at the present moment *OR* indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested	_____ 11. Irritable
_____ 2. Distressed	_____ 12. Alert
_____ 3. Excited	_____ 13. Ashamed
_____ 4. Upset	_____ 14. Inspired
_____ 5. Strong	_____ 15. Nervous
_____ 6. Guilty	_____ 16. Determined
_____ 7. Scared	_____ 17. Attentive
_____ 8. Hostile	_____ 18. Jittery
_____ 9. Enthusiastic	_____ 19. Active
_____ 10. Proud	_____ 20. Afraid

Scoring Instructions:

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 ($SD = 7.9$); Weekly = 33.3 ($SD = 7.2$)

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 ($SD = 5.4$); Weekly = 17.4 ($SD = 6.2$)

Additional items from: Smillie, L. D., DeYoung, C. G., & Hall, P. J. (2015.). Clarifying the relation between extraversion and positive affect. *Journal of Personality*. doi: 10.1111/jopy.12138, and McNiel, J. M., Lowman, J. C., & Fleeson, W. (2010). The effect of state extraversion on four types of affect. *European Journal of Personality*, 24(1), 18-35. doi: 10.1002/per.738

Relaxed	Stimulated	Happy	Hyper-activated
At-ease	Aroused	Content	Wakeful
Placid	Cheerful	Satisfied	Alert
Calm	Inactive	Pleased	Energetic
Peppy	Motivated	Intense	inspired
Elated			engaged

Appendix C3. The Markers for the Big Five Structure (Goldberg, 1992)

A Comparison of the Factor Loadings for 50 Bipolar Scales When Administered in Transparent (T) and Opaque (O) Orders (N = 175)

Scale	I		II		III		IV		V	
	T	O	T	O	T	O	T	O	T	O
Factor I. Surgency										
Introverted-extraverted	.77*	.67*	.01	-.00	.08	.02	.12	.01	-.01	.08
Unenergetic-energetic	.65*	.59*	.27	.30	-.01	.17	.13	.02	.05	.06
Silent-talkative	.65*	.64*	-.05	-.00	.09	-.05	-.07	-.15	.04	.01
Unenthusiastic-enthusiastic	.65*	.64*	.26	.29	.10	.23	.11	.08	.15	.04
Timid-bold	.63*	.64*	-.18	-.25	.07	-.00	.20	.19	.18	.16
Inactive-active	.64*	.54*	.12	.11	.06	.10	.12	.16	.02	.07
Inhibited-spontaneous	.47*	.49*	.17	.13	-.20	-.34	.26	.25	.27	.09
Unassertive-assertive	.54*	.59*	-.18	-.03	.29	.21	.27	.26	.28	.22
Unadventurous-adventurous	.49*	.50*	.05	-.00	-.05	-.02	-.02	.10	.18	.14
Unsociable-sociable	.72*	.42*	.22	.23	-.06	-.06	.13	.07	.17	.22
Factor II. Agreeableness										
Cold-warm	.31	.31	.66*	.59*	.02	.07	.09	.06	.00	-.00
Unkind-kind	.13	.06	.74*	.50*	.10	.12	.08	-.13	.11	.19
Uncooperative-cooperative	-.02	-.03	.63*	.63*	.31	.22	-.03	.12	-.08	.04
Selfish-unselfish	-.10	-.05	.62*	.46*	.11	-.08	.28	.29	.15	-.10
Rude-polite	-.03	-.06	.63*	.59*	.26	.14	.17	-.04	.11	.16
Disagreeable-agreeable	.02	.12	.75*	.37*	-.18	-.06	.01	-.03	-.13	-.02
Distrustful-trustful	.25	.03	.41*	.49*	.12	.14	.17	.03	-.38	-.35
Stingy-generous	.11	.12	.62*	.53*	.02	-.08	.20	.02	.12	-.02
Inflexible-flexible	.07	.02	.65*	.39*	.10	-.13	.06	.10	-.05	.05
Unfair-fair	.10	.01	.55*	.47*	.31	.34	.24	.10	.08	.16
Factor III. Conscientiousness										
Disorganized-organized	.19	.16	.06	-.04	.69*	.68*	-.12	-.08	-.02	-.03
Irresponsible-responsible	.19	-.02	.11	-.01	.79*	.70*	-.07	.18	-.04	-.03
Undependable-reliable	.19	.11	.18	.11	.69*	.57*	-.07	.12	.07	.09
Negligent-conscientious	.14	-.08	.25	.02	.68*	.60*	.01	.05	.20	.38
Impractical-practical	-.11	-.07	.04	.19	.66*	.44*	.21	.04	.11	.14
Careless-thorough	.05	.13	.06	-.08	.74*	.66*	-.00	.03	.15	.08
Lazy-hardworking	.25	.22	.31	.11	.49*	.53*	.20	.04	-.00	-.13
Extravagant-thrifty	-.19	-.23*	.02	-.05	.37*	.12	.29	.17	.00	.00
Rash-cautious	-.24	-.31	.05	.24	.63*	.49*	.18	.00	.12	.10
Frivolous-serious	-.29	-.27	-.13	-.19	.49*	.50*	.12	-.07	.12	.05
Factor IV. Emotional Stability										
Angry-calm	.13	.09	.32	.47*	-.04	-.04	.58*	.33	-.19	-.01
Tense-relaxed	.22	.26	.24	.25	-.13	-.14	.70*	.57*	-.04	-.08
Nervous-at ease	.23	.40	.12	.07	-.05	-.08	.71*	.61*	.04	.02
Envious-not envious	-.01	-.03	.19	.03	.07	.03	.53*	.54*	.22	.09
Unstable-stable	.17	.11	.22	.15	.33	.31	.56*	.48*	-.04	-.08
Discontented-contented	.28	-.07	.24	.32	.19	.17	.57*	.47*	.02	.09
Insecure-secure	.20	.28	-.03	.03	.25	.22	.65*	.66*	.24	.13
Emotional-unemotional	-.15	-.17	-.09	-.10	-.03	-.12	.50*	.54*	-.17	.02
Guilt-ridden-guilt-free	.04	.20	.01	-.01	.10	.10	.57*	.68*	.16	.03
Moody-steady	.13	.24	.26	.38*	.02	.08	.65*	.38	-.25	-.22
Factor V. Intellect										
Unintelligent-intelligent	.06	.09	-.09	-.23	.22	.19	-.06	-.02	.46*	.53*
Imperceptive-perceptive	.20	.13	-.04	-.03	.19	.08	.04	.19	.59*	.39*
Unanalytical-analytical	-.00	.05	-.25	-.20	.19	.10	-.03	-.04	.36*	.38*
Unreflective-reflective	.14	.02	-.03	.18	.11	-.04	-.09	-.08	.56*	.54*
Uninquisitive-curious	.36	.35	.09	.13	-.02	-.02	.05	-.15	.51*	.50*
Unimaginative-imaginative	.13	.12	.19	.06	-.03	.06	.10	.06	.75*	.68*
Uncreative-creative	.14	.17	.20	.10	.01	-.00	.01	-.02	.76*	.65*
Uncultured-cultured	.01	-.11	.16	.25	.32*	.10	.09	.16	.29	.40*
Unrefined-refined	.03	-.13	.32	.25	.33*	.09	.12	.34*	.21	.24
Unsophisticated-sophisticated	.09	.13	.22	.02	.17	-.02	.12	.16	.25*	.43*

Note. Values equal to or larger than |.30| are listed in boldface type.

* Highest factor loading of each scale.

Appendix C4: Experiment Booklet

Participant X

Please do not open this booklet until advised to do so.

Please keep booklet closed on the desk when not in use.

Participant ID: _____

Group: _____

Information for Group DiscussionParticipants in the Positive Social Evaluative Condition will receive the following information:

You are going to take part in a discussion task where you will be asked to work together on a problem solving exercise with the other members of your group. You will be given 15 minutes to complete the task.

At the end of the task you will receive feedback from the other members of your group regarding areas of strength in your performance during the task. That is, your group members will note the areas in which you performed well.

Please do not share any information in your booklet with any of the other participants.

Participants in the Negative Social Evaluative Condition will receive the following information:

You are going to take part in a discussion task where you will be asked to work together on a problem solving exercise with the other members of your group. You will be given 15 minutes to complete the task.

At the end of the task you will receive feedback from the other members of your group regarding areas of weakness in your performance during the task. That is, your group members will note the areas in which you could improve.

Please do not share any information in your booklet with any of the other participants.

Participants in the Control Condition will receive the following information:

You are going to take part in a discussion task where you will be asked to work together on a problem solving exercise with the other members of your group. You will be given 15 minutes to complete the task.

At the end of the task you will complete a short questionnaire regarding the discussion exercise.

Please do not share any information in your booklet with any of the other participants.

Please close your booklet and notify the experimenter that you are ready.

Please complete this booklet one page at a time and do not flick ahead.

You are now going to complete some brief questions about your experience during the discussion task. You will then be asked to complete similar questions for each of the other members of your group.

Please respond with the first answer that comes to mind and try not to think too much about each question.

1. Please rate the extent to which **you** felt each emotion during the discussion task by recording a number between 1 and 5 next to each word, where **1 = very slightly or not at all, and 5 = extremely.**

_____ interested	_____ distressed	_____ excited
_____ upset	_____ strong	_____ guilty
_____ scared	_____ hostile	_____ enthusiastic
_____ proud	_____ irritable	_____ alert
_____ ashamed	_____ inspired	_____ nervous
_____ determined	_____ attentive	_____ jittery
_____ active	_____ afraid	

2. Please rate how accurately each term described the way **you** behaved during the discussion task by recording a number between 1 and 7 next to each word, where **1 = not at all, 7 = very well.**

_____ shy	_____ creative	_____ assertive
_____ bold	_____ practical	_____ unself-conscious
_____ imaginative	_____ relaxed	_____ systematic
_____ compliant	_____ fretful	_____ worried
_____ talkative	_____ active	_____ cooperative
_____ self-critical	_____ reserved	_____ anxious

3. Please rate the extent to which you think **participant A** felt each of the following emotions during the discussion task by recording a number between 1 and 5 next to each word, where **1 = very slightly or not at all, 5 = extremely.**

___ interested	___ distressed	___ excited
___ upset	___ strong	___ guilty
___ scared	___ hostile	___ enthusiastic
___ proud	___ irritable	___ alert
___ ashamed	___ inspired	___ nervous
___ determined	___ attentive	___ jittery
___ active	___ afraid	

4. Please describe how accurately each term described the way **participant A** behaved during the discussion task by recording a number between 1 and 7 next to each word, where **1 = not at all, 7 = very well.**

___ shy	___ creative	___ assertive
___ bold	___ practical	___ unself-conscious
___ imaginative	___ relaxed	___ systematic
___ compliant	___ fretful	___ worried
___ talkative	___ active	___ cooperative
___ self-critical	___ reserved	___ anxious

5. Please rate the extent to which you think **participant B** felt each of the following emotions during the discussion task by recording a number between 1 and 5 next to each word, where **1 = very slightly or not at all, 5 = extremely.**

___ interested	___ distressed	___ excited
___ upset	___ strong	___ guilty
___ scared	___ hostile	___ enthusiastic
___ proud	___ irritable	___ alert
___ ashamed	___ inspired	___ nervous
___ determined	___ attentive	___ jittery
___ active	___ afraid	

6. Please describe how accurately each term described the way **participant B** behaved during the discussion task by recording a number between 1 and 7 next to each word, where **1 = not at all, 7 = very well**

___ shy	___ creative	___ assertive
___ bold	___ practical	___ unself-conscious
___ imaginative	___ relaxed	___ systematic
___ compliant	___ fretful	___ worried
___ talkative	___ active	___ cooperative
___ self-critical	___ reserved	___ anxious

1. Please indicate how accurately the following statement describes your experience with the discussion task by recording a number between 1 and 5 next to each statement, where **1 = disagree strongly**, **5 = agree strongly**

I found the task enjoyable _____

I found the task stressful _____

I found the task interesting _____

I found the task informative _____

I learnt something during the task _____

2. Please indicate the extent to which you found the discussion tasks positive or negative, by circling a number below (1 = very negative, 10 = very positive).

Very Negative

Very Positive

1 2 3 4 5 6 7 8 9 10

3. Besides the study today, have you previously had any contact with any of the other members of your group (e.g., in the same tutorial class)?

Yes No (please circle)

If yes, which participant?

Participant A Participant B Participant C (please circle)

If yes, how do you know this/these participant(s)?

Please notify the researcher that you have completed the task

Appendix C5. Additional Results: Initial Manipulation Check

As mentioned in the main results section of study 2, participants evaluated the interactive task at the end of the study. For the purpose of transparency, their scores were reported here. Table C5 presents the means, standard deviations, reliabilities (McDonald's ω ; McDonald, 1999), and zero-order correlation coefficients of key variables. Figure C5 displays the z scores of initial manipulation check variables between conditions. Participants' ratings on the enjoyableness of the task was positively correlated with trait and state extraversion as well as positive affect reported at baseline and after the task, whereas participants' ratings on the stressfulness of the task was positively correlated with trait and state neuroticism as well as negative affect reported at the baseline and after the task. Moreover, the perceived valence (positive vs. negative) of the task was positively correlated with extraversion and positive affect related scales and negatively correlated with neuroticism and negative affect related scales. ANOVAs revealed that participants evaluated the task similarly across conditions on enjoyableness, $F(2, 171) = .48, p = .62$, valence (positivity vs. negativity), $F(2, 171) = .69, p = .51$, and stressfulness, $F(2, 171) = .25, p = .78$.

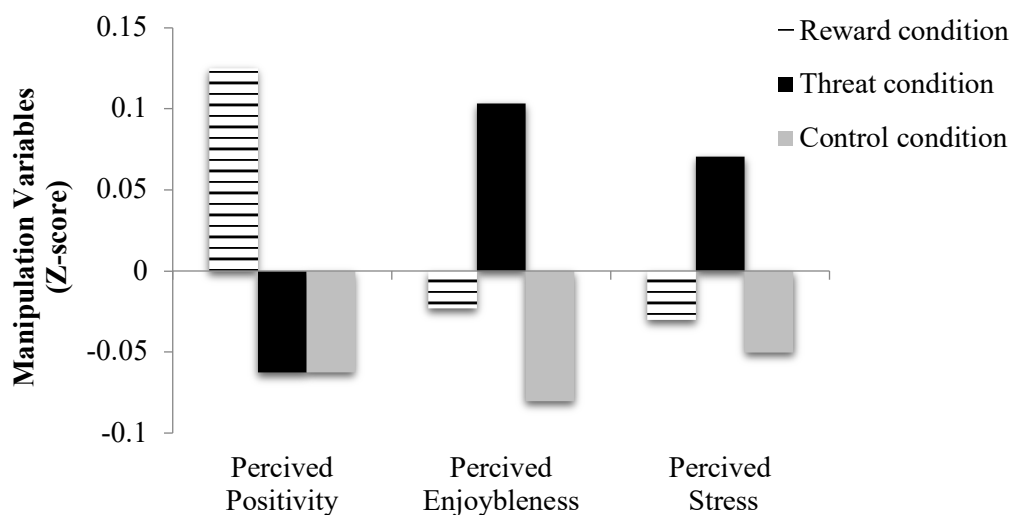


Figure C5. Z-scores for manipulation-check variables between conditions.

Table C5
Means, Standard Deviations, and Intercorrelations Among Variables in Study 2

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Extraversion	1										
2. State extraversion	.52**	1									
3. Baseline positive affect	.54**	.36**	1								
4. State positive affect	.42**	.57**	.57**	1							
5. Neuroticism	-.32**	-.21**	-.24**	-.20**	1						
6. State neuroticism	-.26**	-.36**	-0.13	-.15*	.44**	1					
7. Baseline negative affect	-.18*	-.21**	0.13	-0.11	.45**	.43**	1				
8. State negative affect	-0.10	-.23**	0.01	-0.04	.34**	.65**	.39**	1			
Initial Manipulation check											
9. Valence (Positivity vs Negativity)	.33**	.29**	.26**	.39**	-0.12	-.23**	-.32**	-.24**	1		
10. Enjoyableness	.23**	.34**	.22**	.41**	-0.14	-.15*	-.26**	-0.12	.45**	1	
11. Stressfulness	-0.07	-.23**	0.03	-.19*	.31**	.30**	.24**	.35**	-.20**	-.27**	1
Mean	0.00	28.51	26.98	31.07	0.00	16.13	14.42	13.00	7.89	3.81	1.84
Standard Deviation	0.98	6.06	8.71	7.37	0.97	5.35	5.85	4.39	1.28	0.87	0.99

Note: ** $p < .01$ and * $p < .05$ (2-tailed). Extraversion = standardized composite scores from different measures of trait extraversion.

Neuroticism = standardized composite scores from different measures of trait neuroticism. Valence was measured on a 1 to 10 scale.

Enjoyableness and stressfulness were measured on a 1 to 5 scale. State extraversion and neuroticism were the sum scores of items, measured on a 1 to 7 scale. Positive and negative affect (at baseline and during the task) were the sum scores of items measured on a 1 to 5 scale. Both state and affect measures were average ratings of self-ratings and other-ratings.

Appendix C6. Additional Results: State Expressions using Self-Reported Ratings

Table C6 shows the means, standard deviations, reliabilities (McDonald's ω_i ; McDonald, 1999), and correlation coefficients for traits and self-rated states (state extraversion, state neuroticism). In relative to average ratings of states, self-reported states correlated with traits more strongly. Consistent with results using average ratings of state extraversion, self-reported state extraversion was only significantly predicted by trait extraversion, $F(2, 171) = 64.30, p < .001, \eta_p^2 = .28$, but not condition, $F(2, 171) = .41, p = .67, \eta_p^2 = .01$, nor the extraversion $\times$ condition interaction, $F(2, 171) = 1.50, p = .23, \eta_p^2 = .02$. Similarly, consistent with results using average ratings of state neuroticism, self-reported state neuroticism was only significantly predicted by trait neuroticism, $F(2, 171) = 42.20, p < .0005, \eta_p^2 = .20$, but not condition $F(2, 171) = 1.07, p = .35, \eta_p^2 = .01$, nor the neuroticism $\times$ condition interaction, $F(2, 171) = .79, p = .46, \eta_p^2 = .01$.

Table C6
Means, Standard Deviations, Reliabilities, and Correlations Among Self-rated Variables

Variables	1	2	3	4
1. Extraversion	(0.95)			
2. Neuroticism	-.32**	(0.95)		
3. State extraversion	.52**	-.21**	(0.79)	
4. State neuroticism	-.26**	.44**	-.36**	(0.67)
Mean	0.00	28.51	0.00	16.13
Standard Deviation	0.98	6.06	0.97	5.35

Note. ** $p < .01$ and * $p < .05$ (2-tailed). All variables used self-reported ratings. McDonald's ω_t for all variables are presented in parentheses on the diagonal of the correlation matrix. Correlations from separate scales exceeding $r = .50$ are presented in boldface. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. States were the sum scores of items measured on a 1 to 7 scale.

Appendix C7. Additional Results: State Expressions using Control Participants'

Ratings

Table C7 shows the means, standard deviations, reliabilities (McDonald's ω_i ; McDonald, 1999), and correlations for traits and control-rated states. Compared to the results obtained using self-rated states and average ratings of states, the correlations between traits and control-rated states were somewhat weaker.

Table C7
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Control-rated Variables

Variables	1	2	3	4
1. Extraversion	(0.95)			
2. Neuroticism	-.32**	(0.95)		
3. State extraversion	.34**	-.08**	(0.83)	
4. State neuroticism	-.19*	0.21**	-.38**	(0.57)
Mean	0.00	27.34	0.00	15.54
Standard Deviation	0.98	6.74	0.97	4.78

Note. ** $p < .01$ and * $p < .05$ (2-tailed). All variables used control-reported ratings. McDonald's ω for all variables are presented in parentheses on the diagonal of the correlation matrix. Extraversion and Neuroticism are standardized composite scores from different measures of trait extraversion and neuroticism. States were the sum scores of items measured on a 1 to 7 scale.

Regarding control-rated state extraversion, ANCOVA revealed a main effect of condition, $F(2, 171) = 3.53, p < .05, \eta_p^2 = .04$, a main effect of trait extraversion, $F(2, 171) = 23.49, p < .0005, \eta_p^2 = .12$, as well as a small yet significant extraversion $\times$ condition interaction, $F(2, 171) = 3.97, p < .05, \eta_p^2 = .05$. Post-hoc comparisons using the Tukey HSD test indicated that the mean levels of state extraversion in the reward condition ($M = 28.12, SD = .81$) and the control condition ($M = 28.31, SD = .81$) were both higher than the threat condition ($M = 25.58, SD = .82$), and the mean difference was significant, $F(2, 171) = 3.48, p < .05, \eta_p^2 = .04$. However, the reward condition and the control condition did not differ significantly from each other. Figure C7.1 depicted the correlations between trait extraversion and control-rated state extraversion across conditions. The patterns of results suggest that trait

extraversion is strongly associated with state extraversion across conditions. Moreover, in conditions with anticipatory feedback (reward and threat conditions), extraverts and introverts seemed to adjust their state extraversion differently. Specifically, when feedback was anticipated, positive or negative, extraverts seem to act less extraverted and introverts seem to act more extraverted than they would do otherwise.

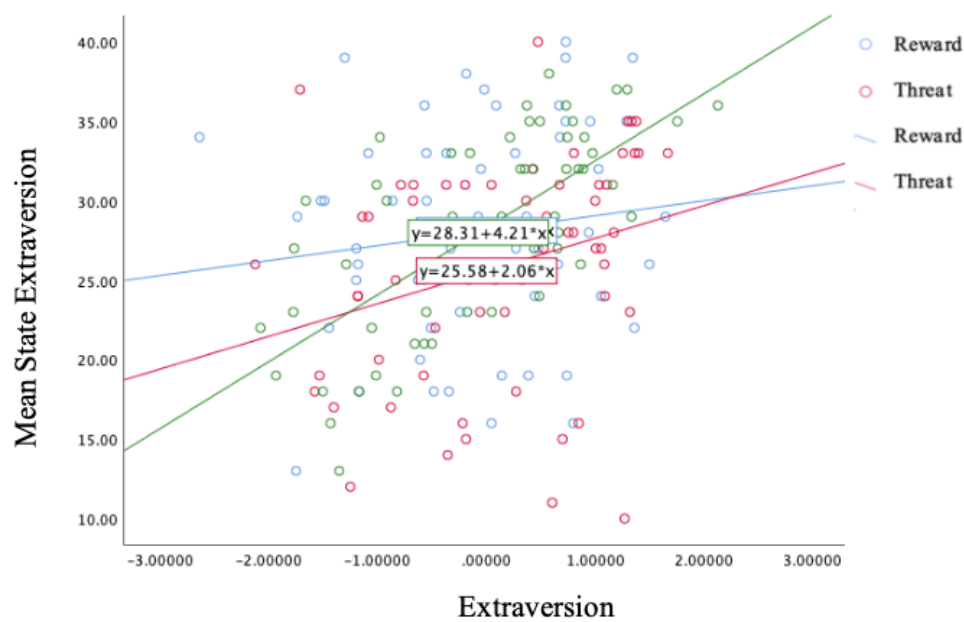


Figure C7.1. Scatterplots depicting correlations between trait extraversion and control-rated state extraversion across conditions.

Regarding control-rated state neuroticism, ANCOVA revealed a main effect of neuroticism, $F(2, 171) = 5.29, p < .05, \eta_p^2 = .03$, a null effect of condition, $F(2, 171) = .51, p = .60, \eta_p^2 = .01$, and a small yet significant neuroticism $\times$ condition interaction, $F(2, 171) = 4.07, p < .05, \eta_p^2 = .05$. Post-hoc comparisons using the Tukey HSD test indicated that there was no significant mean difference in state neuroticism between conditions, $F(2, 171) = .50, p = .61, \eta_p^2 = .01$. The significant interaction effect was not meaningful as it was driven by participants in the control condition had very poor visibility of others' state neuroticism (see Figure C7.2).

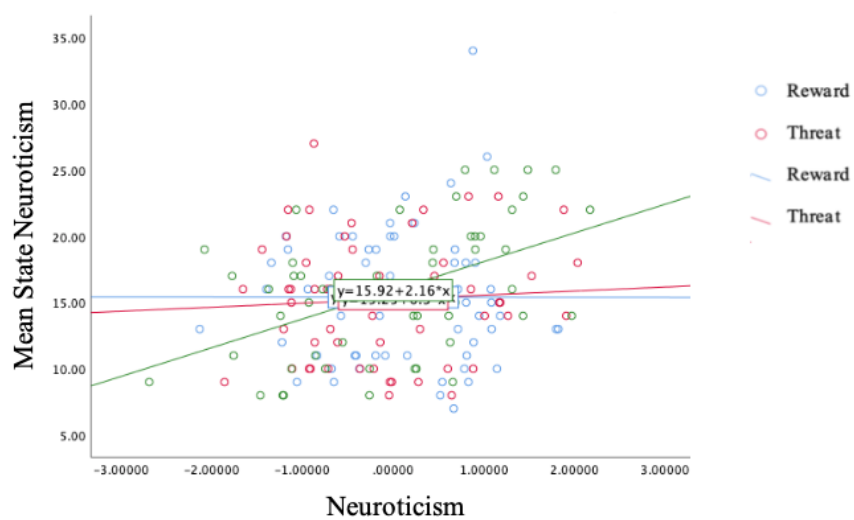


Figure C7.2. Scatterplots depicting correlations between trait neuroticism and controlled state neuroticism across conditions.

Appendix C8. Additional Results: Positive and Negative Affect

In addition to state extraversion and neuroticism, participants also described their affect states, prior to the task (self-rating) and immediately after the task (two informant-ratings and one self-rating).

All items were drawn from the Positive and Negative Affect Scales (PANAS; Watson, Calrk & Tellegen, 1988), which comprised of a range of positive and negative affect descriptors (e.g., positive affect: *excited*, *alert*; negative affect: *afraid*, *nervous*) on a scale of 1 (*not at all*) to 7 (*extremely*). Participants also used the same scale to rate their fellow group members' affect state during the task. For each participant, the three ratings (one self-rating and two others-ratings) collected for state PA and NA immediately after the task were averaged to provide a single estimate to improve the reliability of the measurement (Shrout, 1998).

The same predictive models were constructed for state PA and NA as for state extraversion and neuroticism. In the model for state PA, the predictors were trait extraversion, condition, and the extraversion $\times$ condition interaction, controlling for trait neuroticism; in the model for state NA, the predictors were trait neuroticism, condition, and the neuroticism $\times$ condition interaction, controlling for trait extraversion. In the final models, baseline PA and NA were entered as covariates.

Average ratings of state PA and NA. Table C8.1 shows the means, standard deviations, reliabilities, and correlation coefficients for traits and the average ratings of state PA and NA. Across conditions, the average rating of state PA were significantly predicted by trait extraversion, $F(2, 171) = 21.45, p < .01, \eta_p^2 = .11$, but not condition, $F(2, 171) = .38, p = .69, \eta_p^2 = .004$, nor the extraversion $\times$ condition interaction, $F(2, 171) = .02, p = .99, \eta_p^2 = .00$. Furthermore, after controlling for baseline PA, the effect of trait extraversion on state PA was slightly weakened, $F(2, 171) = 7.01, p < .01, \eta_p^2 = .04$. The attenuation of the main

effect of extraversion was not surprising because PA measured prior to the task is more proximate to state PA measured immediately after the task relative to extraversion. Regarding the average ratings of state NA, ANCOVA revealed that none of the predictors in the model had a significant effect: trait neuroticism, $F(2, 171) = 2.68, p = .10, \eta_p^2 = .02$; condition, $F(2, 171) = .62, p = .54, \eta_p^2 = .01$; and the neuroticism $\times$ condition interaction, $F(2, 171) = .56, p = .57, \eta_p^2 = .01$. Moreover, when baseline NA was included as a covariant, it did not have a significant effect on the average rating of state NA as well, $F(2, 171) = 3.19, p = .08, \eta_p^2 = .02$.

Table C8.1
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Traits and Affects

Variables	1	2	3	4	5	6
1. Extraversion	(.95)					
2. Baseline positive affect	.54**	(.90)				
3. State positive affect	.42**	.57**	(.93)			
4. Neuroticism	-.32**	-.24**	-.20**	(.95)		
5. Baseline negative affect	-.18*	0.13	-0.11	.45**	(.89)	
6. State negative affect	-0.1	0.01	-0.04	.34**	.39**	(.86)
Mean	0.00	26.98	31.07	0.00	14.42	13
Standard Deviation	0.98	8.71	7.37	0.97	5.85	4.39

Note. ** $p < .01$ and * $p < .05$ (2-tailed). State positive and negative affect used average ratings. McDonald's ω^2 for all variables are presented in parentheses on the diagonal of the correlation matrix. Correlations from separate scales exceeding $r = .50$ are presented in boldface. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. Affects were the sum scores of items measured on a 1 to 5 scale.

Self-rated state PA and NA. Table C8.2 shows the means, standard deviations, reliabilities, and correlation coefficients for traits (i.e., extraversion and neuroticism), baseline affects (i.e., PA and NA), and self-rated state PA and NA. Compared to average ratings of state PA and NA, trait extraversion and trait neuroticism correlated with self-rated PA and NA more strongly.

Table C8.2
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Traits and Affect.

Variables	1	2	3	4	5	6
1. Extraversion	(.95)					
2. Baseline positive affect	.54**	(.90)				
3. State positive affect	.42**	.57**	(.79)			
4. Neuroticism	-.32**	-.24**	-.20**	(.95)		
5. Baseline negative affect	-.18*	.13	-.11	.45**	(.89)	
6. State negative affect	-.10	.01	-.04	.34**	.39**	(.85)
Mean	0.00	26.98	31.07	0.00	14.42	13.00
Standard Deviation	0.98	8.71	7.37	0.97	5.85	4.39

Note. ** $p < .01$ and * $p < .05$ (2-tailed). State positive and negative affect used self-ratings. McDonald's ω^2 for all variables are presented in parentheses on the diagonal of the correlation matrix. Correlations from separate scales exceeding $r = .50$ are presented in boldface. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. Affects were the sum scores of items measured on a 1 to 5 scale.

Across conditions, self-rated state PA was significantly and positively predicted by trait extraversion, $F(2, 171) = 29.22, p < .0005, \eta_p^2 = .15$, but not condition, $F(2, 171) = 1.18, p = .31, \eta_p^2 = .01$, nor the extraversion $\times$ condition interaction, $F(2, 171) = .30, p = .74, \eta_p^2 = .00$. However, after controlling for self-rated baseline PA, the effect of trait extraversion on state PA became non-significant, $F(2, 171) = 3.43, p = .07, \eta_p^2 = .02$, whereas self-rated baseline PA strongly and positively predicted self-rated state PA, $F(2, 171) = 41.97, p < .0005, \eta_p^2 = .20$.

Similarly, across conditions, self-rated state NA was significantly and positively predicted by trait neuroticism, $F(2, 171) = 22.45, p < .0005, \eta_p^2 = .12$, but not condition, $F(2, 171) = 2.21, p = .11, \eta_p^2 = .03$, nor the neuroticism $\times$ condition interaction, $F(2, 171) = .82, p = .44, \eta_p^2 = .01$. In addition, after controlling for self-rated baseline NA, the effect of trait neuroticism on state PA was slightly weakened though remained significant, $F(2, 171) = 8.81, p < .01, \eta_p^2 = .05$, while self-rated baseline NA moderately and positively predicted self-rated state NA, $F(2, 171) = 12.41, p < .05, \eta_p^2 = .07$.

Control-rated state PA and NA. Table C8.3 shows the means, standard deviations, reliabilities, and correlations for traits, base-line affect, and control-rated PA and NA.

Compared to the results obtained using self-rated states and average ratings of states, the correlations between traits and control-rated affect were somewhat weaker.

Table C8.3
Means, Standard Deviations, Reliabilities, and Intercorrelations Among Traits and Affect.

Variables	1	2	3	4	5	6
1. Extraversion	(.95)					
2. Baseline positive affect	.54**	(.90)				
3. State positive affect	.28**	.19*	(.88)			
4. Neuroticism	-.32**	-.24**	-.07	(.95)		
5. Baseline negative affect	-.18*	.13	-.22**	.45**	(.89)	
6. State negative affect	-.14	-.04	.04	.10	.20**	(.87)
Mean	0.00	26.98	31.22	0.00	14.42	12.79
Standard Deviation	0.98	8.71	7.33	0.97	5.85	4.25

Note. ** $p < .01$ and * $p < .05$ (2-tailed). State positive and negative affect used control ratings. McDonald's ω^2 for all variables are presented in parentheses on the diagonal of the correlation matrix. Correlations from separate scales exceeding $r = .50$ are presented in boldface. Extraversion = standardized composite scores from different measures of trait extraversion. Neuroticism = standardized composite scores from different measures of trait neuroticism. Affect were measured using the sum scores of items measured on a 1 to 5 scale.

Regarding control-rated state PA, ANCOVA revealed a main effect of trait extraversion, $F(2, 171) = 14.31, p < .0005, \eta_p^2 = .08$, a small yet significant extraversion $\times$ condition interaction, $F(2, 171) = 3.30, p < .05, \eta_p^2 = .04$, but no significant effect of condition, $F(2, 171) = 1.21, p = .30, \eta_p^2 = .01$. Regarding control-rated state NA, neither trait neuroticism, $F(2, 171) = .52, p = .47, \eta_p^2 = .003$, nor condition, $F(2, 171) = .31, p = .74, \eta_p^2 = .004$, had a significant effect, however there was a significant neuroticism $\times$ condition interaction, $F(2, 171) = 4.00, p < .02, \eta_p^2 = .05$. However, post-hoc comparisons using the Tukey HSD test indicated that neither state PA, $F(2, 171) = .50, p = .61, \eta_p^2 = .01$, nor state NA, $F(2, 171) = .31, p = .74, \eta_p^2 = .004$, differed significantly between conditions. The significant interactions were mostly due to participants in the control condition being poor judges of others' affective states (see Figures C8.1 & C8.2). Furthermore, while self-rated

baseline PA did not predict control-rated state PA, $F(2, 171) = .41, p = .52, \eta_p^2 = .002$, self-rated baseline NA significantly predicted control-rated state NA though the effect is small, $F(2, 171) = 4.43, p < .05, \eta_p^2 = .03$.

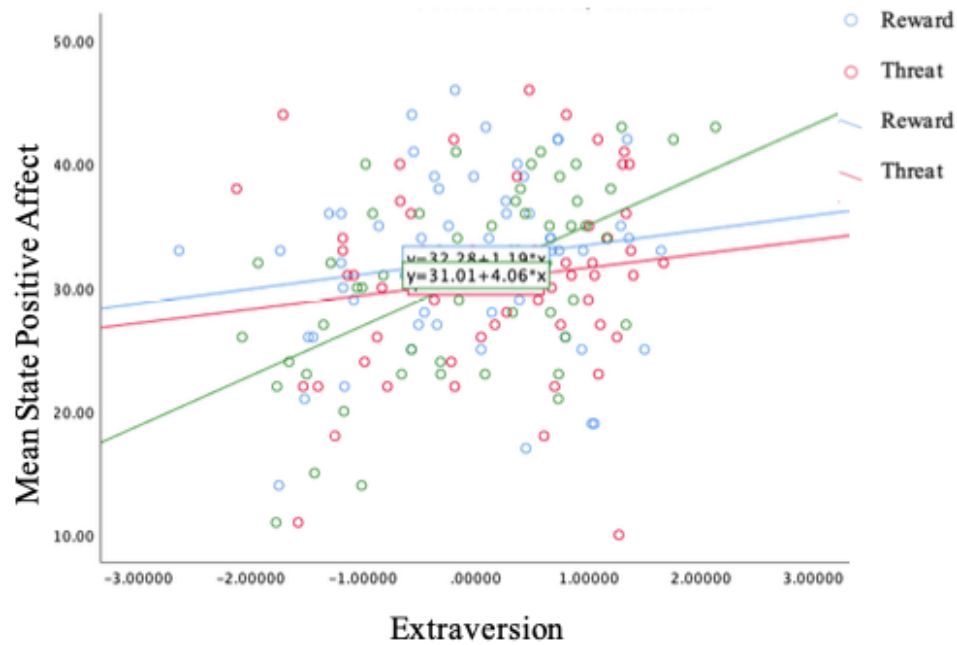


Figure C8.1. Scatterplots depicting correlations between trait extraversion and control-rated positive affect across conditions.

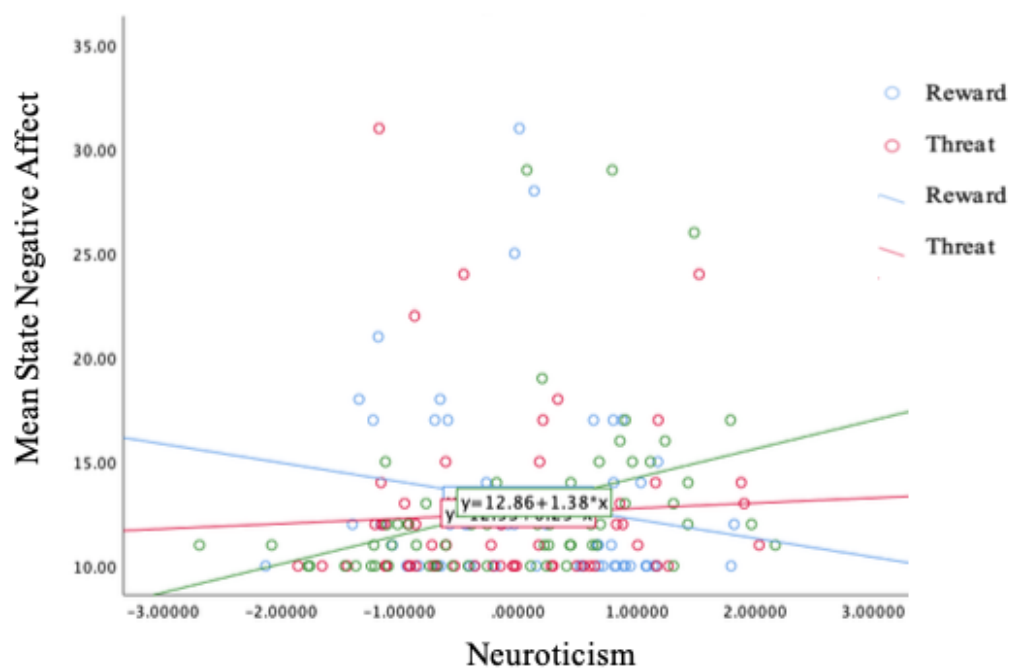


Figure C8.2. Scatterplots depicting correlations between trait neuroticism and control-rated negative affect.

Appendix C9: Online Sample Manipulation Check



Imagine that you are going to take part in a discussion task where you will be asked to work together on a problem-solving exercise with the other members of your group.

At the end of the task you will receive feedback from the other members of your group regarding **areas of weakness** in your performance during the task. That is, your group members will note the areas in which **you could improve**.



Imagine that you are going to take part in a discussion task where you will be asked to work together on a problem-solving exercise with the other members of your group.

At the end of the task you will receive feedback from the other members of your group regarding **areas of strength** in your performance during the task. That is, your group members will note the areas in which **you performed well**.



Measures of the overall perception of the context (the same items were used in lab)

Please indicate how accurately the following statement may describe your potential experience with the hypothetical situation?

	Disagree Strongly	Disagree	Neutral	Agree	Agree Strongly
I would find the task <u>stressful</u>	☐	☐	☐	☐	☐
I would find the task <u>enjoyable</u>	☐	☐	☐	☐	☐

Please indicate the extent to which you may find the discussion task positive or negative?

Very Negative											Very Positive
1	2	3	4	5	6	7	8	9	10		

Measures of the perceived rewarding or threatening characteristics of the context. These items were not used in the lab. They were included in the online survey as additional checks of the manipulation effects.

1. In the described hypothetical situation, to what extent would you feel you have an opportunity to gain **some kind of reward**?
2. In the described hypothetical situation, to what extent would you feel you have an opportunity to **lead or influence others**?
3. In the described hypothetical situation, to what extent would you feel you have some sort of **power or control over others**?
4. In the described hypothetical situation, to what extent would you feel you have an opportunity to engage in a **POSITIVE social interaction**?
5. In the described hypothetical situation, to what extent would you feel you have an opportunity to **pursue some kind of positive outcome**?
6. In the described hypothetical situation, to what extent would you feel you have an opportunity to **do something fun**?
7. In the described hypothetical situation, to what extent would you perceive **some sort of potential threat**?
8. In the described hypothetical situation, to what extent would you **feel conflicted**, or that you had to make **a difficult choice** between two or more options?
9. In the described hypothetical situation, to what extent would you feel that you were being **judged**?
10. In the described hypothetical situation, to what extent would you be feeling torn between two or more **incompatible goals**? (e.g., be liked and be competent)?
11. In the described hypothetical situation, to what extent would feel you had to **avoid or control something stressful**?
12. In the described hypothetical situation, to what extent would you feel you had to avoid **some kind of negative outcome**?

Appendix C10. Additional Results: MANOVA

Does the Association between Traits and States Depend on Context?

A one-way between-groups multivariate analysis of variance was performed to investigate differences in state expressions of traits in three conditions. Two dependent variables were used: state extraversion and state neuroticism. The independent variable was condition. The covariate were extraversion and neuroticism. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance covariance matrices, and multicollinearity, with no serious violations noted. There was no statistically significant difference in state extraversion between conditions, $F(2, 171) = 1.64, p = .20, \eta_p^2 = .02$. There was also no statistically significant difference in state neuroticism between conditions $F(2, 171) = .61, p = .54, \eta_p^2 = .01$. Furthermore, the moderated regression analyses revealed neither the extraversion $\times$ condition interaction, $F(2, 171) = .56, p = .57, \eta_p^2 = .01$, nor the neuroticism $\times$ condition interaction $F(2, 171) = .41, p = .67, \eta_p^2 = .01$, were significant for the models of state extraversion and neuroticism.

Appendix D. Chapter 4 (Study 3)

The below items were used to assess situational characteristics that are specific to the psychological processes thought to underlie Extraversion and Neuroticism. Participants rated their contexts using 13 items in the following order (exact wording):

To what extent do below items describe your situation over the past an hour? (0 = not at all, 10 = very much):

- Were you in a situation where you had an opportunity to gain some kind of reward?
- Were you in a situation with some degree of potential threat?
- Were you in a situation where you had opportunities to lead or influence others?
- Were you in a situation where you need to make a difficult choice between two or more alternatives?
- Were you in a situation where you had some degree of power or control?
- Were you in a situation or anxious about getting into a situation where you are likely to be judged or evaluated?
- Were you in or looking forward to attending a positive social activity?
- Were you torn between two or more incompatible goals?
- Were you pursuing some kind of desired goal or positive outcome?
- Was there something unpleasant or stressful that you were trying to avoid or control?
- Were you in a situation with opportunities to do something fun or adventurous?
- Were you trying to avoid some kind of negative outcome?
- Were you learning about something new (e.g., reading, attending a lecture, or being at a gallery/museum)?”

Appendix E. Chapter 5 (Study 4)

Appendix E1: Context Measures

These items were used to assess situational characteristics that are specific to the psychological processes thought to underlie Extraversion and Neuroticism. Participants first rated their contexts using 12 items in the following order (exact wording). Participants then described their context using the open-ended question.

To what extent do below items describe your situation over the past an hour? (0 = not at all, 10 = very much):

- Were you in a situation where you had an opportunity to gain some kind of reward?
- Were you in a situation with some degree of potential threat?
- Were you in a situation where you had opportunities to lead or influence others?
- Were you in a situation where you need to make a difficult choice between two or more alternatives?
- Were you in a situation where you had some degree of power or control?
- Were you in a situation or anxious about getting into a situation where you are likely to be judged or evaluated?
- Were you in or looking forward to attending a positive social activity?
- Were you torn between two or more incompatible goals?
- Were you pursuing some kind of desired goal or positive outcome?
- Was there something unpleasant or stressful that you were trying to avoid or control?
- Were you in a situation with opportunities to do something fun or adventurous?
- Were you trying to avoid some kind of negative outcome?

“In a few words, describe where you were and what you were doing over the last

hour?” _____

Appendix E2: Additional Analyses

In the results section of Chapter 5, it was noted that the extraversion $\times$ (self-reported) reward context interaction was non-significant when using the BFAS or Mini Markers, though it was significant when using the BFI-2. Table E2 below presents the fixed effects for state extraversion model using extraversion scores obtained from BFAS, BFI-2, and Big Five Mini inventories, respectively.

Table E2
Fixed Effects for State Extraversion Multilevel Models Using Different Trait Inventories

Personality Expressions	<i>b</i>	<i>t</i>	<i>P</i>
State Extraversion	2.41	4.02	< .0001
Extraversion (b; BFAS)	0.64	5.51	< .0001
Self-reported ECC (w)	0.59	5.33	< .0001
Self-reported ECC (b)	0.49	9.59	< .0001
Neuroticism (b; control variable)	-0.13	-1.25	0.21
Survey Order (w; control variable)	0.00	1.21	0.23
Extraversion (b) $\times$ ECC (w)	0.06	1.95	0.05
State Extraversion	2.79	5.80	< .0001
Extraversion (b; BFI-2)	0.53	5.66	< .0001
Self-reported ECC (w)	0.62	7.34	< .0001
Self-reported ECC (b)	0.48	9.37	< .0001
Neuroticism (b; control variable)	-0.09	-1.19	0.24
Survey Order (w; control variable)	0.00	1.21	0.23
Extraversion (b) $\times$ ECC (w)	0.05	2.18	0.03
State Extraversion	3.31	7.98	< .0001
Extraversion (b; Mini)	0.25	5.27	< .0001
Self-reported ECC (w)	0.68	8.96	< .0001
Self-reported ECC (b)	0.48	9.24	< .0001
Neuroticism (b; control variable)	-0.09	-1.81	0.07
Survey Order (w; control variable)	0.00	1.18	0.24
Extraversion (b) $\times$ ECC (w)	0.02	1.68	0.09

Note. $N = 184$. Number of observations = 5914. Self-reported state extraversion (DV, within-person), scale 0 to 10. (w) = within-person. (b) = between-person. *bs* = unstandardized multilevel regression coefficients.