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Bright or dark, or virtues and vices? A reexamination of the big five and job performance

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BRIGHT OR DARK, OR VIRTUES AND VICES?

A REEXAMINATION OF THE BIG FIVE

AND JOB PERFORMANCE

by

Christopher M. Castille, M.A.

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
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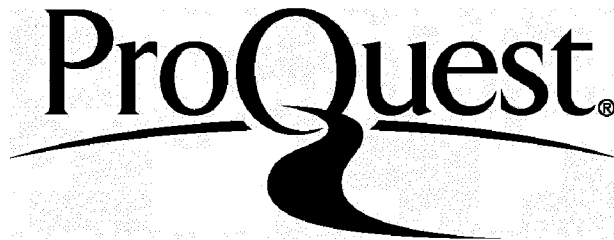LOUISIANA TECH UNIVERSITY

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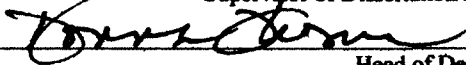
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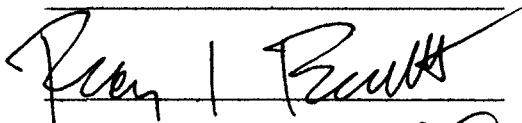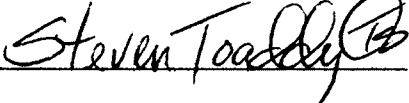
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by **Christopher Castille**
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BRIGHT OR DARK, OR VIRTUES AND VICES?

A REEXAMINATION OF THE BIG FIVE AND JOB PERFORMANCE

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ABSTRACT

Personality research in industrial/organizational psychology has been dominated by the description of personality traits and outcomes as either bright or dark. Unfortunately, research has shown that bright traits have dark outcomes and vice versa, suggesting that a paradox is plaguing the literature. To resolve this paradox, I propose that a different heuristic stemming from positive psychology be utilized: virtues and vices. Virtues refer to exercises of human excellence while vices refer to actions of human failure. Drawing on the virtue ethics concept of the Aristotelian mean, dark traits are viewed as extreme or elevated levels of bright personality traits, allowing both to be described by a common set of dimensions. Further, I posit that under certain circumstances, even extreme trait standings might result in acts of human excellence. Importantly, this resolution implies that nonlinear relationships may accurately describe the functional form of relationships linking personality dimensions to valued outcomes. To test this model, I applied the virtues and vices heuristic to five basic personality dimensions (the Big Five) described by the Five-Factor Model (FFM) of personality in order to construct a measurement model that views extreme levels of these dimensions as dark. To develop this measurement model, trained item writers generated nine hundred fifty-eight items according to these specifications (approximately 30 items per each of the 30 narrow traits of the FFM). Two subject-matter experts rated these items on extremity for the purposes of reducing this initial item pool to a smaller set of usable

items. This resulted in a set of three hundred items that were administered to a sample of 728 working employees obtained through Amazon's Mechanical Turk along with self-descriptions of task performance, organizational citizenship, and deviant work behavior (outcomes widely accepted as either virtuous or vice-like). Ideal-point item-response theory was used to estimate person parameters for the five personality dimensions. Small nonlinear effects were detected linking several traits and outcomes. Small-n employee selection scenarios were simulated to demonstrate the practical importance of these small effects. Implications for theory and practice are discussed.

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DEDICATION

I dedicate this dissertation to the friends and family who support and challenge me, including but not limited to my parents, Michael and Sonya Castille; and my loving wife, Ann-Marie Rabalais Castille, as she always encourages me to believe in myself and to strive for the greater good.

For Holy Name Shall Always Be...

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This dissertation would not have been possible without the assistance provided by my dissertation committee members: Dr. Rebecca J. Bennett and Dr. Steven Toaddy. I would especially like to acknowledge my dissertation chair, Dr. Tilman Sheets, who initially encouraged me to pursue my Ph.D. at Louisiana Tech University and then worked with me as my advisor. Thank you for seeing in me the virtues that I might be worthy of achieving as a graduate student of Louisiana Tech's young, but flourishing, Industrial/Organizational Psychology Ph.D. program.

CHAPTER ONE

INTRODUCTION

This dissertation proposes a heuristic for personality trait researchers in an attempt to conceptually integrate the separate bright, dark, maladaptive, and aberrant personality literature, especially as it pertains to industrial-organizational (I-O) psychology personality research. The term heuristic is used here as an effort-reducing conceptual tool that reduces the complexity of a problem (Shah & Oppenheimer, 2008). Personality traits have been defined as stable individual differences in affect, behavior, cognitions, and motivations (Revelle, Wilt, & Condon, 2011). A collection of personality traits known as the Big Five (Extraversion, Agreeableness, Conscientiousness, Openness to Experience, and Neuroticism/Emotional Stability) and their associated narrow facets have been referred to as bright personality traits, while more irritating characteristics of individuals have generally been referred to as dark personality traits (R. Hogan, Curphy, & Hogan, 1994). Thus, bright and dark traits refer to stable characteristics that reflect differences in kind and not degree.

For many years, the bright and dark heuristic led researchers to view personality in bright or dark terms (Judge & LePine, 2007; Wille, De Fruyt, & De Clercq, 2013). Hogan et al. (1994) initially used the term *bright* simply to refer to Big Five personality traits while more irritating characteristics were referred to as *dark*. These labels were used to explain traits linked to leader effectiveness and derailment, implying that the best

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outcomes emerged when leaders both possessed bright traits and lacked dark traits (R. Hogan et al., 1994). Much later, Judge and LePine (2007) formally defined these terms using differences in the social desirability of both traits and their implications in certain contexts. Accordingly, bright traits were defined as socially desirable traits because of the generally positive implications for the workplace, while dark traits defined as socially undesirable for the generally negative implications for the workplace. Thus, bright and dark traits are assumed to be conceptually independent entities. Offering further granularity, Judge and LePine (2007) called researchers to investigate contrasting implications (e.g., identify situations in which bright traits lead to dark outcomes). In other words, researchers should acknowledge that both bright and dark traits have bright and dark sides.

To understand the implications of Judge and LePine's (2007) framework, consider the bright trait of Conscientiousness, which is a disposition towards competence, order, dutifulness, achievement striving, self-discipline, and deliberation (Costa & McCrae, 1992). Research suggests that increased levels of this trait relate to higher levels of job performance (Barrick & Mount, 1991). However, such levels have also been linked with increased rigidity in the workplace (Carter et al., 2013; Le et al., 2011), which can be detrimental for individuals and organizations. Consider also the bright trait of Agreeableness, which is a disposition towards trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness (Costa & McCrae, 1992). Meta-analytic research suggests that Agreeableness is a prosocial trait linked with higher levels of organizational citizenship behaviors (Chiaburu, Oh, Berry, Li, & Gardner, 2011) and lower levels of organizational deviance (Berry, Ones, & Sackett, 2007).

However, research also suggests that Agreeableness is linked with poorer extrinsic career success, reduced pay, and reduced promotions (Ng, Eby, Sorensen, & Feldman, 2005; Nyhus & Pons, 2005). Thus, bright traits can have a dark side.

Similarly, consider the dark trait of Machiavellianism, which is a disposition described by amorality, a desire for control and status, and distrust of others (Dahling, Whitaker, & Levy, 2009). Research suggests that Machiavellians are more likely to engage in counterproductive work behaviors (O'Boyle, Forsyth, Banks, & McDaniel, 2012), which is one reason why this trait may be considered dark. Machiavellians also appear skilled in winning negotiations without necessarily incurring the disfavor of their targets, suggesting that Machiavellians may serve individualistic as well as organizational goals and aims in certain situations (Gustafson, 2000). Machiavellians also receive more favorable job performance evaluations from their supervisor when working under resource constraints (Kuyumcu & Dahling, 2014). Thus, the dark trait Machiavellianism can manifest in socially beneficial or detrimental behaviors depending on the context.

Three Critiques

The role of many personality traits in the workplace can be understood using the bright and dark heuristic. However, researchers have suggested that this heuristic is not without its shortcomings. First, in its initial conceptualization, this heuristic implied that individuals possessing bright traits and lacking dark traits held an unqualified advantage (and vice versa), which is not only inconsistent with evolutionary theory (Nettle, 2006) but can also result in misleading research claims (Castille, Kuyumcu, & Bennett, 2014; Tett, 1998). Second, this heuristic implied an independence in bright and dark traits that

has produced a fragmented literature (Judge & LePine, 2007). Indeed, Judge and LePine (2007) noted that continued use of this heuristic might allow us to increase our precision in predicting criteria at the cost of increasing complexity and fragmentation in the personality literature. Increasing complexity and fragmentation violates the principle of parsimony in science (Graziano & Raulin, 2010). Third, this heuristic has led researchers to create models of dark personality (e.g., the Dark Triad, the DSM IV-based models) that are imprecise and incomplete descriptions of personality (Guenole, 2014; McCord, Joseph, & Grijalva, 2014), which in the former instance introduces causal ambiguity when links with valued criteria are established empirically (Christiansen, Quirk, Robie, & Oswald, 2014) and in the latter instance produces incomplete pictures of the role of personality in the workplace. Each of these critiques will now be described in greater detail.

The Bright/Dark Heuristic Presupposes a Paradox

Previous research suggests that the bright/dark heuristic may be conceptually inconsistent with evolutionary reasoning. Evolutionary reasoning suggests that if a disposition offered an unalloyed advantage over others across a variety of contexts, then this disposition would become a universal for a species (Nettle, 2006). Thus, bright traits, if defined strictly as socially desirable qualities (R. Hogan et al., 1994), then natural selection would have only selected higher values of these traits, producing not individual differences, but human universals at these socially desirable levels. However, the mere fact that there is variation in individual differences in personality traits suggests that advantages are granted only under certain circumstances and also that there are tradeoffs associated with certain trait levels (Nettle, 2006). In other words, the link

between bright/dark traits and bright/dark sides of traits requires a qualification by context. Notably, more recent reconceptualizations (Judge & LePine, 2007; Wille et al., 2013) attempt to acknowledge the notion of tradeoffs. However, by attempting to qualify such links by maintaining the bright/dark heuristic, researchers may have unintentionally produced a taxonomy that will be misleading.

For instance, recent research by Kuyumcu and Dahling (2014) revealed that in the context of organizational constraints, which are constraints on legitimate performance efforts, supervisors evaluate Machiavellians' performance more favorably. Under the reconceptualization of bright and dark personality proposed by Judge and LePine (2007), this would be an instance in which a dark trait (Machiavellianism) results in a socially desirable outcome (favorable evaluations by supervisors). It should be noted that Kuyumcu and Dahling did not interpret their results with regard to this taxonomy, but predicted this outcome successfully using sociotechnical systems theory (Trist & Bamforth, 1951). Subsequent research by Castille et al. (2014) demonstrated unequivocally that in the context of constraints, Machiavellians are not engaging in organizationally beneficial workplace behaviors. Indeed, they engaged in higher levels of coworker-directed social undermining, production deviance, and theft, suggesting that the positive evaluations by supervisors reported previously by Kuyumcu and Dahling (2014) were a consequence of contextually-induced ethical blindness (Gino, Moore, & Bazerman, 2010). Thus, by failing to account for the strategies in which positive supervisor appraisals are achieved, the taxonomy proposed by Judge and LePine (2007) falsely suggests positive value in Machiavellianism when organizations impose constraints on performance (e.g., political organizations).

The previous example of Machiavellianism draws attention to the role of dark traits in organizations and how such traits can produce socially desirable outcomes through socially undesirable means. However, this is not confined solely to dark traits. Consider the bright trait of Conscientiousness. Meta-analytic evidence suggests that Conscientiousness has an unalloyed advantage in the workplace in regard to job performance criteria (i.e., higher Conscientiousness is better). Tett (1998) issued two arguments against this suggestion. First, he argued that prior evidence (e.g., Barrick & Mount, 1991) contains data suggesting that this advantage is not consistent across all occupations. In other words, there are occupations in which having higher levels of Conscientiousness may be detrimental. More recent research suggests that occupations low in job complexity may not require high levels of Conscientiousness (Le et al., 2011), suggesting that higher levels of Conscientiousness can be detrimental to performance, and therefore organizations selecting for overly high levels of Conscientiousness. This has received support in subsequent research (Carter et al., 2013). His second argument, which was echoed by other researchers (Grant & Schwartz, 2011; Pierce & Aguinis, 2013), suggested that this trait is associated with rigidity, struggle in acquiring new skills, and taking too long to complete tasks. In other words, labeling this bright trait as beneficial for organizations appears to be misleading and can result in decisions (e.g., select for higher levels of Conscientiousness) that can be detrimental for organizations.

The Bright/Dark Heuristic Encourages a Fragmented Literature

Researchers hoping to build more useful models of personality and workplace behavior have mentioned the fragmentation of the personality literature that occurs in adopting the bright and dark heuristic. To quote Judge and LePine (2007):

(W)e conclude that personality traits have both bright and dark effects in both

individual and team contexts, and that the ability to predict criteria in both

contexts could improve, perhaps dramatically, if our theorizing, research and

practice explicitly took these types of effects into account. Unfortunately,

however, I regret to say that doing so can only come at the cost of increasing

complexity and fragmentation, and thus I will forfeit the beauty of the simplicity

of research and practice using a very small set of rather broad personality traits

and criteria. (p. 350)

This concession appears to be a direct consequence of adopting the bright/dark

heuristic. The bright and dark heuristic essentially implies that bright and dark qualities

are differences in *kind* and not *degree*. Empirically, this suggests that bright and dark

traits are independent phenomena. This seems unlikely on theoretical grounds and is,

unsurprisingly, not supported on empirical grounds. For instance, in a twin study

investigating the genetic and phenotypic overlap of the Big Five traits with the Dark

Triad traits, Vernon, Villani, Vickers, and Harris (2008) found that the traits assessed

using the two models co-varied substantially. Further, they stated that covariation

between certain Big Five and Dark Triad traits were largely attributable to genetic

factors, which suggests that a common framework (the Five-Factor Model) can

adequately describe both trait models. Similarly, research by Miller and colleagues

(Miller, Bagby, Pilkonis, Reynolds, & Lynam, 2005; Miller et al., 2008; Miller, Pilkonis,

& Morse, 2004; Miller, Reynolds, & Pilkonis, 2004) demonstrated that scores obtained

from tests of normal (or conventionally bright) personality inventories can be modeled in

the form of compounds so as to represent the *Diagnostic and Statistical Manuel of*

Mental Disorders (DSM) VI-TR personality disorders. For instance, the Narcissistic personality compound is comprised of high levels of assertiveness and excitement seeking and low levels of straightforwardness, altruism, and compliance, to name a few normal personality traits (for other traits in the compound, see Wille et al., 2013). A longitudinal study by Wille et al. (2013) using these personality disorder compounds, but referring to them as "aberrant personality tendencies" (p. 174), revealed that such compounds add incrementally and are relatively important to the prediction of intrinsic and extrinsic career success compared to the Big Five. Interestingly, Wille et al. (2013) found that individuals with higher levels of certain aberrant tendencies (narcissistic and antisocial) evidenced higher hierarchical and financial attainment. As these compounds reflect extreme levels of socially desirable personality traits, these functional outcomes suggest that even extreme levels can have their benefits.

Importantly, the aforementioned studies were early empirical attempts suggesting that socially undesirable tendencies may not reflect different traits, but rather extreme levels of normal personality tendencies. Notably, the updated DSM-5 published by the American Psychological Association (APA) (2013) has provided an alternative dimensional model for personality description that is based on the Five-Factor Model and views maladaptive or dysfunctional personality tendencies as partially a manifestation of extreme levels of normal personality traits. However, even this model appears to ignore certain extremes (e.g., extreme Extraversion, extreme Agreeableness, and extreme Emotional Stability). Still, it seems that extreme levels of the FFM might manifest in the form of maladaptive tendencies, but can also manifest in beneficial ways depending on the context. As this review of the literature suggests, both bright and dark

personality traits are likely related and may be described using a common organizing framework that acknowledges the implications of personality trait levels in terms of costs and benefits, thereby allowing the fragmented literature to achieve unity.

The Bright/Dark Heuristic Encourages Imprecise and Incomplete Assessment

Guenole (2014), in acknowledging the recent update of the DSM, called attention to the new maladaptive Big Five personality inventory, which is an inventory that defines personality disorders in terms of extreme levels of the Big Five traits. The maladaptive Big Five traits included in the DSM-5 are *Negative Emotionality*, *Detachment*, *Antagonism*, *Disinhibition*, and *Psychoticism*, which can be considered as extremely low levels of the Big Five traits of *Neuroticism*, *Extraversion*, *Agreeableness*, *Conscientiousness*, and *Openness*, respectively. Importantly, Guenole (2014) argued that common approaches for understanding personality that are based on the dimensionalized DSM-IV (e.g., aberrant personality profiles) and the Dark Triad (which are narrow dark personality constructs) will be imprecise in the former case and incomplete in the latter. The approaches based on the DSM-IV personality disorder compounds will be imprecise because many of these compounds contain redundant narrow FFM trait facets, making causal attributions ambiguous (Christiansen et al., 2014). The Dark Triad models cover a narrow space of personality extremes that can be subsumed under the Antagonism (or low Agreeableness) factor, resulting in an incomplete picture of the role of personality extremes for the workplace.

The distinction between bright and dark has led researchers to construct measurement models that capture bright and dark personality as if they were distinct entities. For instance, researchers at Hogan Assessments have constructed two separate

personality inventories: the Hogan Personality Inventory (R. Hogan & Hogan, 1995) and the Hogan Development Survey (R. Hogan & Hogan, 1997). The former measures normal personality functioning (i.e., reflect the Big Five) and the latter dark or subclinical levels of the DSM-IV personality traits (De Fruyt, Wille, & Furnham, 2013). Such a distinction in measurement may be appropriate for accurate assessment at certain trait levels (normal vs. extreme); however, use of constructs that are modeled after the DSM-IV personality disorder constructs may unintentionally introduce causal ambiguity for evaluating the role of extreme trait levels for the workplace.

Additionally, Dark Triad approaches will be incomplete because they are overly narrow (i.e., the Dark Triad can be subsumed under the DSM-5 Antagonism factor) (Guenole, 2014). Similarly, McCord et al. (2014) argued that personality researchers would benefit from not only considering the extreme levels of the FFM posited by clinical researchers, but also in considering other extremes of the FFM. Such extremes not mentioned by clinical researchers, but nonetheless consistent with the notion that extreme traits can signal maladaptivity (MacDonald, 1995), include extremely high levels of Extraversion, Agreeableness, Emotional Stability, and extremely low levels of Openness. Unfortunately, most personality inventories commonly in use today lack the content and sensitivity to appropriately reflect the ranges of personality traits discussed thus far (Dilchert, Ones, & Krueger, 2014). In other words, current inventories lack a requisite number of items with content reflecting extreme levels of the FFM traits. Hypothetical inventories including such content would be more informative than commonly used personality inventories.

An Alternative Heuristic: Virtues and Vices

Researchers have argued that our ancestors would have been unlikely to survive had they not been able to generate, recognize, celebrate, and punish certain behavioral strategies (Peterson & Seligman, 2004). In this spirit, I propose that the aforementioned bright and dark heuristic be abandoned, and instead replaced with the heuristic of virtues and vices. Virtue has been defined as "a disposition to act, desire, and feel that involves the exercise of judgment and leads to a recognizable human excellence or instance of human flourishing" (Yearley, 1990, p. 13). Conversely, vice has been defined as "a disposition to act in ways that manifest human failure" (Yearley, 1990, p. 106). While these definitions make explicit use of a reference to disposition, one can easily see how using the terms virtues and vices will refer to conscious actions or strategies that are evaluated in terms of success and failure. Though I have relied upon the use of the term "dispositions" as per the definition, it would admittedly be more appropriate to refer to levels of a given disposition.

Drawing on recent developments in the virtue ethics literature (Grant & Schwartz, 2011), this model assumes Aristotle's (trans. 1999) notion that virtuous characteristics lay at the mean or median level of a dimension, in-between a vice of deficiency (extremely low levels) and a vice of excess (extremely high levels). In this broadened model, trait labels serve as a heuristic, drawing our attention to a range of socially desirable or undesirable values on a trait continuum. Figure 1 provides an illustration using facets of Agreeableness as specified by both the NEO (Costa & McCrae, 1992), the DSM5 (APA, 2013), and is also supplemented by extreme trait descriptions.

Extreme Trust	Extreme Straightforwardness	Extreme Modesty	Extreme Altruism	Extreme Compliance	Extreme Tender-mindedness
Trust	Straightforwardness	Modesty	Altruism	Compliance	Tender-mindedness
Deceitfulness	Manipulativeness	Attention-Seeking	Grandiosity	Hostility	Callousness
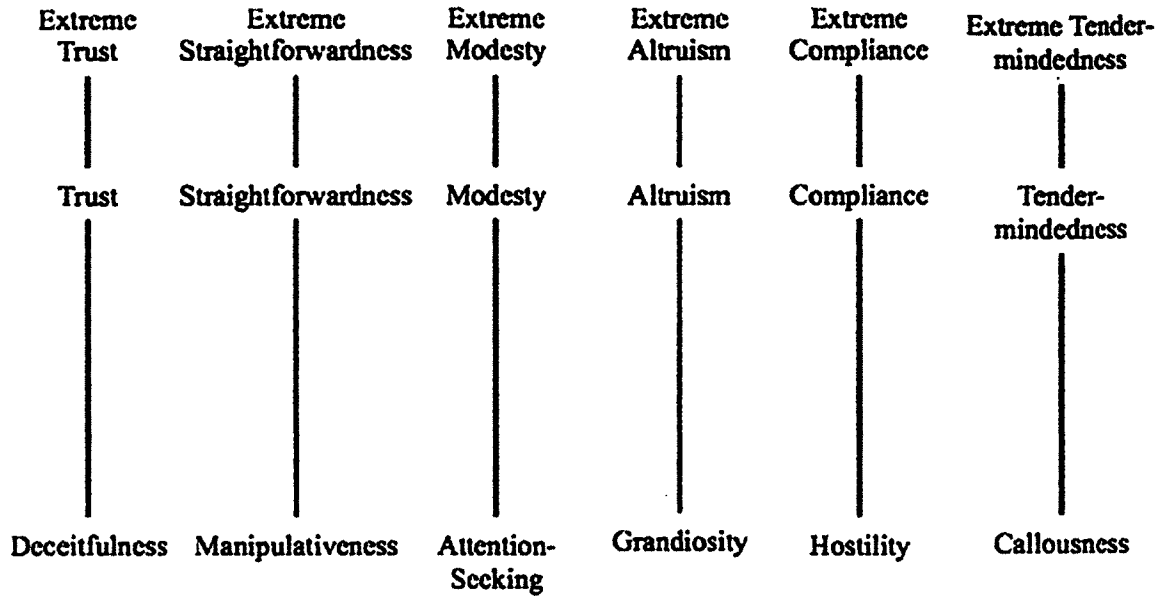
Figure 1. *An Application of the Virtues/Vices Heuristic to Facets of Agreeableness*

Consider the trait of trust, defined as the belief that others are honest, well intentioned, and also by the absence of skepticism towards others (Costa & McCrae, 1992). Individuals high in trust would be described as trusting others, what they say, and they others are basically moral individuals. Furthermore, individuals who are extremely high on this trait would be extremely trusting of others and what they say (perhaps to a fault) and that individuals always or almost always act morally. While it might be tempting for some to refer to such a standing as excessive or maladaptive, there may be virtues to cultivating such a characteristic. Indeed, it has been argued that businesses that can embody such a quality might cultivate a competitive advantage over their competitors (Peppers & Rogers, 2013). On the opposing end of the dimension, those extremely low on the trust dimension would be described as deceitful and inclined to make up stories that are not true in order to get what they want from others. Again, while it might be tempting to call such standing excessive or maladaptive as it harms trust,

more recent research suggests that deception can beneficial and even increase trust under certain conditions (Levine & Schweitzer, 2015). Clearly, nuance is needed in both theory and research in order to understand individual differences in characteristic dispositions, and the virtues/vices heuristic may be of assistance in this matter.

The virtues/vices heuristic might also be applied to broad traits as well. For instance, Conscientiousness describes a range of socially desirable trait values that manifest in its facets (i.e., responsibility, self-control, orderliness, and industriousness). These socially desirable levels lie in between two ranges of socially undesirable trait values. On the extremely high end lies one set of socially undesirable levels of the Conscientiousness facets (i.e., overly responsible for uncontrollable events, overly self-controlled, rigid perfectionism, incapable of breaking away from work). On the extremely low-end lies another set of socially undesirable levels of the same Conscientiousness facets (i.e., irresponsibility, impulsiveness, disorderly tendencies, and distractibility). As another example, the low end of Agreeableness may be referred to using the DSM-5 broad trait label of antagonism while the high end may be referred to as gullibility or submissiveness. Research supports the use of either term for describing extremely high levels of Agreeableness (Haigler & Widiger, 2001; Samuel & Gore, 2012; Trull & Widiger, 2013). This logic applies to each of the Big Five trait dimensions. Importantly, this model acknowledges that, unlike the bright, dark, and related distinctions, socially desirable and undesirable traits reflect differences in degree in the same dimension rather than differences in kind (i.e., different or distinct dimensions). I argued earlier that the bright/dark heuristic fails to acknowledge this common empirical variance. This reconceptualization should allow for any bright or

dark trait to be described using a simpler overarching framework (i.e., the Five-Factor Model) that acknowledges the relationship between bright and dark traits. Indeed, the Dark Triad traits would be adequately described by the DSM-5 Antagonism factor (Guenole, 2014) and perhaps scores on other narrow dimensions. Additionally, this model suggests that there are other levels of personality that have been less studied (e.g., extremely high levels of the Five-Factor Model traits), which broadens the scope of I-O personality research beyond both bright and dark traits. Importantly, this reconceptualization both broadens and integrates the I-O personality literature, which are outcomes that researchers once believed to be out of reach (Judge & LePine, 2007).

Additionally, while these labels have been used as heuristics, they are not meant to imply that extreme levels are necessarily dysfunctional, maladaptive, or counterproductive because such a judgment requires evaluators to consider the behavioral strategies associated with such levels and how those strategies can result in success or failure. Table 1 helps to illustrate how the application of virtues and vices can bring order to the bright and dark personality literature, which contains hypothetical virtues and vices associated with the Big Five trait of Extraversion.

Table 1

Hypothesized Virtues and Vices for Different Extraversion Levels

Trait Level	Virtues	Vices
Extremely High	Extremely pronounced variations of high Extraversion	
High	• Easily establishes new social connections • Can secure new opportunities by exploring social networks • Can generate positive emotion in social exchanges • Can generate bold and daring leadership	• Can fail to maintain multiple relationships • Can defect to other social groups • Dominates conversations • Failing to recognize when over-enthusiastic • Poor task focus
Moderate	• Strikes a balance between talking and listening • A general blend of the above and below virtues	• A general blend of the above and below vices
Low	• High task focus when working alone • Recognizes the value in keeping the peace by withholding one's opinions, feelings, or excitement	• Struggles in contributing to group efforts • Fails to speak up or express their feelings when it is needed
Extremely Low	Extremely pronounced variations of low Extraversion	

Various sources of literature have informed the hypotheses embedded in Table 1.

For instance, Grant (2013) argued that ambiverts (i.e., individuals who have moderate

levels of the Extraversion) can strike a balance between talking and listening, which may

make them more effective salesman. However, it seems likely, based on the notion of

tradeoffs, that even ambiversion has disadvantages that may be considered a blend of the

vices of Extraversion and introversion. Other researchers have noted that Extraversion,

which has generally been evaluated for its virtues, also has many vices, such as a poor

focus on tasks when working in groups (Cain, 2013; Grant & Schwartz, 2011).

Additionally, the virtues of introversion have recently begun to receive attention (Cain, 2013), which can include high task focus and keeping one's thoughts and feelings to oneself in order to maintain peace. However, such strategies can have their vices, especially when group efforts and conflict are needed. Generally speaking, extreme levels of Extraversion (introversion) can be considered to possess more pronounced variations of the virtues and vices associated with high (low) levels. Importantly, this new heuristic implies that Extraversion is not a bright or dark trait, but has various virtues and vices that depend upon the level of Extraversion in question. More importantly, applying this heuristic to the other Big Five traits may bring unity to the bright and dark personality literatures while also suggesting new hypotheses to be tested. Also, this heuristic might be applied to more narrow traits (like those listed in Figure 1) to develop a more comprehensive theory of trait levels and the manifestation of human excellence and failure.

Consider Conscientiousness, research suggests that extremely high Conscientiousness (i.e., perfectionism) may be favored by supervisors in extremely complex jobs, but at an increasing cost to criteria relevant to social and organizational valued activities, such as organizational citizenship behavior (OCB) and counterproductive work behavior (CWB) (Le et al., 2011). In other words, it appears that extremely high Conscientiousness is associated with a tradeoff of increased attentional investment in task performance for decreased attentional investment in OCB, perhaps also resulting in CWB via production deviance. If organizations are willing to accept this tradeoff, then the virtues of extremely high Conscientiousness will be recognized in spite

of the vices. This consideration for context qualifies how manifestations of a disposition can be regarded a virtue or a vice, which requires far more nuance than is adequately addressed by bright and dark trait labels. This is different from the use of social desirability as a criterion (which has been used consistently in employing the bright/dark heuristic) because what counts is the achievement of excellence, flourishing, and the avoidance of failure, which will require researchers to consider how goals may be achieved as opposed to whether or not a generally valued socially desirable criterion has been achieved (e.g., task performance ratings by supervisors).

There are two key conceptual benefits to the use of the terms virtue and vice as opposed to the terms bright and dark. The first is in acknowledging trade-offs. Because it is assumed that no trait level has a complete advantage over others (Nettle, 2006), traits may be linked to strategies that can be defined in terms of their virtues and vices. Such virtues and vices may not be adequately balanced for the workplace setting, suggesting that certain trait levels (i.e., extreme levels) may generally be disadvantageous for the workplace (e.g., extremely low Conscientiousness seems unlikely to be beneficial for individuals or organizations across a variety of settings). However, no trait level is universally beneficial or detrimental: what matters is the social context in which the trait manifests (Nettle, 2006). This is different from the original conceptualization of the terms bright and dark (R. Hogan et al., 1994), which assumes that the former are generally advantageous while the latter are generally disadvantageous. Judge and LePine's (2007) reconceptualization demonstrates the problem with this oversimplification. According to the model of personality virtues and vices, trait levels are assumed to have trade-offs that can be beneficial for the individual, a larger

collective, or both depending on the context. However, what determines this is the extent to which the individual with a specific trait level occupies a social niche that recognizes and encourages the strategies associated with that level of the target dimension.

As an illustration of the conceptual benefit of acknowledging trade-offs and strategies for solving social problems, consider the trait of narcissism, another dark trait typically associated with counterproductive work behavior (O'Boyle et al., 2012). Prior research on narcissism suggests that there is a bright side that includes self-assuredness, charm, success in interpersonal relationships, as well as a dark side that includes antagonistic orientations, aggressive tendencies, and social conflict (Back et al., 2013). According to the model of personality virtues and vices, narcissism occupies a space the generally reflects extremely low levels of Agreeableness, or Antagonism (APA, 2013). Such tendencies would likely involve the use of impression management strategies (e.g., appearing like a team player, managing one's appearance), charming others, and promising rewards (Back et al., 2013; Jonason, Slomski, & Partyka, 2012), which may be functional for negotiating status hierarchies at certain levels of Antagonism. However, the vices of such levels would also likely involve selfish behaviors that place others in harm's way in threatening situations. Thus, rather than viewing these strategies as separate bright and dark sides, the virtues/vices heuristic calls attention to the strategies that are inherent to being a narcissist and calls attention to the ways in which the virtues of narcissism may be useful while minimizing the cost of certain vices. One such workplace arrangement may be short-term exchange relationships (e.g., contracting consulting relationships) as such qualities might actually be beneficial, but would be detrimental for maintaining long-term exchange relationships (Back et al., 2013; W. K.

Campbell, Bush, Brunell, & Shelton, 2005). Indeed, W. K. Campbell, Bush, Brunell, and

Shelton (2005) found that in competitive resource acquisition situations, narcissists were

more effective in acquiring resources than less narcissistic individuals, which was

detrimental to others in long-term exchange relationships. Such skill in negotiation

would also come with personal benefits and research suggests that narcissism is

associated with increased extrinsic career success in the form of hierarchical and

financial attainment (Wille et al., 2013), though it remains unclear how such outcomes

are achieved and if these strategies are virtues in action or instances of failure. Should

narcissists, operate in a context in which their skills for effective negotiation are valued

in short-term relationships, their virtues would be mutually benefiting both for the

individual and the (temporarily) hosting community, while minimizing the costs of

potentially self-servicing resource acquisition efforts that are detrimental in the long

term. Such an opportunity would be missed using the bright and dark distinction.

The second key benefit involves qualifying trait levels by their strategies and the

context in which these strategies result in excellences or failures for navigating social

problems as opposed to the social desirability of correlates. To understand why a

consideration for strategies is important, consider this empirical example. Research

suggests that Machiavellians receive more favorable task performance ratings from their

supervisors when faced with resource constraints (Kuyumcu & Dahling, 2014).

According to Judge and LePine's (2007) framework, this is a context in which a dark

trait (Machiavellianism) relates to a bright outcome (higher task performance

evaluations). However, according to the model of personality virtues and vices,

Machiavellianism generally reflects extremely low levels of Agreeableness, suggesting

that when experiencing the frustration of constraints on performance, Machiavellians will respond with higher levels of Antagonistic behaviors that help them to achieve higher performance evaluations (e.g., coworker-directed social undermining). Empirical research directly supports this argument (Castille et al., 2014). Thus, for this example, the bright and dark distinction would merely describe the two correlates in terms of their social desirability and fail to recognize the vices of extremely low Agreeableness in the context of negotiating status hierarchies. Furthermore, practitioners recognizing that Machiavellians thrive in constrained contexts might apply this knowledge in their own organizations, which would likely result in adverse consequences for the hosting organization. By contrast, the use of the terms vice and virtue draws attention to the manner in which certain outcomes are achieved. Virtue is achieved when trait-relevant strategies for navigating the social environment result in increased net benefits to the community at large, which can include the individual. In contrast, failure occurs when trait-relevant strategies result in consequences that damage the community at large (again, including the individual). By adopting virtues and vices, researchers are encouraged to identify those strategies that result in failures as well as those that result in excellences. This is in stark contrast to the bright and dark distinction, which requires researchers to merely identify correlates of traits that are generally accepted as socially desirable or undesirable. By adopting the model of personality virtues and vices, organizational researchers may develop an empirically based theory of virtue ethics (Grant & Schwartz, 2011).

It is important to note that the model of personality virtues and vices is also an attempt to conceptually integrate bright and dark I-O personality research with other

disciplines. Cosmides, Tooby, and Barkow (1992) argued that social scientists should conceptually integrate their research with the principles of evolutionary theory in order to abide by the scientific norm of mutual consistency. Evolutionary theory (Darwin, 1859), and more recently evolutionary psychologists (e.g., Buss, 2009a, 2009b; Buss & Duntley, 2008; Confer et al., 2010; Simpson, Griskevicius, & Kim, 2011), have provided many concepts that can enrich a discussion on the role of personality in organizations. Evolutionary psychologists have argued that personality traits reflect fitness trade-offs in which different locations on a trait dimension are associated with costs and benefits that are dependent upon environmental conditions (Buss, 2009b; Nettle, 2006), with the possible exception of fitness disadvantages at the extremes of a trait dimension (MacDonald, 1995). MacDonald (1995) argued that the normal range of personality dimensions represents viable alternative strategies for maximizing fitness. He also proposed that average fitness (i.e., the fitness of a trait level across contexts) is approximately equal for normal range levels of a personality dimension and that different levels of a trait would be associated with different strategies for achieving fitness. In other words, no trait has an unalloyed advantage over others but may be associated with different behavioral repertoires for solving adaptive problems that are not cost-free. Researchers have long noted that the environment in which humans have evolved was highly social (e.g., Caporael, 1997; Cosmides et al., 1992), presenting many adaptive problems such as social competition over status and resources. It has been argued that personality traits may have evolved to solve such problems (Buss, 1991). Nettle (2006) logically extended MacDonald's reasoning, arguing that if two traits are equal in terms of fitness, then adjustments in a trait level, which has some benefits, must

also produce recognizable costs. He noted that without this trade-off, natural selection would only favor higher values of a given trait, leading to a universally held level and a competitive parity among members. Using the trait of Extraversion, Nettle (2005) found that Extraverts pursued a riskier life history strategy that resulted in higher numbers of sexual partners at the cost of somatic risk (e.g., increased incidents of hospitalization due to risk). He later expanded on the idea of trade-offs using other Big Five traits (Nettle, 2006). Thus, evolutionary psychology can provides some powerful conceptual tools for explaining individual differences in personality traits while also providing the novel insight that virtually all levels of a personality dimension (with the potential exception of extreme levels) have trade-offs.

An important point to make in adopting an evolutionary perspective for explaining the role of personality in the workplace concerns the role of the environment. Darwin's insight was that environments serve as the means for shaping functional information-processing modules that may be described in terms of personality traits (Revelle et al., 2011). In regard to personality research in general, Buss (2009a) argued that environmental conditions should be defined as adaptive problems to solve a coherency problem that has long plagued personality research, which is the problem of personality invariance and behavioral variability (Mischel, 2004). Buss (2009a, 2009b) describes several important adaptive problems that virtually all humans have faced across evolutionary history, such as negotiating status hierarchies, forming social alliances, extracting resources from other people, dealing with cheaters in social exchange, and resolving conflict among one's group or between one's group and another group. These adaptive problems have long been plainly evident in organizational life

(Blau, 1964). Thus, evolutionary psychology predicts that personality traits are relevant for organizational life. Buss (2009b) argued that personality traits might reflect different strategies for navigating these problems. In regard to acquiring status for instance, he argued that Extraverts will tend to engage in social networking behaviors, those low in Agreeableness will use deception and manipulation, and those high in Conscientiousness will use sheer industriousness. These predictions have been supported empirically. In regard to extracting resources from others, another study by Buss (1992) linked different influence strategies to the Big Five. Individuals low in Agreeableness used coercive strategies; those low in Emotional Stability use sulking, pouting, and whining; and those low in Extraversion used their financial resources or self-deprecation (Buss, 1992). Similarly, Peterson and Seligman (2004) argued that such motivational dispositions might have emerged, been selected, and sustained because they solve certain survival problems. The authors hypothesized that the absence of biologically predisposed mechanisms would not have allowed our ancestors to generate, recognize, and celebrate or punish such virtues and vices, leading social groups to quickly die out. They further argued that our ancestors' ability to recognize such virtues allowed us to triumph over our vices that are costs associated with our dispositions. Thus, it appears that personality traits seem to have evolved in order to solve certain adaptive problems, namely hierarchy negotiation and resource extraction, which appear to emerge in social environments (Buss, 2009a), such as organizations. Further, it appears that traits will likely relate to different behavioral strategies for solving these problems and that these strategies have both costs and benefits (Nettle, 2006) that are celebrated in terms of virtues and vices in certain contexts (Peterson & Seligman, 2004) if they manifest in the

right context, that is, if they solve a problem faced by a larger collective in a manner that raises the collective's wellbeing.

By viewing personality traits as dispositions to solve adaptive social problems, the model of personality virtues and vices is consistent with a cognitive or information processing perspective on personality. This perspective essentially views personality traits as disposition to respond to certain environmental stimuli in a particular manner (Revelle et al., 2011). Such *if...then* behavioral patterns form the signature of an individual's personality (Mischel & Shoda, 1995). This information-processing perspective views personality traits as motivational dispositions that influence the way in which an individual responds to environmental stimuli (Denissen & Penke, 2008).

Additionally, the model of personality virtues and vices is conceptually aligned with clinical psychology research on personality disorders, which suggests that disorders are more likely for individuals with extreme levels of normal personality traits (e.g., De Fruyt, Wille, et al., 2013; Samuel & Gore, 2012; Samuel & Widiger, 2011; D. Watson, Stasik, Ro, & Clark, 2013). For example, Samuel and colleagues (Samuel & Gore, 2012; Samuel & Widiger, 2011) demonstrated that Conscientiousness, a normal or typical personality trait, at extremely high levels could manifest as rigid perfectionism or obsessive-compulsive personality disorder tendencies. Similarly, other researchers have demonstrated that normal or typical personality traits (i.e., Big Five) at extremely low levels could manifest as maladaptive personality traits (e.g., detachment, disinhibition, antagonism, psychoticism, and negative affectivity) (De Fruyt, De Clercq, et al., 2013; D. Watson et al., 2013). The recently updated DSM-5 reflects this trend, proposing an alternative dimensional model to the classification of personality disorders that considers

disorders as extreme levels of the FFM (APA, 2013). Many researchers have argued that the FFM is the common coherent framework for organizing personality research across disciplines (De Fruyt, De Clercq, et al., 2013; Guenole, 2014; Presnall, 2013; Thomas et al., 2013; Trull & Widiger, 2013; D. Watson et al., 2013; Widiger & Presnall, 2013). Indeed, pursuing an understanding of how different traits correspond to different skills, motives, values, interests, and meld together into a particular self may one day satisfy the aims of modern personality psychology (e.g., Peterson & Seligman, 2004).

Purpose of this Chapter

The goal of this chapter is to describe the historical origins of relevant concepts that have informed the model of personality virtues and vices and the way in which it might be tested in organizational settings. The implications of this model for the workplace and the related historical trends for these implications will also be addressed. The upcoming section contains a historical overview beginning with theory and inquiry developed by Greek and renaissance philosophers, early scientists and psychologists, and continues to I-O psychology personality research in the present. While this review is decidedly western, it is important to note that there are eastern or religious contributions to the study of personality and virtue (e.g., Mencius or Meng Tzu and Thomas Acquinas; Yearley, 1990). In other words, this review is not exhaustive. However, it is meant to cover enough material to inform the reader on concepts that inform the present investigation. A detailed treatment of the problem facing I-O psychology researchers is presented afterward. Following this is the purpose of this study and its goals as well as sections describing how these goals will be satisfied, which will contain hypotheses to be tested.

A Historical Overview

The goal of this section is to identify important influences on the concepts of personality, virtue, vices, and their implications for the workplace. Many historians of science (e.g., Boring, 1929; Goodwin, 2008; Stocking, 1988) have argued that historical reviews should attend to the context surrounding an idea's emergence. Thus, an attempt was made where possible to describe the historical context surrounding the emergence of important ideas.

Theory from Classical Greek Philosophers and Practitioners

Peterson and Seligman (2004, p. 45) noted that the early Greek philosophers sought to answer the question, "What is the good of a person" (p. 45). They noted that the framing of this question led philosophers such as Socrates, Plato, and Aristotle to examine virtuous traits and their role in society. Still, other important Western philosophers and practitioners (e.g., Theophrastus, Hippocrates, and Galen) sought to address other questions that are important for the study of personality (Revelle et al., 2011), each of which will be covered in subsequent paragraphs.

Early discussions on the vices and virtues associated with psychological dispositions can be traced back to Plato's (ca. 429-347 B. C.) discussion of the utopian society in *The Republic* (trans. 1892). Plato (trans. 1892), citing Socrates, proposed four essential virtues: wisdom (Sophia), courage (andreia), self-restraint (sôphrosune), and justice (dikaisunê). He believed that these virtues were essential to cultivating a utopian society. According to Plato, the utopian society was class-based and divided along the lines of social roles (worker, warrior, and king), which were occupied accordingly by individuals of a specific and innate constitution that was fit for performing the duties of

that role. Plato argued that individuals dominated by desire or lacking in self-restraint would make for productive workers and slaves, while those dominated by courage would make for effective warriors, and those dominated by wisdom would make for wise philosopher-kings. In other words, the most ideal society was one in which individuals were matched to social roles according to their virtues. The implication seems to be that, if this were to not occur, then their vices would manifest to the detriment of individuals and society at large.

Plato's most well known student, Aristotle (ca. 384-322 B.C.), echoed Plato's argument that virtuous behaviors are enacted in ideally constructed societies (Peterson & Seligman, 2004). However, he apparently believed that Plato's virtue theory was lacking. In his *Nicomachean Ethics*, Aristotle (trans. 1962) argues that certain virtues are innate while others were acquired through experience, which reflects a fundamental difference in philosophy that divides these two scholars. In other words, while Plato believed that all virtues were innate, which has been argued to follow directly from his theory of forms or ideas (Hergenhahn, 2009), Aristotle (trans. 1962) argues that virtues must be cultivated through the sheer force of will. Aristotle further argued that virtues came in intellectual and moral varieties, the former of which were acquired through education while the latter of which were determined by one's habits, or how well one managed one's inclination toward characteristic vices.

For the purpose of this study, the most important contribution Aristotle made to the study of personality and virtue theory is his proposition that happiness, success, or individual excellence depends upon an individual's ability to cultivate characteristics at their mean or median levels, or what has become known as the proposition of the

Aristotelian mean (Grant & Schwartz, 2011; Yearley, 1990). To quote a translation of

Aristotle:

> (I)t must be observed that the nature of moral qualities is such that they are
>
> destroyed by defect and by excess. I see the same thing happen in the case of
>
> strength and of health, to illustrate, as I must, the invisible by means of visible
>
> examples: excess as well as deficiency of physical exercise destroys our strength,
>
> and similarly, too much and too little food and drink destroys our health: the
>
> proportionate amount, however, produces, increases, and preserves it. The same
>
> applies to self-control, courage, and the other virtues: the man who shuns and
>
> fears everything and never stands his ground becomes a coward, whereas a man
>
> who knows no fear at all and goes to meet every danger becomes reckless.
>
> Similarly, a man who revels in every pleasure and abstains from none becomes
>
> self-indulgent, while he who avoids every pleasure like a boor becomes what
>
> might be called insensitive. Thus, I see that self-control and courage are
>
> destroyed by excess and by deficiency and are preserved by the mean (Aristotle,
>
> trans. 1962, p. 35-46).

The Aristotelian mean is the proposition that human virtues are cultivated at the

mean or median levels of traits, between a vice of a characteristic deficiency and a vice

of characteristic excess (Grant & Schwartz, 2011; Yearley, 1990). For instance, Aristotle

(trans. 1962) argued that courage is a virtue that is cultivated when an individual's

disposition is simultaneously opposed to cowardice and recklessness. An individual who

would seek out any danger indiscriminately would be considered reckless, while one

who always avoids danger would be considered a coward. The courageous seek out and

avoid danger appropriately. In terms of modern measurement theory (Crocker & Algina, 1986), an individual's true trait score, or theta, is the point that appropriately summarizes an individual's level of this dimension. Low points on this dimension would be referred to as cowardice (a vice of deficiency) and extremely high points would be referred to as recklessness (a vice of excess), while moderate points would be referred to as courageous. The importance of this point was detailed earlier in describing the model of personality virtues and vices.

At this point, it is important to note that the Aristotelian mean has special meaning for the aforementioned distinction between bright and dark personality traits. Aristotle was the first to note that psychological attributes may be virtuous at the mean or median levels and vices at extreme levels. In regard to personality, Aristotle's notion suggests that traditionally bright or socially desirable traits tend to occupy mean or median levels of dimensions. His notion also suggests that dark or socially undesirable traits tend to occupy more extreme manifestations of these same dimensions. For instance, Agreeableness, a socially desirable trait, occupies the mean or median trait level whereby Dark Triad tendencies reflect a socially undesirable level of Agreeableness (i.e., Antagonism). Similarly, gullibility and/or submissiveness reflect socially undesirable levels of Agreeableness, but in the opposite direction on the Agreeableness dimension. Aristotle's argument that virtue lies at the mean or median level of a psychological characteristic is one reason why the model proposed in this dissertation is referred to as *the model of personality virtues and vices*. The other reason, which was mentioned previously in outlining the model, is that each level of a psychological characteristic is related to various virtues and vices.

A separate contribution to the study of personality comes from one of Aristotle's students, Theophrastus (ca. 372-287 B.C.). Theophrastus (1870), a botanist and taxonomist, was interested in classifying individuals into types. Theophrastus (trans. 1870) developed an early taxonomy of "characters" which describes, organizes, and provides a causal explanation for apparent individual differences in personality characteristics. Theophrastus's bewilderment led him to develop a typology of characters. More recently, Revelle et al. (Revelle et al., 2011) demonstrated that the characters described in Theophrastus's model align with the FFM. While Theophrastus's taxonomy of "characters" has been criticized as lacking coherence (e.g., Digman, 1990; John, 1990), Revelle et al.'s (2011) demonstration suggests that Theophrastus was a talented eductionist.

Another important causal theory of personality begins with the Greek physician Hippocrates (ca. 460-377 B. C.). His experience and proficiency in the practice of treating diseases led him to believe that natural forces such as an inherited susceptibility to disease, injury, or an imbalance of bodily fluids (e.g., blood, black bile, yellow bile, and mucus, or the four humors), cause mental and physical disease (Chamorro-Premuzic & Furnham, 2005; Hergenhahn, 2009). Revelle et al. (2011) noted the Hippocratic known as Galen (ca. A.D. 130-200) refined humor theory in an attempt to unify the separate Hippocratic and Platonic-Aristotelian literatures. Galen associated the humors with four temperaments, proposing a causal basis for personality types and devised treatments for ensuring ideal levels of personality functioning (e.g., bloodletting, emetics, dietary changes, purging, and diuretics; (Hergenhahn, 2009). Revelle et al. (2011) noted that this updated humor theory made several predictions, which will now

be summarized. The sanguine personality type, an enthusiastic, positive, cheerful, satisfied, and psychologically healthy disposition, was a function of the strength of the blood supply and the strength of the liver. The melancholic personality type, a chronically sad or depressed, reflective, and pessimistic disposition, was believed to be a function of black bile produced by a failing gallbladder. The choleric personality type, an aggressive, tense, volatile, and hot-tempered disposition, was believed to be a function of yellow bile released from the spleen during digestion. The phlegmatic personality type, a rational, calm, and unemotional disposition, was believed to be a function of the amount of water present in the brain or lungs. Interestingly, this updated model maintained a bifurcation between socially desirable (sanguine and phlegmatic) and socially undesirable (melancholic and choleric) personality types, which the modern distinction between bright and dark traits. Additionally, the Hippocratic-Galenic model influenced Immanuel Kant, Wilhelm Wundt, Hans, Eysenck, and Jan Strelau, who are a small collection of philosophers and scientists who would revisit this model later in history (Hergenhahn, 2009; Revelle et al., 2011).

This review of relevant Greek literature describes many important roots for research in personality and specifically the model of personality virtues and vices. Plato (trans. 1892) demonstrates an insight into the virtues and vices associated with internal dispositions and how such attributes might be leveraged for the benefit society. This suggests that even individuals with socially undesirable tendencies may serve a purpose, which is an argument that has been made in recent times (Jonason, Wee, & Li, 2014). Aristotle's (trans. 1962) contribution to virtue theory noted that virtuous dispositions typically lie at mean or median levels between vices of deficiency and vices of excess.

The model of personality virtues and vices draws on this insight by positing socially desirable traits as occupying a range of trait values in between two socially undesirable trait ranges. Approaching personality through the use of causal theory, Theophrastus's (trans. 1892) taxonomy of character traits and the theory of humors often attributed to Hippocrates and Galen provided other early causal trait theories for explaining observable tendencies (e.g., Chamorro-Premuzic & Furnham, 2005; Hergenhahn, 2009). The Hippocratic-Galenic model of humors was a popular and widely received model of personality, though it is often coupled with predictions that are unsupported by empirical data (Buckner V & Buckner, 2014). These separate contributions have in many respects informed personality research, and thus conceptually relate to the model of personality virtues and vices.

Theory from the Renaissance and Enlightenment

The insights provided by the Greeks emerged again during the Renaissance (~1400-1650 A.D.) and the Enlightenment (~1650-1799 A.D.) periods, which provided the opportunity for questions regarding personality (e.g., Is there a single, integrated self which is unique to each individual?) to receive further scrutiny. Many ideas articulated by the Greeks would reemerge. These ideas include the Hippocratic-Galenic model of humors, the notion of innate individual differences, and the qualities of describing healthy and ill mental functioning. However, the Roman Catholic Church, which suppressed any work of science and philosophy that was inconsistent with church dogma, likely shaped and selected certain ideas while suppressing others (Goodwin, 2008). Such works were placed in *Index of Prohibited Books*, which was used by the Church to censor works (Goodwin, 2008). The Church initially rejected many Greek

ideas that were contrary to church teachings, such as Aristotle's discounting of a

personal God, immortal soul, or creation (Perry, Chase, Jacob, Jacob, & Von Laue,

2011). However, the Church's stance changed once Thomas Aquinas reconciled the

Aristotelian and Christian perspectives in his *Summa Theologica* (Perry et al., 2011).

Following this reconciliation, the Church adopted Aristotle's philosophy but continued

to suppress works. Seen in this way, the Church was a force that likely suppressed and

shaped important ideas that emerged or reemerged in the ensuing philosophical and

pre-scientific dialogues on the nature of the self and individual differences.

Though a true beginning for the discussion on the vices and virtues associated

with personality traits that occurred during this time period is incredibly difficult to

identify, I might still point to one important sign post: the debate on the nature of the

soul. This debate, which produced a philosophy known as Cartesian dualism, might be

said to begin with political philosopher Thomas Hobbes's (A.D. 1588-1679) publication

of *Leviathan*. In *Leviathan*, Hobbes (trans. 1998) proposed social contract theory, which

posits that individuals in a society enter into a mutual contract relinquishing their right to

governments who in turn maintain order by imposing these contracts. Hobbes (trans.

1998) argued that human nature was inherently mechanistic and he believed that moral

faculties, including virtues, were imposed upon individuals by larger governing

institutions. In other words, he asserted that an individual's behavior, including virtuous

behavior, could be considered a function of the society in which one was raised and

predictable in advance if an observer understands this context. His arguments provoked

René Descartes (A.D. 1596-1650) to propose an alternative theory of human nature that

placed the soul at the seat of virtue (Pinker, 2002). According to Descartes, without

choice or with the assumptions of determinism, individuals cannot act in moral or virtuous ways (Descartes, 1649). Descartes, a man who was both sympathetic to scientific reasoning and a devout Roman Catholic, denied Hobbes's claim but not without struggling to do so. Descartes was motivated to deny Hobbes's claim by his identity as a Roman Catholic (Ryle, 1949). Ryle notes:

> When Galileo showed that his methods of scientific discovery were competent to provide a mechanical theory, which should cover every occupant of space, Descartes found in himself two conflicting motives. As a man of scientific genius he could not but endorse the claims of mechanics, yet as a religious and moral man he could not accept, as Hobbes accepted, the discouraging rider to those claims, namely that human nature differs only in degree of complexity from clockwork (Ryle, 1949, p. 20).

Descartes counter argued in *Traite de l'homme* (published posthumously in Les passions de l'âme; 1649) that the mind or soul (an immaterial substance) and the body (a material substance) both exist and mutually influence one another via the pineal gland, which he termed the "seat of the soul." While it was novel in that it linked behavior to the brain, it proposed a doctrine regarding the existence of a disembodied immaterial soul that nevertheless had a materialistic effect on human behavior. This proposition became known as the mind-body problem (Goodwin, 2008; Hergenhahn, 2009). Importantly, Descartes' thesis restricted the mind to conscious experience and ignored the possibility of nonconscious thoughts, motives, emotions, behaviors, and cognitions. For approximately three centuries, Descartes' thesis, which became legitimized as a

problem by a subsequent debate, reduced the need for a dialogue on a scientific

psychology that investigated psychological causes to behavior (Wilson, 2002).

While at first blush it might seem that Descartes' response to Hobbes had a

damning effect on the development of a scientific psychology, and indeed this has been

argued previously (e.g., Koestler, 1978; Wilson, 2002), the ensuing debate on

consciously controlled behavior does have implications for the present discussion on the

virtues and vices of personality traits. Cartesian Dualism was hotly debated among many

scholars during this time period, primarily because there was an uncertainty regarding

the relationship between the role of the environment and one's characteristic moral or

virtuous behavior. Descartes' dualism suggests that individuals must independently

cultivate virtue by behaving virtuously. This is not inconsistent with Plato's thesis that

virtues are indeed cultivated in an ideally constructed society, but does deny the role of

innate dispositions for enacting virtue. Indeed, the role of innate faculties, virtuous or

otherwise, would be the source of debate for many philosophers during the Renaissance

and Enlightenment Periods. For instance, the empiricist John Locke (A.D. 1632-1704)

argued against Cartesian Dualism by borrowing on Aristotle's concept of tabula rasa and

drawing attention to the role of experience in shaping behavior. By likening the mind to

a blank piece of white paper, Locke (Locke, 1689) sought to set up a psychological

theory that rejected any dogmatic claims such as Descartes's notion of an immaterial yet

influential soul. Locke's theory claimed that individuals gained their characteristics from

the environment, which implies that individual differences in virtues or vice are purely a

function of environmental characteristics: place an individual in an environment

designed to cultivate virtue and individuals would naturally develop a virtuous

behavioral repertoire. Like Descartes' theory of the person, Locke's theory denied the role of innate psychological attributes. As such, Locke's claim would also not go unchallenged. Gottfried Wilhelm Leibniz (A.D. 1646-1716) criticized Locke's theory for failing to address how individuals acquired behavioral repertoires, virtuous or otherwise, from the environment (Leibniz, 1765). Seeking to remedy the flaw in Locke's theory, John Stuart Mill (A.D. 1806-1873) proposed associationism, which claimed that individuals contain association engines, which allow them to gain ideas from their environment. Through amassing associations, characteristic behavioral tendencies could develop (Goodwin, 2008). Unfortunately, this theory also failed to account for innate dispositions (Hergenhahn, 2009). In short, this period of debate consistently assumed that the virtues and vices associated with an individual were purely a product of their environment. Interestingly, this debate reflects one that took center stage later in the history of psychology known as the person-situation debate. In this debate, the extent to which social behaviors were a function of environmental or innate attributes was considered a legitimate problem worth solving (Mischel, 1968). Most academics today do not consider this to be a legitimate problem and have moved on to other problems, such as the problem of personality invariance and behavioral instability (Mischel, 2004).

The debate on human nature appears to have drawn little on Greek virtue theories and personality taxonomies, which may be a function of Church censorship (Perry et al., 2011). Nevertheless, philosophers appear to have been influenced by the Greek literature. For instance, moral philosopher Immanuel Kant (A.D. 1724-1804) in his *Anthropology from a Pragmatic Point of View* (1796/1996) drew on the Hippocratic-Galenic humor model of blood and temperaments in outlining a model of

individual differences. It is important to note that Kant did not reference the Greek literature, but simply observed that many individuals during this time period believed in the assumptions guiding the model, suggesting that the public in some form or fashion was consuming the Greek literature. Importantly, he also outlined a virtue or moral theory that had one goal of describing how moral predispositions were cultivated:

> The question here is: whether the human being is *good* by nature, or *evil* by nature, or whether he is by nature equally susceptible to one or the other, depending on whether this or that formative hand falls on him...The human being is destined by his reason to live in a society with human beings and in it to cultivate himself, to *civilize* himself, and to *moralize* himself by means of the arts and science. Ho matter how great his animal tendency may be to give himself over passively to the impulses of comfort and good living, which he calls happiness, he is still destined to make himself worthy of humanity by *actively* struggling with the obstacles that cling to him because of the crudity of his nature. The human being must therefore be *educated* to be good (Kant, 1996/2006, pp. 228-230).

Interestingly, Kant did not outline a link between the model of temperaments and virtuous behavior. From the perspective of the model of personality virtues and vices, the fact that no apparent attempt was made by Kant or other philosophers to link these physiological and psychological characteristics to innate virtues and vices reflects a missed opportunity during this time period.

To summarize this historical period and its relationship to personality virtues and vices, inquiry during this period was directed primarily, for the present purposes, toward

the causes of consciously controlled behaviors, virtuous or otherwise. Old Greek notions

on virtue (e.g., utopia) and individual differences (e.g., the Hippocratic-Galenic model),

which were initially suppressed or censored by the Church (Perry et al., 2011),

eventually reemerged. Hobbes' argument for a mechanistic human nature provoked

Descartes to develop what became known as Cartesian Dualism (Ryle, 1949), seemingly

subduing psychological inquiry by denying the need for studying psychological

phenomena (Koestler, 1978). Perhaps unsurprisingly, those scholars interested in

studying psychological phenomena have heavily stigmatized Descartes' mind-body

problem in modern times as "the dogma of the Ghost in the Machine" (Ryle, 1949, p. 5),

"Descartes's error" (Damasio, 1994, p. 248), the "Cartesian catastrophe" (Koestler,

1978, p. iii), "one of the most fundamental blunders made by the mind" (L. L. Whyte,

1978, p. 26), and a mistake that led to an impoverishment of psychological inquiry that

took nearly three centuries to correct (Koestler, 1978, p. iii). Of course, in any area of

inquiry, gaps in knowledge and holes in inquiry are likely to emerge when an idea

dominates its scholars (Rozin, 2007).

Empirical Research During the 19ᵗʰ and 20ᵗʰ Centuries

The mind-body debate lacked empirical rigor, and with the establishment of the

first psychology labs by Wilhelm Wundt (A.D. 1832-1920) and William James (A.D.

1842-1910), philosophy would give way to psychology (Landy, 1997). However, these

researchers were largely guided by the motive to establish psychology as another science

(Hergenhahn, 2009), which involved mimicking the value-free aspect of the natural

sciences (Landy, 1997). Thus, these early psychologists, their contemporaries, and

associated students, largely avoided linking characteristic dispositions with virtues and

vices. This is not to say that the contributions of other empiricists was lacking in value-free judgment.

The first introduction of the word *personality* into the lexicon of language occurred during this time period. French philosopher Victor Cousin (A.D. 1792-1867) coined the term *personnalité* to describe an awareness of the self and promoted introspection as a means to understand one's personnalité (Smith, 1997). Importantly, this definition provides the impetus for modern personality testing in organizational settings because such tests rely upon introspection as a means for understanding how one projects his or her self into the workplace (Zickar & Kostek, 2013). However, one might argue that what is apparently omitted is unconscious tendencies or attributes of the self that may be difficult to know through introspection, but nevertheless guide emotion, behavior, cognition, and motivation (Wilson, 2002). Importantly, such phenomena has recently captured the attention of scholars in organizational settings (James & LeBreton, 2012).

As hinted at earlier, the first empirical attempts to link personality, virtue, and vices did not come from psychology. French anatomist, Franz Gall (A.D. 1758-1828), popularized the phrenology movement, which attempted to link virtues and vices to characteristics of one's skull (Hergenhahn, 2009). Heregenhahn (2009) notes that Gall believed the shape and size of cranial features correlated with both personal virtues and vices (or more modern day personality traits), which could be used to predict future behaviors. Importantly, Gall's work was, like Aristotle's virtue theory and Galen's modification to humor theory, an early model linking both virtues (e.g., Conscientiousness) and vices (e.g., destructiveness) to biological causes and observable

signs. In this sense, Gall was among the first to posit localization of function for psychological faculties (Hergenhahn, 2009). However, Hergenhahn notes that by the mid-1800s, phrenology fell out of favor with scientists (e.g., John Stuart Mill) primarily due to replication difficulties.

Separately from the works of Gall, Sir Francis Galton was interested in "the character which shapes our conduct," which he viewed as "a definite and durable 'something'" that may be heritable and ought to be measured (Galton, 1884, p. 181). In other words, Galton would likely agree that virtues and vices are innate to a degree, as proposed earlier by Plato. Importantly, Gall might be considered both the progenitor of the trait approach to personality psychology (Goldberg, 1990) and the father of differential psychology (Allport, 1937), Perhaps most important to the study of personality, Galton proposed the lexical hypothesis (Galton, 1884), later popularized by Goldberg (1990), which asserts two claims. First, characteristics that are important to individuals are likely to be talked about. Second, markers for important character traits are likely to be encoded in language. Modern research by evolutionary psychologists suggests that the lexical hypothesis is likely because others' tendencies represent important features of the social environment (Buss, 1989b) and create adaptive problems that must be solved (Buss, 2009a). Indeed, had our ancestors not been able to generate, recognize, celebrate virtues, and punish vices, social groups would have likely quickly died out (Peterson & Seligman, 2004). Perhaps unsurprisingly, Galton expressed an interest in previous personality typologies. In his study on the heritability of personality, Galton (Galton, 1874) asked participants to rate themselves on the Hippocratic-Galenic typology of temperaments. Forrest (1974) notes that Galton also proposed the first

objective measures of personality but never developed the instruments himself. James

McKeen Cattell, a student of Galton's, would do such work (Landy, 1997). Not

surprisingly, Galton was inspired by Charles Darwin's theory of evolution by natural

selection, which in more modern times has been considered to be an important theory for

I-O psychologists to consider in their research (Ilies, Arvey, & Bouchard, 2006). In *On*

the Origin of Species by Means of Natural Selection, Darwin (1859) proposed the

mechanism of natural selection to explain gradual change (i.e., speciation) over long

periods of time as the outcome of three common and observable phenomena: (1)

variation within members of a species, (2) heritability (i.e., characteristics passed onto

offspring), and (3) differential reproductive success (i.e., organisms differ in the extent

to which they reproduce). Evolutionary psychologists have provided rationales linking

personality traits to each of these propositions (Buss, 2009a, 2009b; Confer et al., 2010;

Figueredo et al., 2005; Simpson et al., 2011). However, Darwin avoided doing this,

noting:

> In the distant future I see open fields for far more important researches.
>
> Psychology will be based on a new foundation, that of the necessary acquirement
>
> of each mental power and capacity by gradation. Light will be thrown on the
>
> origin of man and his history. (Darwin, 1859, p. 488)
>
> By contrast, Galton directly applied evolutionary theory to the study of

individual differences using twin studies (Galton, 1874) and conducting some of the

earliest empirical studies in occupational choice (Galton, 1865, 1869). Galton noticed

that personality traits vary substantially across individuals and that this variation

appeared in family lineages (Galton, 1865, 1869, 1884). His work spawned the

nature-nurture debate in psychology and started the eugenics movement (Goodwin,
2008; Hergenhahn, 2009), which later influenced the history of personality research in
the 20th century (R. Hogan, 2007).

Galton's interest in the heritability of character indicates that prior to the
adoption of a scientific psychology, personality as a concept was less relied upon as a
vehicle for communicating important individual differences. Given our current
preoccupation with personality as opposed to character, this further suggests that a
transition occurred. Indeed, historians have described the transition from 19th to the 20th
century in the United States specifically as one moving from a "Culture of Character"
(Susman, 1973, p. 302) to a "Culture of Personality" (Nicholson, 1998, p. 60). Nicholson
(1998) notes that several features of the personality concept appear to have prompted
this shift. The two quintessential features described by Nicholson include the moral
ambiguity of personality descriptions and the broadness of abstract trait terms. Gordon
Allport (1921, 1937), who was a leading figure in the movement to establish personality
psychology as a respected science, consistently policed a division between personality
and character noting that the former was the subject of a scientific psychology while the
later was the subject of social ethics and philosophy. This gave the concept a distinctly
value-free feature. Allport's striving was influenced by the widespread scientism that
gripped the social sciences during the 1920s (Ross, 1991), a central tenet of which was
value-neutrality (Nicholson, 1998). Additionally, as personality psychology was in its
infancy, the concept was quite ambiguous in meaning and applied idiosyncratically,
which reflects its broadness and possibly relates to its scientific appeal. Nicholson
(1998) notes that different parties preferred the personality concept for different reasons.

Scientifically minded scholars used the term to describe an objective self viewed apart from a moral context. In ethics and art, the term referred to those aspects that made an object distinctly human. Religious theorists, the term was used to describe motivations towards religious engagement with the social world. Thus, in Allport's eyes, personality was a superior vehicle compared to the concept of character for pursuing a science of uniqueness that linked the self to moral action (Nicholson, 1998). However, perhaps unintentionally, Allport's work established a tenet of the new culture of personality: the objective self was dissociated from the social and cultural contexts in which it operated (Nicholson, 1998). Therefore, it might be argued that Allport's policing of the division between personality and character may have contributed to the field's failure in realizing the virtues and vices associated with different levels of personality dispositions.

Meanwhile and separate from the works of Gall, Galton, Darwin, and (later) Allport, experimental psychology emerged as a scientific discipline with the establishment of laboratories by Wilhelm Wundt and William James (Hergenhahn, 2009). Wundt's lab is of specific importance because certain early and prominent psychologists who made significant contributions in areas that would later develop into industrial-organizational psychology completed internships and dissertations under his instruction: Hugo Münsterberg, James McKeen Cattell, and Walter Dill Scott. James's work in functionalism is important because these three scholars would later draw inspiration from James's approach, leading them to develop differential psychology (Landy, 1997) and psychometrics (Landy & Conte, 2013). These two disciplines of psychology are the larger branches of psychology to which personality psychology ultimately finds its place (Revelle et al., 2011). By contrast to functionalism, Wundt's

structuralist paradigm was guided by the belief that psychology would benefit by becoming a normal science that is value-free and seeks to identify general laws of behavior, which mirrored the goal of the natural and physical sciences (Kuhn, 1970). This focus essentially omitted the study of individual differences, but is not meant to suggest that Wundt lacked an interest. On a discussion of personality, Wundt (1874, 1904) reorganized the Hippocratic-Galenic model of four temperaments into a two dimensional model. This updated model described the original four temperaments as functions of the interaction between two higher order dimensions labeled excitability and changeability, which reflects an attempt by Wundt to describe dispositions in value-free terms. This two dimensional model would later be revisited in the 20th century by Han's Eysenck (1965, 1967), who would develop an early biological theory of personality traits that more recently has been reformulated into reinforcement sensitivity theory (Corr & McNaughton, 2008).

Eventually, personality testing would make its way into organizational life. However, personality testing in organizations for selection purposes was uncommon until the 1930s (Vinchur, 2007). During the early 20th century, external events, such as World War I, World War II, and the labor-management battles of the 1930s, provided the impetus for their use (R. Hogan, 2007; Zickar & Gibby, 2007). Before WWI, Walter Dill Scott (the "first" I-O psychologist; Ferguson, 1962) and Walter Van Dyke Bingham were developing tests for sales personnel (Landy & Conte, 2013). WWI and WWI brought the need to assign individuals to rank and positions in the military, which led to the greatest and most rapid advances in psychological testing (Zickar & Kostek, 2013). After the United States entered WWI in 1917, these psychologists volunteered their

talents to help design assessment and placement systems for the military (Landy &
Conte, 2013). Landy (1997) notes that Scott and Bingham, who left their academic posts
to help the general of the U.S. Army select, train, and assess the performance of recruits,
were the two psychologists who demonstrated the viability of industrial psychology
during WWI. Landy (1997) goes on to state that Robert Yerkes, the then president of the
APA, saw the war as an opportunity to demonstrate the value of psychology in the
scientific community, and mobilized professionals in the field to act, with Scott handling
recruit placement while Yerkes handled recruit selection and classification. Their
adaptations of the Stanford-Binet test became known as Army Alpha and Army Beta, the
former of which was used to assess literate candidates while the latter was used for
assessing illiterate candidates. Separately, the APA requisitioned Robert S. Woodworth,
who was influenced by Cattell's research in personality, to develop a test for identifying
shell-shocked soldiers, or soldiers who would flee or prove useless in the stress of battle
(Zickar & Gibby, 2007). This may be the earliest use of personality tests to identify
characteristic vices: cowardice. Due to the collective efforts of these early I-O
psychologists, over one million men who probably would have never encountered an I-O
psychologist did, which served as an excellent promotional device because many of
these individuals became business owners (Landy, 1997). Corporations eventually
adopted tests after the war to mimic the success of testing in WWI and WWII (Landy &
Conte, 2013). Woodworth later revised his test into the *Woodworth Personal Data Sheet*
(WPDS) and began marketing the test to organizations in order to screen out maladjusted
individuals. Thus, Woodworth's assessment became the first to systematically identify
vices. Woodworth's success with the WPDS led other psychologists to develop their

own personality tests, many of which faded from history but are nonetheless important for the discussion of personality virtues and vices (Zickar & Kostek, 2013). These tests include the *Colgate Tests of Emotional Outlets* (Laird, 1925), the *Mental Hygiene Inventory* (House, 1927), the *Personality Schedule* (Thurstone & Thurstone, 1929), and *X-O Tests for Investigating the Emotions* (Pressey & Pressey, 1919). It is important to note that the early applications of personality testing in organizations also focused on adjustment (Gibby & Zickar, 2008), which is a construct that reflects the utility of a model of personality that describes vices.

Both personality testing during the early 20th century and the field of I-O psychology flourished in this context (Ferguson, 1962; Landy, 1997). The passing of the National Labor Act of 1935, which made it illegal to ask applicants if they were sympathetic to organized labor, raised concerns over the ethics surrounding personality testing in organizational settings. Elton Mayo, an organizational sociologist, argued that individuals, particularly those who joined labor unions, were emotionally maladjusted and irrational (Gibby & Zickar, 2008) and recommended the use of personality inventories as a means for screening out potential agitators and labor radicals (Zickar, 2001). After the passing of the Wagner Act, personality tests became widely used by organizations to screen out union sympathizers. Zickar and Kostek (2013) note that applications of objective personality testing in organizations eventually expanded construct coverage to include more dimensions. Zickar and Kostek provide the example of the *Bernreuter Personality Inventory* (BPI), which Robert Bernreuter developed by combining the scales from multiple personality inventories in order to describe typical personality tendencies (e.g., Neurotic tendencies, Self-sufficiency,

Introversion-Extraversion, and Dominance-Submission). Another example offered by

Zickar and Kostek is the *Humm-Wadsworth Temperament Scale*, which assessed other

tendencies (e.g., hysteroid, manic, depressive, autistic, paranoid, epileptoid, and

self-mastery). Other important instruments developed during this time include Cattell's

16PF (Cattell & Stice, 1957), the *California Psychological Inventory* (Gough, 1956), the

Guilford and Zimmerman Temperament Survey (Guilford & Zimmerman, 1949), and the

Personality Research Form (Jackson, 1967). These and certain previously discussed

instruments assessed individual differences in personality in normal populations and

were commercial successes during their time (Gibby & Zickar, 2008). Importantly, these

tests provided a means of assessing the virtues and vices of individuals. However, the

use of personality tests eventually led to a backlash by figures in academic, political, and

public domains (Zickar & Kostek, 2013).

To summarize, the 19th and early 20th century saw the introduction of the

personality term and empirical scrutiny on the concept. Franz Gall, though presently

considered a pseudoscientist, was the first to apply measurement protocols to link

personality to virtues and vices (Hergenhahn, 2009). Gall's work is of specific

importance because it draws attention to deep connection between personality

psychology and pseudoscience. The two domains have and will likely continue to have a

connection (Zickar & Kostek, 2013). Indeed, public scrutiny of the personality testing

enterprise continue to this day (Paul, 2004), though there are legitimate ongoing attempts

to separate science from pseudoscience (Buckner & Buckner, 2014). Darwin's (1859)

evolutionary theory inspired Galton to provide the first scientific studies into the

heritability of individual differences (Galton, 1865, 1869, 1884). Wundt, the founder of

experimental psychology, who trained the early founders of differential psychology and psychometrics, drew on insights from the Greeks to refine a model of temperament (Wundt, 1874, 1904) that inspired later theoretical and empirical developments. Nevertheless, the link between personality, virtue, and vice did not receive attention from these early empirical researchers. This may be due to the fact that during its infancy, psychologists sought to establish the discipline as a value-free science that was consistent with logical positivism (Peterson & Seligman, 2004). Indeed, early personality theorists considered such value-laden topics as ethical concepts to be studied by philosophers as opposed to psychologists (Allport, 1927; Peterson & Seligman, 2004). This attitude was less apparent in early I-O psychology during the early 20th century in the advent of applied psychological testing. The rise of I-O psychology during WWI and WWII further spawned the development of tests for identifying the virtues and vices of personality traits. However, vices were the primary concern. External events, such as WWI, WWII, and the labor-management battles of the 1930s further spurred the development of personality tests (R. Hogan, 2007; Zickar & Gibby, 2007), which further enhanced the reputation of I-O psychology (Ferguson, 1962; Landy, 1997). Personality tests were eventually widely applied in organizational settings by the 1930s (Vinchur, 2007) becoming commercial successes (Gibby & Zickar, 2008). Also during this time, the first legal restrictions (i.e., the Wagner Act) were placed on employment selection practices, which also provided an ethical dilemma to psychologists regarding the utility of personality tests. The decision to use personality tests in organizations, which naturally involved making value judgments of individuals' dispositions, eventually led to

a backlash by public figures and then credibility crisis in personality research (Zickar & Kostek, 2013).

The Dark Ages of Personality Research (Mid-1960s to 1990s)

Personality research was called into question after the mid-1960s when self-inflicted wounds led to a credibility crisis (R. Hogan, 2007). In brief, prominent I-O psychologists expressed concerns over personality tests, academics criticized the trait concept, and popular press figures attacked the personality testing enterprise (Gibby & Zickar, 2008; R. Hogan, 2007; Zickar & Kostek, 2013). These self-inflicted wounds later produced a credibility that suppressed much research into personality, further preventing researchers from realizing the link with virtues and vices.

Empirically, personality tests were criticized for their dubious predictive value. In summarizing the poor criterion validity evidence, Guion and Gottier (1965) argued that "it is difficult...to advocate, with a clear conscience, the use of personality measures in most situations as a basis for making employment decisions about people" (p. 160). Guion (1967) later expressed that he hoped that the previous attack would actually spur research, not assist in bringing it to an untimely conclusion. Later, social psychologist Walter Mischel (1968) questioned the utility of personality tests in predicting behavioral consistencies across situations. Mischel (1973) suggested that theories of personality were of dubious scientific value, should be dismissed outright, and replaced with social behavior theory that sought to describe how social behaviors were acquired and pressed by situational cues. Mischel similarly questioned the criterion validity of personality tests in predicting specific behaviors within a situation, which he described as being so low (less than .30) as to be meaningless. In the public, senators, humorists, and others

criticized personality tests, which were seen as tools for management to spy on workers and enforce corporate hegemony (e.g., Gross, 1962; W. H. Whyte, 1956).

Hogan (2007) describes three self-inflicted wounds that may have led to this credibility crisis. The first concerns the disagreement among early personality psychologists on a research agenda. Many influential Europeans during the turn of the 20th century (for example, Freud, Jung, Adler, Horney, and Erickson) believed that neuroses deserved the most attention. However, in the 1930s, American psychologists (e.g., Allport, Murray, Maslow, and Rogers) believed that needs, personal growth, self-enhancement, and the difficulties faced in achieving these and related goals deserved attention. Also during this time, psychometrically inclined psychologists (e.g., Thurstone, Guilford, Cattell, Eysenck, and their students) believed that researchers should focus on identifying and describing the true underlying structure of personality, which was and still largely is defined by statistical abstractions called traits.

The second reason offered by Hogan (2007) concerns assessing personality itself. Individuals who lacked the necessary training in psychometrics developed many personality assessments. Hogan offers the example of the *Myers-Briggs Type Indicator* (MBTI), which is arguably the most well known and most administered personality test in organizations in modern times. Katherine Briggs and her daughter, Isabel Myers, inspired by Carl Jung, sought to develop a test that would help organizations assign individuals to jobs suited for their personality (Myers & McCauley, 1985). The test uses a series of four dichotomies to classify individuals into different types (Thinking vs. Feeling, Sensing vs. Intuition, Introverted vs. Extraverted, Judgment vs. Perception) (Myers & McCauley, 1985). This instrument, despite its popularity, was and remains

controversial among personality researchers for two reasons: (1) Myers and Briggs received no formal training in psychology and (2) psychologists, who viewed personality as a set of continua, were uncomfortable with the idea of assigning individuals to one of two possible outcomes (Reynierse, 2013). Such tests may have made it difficult for lay-individuals to distinguish between tests developed by test development professionals and those developed by untrained individuals. Another problem raised by academics concerns the social desirability of traits assessed by personality inventories. Consider the *Minnesota Multiphasic Personality Inventory* (MMPI) (Hathaway & McKinley, 1940). Whereas previous personality tests were developed rationally, the MMPI was developed empiricaly to diagnose and identify psychopathology (Hathaway & McKinley, 1940). Many scholars argued that items in this test (for example, "I often have strange and unusual thoughts" - an item on the Schizophrenia scale) might lead an individual to respond in a socially desirable manner (R. Hogan, 2007). This controversy, which has recently taken the form of the debate on personality faking (Morgeson et al., 2007), has yet to be resolved (R. Hogan, 2007). Hogan describes two outcomes of this controversy: (1) a decline in personality research funding and (2) difficulty publishing assessment-based personality research in peer-reviewed journals.

The third reason offered by Hogan (2007) concerns a collection of cultural causes that influenced academic criticism of personality research. This collection of cultural causes was described by Hogan (2007) as (1) beliefs that personality research was conducted by racists, (2) the New Age movement that followed World War II and blossomed in the 60s, and (3) the influence of behaviorism on psychology in the early 20th century. Beginning with the first cause, an important event occurred in academic

psychology during the 60s when Arthur Jensen published an influential article in the

Harvard Educational Review entitled, "How Much Can I Boost IQ and Scholastic

Achievement?" In this article, Jensen (1969) argued that racial differences in

intelligence, specifically Black-White differences, are innate and heritable differences.

Jensen relied on statistical techniques commonly employed by personality psychologists

(i.e., factor analysis). While Jensen's arguments appear to follow logically from his data,

he was eventually labeled a racist by many liberally minded scholars (e.g., Gould, 1996).

Second, the New Age movement that occurred following World War II may have

created a divide in the academic community with many believing in the possibility of

infinite self-enhancement and personal growth, and personality psychologists believing

that behavior was guided by stable psychological structures called traits (R. Hogan,

2007). Academics holding to the former belief could with public approval easily attack

personality researchers (R. Hogan, 2007). Third, psychology was dominated in the early

20th century by behaviorism, which maintained the doctrine of situational specificity.

This doctrine, taken up early by scholars in psychology, claims that behavior is

determined primarily by specific situational factors. This doctrine was implicit in

Mischel's criticism of personality psychology, which started the person-situation debate

in psychology. This debate further paralyzed personality research by drawing attention

to competing (person vs. situation) instead of complementary (person *and* situation)

models of predicting behavior (Kenrick & Funder, 1988). Also, behaviorism flourished

because it provided a scientific alternative to what was viewed as the fuzziness of

psychoanalytic concepts and methods, some of which were often employed by

personality researchers (Wilson, 2002).

This period of time has been referred to as one where the Standard Social Science Model (SSSM) flourished (Tooby & Cosmides, 1990). The SSSM proposes that individual minds are indeterminate materials shaped or transformed by social factors such as the environment or culture (Tooby & Cosmides, 1990). From the perspective of the SSSM, humans are incredibly malleable and the task of the social sciences is to demonstrate how culture is transferred in the creation of individual differences. This reflects thinking that goes back to the debates on the nature of the soul that was discussed previously. With this model, the attention of social scientists was drawn to the developmental course of individuals over time and the development of learning theory (Tooby & Cosmides, 1990). Indeed, early theories, such as psychodynamic theory (e.g., Freud, 1957), learning theory (e.g., Thorndike, 1932), and behavioral theory (Skinner, 1938; J. B. Watson, 1930, 1994) which emerged in a supposedly value-free period of social science, reflect a focus on the malleability of the individual mind (Tooby & Cosmides, 1990). This is most clear in John Watson's famous declaration:

> Give me a dozen healthy infants, well-formed, and my own specified world to
>
> bring them up in and I'll guarantee to take any one at random and train him to
>
> become any type of specialist I might select - doctor, lawyer, artist,
>
> merchant-chief, and yes, even beggar-man and thief, regardless of his talents,
>
> penchants, tendencies, abilities, vocations, and race of his ancestors (Watson,
>
> 1930, p. 82).

Importantly, while Watson's thought experiment is consistent with the notion that the mind has many evolved information-processing mechanisms, his claim was interpreted as suggesting that individuals were a product of their society or culture, and

that changes in the former meant changing the latter (D. E. Brown, 1991). It should also

be noted that during this time period, attempts to demonstrate limitations on the

malleability of individual minds via biological constraints (e.g., Jensen, 1969; Spearman,

1904, 1946) were described as fallacious arguments predicated on biological or genetic

determinism (Gould, 1996) or as misguided by racist and sexist beliefs (Tooby &

Cosmides, 1990). This only further crippled personality research.

   To summarize this account of the dark ages of personality research, three

self-inflicted wounds led to a credibility crisis in personality research (R. Hogan, 2007).

These reasons include the disagreement among personality researchers regarding goals,

the proliferation of tests created by individuals lacking in appropriate training, and the

cultural milieu of this time period (R. Hogan, 2007). Indeed, this time period has been

described as one in which the SSSM dominated as a paradigm guiding research in the

social sciences (Tooby & Cosmides, 1990). Personality research during this period

sought to describe how personality, or social behavior, was acquired, leading to the

person-situation debate in psychology (Mischel, 1968). Research on personality traits,

which did occur during this time period (e.g., Tupes & Christal, 1961), largely lay

suppressed till the 1990s (Tupes & Christal, 1992).

The Renaissance of Personality Research (1990s-Present)

   Personality research experienced a dramatic comeback in the 1990s (B. W.

Roberts & Hogan, 2001) with the publication of Barrick and Mount's (1991) and Tett,

Jackson, and Rothstein's (1991) meta-analyses on personality traits and job

performance. These publications also brought the FFM into wide-scale acceptance,

leading to the creation of several personality inventories modeled after the Big Five

(e.g., NEO-IP-R3, Costa & McCrae, 1992). Consultants embraced personality tests, especially those measuring Conscientiousness, for their job-related validity and utility in mitigating adverse impact (R. Hogan, 2007).

Hogan (2007) proposes five possible influences for this renaissance, the first of which is the rediscovery of the Big Five. First identified by Tupes and Christal (1961), these broad personality traits were rediscovered by Robert McCrae, Paul Costa (McCrae & Costa, 1987), and John Digman (1986), who used more modern versions of factor analysis. The second influence is Title VII of the Civil Rights Act (CRA) of 1964, which forbade the use of selection instruments that result in adverse impact. The Equal Employment Opportunity Commission (EEOC) was given power to enforce the CRA in 1972 and exercised this power in 1973 when the EEOC successfully sued AT&T for discriminatory hiring practices that favored men over women (physical ability tests) and whites over blacks (cognitive ability tests). In 1978, the EEOC published the *Uniform Guidelines on Employee Selection Procedures*, which sparked a search for equally valid selection procedures with comparable utility (criterion validity) but less adverse impact, which inevitably led to personality measures (R. Hogan, 2007). The *Guidelines* also required the use of a job analysis to justify decisions for test use, which also has implications for personality research (R. Hogan, 2007). Indeed, job analytic strategies, specifically personality-oriented work analysis, can identify job-relevant personality traits (Goffin et al., 2011; O'Neill, Goffin, & Rothstein, 2013). Though methods for identifying ideal trait levels are lacking.

Hogan (2007) argues that the combined need to use procedures that do not adversely impact protected class members, combined with the rediscovery of the FFM,

led I-O psychologists to reevaluate personality measures for employment selection, which is the third reviving influence on personality research. Many later meta-analyses (J. Hogan & Holland, 2003; Judge, Heller, & Mount, 2002) showed the utility of the FFM for predicting valued workplace outcomes, which gave an indication that personality traits can be evaluated in terms of their associated virtues and vices. These and related findings led I-O psychologists to both engage in personality research and employ personality assessments in practice.

The fourth influence on personality research noted by Hogan (2007) is the widespread use of the Myers-Briggs Type Indicator (MBTI; Myers & McCauley, 1985) and interest in emotional intelligence (EQ; Goleman, 1995), the former of which was described in the previous sub-section. Emotional intelligence may have arisen because of concerns over the seemingly limited utility of cognitive ability tests (Goleman, 1995), which sparked a debate in I-O psychology (Landy, 2005; Locke, 2005). Even though many academic psychologists view the MBTI as little more than a fortune cookie (Reynierse, 2013) and EQ as either a rebranding of personality and intelligence (Schulte, Ree, & Carretta, 2004), Hogan notes that these ideas were widely popular among organizational figures, perhaps also garnering interest in personality testing.

The fifth reason, Hogan (2007) argues, is the competency movement that occurred within I-O psychology. McClelland (1973) introduced the competency concept as an alternative to intelligence in determining occupational success. On survey of large organizations during the 1990s suggest that approximately 75% (Cook & Bernthal, 1998) of responding organizations used competency modeling. While considered by some researchers to be a "quick and dirty" job analysis (Brannick, Levine, & Morgeson,

2007), the technique allowed practitioners to identify job-relevant competencies that were considered important for job performance across all jobs in the organization (R. Hogan, 2007). Although there has been disagreement on defining a competency, personality traits have been considered (Brannick et al., 2007), thus offering an avenue for personality research.

To summarize the history on the renaissance of I-O psychology personality research, meta-analyses linking personality to organizationally valued outcomes led I-O psychologists to reevaluate this research vein. Five possible influences leading up to this renaissance, which were provided by Hogan (2007), were described. These reasons include the rediscovery of the Big Five personality traits, Title VII of the 1964 Civil Rights Act, I-O psychologists reevaluating personality research, interest among organizational figures in the MBTI and EQ, and the competency movement in I-O psychology. These changes also appear to reflect recognition that there is some value in knowing the innate characteristic dispositions of other individuals. One might argue that the value is in known the virtues and vices of a particular person.

The Status of I-O Personality Research in the Present

Personality research in I-O psychology has flourished in recent years (Gibby & Zickar, 2008; Zickar & Kostek, 2013). New theory has been developed linking personality traits to valued outcomes (e.g., Barrick, Mount, & Li, 2013; Chan & McAllister, 2014; R. Hogan & Shelton, 1998; Schneider, 1987; Tett & Burnett, 2003). A distinction between bright and dark personality traits emerged (R. Hogan et al., 1994), leading to the creation of new measurement models that maintained a distinction between bright and dark traits. Research has also expanded to include criteria beyond the

individual level of analysis (Van Iddekinge & Ployhart, 2008). To organize these findings into a coherent framework, I-O psychology researchers have frequently used the FFM, specifically the Big Five traits at the broadest level of the hierarchy. I-O psychologists have used meta-analyses to describe relations between the FFM traits and various valued outcomes, such as job and training performance (Barrick & Mount, 1991; Tett et al., 1991), organizational citizenship (Chiaburu et al., 2011; Organ & Ryan, 1995) and counterproductive work behavior (Berry et al., 2007; Salgado, 2002), work attitudes (Judge, Heller, et al., 2002; Organ & Ryan, 1995), leadership (Judge, Ilies, Bono, & Gerhardt, 2002), and motivation (Judge, Heller, et al., 2002). Despite this wealth of evidence, which might suggest that researchers know what they need to know, researchers continue to argue that more research is needed (Gibby & Zickar, 2008; Zickar & Kostek, 2013) and that further research may produce knowledge that has the potential to improve society at large (Revelle et al., 2011). Thus far, the argument has been made that what is needed is more research addressing the implications of trade-offs associated with various trait levels for the workplace. In this study, I seek to address this need.

Additionally, while the wealth of research on the role of personality in the workplace may be informative, it might also be misleading. A great majority of empirical studies test for and support linear associations between personality traits and organizationally relevant outcomes. These meta-analyses, which have prompted I-O psychology practitioners to recommend practices consistent with these findings (e.g., select for high levels of Conscientiousness), may actually systematically lead to undesirable outcomes (e.g., workforce rigidity) (Pierce & Aguinis, 2013). Indeed, in

their extremes, even desirable personality traits may become "too much of a good thing" (Pierce & Aguinis, 2013), negatively impacting valued criteria. While this "too-much-of-a-good-thing" hypothesis suggest the possibility of diminishing returns (Grant & Schwartz, 2011), it has been argued here that the notion of tradeoffs may be more appropriate for personality traits. Diminishing returns assume that extreme tendencies are universally maladaptive or detrimental. However, tradeoffs suggests that the resources invested in pursuing a more extreme strategy are more sensitive to context (Nettle, 2006), such as that provided by the workplace. Indeed, research suggests that in the right context (i.e., highly complex jobs), even individuals with extreme tendencies (e.g., extremely high conscientiousness) may thrive (Le et al., 2011). This distinction between extreme dispositions and typical dispositions seems to be akin to differences between dandelions and orchids: the former can grow anywhere, but the latter, if placed in the right kind of soil, can flourish (Dobbs, 2009). While the categorization implicit in this metaphor is overly simplistic, it suffices to convey the notion that individuals pursuing extreme strategies are more sensitive to context. In other words, extreme strategies may appear generally detrimental (i.e., "too-much-of-a-good-thing"), but in the right context would also demonstrate a distinct advantage that is inherent to a tradeoff (Nettle, 2006).

This notion of tradeoffs is difficult to test for a number of reasons. Firstly, there are currently no assessments that have been designed with the assumption of tradeoffs in mind. This suggests that there is a need to construct assessments to be consistent with the notion of virtues and vices. Additionally, as most prior research has tested for linear relationships with valued criteria, curvilinear relationships often go untested. Reasons

why such tests are sparse involve sample size limitations (Grant & Schwartz, 2011;

Pierce & Aguinis, 2013), the requirement of more sophisticated analytical techniques

(Carter et al., 2013), and highly sensitive measure that appropriately reflect multiple

levels of a trait dimension (Dilchert et al., 2014). This suggests that, to accurately

describe the role of personality traits in the workplace, organizational researchers need to

conduct investigations with larger samples, use appropriately sophisticated techniques,

and utilize assessments that appropriately reflect multiple levels of a trait dimension in

order to study the possibility of psychological tradeoffs. Indeed, in a review of the I-O

personality literature, Burch and Anderson (2008) noted: "[For] too long, uncritical

assumptions over linear relationships have dominated the I-O personality psychology

literature, but these initial studies are highly suggestive of other, more complex patterns

of relation between personality traits and behavior on the job" (p. 288). Further, recent

reviews of the broader psychological literature suggest that most any important

psychological phenomena likely comes with caveats, such as tradeoffs, which through

research may allow psychology to develop an empirically-based virtue theory (Grant &

Schwartz, 2011).

Statement of the Problem

Earlier the case was made that the personality literature has become fragmented

due to an illusory divide between bright and dark traits and sides of traits. As argued

previously, the terms 'bright' and 'dark,' and their derivatives (e.g., bright/dark-sides of

traits) emphasize a divide between socially desirable and undesirable traits or

manifestations of traits that does not reflect reality. Additionally, because any trait can

be both bright and dark, researchers' attention is taken away an overall integrating

theme, which leads to a fragmented literature, a surplus of overlapping constructs, and a violation of the scientific principle of parsimony. Generally speaking, researchers have assigned a contrast label or drawn attention to a side of trait if research suggests that said trait has positive or negative implications for individuals or organizations in specific contexts. However, evolutionary reasoning predicts that every trait level is associated with trade-offs in navigating social adaptation problems, suggesting that personality traits have both positive and negative implications. In order to detect the existence of such tradeoffs, researchers must adopt more sophisticated methodologies, such as modeling tradeoffs in personality testing and in context via behavioral criteria. Adopting such methodologies would have greater utility for practitioners by informing them of the tradeoffs associated when various decisions. Lastly, if the hypothesis that personality trait levels involve psychological trade-offs is true, then prior theories and models failing to acknowledge these trade-offs not only offer misleading arguments regarding the nature of personality trait-workplace behavior relationships, but misguide researchers attempts to link personality traits to outcomes in the workplace. Cumulatively, these problems place a limit on both the theoretical and practical value of prior I-O personality research.

Purpose of the Present Study

Recently, researchers in the organizational disciplines have called for a re-consider the value of certain psychological factors, such as personality traits (Grant & Schwartz, 2011; Pierce & Aguinis, 2013). This is evident in I-O psychology in the Spring 2014 issue of the journal *Industrial and Organizational Psychology: Perspectives on Science and Practice*, which is the flagship journal for the Society for Industrial &

Organizational Psychology, Inc. In this issue, a discussion was held among many scholars on research into extreme or maladaptive personality traits. In this discussion, many methodological issues discussed here were also raised. It was noted there have been few empirical studies on trade-offs associated with personality traits in the workplace (one exception is Le et al., 2011). This suggests that the decision to re-examine the role of personality in the workplace is timely and needed. As the model of personality virtues and vices organizes both typical and extreme levels of personality tendencies into one coherent model, the goals of this study are to (1) evaluate the utility of the model for developing a Big Five personality assessment that recognizes tradeoffs and (2) predicting nonlinear associations with valued outcomes in the workplace. It was argued previously that knowledge on the role of personality in the workplace, as presented both by the many meta-analyses on the topic and theory is in the former case incomplete and misleading and in the latter case miss-specified. It was also argued that simply labeling traits and appropriate sides as bright or dark is conceptually inferior to a model that views trait levels in terms of tradeoffs. The proposed model of personality virtues and vices will be an alternative model linking personality traits to various job performance criteria (e.g., task performance, citizenship, counterproductive behavior), which in many instances are assumed to be linear, but from the perspective of an alternative model are often assumed to be nonlinear.

As this literature review suggests, prior studies on the role of personality in organizations have focused on linear relationships with organizationally valued outcomes. Recent research has called this assumption into question (Grant & Schwartz, 2011; Le et al., 2011; Pierce & Aguinis, 2013). Understanding how various levels on

personality dimensions manifest in organizations has the potential to advance personality research in organizations and to inform employee selection and development systems as well as personality theory. By introducing the model of personality virtues and vices, this investigation also has the potential to introduce insights from related disciplines (i.e., clinical, counseling, and evolutionary psychology) to organizational researchers, which answers the call to find ways to align these distinct psychological research traditions (Sternberg, 2005). Therefore, the purpose of this dissertation is to apply the model of personality virtues and vices to the assessment of the Big Five personality traits and in linking these traits with employee outcomes, specifically job performance behaviors.

To fulfill the purpose of this dissertation, the viability of a proposed Big Five virtues and vices measurement model will be evaluated. This model will rely on recent innovations in personality assessment, specifically ideal point item response theory (IRT) models, which will be contrasted with conventional classical test theory models. Following the description of these measurement models is a section on testing the criterion validity of the proposed measurement model. The criterion validity of this model will be described according to two separate models. The first is a more widely assumed general linear model (GLM) that links personality to job performance behaviors in expected linear fashions. Importantly, this GLM underlies many theories linking personality to job performance. The second is an alternative nonlinear model that is conceptually aligned with the model of personality virtues and vices. To the extent that personality traits link to performance behaviors in a nonlinear fashion in the manner predicted by this alternative model, this would place at risk of failure those theories and models predicated on the GLM. Thus, the goals of this study are to evaluate the virtues

and vices model for creating new measures, as well as to test the viability of these

measurement models for predicting job performance behaviors.

In order to achieve these goals, two steps will be taken. First, because prior

personality assessments lack the content and sensitivity to capture the full range of the

Big Five personality traits (Dilchert et al., 2014), an assessment that captures the full

range of the Big Five personality traits will be constructed. This assessment will be

designed based on the assumption that personality traits reflect tradeoffs in behavioral

strategies for navigating social adaptation problems. Second, after the assessment has

been constructed, criterion-validation using job performance behaviors will be

conducted to test for nonlinear associations. Instances in which nonlinear hypotheses are

supported will place at greater risk of failure those models with an empirically

established linear association with the job performance criterion in question. Next there

is a review of the classical test and item response theories. Following this is a review of

the literature on the GLM linking personality traits to job performance criteria along

with hypotheses that are consistent with this model. Following this is an alternative

model containing alternative hypotheses and then the conclusion of this chapter.

Measurement and the Virtues/Vices Heuristic

Measurement theory refers to a paradigm that attempts to explain observations

(de Ayala, 2009). Organizational and personality researchers commonly invoke classical

test theory (CTT) as the theoretical foundation for designing measurement models,

which assumes that observed scores are a function of an individuals true score on a

targeted dimension in addition to error in measurement (de Ayala, 2009). Factor analytic

methods (Gorsuch, 2003) are commonly used to support the development of personality

tests, which assumes that covariation among a set of observations are explained by a common underlying factor. Importantly, applied to attitudinal assessments, these methods assume that the underlying response process producing observations holds dominance response process assumptions. Dominance response processing assumes that the probability of an individual endorsing an item increases the higher the person lies above the item's location. In other words, considering a continuum representing a personality dimension, an individual will tend to endorse, for instance, a positively worded item when his or her standing on the dimension is more positive than that of the item (vice-versa for a negatively worded item). By contrast to classical test theory, item response theory (IRT) assumes that both individuals and items can be characterized in terms of their locations on a latent dimension and that items can be characterized by their capacity to discriminate among individuals. IRT also provides a series of models for establishing the correspondence between latent traits and observations (de Ayala, 2009) that include both dominance models and what are referred to as ideal point models. Ideal point models assume that the underlying item response process involves participants responding to an item by considering the extent to which the item reflects their own level of a psychological attribute. Unlike dominance processing, ideal point processing assumes that as a respondent's location on a trait continuum (i.e., the respondent's ideal point) increases, the probability of endorsing that item decreases (Stark, Chernyshenko, & Drasgow, 2005), which implies a single-peaked, bell-shaped item response function.

Importantly, most personality scales are constructed under dominance response model assumptions because Rensis Likert's scaling technique for measuring attitudes (Likert, 1932) was perceived as less cumbersome compared to an alternative Thurstone

scaling technique (Thurstone, 1928, 1929), which assumes an ideal point response process (J. S. Roberts, Laughlin, & Wedell, 1999). Research suggests that the Likert and Thurstone approaches to attitude measurement differ appreciably in their utility for estimating extreme levels of a dimension, which appears to be due to the underlying item response process (J. S. Roberts et al., 1999). It has also been suggested that the historical reliance of dominance scoring may have led to incorrect estimates of regression effects regarding the links between personality and job performance dimensions (Carter et al., 2013). For instance, when regressing performance scores onto Conscientiousness estimates, lower performing scores that might be associated with extremely high Conscientiousness are often incorrectly equated with moderate levels of Conscientiousness. This would have the effect of pulling performance predictions downward. Consequently, curvilinear trends would appear as simple linear trends (or, in the case of small effects, no trends at all) (Carter et al., 2013). Importantly, there has been sparse use of ideal point modeling in applied personality research, though research has begun to merge (Carter et al., 2013). If Thurstone scaling procedures more accurately reveal underlying response processes, then ideal point IRT models are more appropriate for measuring attitudinal variables, including personality traits (Carter et al., 2013; Chernyshenko, Stark, Drasgow, & Roberts, 2007; Stark, Chernyshenko, Drasgow, & Williams, 2006). In noting that ideal point models evidence better fit to personality data, Drasgow, Chernyshenko, and Stark (Drasgow, Chernyshenko, & Stark, 2010) argue that in introspecting, respondents compare the extremity of an item to their own when deciding whether or not to endorse the item. Cater et al. (2013) suspect that that the use of ideal point models may reveal that the historically near zero validity of certain

personality traits with performance criteria are significant and meaningfully related to dimensions of performance. For these reasons, Thurstone scaling techniques will be invoked here. Additionally, to appropriately assess trait levels across the range of the Big Five dimensions, as is required by the model of personality virtues and vices, an ideal point IRT model will be utilized.

Different methods for designing Thurstone scales provided by the literature will now be reviewed. Roberts et al. (1999) offered a two-stage approach to building a Thurstone scale. First, a large number of items are written to span the range of a targeted psychological dimension. Subject matter experts can then be instructed to sort the items into different categories representing different ranges of the dimension (e.g., 1 = *most low end of the dimension*; 4 = *middle of the dimension*; 7 = *most high end of the dimension*), separate dimensions (e.g., the Big Five), or both (i.e., Q-Sort). Those items in which SMEs agree upon the most should be retained for developing item sets. In the second stage, relevant items can be selected through a pilot study in which items demonstrating unfolding are selected. Item and person parameters can then be estimated using the GGUM2004 (J. S. Roberts, Haw-Ren, Weiwei, & Yingji, 2006) and chi-square fit statistics computed using MODFIT (Stark, 2007) to identify poorly fitting items. Poorly fitting items should be removed and the most discriminating items at different trait levels retained. Research suggests that 10 items per dimension are sufficient to obtain reasonable item and individual parameter estimates (J. S. Roberts, Donoghue, & Laughlin, 2000).

Chernyshenko, Stark, Drasgow, and Roberts (Chernyshenko et al., 2007) provided a three-step process that involves (1) selecting a model for estimating item

parameters, (b) examining model-data fit and eliminating poorly fit items from further consideration, and (c) selecting a subset of items for the final measurement model that provides high measurement precision across desired levels of the target dimension. Chernyshenko et al. (2007) advocated the generalized graded unfolding model (GGUM) (J. S. Roberts et al., 2006) to estimate item parameters when ideal point response processing is assumed to occur (i.e., item response functions demonstrate unfolding). GGUM is regularly chosen because it can be used with both dichotomous and polytomous responses, does not require that all items are equally discriminating or that all items have the same number of response categories, and has been found to perform reasonably well at recovering parameters in a variety of situations (Chernyshenko et al., 2007). The GGUM2004 computer program estimates item parameters using the marginal maximum likelihood approach. Second, unidimensionality is addressed by assessing model-data fit and process of item responding using both statistical and graphical means. Statistical means involve examining model-data chi-square fit statistics for item singles, pairs, and triplets. Item singles reflect the difference between observed scores and scores that would be expected by the IRT model (Carter et al., 2013). Unidimensionality is supported if the fit statistics computed are small, suggesting that a single latent trait is sufficient to account for item responding. Also, predictions based on the estimated model are compared graphically with observed responses to evaluate goodness of fit. These steps can be easily carried out using the MODFIT computer program (Stark, 2007). Third, as the goal of constructing a Thurstone scale involves selecting a subset of items that provide measurement precision across a dimension, items with location parameters that are spread across the trait continuum (including neutral items and

extreme items), high discrimination parameters and/or large threshold values should be retained.

Yet another method was offered by Stark, Chernyshenko, and Drasgow (Stark et al., 2005), but in regard to constructing and scoring multidimensional pairwise preference assessments. Such a test presents two or more statements in a multiple choice format and participants are instructed to select the statement that most or least describes them or to rank order the statements in terms of most descriptive to least descriptive. Using forced-choice formats helps to curb response biases associated with personality testing (Jackson, Wrobleski, & Aston, 2000). It also results in more efficient testing by reducing the number of items presented to candidates. Stark et al. (2005) offered six steps in developing such a test. First, a large number of statements representing different levels of multiple targeted dimensions are written. Second, these statements are administered to respondents who are asked how well each statement describes him or her on a 7-point scale. Additionally, a separate group of judges are instructed to rate the desirability of each statement using a similar scale. Third, item parameters are estimated separately for each dimension using a unidimenional IRT model and poor fitting items are eliminated until good model-data fit has been achieved. In the fourth step, retained statements are then formed into blocks of 2 to 4 statements (A. Brown & Maydeu-Olivares, 2011) that are similar in desirability (Chernyshenko et al., 2009) but representing different dimensions. Because these blocks contain statements that are similar in desirability but have different location parameters, these groupings constitute a fake-resistant personality assessment (Stark et al., 2005). Chernyshenko et al. (Chernyshenko et al., 2009) later advocated the creation of unidimensional items (2 per

trait) in order to identify the latent metric and to use content that did not overlap with the other items. In the fifth step, the resulting test is administered to respondents who are instructed to choose the statement in each pair that better describes him or her. After respondents' data has been collected, latent trait scores can be estimated (Stark et al., 2005).

In order to construct Thurstone scales that capture the virtues and vices of the Big Five personality traits, I will borrow on insights from these separate scaling procedures. The description of the steps for constructing this virtues and vices Thurstone scale will be outlined in the method section. Additionally, given the evidence favoring GGUM, this model will be chosen to model the ideal point response process.

The GLM of Personality-Job Performance Relationships

Before describing the general linear model of personality-job performance behavior relationships, a definition of job performance must be used. Job performance has been defined broadly as scalable actions that directly or indirectly contribute to the organization's goals (J. P. Campbell, McCloy, Oppler, & Sager, 1993). Importantly, this conceptualization of job performance views such job performance behaviors as theoretically distinct from both job performance evaluations (e.g., performance appraisals) and the effectiveness of such behaviors (J. P. Campbell et al., 1993). For instance, individuals might engage in legitimate efforts that go unrecognized by supervisors, suggesting that accurately modeling the occurrence of behaviors is important. Also, such behaviors may not meet the needs of the evaluator (Tett & Burnett, 2003), resulting in poor evaluations. Additionally, individuals might put effort into their work, but such effort might be ineffective due to other factors, such as constraints on

performance (Trist & Bamforth, 1951) or organizational politics (Chang, Rosen, &

Levy, 2009). Here, I will focus on job performance behaviors. Three broad dimensions

of job performance behaviors relate will be investigated: task performance behavior,

organizational citizenship behavior, and counterproductive work behavior. Task

performance behavior has been defined as "activities that contribute to the organization's

technical core either directly by implementing a part of its technological process, or

indirectly by providing it with needed materials or services" (Borman & Motowidlo,

1997). Such behaviors would include completing formal duties specified in the job

description, completing assigned duties, learning on the job as needed, and abiding by

organizational rules and procedures. Organizational citizenship behavior (OCBs) has

been defined as discretionary behaviors that may not be directly or explicitly recognized

by the formal reward system and yet promote the effective functioning of the

organization (Organ, 1977; Organ, Podsakoff, & Podsakoff, 2011). Example behaviors

would include helping a coworker in need or staying past normal working hours to

complete discretionary tasks. Lastly, counterproductive work behavior (CWB) has been

defined as behaviors that detract from the organizational goals and wellbeing or bring

about undesirable consequences for the organization, its stakeholders, or both (Ones &

Dilchert, 2013). Example behaviors include, aggressiveness, destroying organizational

property, working under the influence of drugs or alcohol, lying, sabotaging others

efforts, loafing at work, undermining others, coming in late, stealing, or withdrawing

from work. Henceforth, when job performance is described, unless qualified it will be

considered as synonymous with behaviors that have the potential to affect the goals of

the organization, its key stakeholders, or both, which is a central element linking each of these three separate factors of job performance.

The general linear model (GLM) linking personality traits to job performance criteria is a model that has long dominated empirical research (Murphy, 1996). This is unsurprising because this assumption underlies the common practice of top-down selection in employment settings and is also the basis of utility analysis (Schmidt & Hunter, 1998). I will next highlight the empirical aspects linking each of the Big Five traits to task performance, CWB, and OCB. Importantly, while a distinction between job performance behavior, evaluations, and effectiveness has been adopted, prior research has often not taken up this distinction in regard to task performance behavior specifically. However, care was taken to distinguish between these different elements of job performance to facilitate an accurate understanding of this literature.

To outline the hypotheses linking the Big Five traits to job performance dimensions, I will draw upon both an attentional resource model of performance (Kanfer & Ackerman, 1989) as well as J. P. Campbell et al.'s (1993) theory of job performance. According to Kanfer and Ackerman's (1989) model, individuals possess limited attentional resources, the allocation of which influences task performance. For instance, individuals who devote too much attention to mindless details may fail to address other important performance-related needs (Le et al., 2011). Using the attentional resource concept, each of the Big Five traits can be linked to performance via the allocation of attentional resources towards certain preferred tasks (e.g., fulfilling duties, helping others, or violating norms). According to Campbell et al. (1993) theory of job performance, performance is a function of individual differences in declarative

knowledge, procedural knowledge and skill, and motivation. Research suggests that the Big Five are linked to different knowledge constructs (both procedural and declarative) and skillsets (Ackerman, 1996) and motivations (J. Hogan & Holland, 2003) suggesting that personality traits should be associated with job performance. These separate models suggest that personality traits and job performance are linked via similar mechanisms (allocation of attentional resources may be considered as a self-regulation or motivational variable). Thus, both models suggest that personality traits are linked to job performance. However, the exact functional form of these relationships remains to be clarified. I will next outline the evidence favoring a linear functional form, which is consistent with the GLM.

Hypotheses 1a-1c: Extraversion-job performance. The social skills and social work preferences associated with Extraversion suggest that job performance behaviors involving social activities are likely correlates. The relationship between Extraversion and job performance has received much meta-analytic attention and generally suggests that Extraversion is related job performance dimensions of social nature. A meta-analysis by Barrick and Mount (1991) suggests that when jobs require sociability, gregariousness, talkativeness, and a high degree of energy (e.g., sales), Extraversion shares a small relationships with job performance outcomes (e.g., productivity, status change, and subjective ratings), but across occupations this relationship is quite small and varied. A separate meta-analysis by Tett, Jackson, and Rothstein (1991) reported similar findings when considering only confirmatory studies ($r = 0.10$, $\sigma_r = 0.10$, 95% CI: -0.05, 0.26, $k = 15$, $N = 2,302$). Regarding contextual performance behaviors, Borman, Penner, Allen, and Motowidlo (2001) linked Extraversion to contextual

performance behaviors (r = 0.08, k = 8, N = 1,832), which are analogous to OCBs.

Regarding the link between Extraversion and CWB, Salgado (2002) reported a

negligible estimate (r = 0.01, σ_r = 0.02, k = 8, N = 1,832) that was in the opposite

direction to the estimate (ρ = -0.03) reported by Berry et al. (2007). On the basis of these

empirical findings, the hypotheses 1-1c are a reflection of the general linear model.

Hypothesis 1a: Extraversion is unrelated to task performance behaviors.

Hypothesis 1b: Extraversion is positively related to OCB.

Hypothesis 1c: Extraversion is unrelated to CWB.

Hypotheses 2a-2c: Conscientiousness-job performance. The self-regulation

skills and achievement motivation often associated with Conscientiousness suggests that

there are likely associations with job performance dimensions. Empirical research

suggests that Conscientiousness is related to each of the job performance factors. A

meta-analysis by Barrick and Mount (1991) suggests that relationship between

Conscientiousness and job performance is quite small and varies across criteria and

occupations. A separate meta-analysis by Tett et al. (1991) reported similar findings

when considering only confirmatory studies (r = 0.12, σ_r = 0.10, 95% CI: -0.11, 0.35, k

= 7, N = 450). In regard to OCB, Borman et al. (2001) linked Conscientiousness to

contextual performance behaviors (r = 0.24, k = 12, N = 2,378). Lastly,

Conscientiousness is perhaps the most useful predictor of CWB, or rather the avoidance

of CWB. An initial meta-analysis (Salgado, 2002) estimated a small-to-moderate true

score relationship (r = -0.16, σ_r = 0.07, k = 13, N = 6,276) while a later meta-analysis (R.

S. Dalal, 2005) reported a stronger relationship (r = -0.29, k = 10, N = 3,280), suggesting

that Conscientiousness is a rather robust predictor of CWB. Once again, hypotheses 2a-2c are derived from a general linear approach.

Hypothesis 2a: Conscientiousness is positively related to task performance behaviors.

Hypothesis 2b: Conscientiousness is positively related to OCB.

Hypothesis 2c: Conscientiousness is negatively related to CWB.

Hypotheses 3a-3c: Agreeableness-job performance behaviors. The helping skill and motives often associated with Agreeableness suggest that helping-related job performance behaviors are likely correlates. Research suggests that Agreeableness is related to job performance criteria that are relevant for social exchanges. The relationship between Agreeableness and job performance appears to be quite small and varies across criteria and occupations (Barrick & Mount, 1991). A separate meta-analysis by Tett et al. (1991) reported a stronger and positive yet unstable relationship when considering only confirmatory studies ($r = 0.22$, $\sigma_r = 0.15$, 95% CI: -0.16, 0.60, $k = 4$, $N = 280$). A separate meta-analysis by Tett et al. (1991) reported a stronger and positive yet unstable relationship when considering only confirmatory studies ($r = 0.22$, $\sigma_r = 0.15$, 95% CI: -0.16, 0.60, $k = 4$, $N = 280$). In regard to OCB, Borman et al. (2001) linked Agreeableness to contextual performance behaviors ($r = 0.13$, $k = 7$, $N = 1,554$). In regard to CWB, Salgado (2002) estimated an observed relationship of -0.13 ($\sigma_r = 0.09$, $k = 9$, $N = 1,299$), suggesting that Agreeableness is related to avoidance of CWB. A subsequent meta-analysis by Barry et al. (2007) reported an estimated true score correlation that is much higher ($\rho = -0.44$), suggesting

that Agreeableness is a rather robust predictor of CWB avoidance. The general linear

approach leads to hypotheses 3a-3c.

Hypothesis 3a: Agreeableness is positively related to task performance

behaviors.

Hypothesis 3b: Agreeableness is positively related to OCB.

Hypothesis 3c: Agreeableness is negatively related to CWB.

Hypotheses 4a-4c: Openness-job performance behaviors. Because most jobs

will require a degree of problem solving skill, Openness and job performance should be

linked. Research has generally failed to link Openness to job performance factors (Woo,

Chernyshenko, Stark, & Conz, 2014). A meta-analysis by Barrick and Mount (1991)

reported a positive yet unstable relationship between Openness and job performance

criteria ($\rho = 0.03$, $\sigma_\rho = 0.13$). Tett et al. (1991) reported a positive yet unstable

relationship between Openness and job performance criteria when considering only

confirmatory studies ($r = 0.18$, $\sigma_r = 0.17$, 95% CI: -0.07, 0.44, $k = 10$, $N = 1,304$). No

prior data were found on the relationship between Openness and OCB. Salgado (2002)

found a small, positive, but unstable relationship between Openness and CWB ($r = 0.10$,

$\sigma_r = 0.13$, $k = 8$, $N = 1,421$). However, a small negative relationship ($\rho = -0.08$) was

reported by Berry et al. (2007). While these differences may reflect differences in

meta-analytic methodology (Salgado used an aggregate CWB measure as outcome,

while Berry et al. used the classical interpersonal vs. organizational CWB distinction),

these differences may simply reveal the true variability in the underlying relationship.

Indeed, under the linear model such variability would be considered sampling error and

the relationship would be summarized as near zero and therefore non-significant. On the

basis of these empirical findings, hypotheses 4a-4c is a list of the hypotheses associated with the general linear model.

Hypothesis 4a: Openness is unrelated to task performance behaviors.

Hypothesis 4b: Openness is unrelated to OCB.

Hypothesis 4c: Openness is unrelated to CWB.

Hypotheses 5a-5c: Neuroticism-job performance behaviors. Research suggests that Neuroticism is relevant for task performance because the ineffective regulation of emotions can facilitate or inhibit performance (Le et al., 2011) while also impeding the effective regulation of negative emotions, which are likely to precede acts of CWB. However, Barrick and Mount (1991) reported a small relationship between Neuroticism and job performance that varies across both criteria and occupations $(\rho = -0.05, \sigma_\rho = 0.08)$. Similarly, Tett et al. (1991) reported a small negative relationship between Neuroticism and job performance criteria when considering only confirmatory studies $(r = -0.15, \sigma_r = 0.05, 95\% \text{ CI: } 0.02, 0.28, k = 10, N = 900)$. Similarly, Borman et al. (2001) linked negative affectivity to OCB $(r = -0.14, k = 6, N = 1,151)$. Research suggests that Neuroticism is also linked to CWB. Berry et al. (2007) reported an estimated true score correlation of -0.26 between Neuroticism and CWB, suggesting that Neuroticism is a rather robust predictor of CWB avoidance. Below are the hypotheses associated with the general linear model.

Hypothesis 5a: Neuroticism is negatively related to task performance behaviors.

Hypothesis 5b: Neuroticism is negatively related to OCB.

Hypothesis 5c: Neuroticism is negatively related to CWB.

Summary of the GLM. Prior theory or models of performance predict that personality traits influence job performance behaviors via knowledge, skills, or motivational mechanisms (e.g., allocation of attentional resources). The GLM supports the job relevance of certain Big Five personality traits for predicting job performance criteria in that for each trait there is at least one association between the trait and a dimension of job performance (with Openness as the exception). However, one important implication of this summary concerns the variability in the meta-analytic results. In each instance where observed variance estimates could be derived from the meta-analyses, these linear relationships varied substantially across situations. While it has been argued that such results suggest the existence of moderators (Tett & Burnett, 2003), it might also be argued that such variability is due to the assumption that a linear relationship best characterizes the underlying relationship between a personality trait and a job performance outcome. Indeed, this has been suggested previously been Barrick and Mount (1991).

An Alternative Nonlinear Model

The alternative model to the GLM assumes that the relationships between some personality traits and job performance may be nonlinear. It is an attempt to address concerns posed by previous researchers regarding the nature of the underlying relationship between personality and job performance criteria (Murphy, 1996; Ones, Dilchert, Viswesvaran, & Judge, 2007). In Barrick and Mount's (1991) influential meta-analysis the authors speculate on the possible curvilinear relationships between some personality factors (e.g., Neuroticism) and job performance. Recent research suggests that these relationships are likely, especially for Conscientiousness (Carter

et al., 2013; Le et al., 2011) and Neuroticism (Le et al., 2011). Other possible curvilinear relationships have been proposed (McCord et al., 2014), but remain to be tested. Indeed, in the clinical psychology literature, extreme FFM personality trait levels are seen as synonymous with maladaptive tendencies (Thomas et al., 2013; Widiger & Presnall, 2013). However, individuals with extreme tendencies may simply require a specific environment compared to individuals with normal or typical tendencies, akin to the needs required of orchids (which are flowers that thrive well in certain specific environments) compared to dandelions (which are generally more adaptable) (Dobbs, 2009). An evolutionary psychology perspective suggests that an organism's purpose in life is to pursue niches to which it is adapted. Applied to understanding employee behavior, then, it follows that roles or positions in organizations requiring that certain social problems to be solved (e.g., exchange of resources) in a certain way (e.g., short-term vs. long-term relationship orientation) will be performed best by those who have the relevant individual differences in personality traits. Indeed, this is core to the concept of situation-trait relevance in trait activation theory (Tett & Burnett, 2003), one of the most commonly relied upon theories for linking personality traits to workplace outcomes.

Hypotheses 1d-1e: The nonlinear Extraversion-job performance relationships. High levels of Extraversion have been positively correlated with sensation seeking, initiating more social behavior, higher levels of social support, and exploration of their environment (Nettle, 2006). However, as most jobs require some form of routine fulfillment of requirements, Extraverted individuals characterized by high energy and activity levels may become distracted by their needs to express

themselves (Beauducel, Brocke, & Leue, 2006). Additionally, while typical levels of

Extraversion may make for a pleasant and helpful coworker, in extreme levels

Extraversion may take the form of self-aggrandizing, long-winded egotism (Coker,

Samuel, & Widiger, 2002), which will lead them to dominate rather than help others.

Individuals with extremely high levels of Extraversion may become attention-seeking,

inappropriately flirty, pushy, authoritarian, reckless, and risky (Gore, Tomiatti, &

Widiger, 2011) while failing to appreciate the implications of their behavior (Widiger &

Presnall, 2013). In other words, extremely extraverted individuals may struggle to

allocate their attentional resources effectively to their own work and instead invest more

of their attention towards socializing rather than on their work. Conversely, introverted

individuals may find it less difficult to thrive in roles requiring a degree of routine and

solitude (Cain, 2013), allowing them to direct their attentional resources towards their

work. However, individuals with extremely low levels of Extraversion will be shy

introverts (Presnall, 2013), anhedonic (Widiger & Presnall, 2013), or (less severe)

passive, socially withdrawn, and disengaged (Lynam, Loehr, Miller, & Widiger, 2012),

which would influence their levels of OCB. Indeed, it has been argued that extremely

low levels of Extraversion (high levels of introversion) can be maladaptive in the

workplace, manifesting in a detachment from the needs of others (Guenole, 2014) and

failing to capitalize on opportunities to contribute to the organization through social

means. Indeed, when it comes to navigating the workplace, there may be a performance

advantage for ambiverted individuals, or individuals moderate on Extraversion (Grant,

2013). Such individuals may balance the allocation of their attentional resources across

various job performance demands. On the basis of these findings, I propose that the

relationships between Extraversion and job performance dimensions are curvilinear rather than linear such that moderate levels of Extraversion are generally desirable for the workplace.

Hypothesis 1d: Extraversion and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Extraversion increases; the relationship becomes negative when Extraversion increases further (i.e., inverted-U).

Hypothesis 1e: Extraversion and OCB are curvilinearly related such that the relationship follows an inverted-U such that the relationship is initially positive but becomes weaker as Extraversion increases; the relationship becomes negative when Extraversion increases further (i.e., inverted-U).

Hypothesis 1f: Extraversion and CWB are curvilinearly related such that the relationship is initially negative but becomes positive as Extraversion increases; the relationship becomes negative when Extraversion increases further (i.e., U-shaped).

Hypotheses 2d-2f: The nonlinear Conscientiousness-job performance relationships. It is generally assumed that Conscientiousness has an unalloyed advantage over other traits (Nettle, 2006). While individuals high on Conscientiousness have been generally viewed positively by organizational researchers and practitioners, individuals who are very or extremely high on this trait may be overly cautious and rigid (Le et al., 2011; Pierce & Aguinis, 2013), have difficulty acquiring new skills (Tett, 1998), and be less adaptable to change (McCord et al., 2014). In regard to task performance, such a curvilinear effect of Conscientiousness has been reported in the

literature (Carter et al., 2013; Le et al., 2011), suggesting that excessive

Conscientiousness can be too much of a good thing. Such individuals may even possess

an obsessive-compulsive personality disorder (Samuel & Gore, 2012; Samuel &

Widiger, 2011). They may be perfectionistic, preoccupied with order and organization,

rigidly principled, workaholics, single-mindedly determined, and ruminate over their

decision-making. Additionally, obsessive rule-following may prevent individuals high

on Conscientiousness from going above and beyond their formal in-role responsibilities,

leading to reduced OCBs (Le et al., 2011). By failing to effectively allocate their

attention to all of their formal requirements (i.e., focusing only on specific formal

requirements), they may struggle to consistently engage in all of the formal behaviors

required of their role, which becomes evident in the form of CWB (Judge & LePine,

2007). Additionally, their high focus on long-term gains may lead them to avoid taking

advantage of short-term opportunities (Nettle, 2006). Indeed, empirical research supports

curvilinear relationships between Conscientiousness and both OCB and CWB (Carter et

al., 2013; Le et al., 2011). Individuals with extremely low levels of Conscientiousness

may be lax, easily distracted, careless, disinhibited, reckless, rash, and carefree (Widiger,

Trull, Clarkin, Sanderson, & Costa, 2002). Such individuals can be highly cognizant of

their tendencies but may often care less about seeking help (Widiger & Presnall, 2013).

This is supported by the literature linking low levels of Conscientiousness to undesirable

workplace outcomes reviewed previously. On the basis of these findings, I propose that

the relationships between Conscientiousness and job performance dimensions are

nonlinear rather than linear.

Hypothesis 2d: Conscientiousness and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Conscientiousness increases; the relationship becomes negative when Conscientiousness increases further (i.e., inverted-U).

Hypothesis 2e: Conscientiousness and OCB are curvilinearly related such that the relationship is initially positive but becomes negative as Conscientiousness increases; the relationship becomes negative when Conscientiousness increases further (i.e., inverted-U).

Hypothesis 2f: Conscientiousness and CWB are curvilinearly related such that the relationship is initially negative but becomes positive as Conscientiousness increases; the relationship becomes negative when Conscientiousness increases further (i.e., U-shaped).

Hypotheses 3d and 3e: The nonlinear Agreeableness-job performance relationships. Like Conscientiousness, it is widely believed that Agreeableness has an unalloyed advantage over other traits (Nettle, 2006). While the GLM assumes that Agreeableness is a positive trait for the workplace, the alternative model proposed here views the trait as having tradeoffs at various levels. Indeed, prior research suggests that Agreeableness is associated with lower pay, fewer promotions, and decreased extrinsic career success (Ng et al., 2005; Wille et al., 2013), which may be due to Agreeable individuals focusing more of their attention on getting along with others rather than getting ahead of others (R. Hogan & Shelton, 1998). Thus, there appear to be vices to being high (or extremely high) on Agreeableness. In regard to both task performance and CWB, it has been argued that extremely low levels of Agreeableness manifesting as

Antagonism (APA, 2013) would incline an individual to shirk their duties, ignore their responsibilities towards their peers and organization, as well behave deceptively and manipulatively in the workplace (Guenole, 2014). Individuals with extremely low levels of Agreeableness will be disagreeable, distrustful, suspicious, oppositional, manipulative, and/or arrogant (Widiger & Presnall, 2013). Seemingly, by devoting more attentional resources to getting ahead, Antagonistic individuals are likely to invest less attention towards performing their legitimate duties and instead devote more attention towards illegitimate tasks that help them to get ahead to their peers' detriment (Castille et al., 2014). Conversely, extremely high Agreeableness manifesting as gullibility and/or submissiveness (Samuel & Gore, 2012) could lead an individual to spend more time helping their peers at a cost to fulfilling their own responsibilities. Indeed, by increasingly allocating their attentional resources to engaging in OCB, highly Agreeable individuals may fail to fulfill their own responsibilities. Additionally, such individuals seem likely to be exploited by individuals low in Agreeableness. Indeed, unconditional trusting is hardly an adaptive strategy and opens one up to being taken advantage of by less loyal individuals (Nettle, 2006). Individuals with extremely high levels of Agreeableness may be gullible and selfless martyrs (Widiger & Presnall, 2012) who are also subservient and self-effacing (Gore, Presnall, Miller, Lynam, & Widiger, 2012; Lowe, Edmundson, & Widiger, 2009). Such individuals may lack the insight into such problems, but will eventually recognize that they have a history of troubled, problematic, and maybe even abusive relationships (Widiger & Presnall, 2013). On the basis of these findings, I propose that the relationships between Agreeableness and job performance dimensions are nonlinear rather than linear.

Hypothesis 3d: Agreeableness and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Agreeableness increases; the relationship becomes negative when Agreeableness increases further (i.e., inverted-U).

Hypothesis 3e: Agreeableness and CWB are curvilinearly related such that the relationship is initially negative but becomes weaker as Conscientiousness increases; the relationship becomes positive when Agreeableness increases further (i.e., U-shaped).

Hypotheses 4d-4f: The nonlinear Openness-job performance relationships. While research on highly open individuals extols their creative and artistic virtues (Goldberg, 1990), as the previous literature review suggested Openness appears relatively unrelated to workplace outcomes in a linear fashion. However, high levels of Openness have been linked with rebellious and unconventional behavior which suggests that extremely open individuals may shirk their duties or engage in higher levels of rule-breaking behavior, such as CWB (Hough, 1992; Piedmont, Sherman, & Sherman, 2012). Such individuals may also be more accident prone , implying higher levels of self-directed CWB such as unsafe behavior (Marcus, Taylor, Hastings, Sturm, & Weigelt, in press). Additionally, their increased allocation of attentional resources towards creativity may lead to less focus on mundane and typical performance responsibilities, resulting in lower levels of task performance behaviors. Thus, extremely high Openness may be associated with higher CWB and lower task performance. Individuals with extremely high levels of Openness tend to be eccentric, weird, and out of place in both their thoughts and their actions (Edmundson, Lynam, Miller, Gore, &

Widiger, 2011; Piedmont et al., 2012; Widiger, 2011). Conversely, individuals with extremely low levels of Openness may invest a majority of their attentional resources towards tried-and-true solutions to work problems, leading them to encounter difficulties adapting to changes that naturally arise in the workplace (Piedmont et al., 2012). This suggests that lower levels of task performance are likely when individuals are low or extremely low on Openness. Additionally, such individuals may have a low tolerance for different perspectives (Piedmont et al., 2012), which may motivate them to avoid helping others. Regardless of the extremity (extremely high or extremely low), both levels result in difficulties interacting with coworkers, with extremely open individuals' need to express their unconventional ideas and extremely low open individual's over-regulation of internal cognitions making it difficult to maintain relationships based on mutual understandings (Piedmont et al., 2012), resulting in low levels of OCB. Individuals with extremely low levels of Openness will be extremely rigid in their thoughts, ideas, or beliefs (Piedmont et al., 2012). While they may see themselves as practical, realistic, and down to earth individuals, others will describe them as closed-minded, intolerant, rigid, or inflexible (Widiger & Presnall, 2013), which would make them less adaptable workers in interpersonal domains of work (Pulakos, Arad, Donovan, & Plamondon, 2000). Thus, Openness would have a curvilinear relationship with OCB, with moderate levels resulting in higher levels of OCB.

Hypothesis 4d: Openness and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Openness increases; the relationship becomes negative when Openness increases further (i.e., inverted-U).

Hypothesis 4e: Openness and OCB are curvilinearly related such that the relationship is initially negative but becomes weaker as Openness increases; the relationship becomes positive when Openness increases further (i.e., U-shaped).

Hypothesis 4f: Openness and CWB are curvilinearly related such that there is no relationship when Openness is low or moderate. The relationship becomes positive when Openness becomes high or extremely high.

Hypothesis 5d-5f: The nonlinear Neuroticism-job performance relationships. While prior research suggests that Neuroticism is an undesirable trait for the workplace (Barrick & Mount, 1991), more recent research suggests that extremely low Neuroticism can manifest in the form of cold, emotionless, and inhuman behaviors (Coker et al., 2002). Such emotional over control for individuals low on Neuroticism may saturate cognitive resources needed for fulfilling requirements of their core duties (Le et al., 2011). In accordance with this argument, Le et al. (2011), demonstrated that Neuroticism is nonlinearly related with task performance. They also found evidence that linked Neuroticism in a curvilinear fashion to both OCB and CWB with extremely low levels of Neuroticism being generally detrimental for workplace outcomes. Research has also demonstrated that there are vices to empathy (which is common among emotionally stable individuals) that can encourage unethical behaviors that help those are the targets of empathy, but result in a violation of fairness and justice principles (Batson, Klein, Highberger, & Shaw, 1995; Gino & Pierce, 2009). Conversely, extremely high levels of Neuroticism are likely to reveal unsurprising results and be consistent with prior research on the relationship between Neuroticism and dimensions of job performance. Individuals with extremely high levels of Neuroticism will describe themselves as

experiencing an ongoing pattern of emotional distress that has become increasingly unbearable (Widiger & Presnall, 2013), which will influence each job performance dimension. Additionally, anxiety, a facet of Neuroticism, makes an individual sensitive and responsive to threatening stimuli, leading them to focus attentively on negative events, which may protect individuals from engaging in otherwise risky behaviors (Nettle, 2006). High levels of Neuroticism have correlated with competitiveness, suggesting that negative affect might facilitate striving to better one's position (Nettle, 2006). Thus, a little Neuroticism may be conducive for job performance behaviors, but in excess becomes detrimental.

Hypothesis 5d: Neuroticism and task performance are curvilinearly related such that the relationship is initially positive but becomes weaker as Neuroticism increases; the relationship becomes negative when Neuroticism increases further (i.e., inverted-U).

Hypothesis 5e: Neuroticism and OCB are curvilinearly related such that the relationship is initially positive but becomes weaker as Neuroticism increases; the relationship becomes negative when Neuroticism increases further (i.e., inverted-U).

Hypothesis 5f: Neuroticism and CWB are curvilinearly related such that the relationship is initially negative but becomes less negative as Neuroticism increases; the relationship becomes positive as Neuroticism increases further (i.e., U-shaped).

Summary of the proposed alternative model. Nonlinear relationships have been proposed between each of the Big Five traits and job performance criteria. While

these relationships have been informed by prior empirical findings as well as the arguments of other researchers (e.g., McCord et al., 2014), with the exception of the hypotheses for Conscientiousness and Neuroticism, the remaining effects remain to be tested in conjunction with ideal point models for latent trait estimation. The current study fills this void in the literature by examining the curvilinear relationships between the Big Five personality traits and job performance dimensions.

Conclusion

First, the I/O personality literature has been largely fragmented due to the use of the terms bright and dark for describing traits and sides of traits. As an alternative, the model of personality virtues and vices was presented and elaborated upon using arguments from evolutionary, cognitive, clinical, and counseling psychological perspectives. The historical foundation of these ideas stemming from the ancient Greeks to modern personality research was then reviewed. The statement of the problem and the purpose of the study were then elaborated upon. The model of personality virtues and vices was then used to outline the measurement of the Big Five personality traits according to the assumptions of the model. Then the criterion-related validity of the Big Five were discussed under the assumptions of a general linear model and an alternative model that was consistent with the model of personality virtues and vices. It remains unclear which functional form (i.e., linear or nonlinear) best approximates the relationship between personality traits and job performance dimensions. Importantly, there has been sparse use of ideal point modeling in applied personality research, though research has begun to merge (Carter et al., 2013). To my knowledge, there has not been a systematic investigation in which both ideal point modeling and curvilinear hypotheses

linking the Big Five to job performance dimensions have been simultaneously investigated. As noted, most prior work has examined the linear assumption underlying personality and job performance dimensions. By empirically examining the curvilinear assumption using ideal point models of personality data, this study makes a strong contribution to the I-O personality literature. Evidence and arguments favoring separate models (linear vs. nonlinear) have been put forward. This consideration is critical because having an accurate representation of the relationships between these factors would call into question personality theories that assume linear relationships between traits and criteria (J. Hogan & Holland, 2003). It would also call into question the utility of top-down selection practices with personality tests. This study examined the relationship between the Big Five personality traits and job performance dimensions. While evidence suggests that linear relationships serve as reasonable approximations, both prior data and models of job performance suggest that nonlinear relationships are more likely to serve as better approximations for each of the Big Five.

CHAPTER TWO

METHOD

Participants

As this study involved measurement development, I trained four graduate assistants in Human Resources Development in ideal point item writing strategies. I, along with another industrial and organizational psychology doctoral student with training in personality and psychometric theory, evaluated the items (detailed in the procedure). For the primary investigation, participants were individuals sampled from Amazon's Mechanical Turk (MTurk). MTurk is a crowdsourcing tool for obtaining access to various and diverse subject pools and has recently gained popularity among social science researchers due to the efficiency and inexpensiveness of data collection and (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012; Rand, 2012). It has also been used successfully in developing assessments (Mathieu, Hare, Jones, Babiak, & Neumann, 2013) and has been recommended for calibrating IRT-based assessments (Carter et al., 2013). Surveys were administered using the Qualtrics survey software. Participation was voluntary and participants were free to withdraw from the study at any time. Participants were paid $1.30 each for their participation.

Measures

Demographics

The demographic questionnaire (Appendix A) contained the questions related to age, gender, ethnicity, job tenure, work experience, educational level, job title, O*NET occupation, employment type, employment sector, and employment tax information. In regard to the employment tax information, participants were asked, "Does your place of employment require the completion of tax forms (e.g., W-9, W-2)?" Participants were also asked to self-report (a) their job title and (b) the most relevant occupation after conducting a search using O*NET online. These steps were taken because of concerns over whether or not MTurk workers acquire income primarily through MTurk.

Big Five Inventory-10 (BFI-10)

Because a new set of personality scales were constructed under ideal point assumptions, it was important to examine how scores on this new assessment compared to those produced by more conventional methods. Hence, I administered the ten-item version of the Big Five Inventory (BFI-10) (Rammstedt & John, 2007) to establish convergent and discriminant validity (Appendix B). The BFI-10 contains 10 items, two for each Big Five trait. Each item begins with the prompt, "I see myself as someone who." The average test-retest reliabilities from three separate data collection efforts reported by Rammstedt and John are as follows: (a) Extraversion ($\alpha = .83$) was measured using two items, "is outgoing, sociable" and "is reserved" (R); (b) Openness ($\alpha = .72$) was measured using two items, "has an active imagination" and "has few artistic interests" (R); (c) Agreeableness ($\alpha = .68$) was measured using two items, "is generally trusting" and "tends to find fault in others" (R); (d) Conscientiousness ($\alpha = .77$) was

measured using two items, "does a thorough job" and "tends to be lazy" (R); and, lastly,

(e) Emotional Stability (α = .74) was measured using two items, "is relaxed, handles

stress well" and "gets nervous easily" (R).

Job Performance Behavior

Job performance has been defined as scalable activities that contribute to or

detract from the overall goals of the organization (J. P. Campbell et al., 1993). While

many components for describing job performance have emerged from the literature,

there is much agreement that three general components adequately define job

performance behaviors (Landy & Conte, 2013): job-specific or task performance,

organizational citizenship, and counterproductive workplace behavior.

Task performance behavior. Task performance has been defined broadly as

encompassing the performance of duties formally required of an individual occupying a

certain position or organizational role (J. P. Campbell et al., 1993). It has also been

defined in terms of the self-regulation, allocation, or investment of attentional resources

(Beal, Weiss, Barros, & MacDermid, 2005; Kanfer & Ackerman, 1989). Combining

these two yields a definition of task performance defined broadly as the direction and

regulation of attentional resources for the purposes of performing specific formal duties

or requirements. A review of the literature for measures and items that conformed to this

definition revealed few comprehensive measurement models that fit this definition.

Indeed, many were written to reflect evaluations of behaviors from the perspective of

supervisors, which may confound description of behavior with the evaluation of

behavior (J. P. Campbell et al., 1993). Therefore, items were taken from separate

inventories and modified for the present purposes (see Appendix C). Two modified

items were taken from Williams and Anderson's (1991) in-role behaviors scale.

Specifically, the two modified items are: (1) "I complete duties as they are assigned" and

(2) "I complete tasks specified in my job description." Organ et al. (2006) judged these

items as possessing adequate substantive validity as reflecting in-role performance

behavior, which has strong conceptual similarities with task performance behavior

(Griffin, Neal, & Parker, 2007). Additionally, as previous researchers have defined task

performance in terms of job-related learning and following rules and procedures, the

items (3) "I take the time to learn skills that are needed in order to do my work" and (4)

"I follow organizational rules and procedures," which have been used recently in a study

linking personality to task performance (Carter et al., 2013), were used here due to their

relationship to task performance. An additional item was also created in order to

adequately reflect the role of regulating attentional resources within the context of task

performance, such as (5) "I avoid distractions that draw my attention away from my

formal duties."

Organizational citizenship behavior. Organizational citizenship behaviors were

measured using the 20-item version of the Organizational Citizenship Behavior

Checklist (OCB-C) (see Appendix D). It was specifically designed to minimize overlap

with a scale of counterproductive work behavior, which has been a common criticism of

previous scales (R. S. Dalal, 2005; Spector, Bauer, & Fox, 2010). Items in this scale

reflect acts directed toward the organization (OCBO) as well as other people in the

organization, such as one's coworkers (OCBP). Example items for measuring OCBO

include "Decorated, straightened up, or otherwise beautified common work space,"

"Volunteered for extra work assignments," and "Offered suggestions for how work is

done." Example items for measuring OCBP include "Lent a compassionate ear when someone had a personal problem," "Helped a co-worker who had too much to do," and "Took time to advise, coach, or mentor a co-worker" (see Appndix D). Taking recommendations for scaling OCB scales provided by Spector, Bauer, and Fox (2010), items were measured using a seven-point frequency scale (1 = *never*, to 7 = *every day*). Though the scale was designed to represent a formative OCB construct, which may lack internal consistency (Coltman, Devinney, Midgley, & Venaik, 2008), Fox, Spector, Goh, Bruursema, and Kessler (2012) report a coefficient alpha for the self-report 20-item versions of the OCB-C as .89 and .94 for the OCBO and OCBP scales, respectively. Thus, an estimate of overall coefficient alpha computed as a simple average of these two constructs is .92. Scores on the OCB-C have correlated positively with the CWB-C, a measure of counterproductive work behavior (Fox et al., 2012; Spector et al., 2010) as well as another commonly used measure of OCB authored by Podsakoff, MacKenzie, Moorman, and Fetter (1990).

Counterproductive work behaviors. In order to capture a broad CWB factor, two scales capturing CWBs were utilized. The first, Bennett and Robinson's (2000) measure of workplace deviance, contains two subscales. The first seven-item subscale captured CWBs directed at the organization. Example items include, "made fun of someone at work," "said something hurtful to someone at work," and "publicly embarrassed someone at work." The second 12-item subscale captures CWBs directed at the organization more generally. Example items include, "taken property from work without permission," "come in late to work without permission," and "taken an additional or longer break than is acceptable at your workplace" (see Appendix E). This

scale has been popular among organizational researchers and has been linked to the Big Five and other variables via meta-analysis (Berry et al., 2007). The average of the meta-analytic reliability coefficients reported by Berry et al. (2007) is .83, which is an estimate of the reliability for the overall CWB scale. Per the recommendations for scaling CWB scales provided by Spector et al. (2010), items were measured using a 7-point frequency scale (1 = *never*, to 7 = *every day*).

Procedure

Since this study required measurement construction, it was important that our measurement model construction process aligned with published standards for measurement development, especially those of the ideal point variety (Chernyshenko et al., 2007; Hinkin, 1998; J. S. Roberts et al., 1999; Stark et al., 2005). First, the content domain to be sampled (i.e., the FFM) was specified. To do this, I drew upon published and widely accepted definitions for the narrow traits of the FFM of personality. Second, following recommendations for constructing ideal point scales (see Chernyshenko et al., 2007), items were constructed to reflect different extremities of each of these narrow traits. For this task, four graduate students in human resources development who received training by the lead researcher in ideal point measurement item writing strategies wrote the initial items. Students were instructed to write short-sentence statements that described specific behaviors believed to be associated with different extremities of these facets. Students were assigned between 5 and 10 narrow facets and then instructed to write approximately 15 items per facet (approximately 3 items per extremity) with two students assigned to each narrow trait. Third, following

recommendations for constructing ideal point scales (see Chernyshenko et al., 2007), these items were reviewed by two industrial/organizational psychology doctoral students (one of which was the lead researcher) who completed doctoral-level coursework in both personality and psychometric theory. Prior research supports the utility of such subject matter expert (SME) ratings (Chernyshenko et al., 2007).

To ensure adequate content validation, review of the items was conducted using these steps: (1) each narrow trait was presented to the two raters in a random-with-replacement fashion to reduce the influence of order effects; (2) items within each narrow trait were further randomized to reduce the influence of order effects; and (3) the definition for each narrow trait was presented to each rater to allow for ease of evaluating the extent to which each item substantively reflected the target dimension (see Anderson & Gerbing, 1991). These two raters assigned both extremity ratings (1 = *extremely negative end of dimension*; 7 = *extremely positive end of the dimension*; adapted from Chernyshenko et al., 2007) and fakability ratings (1 = *it is not clear how to respond to this item in order to "fake good"*; 7 = *it is very clear how to respond to this item in order to "fake good"*) (see Appendix F). Also, prior to rating the full set of items, two randomly chosen dimensions were rated one at a time in order to orient and calibrate the raters to the rating task. SME performance was evaluated using the average deviation (AD) index (Burke & Dunlap, 2002), which captures SME disagreement by describing the deviation (in raw scale units) of ratings from the average rating. Thus, large values of AD indicate high levels of disagreement. Following the published rule-of-thumb for practically significant levels of agreement, values greater than 1.0 were judged as reflecting practically meaningful levels of disagreement and was

more conservative than published standards (Burke & Dunlap, 2002). Items with AD indices exceeding this value for either extremity or fakability were discussed and either modified or dropped. More details concerning the protocol are provided in Appendix F.

Finally, given that our goal was to test for nonlinear relationships at the broad rather than narrow level of personality abstraction, a target goal of 12 items per extremity and 10 items per narrow trait, totaling in 60 items overall per broad trait was set. Items were selected for inclusion if the AD extremity index was equal to or less than 0.5 and also if the AD fakability index was equal to or less than 1.0. These differing cutoffs were chosen because fakability ratings evidenced somewhat more disagreement than extremity ratings. Also, to ensure that each dimension adequately represented each level of each narrow trait, items were placed into categories based on their average extremity score: 1-1.5 (extremely negative), 2-3 (negative), 3.5-4.5 (moderate or neutral), 5-6 (positive), 6.5-7 (extremely positive). This process produced a set of 300 total items. Within each set of 60 items, ten item sets were selected from each of the six narrow dimensions. Within each of these ten item sets, five reflected items with high levels of social desirability (or undesirability) from each extremity level of a specific dimension (extremely low, low, moderate, high, or extremely high) and five reflected items with low or no levels of social desirability (or undesirability) from each extremity level. This was done because I wanted to ensure that the FFM domain was adequately reflected in the final assessment (i.e., each proposed narrow trait was represented in the final battery).

Following this preliminary substantive validity study, I launched the main study which both tested the personality measurement model and also my hypotheses. The

retained statements were administered to a pool of respondents from MTurk who were asked how well each statement described him or herself on a 6-point scale (1 = *very inaccurate*; 6 = *very accurate*). This scaling technique was chosen because research suggests that middle response options are inappropriate for ideal point responding (D. K. Dalal, Carter, & Lake, 2013). Participants in the main study were given an informed consent form that included a cover story that masked the purpose of this study. Specifically, participants were told, "The purpose of this study is to test the viability of a personality test and a series of measures of job performance behaviors. These measures were developed by multiple researchers and the statements that you read may not necessarily relate to one another" (see Appendix G for more information). This was done in order to reduce the influence of common method variance via hypothesis guessing (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Participants who indicated that their place of employment required them to complete W-2 or W-9 tax forms, or applied for a tax ID number, were granted access to the job performance measures (Appendices C-E). This was done to ensure that participants were employed through an organization other than MTurk. Participants indicating that MTurk was their only means of securing income (or that they were not employed) were not granted access to the job performance measures but were given other scales to equalize treatment (specifically, a measure of the Dark Triad personality traits). All participants were given the ideal point FFM scale and the BFI-10 (Appendix B).

Analyses

Descriptive Statistics

Descriptive statistics, the mean and standard deviation, were calculated and examined for all variables in the study. Pearson product moment correlations were calculated to examine the degree of association among variables. For the BFI-10 and job performance scales, internal consistency reliability (α) was calculated.

Construct Validity of the Job Performance Measures

I used CFA to test for convergent and discriminant validity of the self-report job performance measures (i.e., task performance, organizational citizenship behavior, and counterproductive work behavior). First, each measurement model was nested in the data and evaluated for fit. Second, once the measurement model achieved adequate levels of fit, I then ran a model in which each measurement model was tested simultaneously. Lastly, the observed latent construct correlations between the focal substantive constructs were compared to prior literature to evaluate the construct validity of the proposed measurement model.

Ideal Point IRT Analytical Strategy for Creating Unfolding Big Five Scales

There are two key assumptions that must be tested when building IRT scales: unidimensionality and local independence. Unidimensionality requires that all responses on a scale be due to a single underlying causal factor. Similarly, local independence refers to the notion that if the latent trait were controlled for, then item scores would not covary. Unfortunately, there is little agreement regarding appropriate methods that are accessible for ensuring that measures are unidimensional unfolding and do not violate local independence because the current measures do not account for nonlinearities (e.g.,

they assume that strong linear relationships imply measurement reliability) (Carter et al., 2013; Chernyshenko et al., 2007). In regard to testing these assumptions for personality assessment, this matter is further complicated because personality assessments may be affected by a variety of factors (e.g., impression management bias, evaluation apprehension, and self-deception), which reflect various alternative hypotheses to be tested in subsequent studies (this is one reason why fakability ratings from SMEs were captured). Such possible causes of variation inherently reduce the assessment of personality to a multidimensional model and so others may argue that unidimensional model selected here is inappropriate. However, as Lord (1968) noted, "The appropriate question is not whether the (or any selected) model holds exactly - this can hardly be expected - but whether it can provide trustworthy approximate answers to important questions" (p. 990). Fortunately, IRT models are relatively resistant to such violations (Drasgow & Parsons, 1982).

GGUM2004 estimates item and person parameters (J. S. Roberts, Donoghue, & Laughlin, 2002; J. S. Roberts et al., 2006), which uses marginal maximum likelihood (MML) estimation for item parameters and expected a posteriori (EAP) for estimating person scores. GGUM2004 provides plots of observed and expected responses as a function of theta-delta differences, which were sorted and classified into 15 homogenous groups of approximately equal size. The average observed and expected responses based on the generalized unfolding model are then calculated for each group, which are then plotted against the average theta-delta value for each group. Large discrepancies indicate portions of the latent continuum in which the model does not adequately fit the data well, (J. S. Roberts et al., 2000), which is one graphical means of evaluating overall

model-data fit for specific unfolding Big Five measures (Carter et al., 2014). In regard to statistical means of evaluating fit, simulation research by Roberts (2004a) suggests that two Pearson-like χ^2 statistics can be used to evaluate item fit because these statistics have reasonable empirical Type I error and power rates: $S\text{-}X_i^2$ and $_cS\text{-}X_i^2$. Roberts (2004a) encourages a hierarchical strategy in which $S\text{-}X_i^2$ is relied on unless it cannot be calculated due to too few degrees of freedom, in which case, $_cS\text{-}X_i^2$ could be considered. However, these statistics test the null hypothesis of perfect fit of the model to the data, and so will often flag otherwise desirable items for capturing personality traits. Indeed, researchers have noted the need for more research into relative fit indices for IRT models (Zickar & Broadfoot, 2009) that are similar to those commonly adopted in evaluating structural equation models. Considering the ambiguity of using GGUM2004 and the absence of other alternatives for evaluating model-data fit, I have adopted a strategy that is consistent with arguments made by (J. S. Roberts, 2004b). First, I viewed item plots (i.e., item fit plots, item characteristic curves, and item information curves). Item fit plots, graphically depict the difference between predicted (depicted as dots) and observed theta values along with a pseudo-confidence interval (J. S. Roberts, 2004b). Multiple predicted values outside the pseudo-confidence interval imply poor fit (de Ayala, 2009). Researchers have noted that item characteristic curves, which plot the item response function, can also assist in item selection (de Ayala, 2009). Items were chosen if the item characteristic curve suggested that the item captured the hypothesized level of the Big Five trait in question as suggested by SME judgments. Additionally, given the desire to have a scale that captured the unfolding response process, I also selected items that clearly evidenced unfolding (i.e., had bell-shaped item response functions) (J. S.

Roberts et al., 2000). Also, in an effort to construct a scale that reliably assessed multiple

levels of each Big Five trait, items were retained according to their item information

curves. Item information curves allow for a graphic assessment of item utility (de Ayala,

2009). Generally, this figure correlates with item discrimination, which will be

addressed momentarily. Item selection decisions were made in an attempt to maintain

content adequacy (Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993); that is, a

relatively equal number of items from each narrow facet of each Big Five trait were

selected. This was done to ensure that each scale would appropriately capture an

individual's hypothesized standing on each Big Five trait that would not be biased in

favor of a random narrow trait. Second, while making item selection decisions, the

associated test plots (i.e., test characteristic curves and test information curves) were

examined in order to assess the extent to which poorly fitting items contributed to

undesirable test qualities (e.g., flat test characteristic curves and variable test information

curves). Test characteristic curves, which in this context relate unfolding theta values to

traditional Likert-type scores, suggest that a test captures unfolding if it peaks with an

inflection point occurring approximately at the mean (0) of theta (Carter et al., 2014).

Test information curves, which describe the reliability of measurement of different theta

levels, were viewed to see if items contributed to the reliable assessment of the full trait

continuum (de Ayala, 2009). If a flagged item detracted from the goal of creating

unfolding Big Five scales that reliably assessed the entire trait continuum, then this item

was discarded and another analysis was run. Lastly, I viewed the three primary GGUM

parameters of interest. The first is the item location estimate (δ), which corresponds to a

trait level (θ) that describes individuals that are likely to fully endorse (i.e., strongly

agree) with this item. For instance, for an item with δ of 3.18, an individual who strongly agrees to this item would be expected to have an overall score that is 3.18 standard deviations above the mean. Items that were relatively consistent with the hypothesized SME item location were retained. The second parameter of interest (α) is the discrimination parameter. Generally speaking, higher values are preferred as they imply more reliable discrimination across a certain range of a trait (de Ayala, 2009). I also viewed the standard errors for these estimates and deleted items that contained notably large standard errors. Otherwise, it was retained.

Following other researchers (Huang & Mead, 2014), IRT estimates of each item's location were used and then weighted (i.e., multiplied) each individual's response to each item by these weighted responses, which were then averaged across items to create scale scores. These scale scores were then used in the subsequent analyses.

Linear and Polynomial Regression Analysis

To examine the relationships among the Big Five personality traits and the job performance dimensions, 15 hierarchical regressions were conducted in which each dimension of performance was regressed onto a single Big Five trait. Following previous tests for nonlinear relationships for Big Five traits (Le et al., 2011), analyses were conducted separately for each combination of the Big Five and each performance dimension. All Big Five scores were standardized, and the polynomial (i.e., curvilinear) terms were calculated from that standardized value to reduce the biasing effects of multicollinearity (Aiken & West, 1991). In the first step, the relevant standardized Big Five (e.g., Extraversion) scores were entered as a predictor of the performance dimension (e.g., task performance). In the second step, the squared values of the relevant

standardized Big Five scores were entered, and the change in R^2 was evaluated for significance ($p < .01$). This approach allowed an estimate of the unique relationships between a given independent variable and a dependent variable. This analysis also provided estimates of both the amount of variance a given model explained (R^2) and the incremental variance explained by additional model components; that is, how much variance in the dependent variable was explained by both a linear and nonlinear combination of the independent variables. Linear and polynomial regression was chosen because it allowed for testing the hypothesized nonlinear relationships among the Big Five and job performance criteria in terms of additional amount of variance explained by the model (Aiken & West, 1991). The 'forced entry' method was used for all variables when entering them into the regression because it allowed for the selection of which variables remained in the regression model when evaluating hypotheses.

CHAPTER THREE

RESULTS

Descriptive Statistics of Study Participants

Seven hundred twenty-eight individuals successfully completed the survey.

Inattentive responding checks were used to screen participants. One participant's data

indicated attentive responding to only inattentive responding items, as they provided the

same answer for all survey questions except the inattentive responding items, which they

correctly answered. This individual's data was removed from all subsequent analyses.

The average age of the individuals participating in this study was 34.34 (SD = 10.46).

Fifty-eight percent of participants were female (n =417). Participants indicated working

with their current employer for an average (median) of 3.75 years (ranging from 0 to 38

years). In regard to educational achievement, a majority of participants (38.7%)

indicated achieving a 4-year degree (n = 282), followed by high school degree (n = 171,

or 23.5%), 2-year degrees (n = 145, or 19.9%), masters or equivalent (n = 112, or

15.4%), PhD or equivalent (n = 16, or 2.2%), and less than middle school (n = 2, or

.3%). Seven hundred twenty-seven participants reported either a job title or occupational

title from O*NET. One hundred sixty-one (22.3%) of participants indicated working as

part-time employees while 562 (77.3%) indicated full-time employment status. In regard

to employment status, 499 (68.5%) indicated working in the private sector while 225

(30.9%) indicated working in the public sector. The median reported income ($n = 405$)

was $38,000 (interquartile range of $32,500). A majority of participants were Caucasian

($n = 584$, or 80.3%), followed by Hispanics ($n = 44$, or 6.1%), African Americans ($n = $

39, or 5.4%), Asians ($n = 34$, or 4.7%), Other ($n = 14$, or 1.9%), Native Americans (n = 8,

or 1.1%), and Indian ($n = 4$, or 0.6%). Lastly, seven hundred two individuals indicated

completing tax forms, applying for a tax ID number, or that an organization other than

MTurk provided their primary source of income, and these participants were allowed

access to the job performance measures. Descriptive statistics for study variables are

available in Table 2.

Table 2

Intercorrelations and Internal Consistency Estimates of Observed Scores

	Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Age	34.35	10.46															
2	Gender	1.58	0.49	.04														
3	U-Extraversion	0.52	1.65	-.09	-.09	.86												
4	U-Conscientiousness	2.10	1.96	.07	.06	.33	.88											
5	U-Agreeableness	0.82	1.22	.04	.15	.24	.48	.87										
6	U-Openness	4.83	1.96	-.07	.07	.50	.42	.41	.83									
7	U-Neuroticism	-0.88	1.80	-.22	.06	-.60	-.49	-.34	-.26	.91								
8	BF10 Extraversion	2.88	1.00	.00	-.05	.68	.09	.07	.27	-.34	.69							
9	BF10 Conscientiousness	3.93	0.76	.13	-.01	.33	.61	.26	.21	-.47	.18	.49						
10	BF10 Agreeableness	3.47	0.89	.00	-.01	.31	.16	.53	.23	-.36	.22	.16	.53					
11	BF10 Openness	3.72	0.89	.02	.01	.26	.11	.10	.45	-.09	.19	.05	.05	.49				
12	BF10 Emotional Stability	3.40	1.01	.09	-.22	.47	.29	.20	.20	-.75	.27	.35	.30	.03	.69			
13	Task Performance	6.10	1.11	.11	.14	.11	.37	.29	.30	-.03	-.03	.19	.09	.08	.04	.86		
14	OCB	4.38	1.12	-.05	.06	.28	.17	.19	.28	.16	.19	.10	.13	.15	.06	.28	.92	
15	CWB	1.83	0.83	-.13	-.12	-.17	-.43	-.35	-.18	.21	.26	-.36	-.22	-.05	-.20	-.23	.08	.90

Note. $N = 701$ to 727. The "U-" corresponds to the unfolding personality scales created in this study. Correlations of a magnitude greater than |.08| are significant at the .05-level.

Convergent and Discriminant Validity of Job Performance Measures

The task performance measurement model, in which the five task performance items reflected a latent task performance construct, was tested first. Because this 5-item measure of task performance was newly developed for this study but the latent structure was largely known, a CFA was run on a subsample of randomly selected participants (n = 200). The fit for this measurement model was excellent [$\chi^2(5)$ = 1.275, p ns; CFI = 1.00; TLI = 1.015; RMSEA = 0.000] and the factor loadings for the first four items were acceptable ($\overline{\lambda}$ = 0.81). However, the factor loading for the fifth item (λ = 0.47) suggested that this item might be considered a candidate for removal as more variance is explained by the residual rather than the task performance factor. Nevertheless, this item was retained because it was theoretically relevant for the attentional resources model of task performance, which suggests that the cognitive activity of regulating attentional resources reflect task performance behavior. Fitting this model to the remaining data (with the original data included) suggested acceptable model fit [$\chi^2(5)$ = 20.92, p < 0.001; CFI = 0.99; TLI = 0.98; RMSEA = 0.07] and all items significantly reflected task performance (standardized λs > 0.56, p < 0.001).

The OCB measurement model, in which all 20 OCB items reflected a latent OCB construct, was tested next. The model-data fit statistics indicated poor fit [$\chi^2(170)$ = 1258.53, p < 0.001; CFI = 0.85; TLI = 0.83; RMSEA = 0.09]. Scanning the modification indices indicated that item five ("Lent a compassionate ear when someone had a work problem.") and item six ("Lent a compassionate ear when someone had a personal problem.") correlated very strongly. A similar problem was observed with item eight ("Offered suggestions to improve how work is done.") and item nine ("Offered

suggestions for improving the work environment."). In examining the amount of overlap

in the item content, I interpreted such high degree of correlation as reflecting common

item content factors and randomly removed items 5 and 9. This revised model yielded

acceptable fit [$\chi^2(152) = 592.40, p < 0.001$; CFI = 0.92; TLI = 0.91; RMSEA = 0.07)]

and all items significantly reflected OCB (standardized λs > 0.50, $p < 0.001$).

The CWB measurement model, in which all 22 items reflected a latent CWB

construct, was tested last. Researchers have noted that CWB data may be best fit by a

bimodal model in which all items reflect multiple content and target factors while a

higher-order model explains both content and target factors (Marcus et al., in press).

Rather than adopt this more complex model, a simpler bifactor model was specified in

which all items reflected both the general CWB factor and two latent target factors

(interpersonal and organizational), with all items reflecting the general CWB factor. Item

8 was dropped due to an administrative error. This model evidenced adequate

model-data fit [$\chi^2(119) = 367.15, p < 0.001$; CFI = 0.95; TLI = 0.94; RMSEA = 0.05].

Given that the proposed hypotheses address common variance among the observed acts

of CWB, I was primarily interested in whether or not all items significantly reflected the

broad CWB factor, which they did (standardized λs > 0.26, $p < 0.001$).

Following the evaluation of each of these individual models, a final model was

tested in which the three previous measurement models were nested in the data. This

would test the construct validity of the proposed measurement model. In addition to

achieving acceptable model-data fit, support for the construct validity of the

measurement model would be achieved if the broad constructs (i.e., task, CWB, and

OCB) correlated in a manner that is expected given prior research. More specifically,

task performance should be positively related to OCB and negatively related to CWB

while both CWB and OCB should not be strongly related. This revised model yielded

acceptable fit ($\chi^2(756) = 1789.38$, $p < 0.001$; CFI = 0.92; TLI = 0.92; RMSEA = 0.04)

and the latent construct correlations between task performance and CWB ($\phi = -0.42$, $p <$

.001), task performance and OCB ($\phi = 0.26$, $p < 0.001$), and CWB and OCB ($\phi = 0.02$, p

= ns) were consistent with these expectations. Thus, the construct validity of these

measures was supported by the data. Therefore, these items were summed to create task

performance, OCB, and CWB scales for hypothesis testing purposes.

Scale Development of Unfolding Big Five Assessments

In this section, the analyses of the unfolding FFM Big Five scales are presented.

Appendix F lists the items used for each Big Five factor (which have been organized

according to their 30 hypothesized facets) and the associated item parameter estimates

(e.g., SME judged location, and MML item location and discrimination parameters

derived from GGUM2004). Graphical analysess of the expected and observed scores are

shown in Figures 2, 4, 6, 8, and 10 to allow a more transparent examination of

model-data fit. Acceptable model-data fit is achieved when the observed theta-delta

values (depicted as dots) do not deviate far from the predicted theta-delta values (J. S.

Roberts, 2004b). Also, the test characteristic curves corresponding to each assessment

are shown. A truly unfolding scale would uncover nonlinear response functions that are

graphically depicted by a nonlinear test characteristic curve. Thus, if the test

characteristic curve (TCC), which depicts the relationship between trait and true scores,

is bell shaped with an inflexion point occurring near the mean, then the scale reflects an

ideal-point response process (Carter et al., 2014). The TCCs for each Big Five scale will also be depicted. Lastly, in order to show that the assessments reliably estimate different trait levels, the Test Information Curves (TICs) should be relatively flat across the trait continuum.

Extraversion

Graphical analysis comparing the observed scores to those that would be expected by the estimated model supported the acceptable model-data fit of the Extraversion scale (see Figure 2). In regard to the unfolding aspect of the scale, the Extraversion TCC revealed that the scale captured unfolding. Even though the inflection point of the curve occured at approximately one standard deviation above the mean, the curve suggested that this scale captured an unfolding item response process. To illustrate the notion that this scale contains items that capture unfolding, example unfolding items have been provided (see Figure 3). These items are displayed from the midrange of the unfolding Extraversion scale because this is the domain where we would expect unfolding to occur (D. K. Dalal et al., 2013). In regard to measurement reliability, the Extraversion TIC shows that the scale reliably captured trait scores across the Extraversion continuum but was more reliable at capturing trait levels between -2 and +1 standard deviations. Nevertheless, at most levels of Extraversion, the unfolding Extraversion scale is similarly reliable.
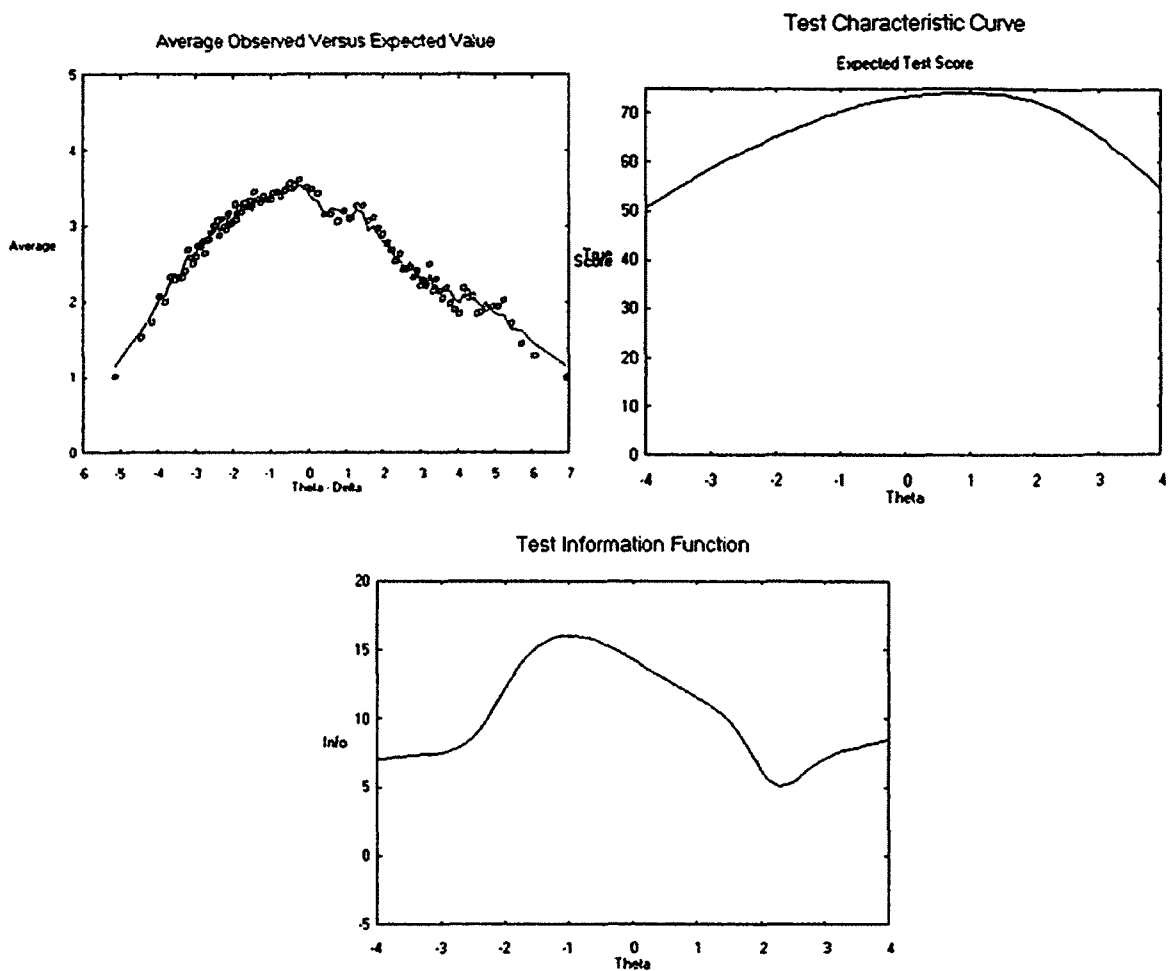
Figure 2. *Model-Data Fit, Test Characteristic Curve, and Test Information Curve for the Unfolding Extraversion Scale*

Item Characteristic Curve

Item#. 25. delta= 0.558. alpha= 0.310. tau= 0.000. -4.049. -2.171. -3.252. 0.842. 4.582

I don't mind loud parties, but I don't like them either.

E(Z)

-4 -3 -2 -1 0 1 2 3 4
Theta

Item Characteristic Curve

Item#: 33. delta= 0.403. alpha= 0.345. tau= 0.000. -3.572. -2.231. -4.048. -0.435. 4.563

From time to time, I enjoy taking on projects, but some other times I prefer others to take the lead.

E(Z)

-4 -3 -2 -1 0 1 2 3 4
Theta

Item Characteristic Curve

Item#. 29. delta= 1.010. alpha= 0.510. tau= 0.000. -4.743. -3.421. -2.972. -0.266. 2.443

Half of the time I prefer leisurely activities and half of the time I prefer activities to be fast-paced.

E(Z)

-4 -3 -2 -1 0 1 2 3 4
Theta

Figure 3. *Example Unfolding Items from the Midrange of the Unfolding Extraversion Scale*

In summary, the unfolding Extraversion model demonstrated acceptable model-data fit, captured the ideal-point response process, and the scale was reliable across the Extraversion continuum. To score the scale, Thurstone scaling techniques were utilized, which involved weighting each response by the IRT item location, which provide comparable to EAP theta estimates (Huang & Mead, 2014). This process allowed the unfolding scale to be evaluated using Cronbach's alpha, which was acceptable ($\alpha = 0.86$). In regard to the convergent-discriminant validity of the measure,

scores on this scale correlated most strongly with the BF-10 Extraversion scale ($r = 0.68$, $p < .001$) and to a lesser extent with the other Big Five personality measures ($r = 0.26$ to 0.47, all $ps < .001$), further supporting the convergent and discriminant validity of the unfolding Extraversion scale (see Table 2). In summary, the unfolding Extraversion scale appeared to reliably capture individual differences in Extraversion.

Conscientiousness

Graphical analysis comparing the observed scores to those that would be expected by the estimated model supported the acceptable model-data fit of the unfolding Conscientiousness scale (see Figure 4). In regard to the unfolding aspect of the scale, the Conscientiousness TCC demonstrated that the model might have insufficiently captured unfolding. Specifically, the TCC was rather flat. While the TCC for the unfolding Conscientiousness scale suggested that the scale poorly captured unfolding, it did contain some items (albeit, not many) that appeared to trigger an unfolding response process. See Figure 5 for example items from the midrange of the unfolding Conscientiousness scale. In regard to measurement reliability, the Conscientiousness TIC suggested that the scale reliably captured trait scores across the Conscientiousness continuum, but was particularly effective at discriminating among individuals in the lower end of the distribution (-3 to -1 SD below the mean).

Average Observed Versus Expected Value

Test Characteristic Curve

Expected Test Score

Test Information Function
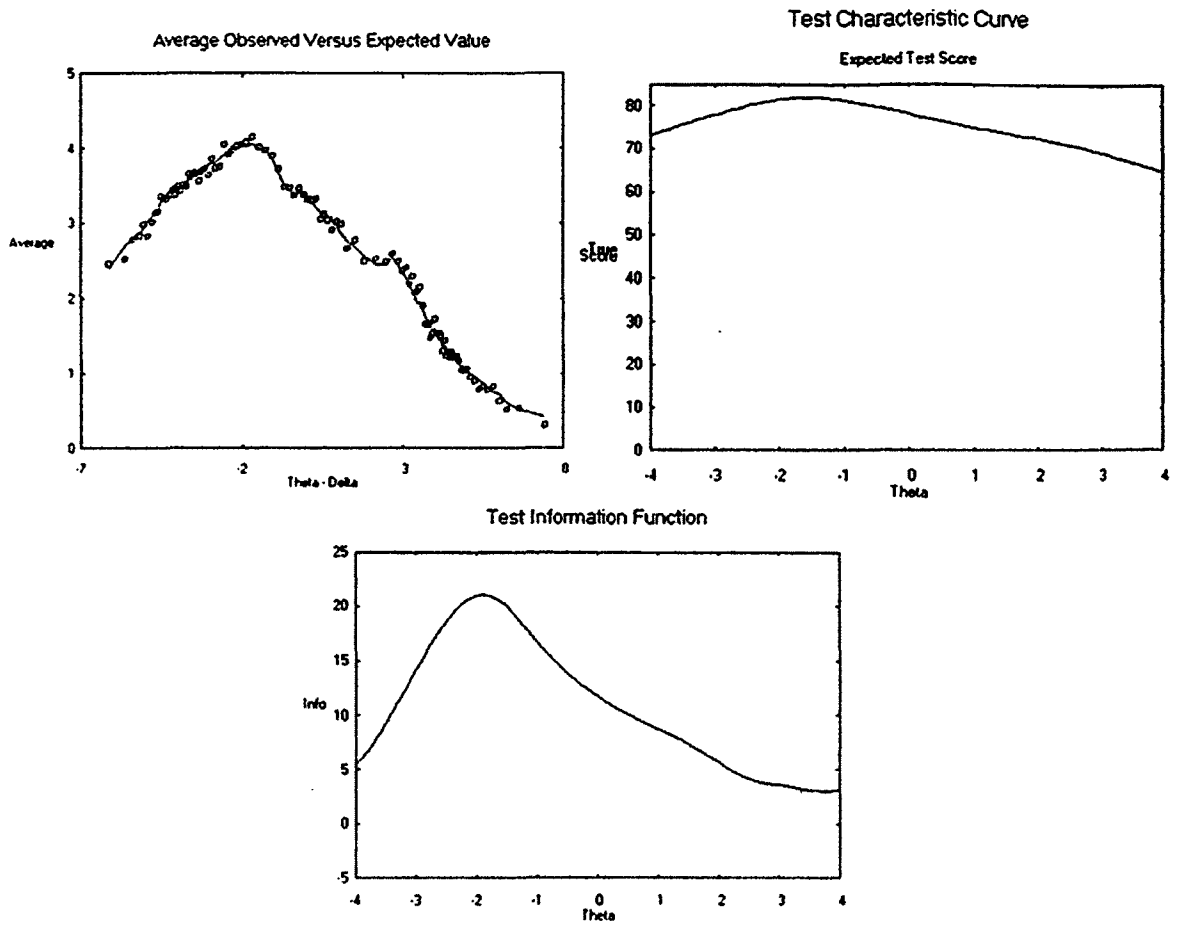
Figure 4. *Model-Data Fit, Test Characteristic Curve, and Test Information Curve for the Unfolding Conscientiousness Scale*

Item Characteristic Curve

Item: 30, delta=-0.455, alpha= 0.240, tau= 0.000, -5.584, -2.130, -4.407, 0.599, 6.755

I sometimes make decisions based on instinct rather than facts; and sometimes I prefer facts.

Item Characteristic Curve

Item: 32, delta=-0.852, alpha= 0.261, tau= 0.000, -4.494, -2.728, -2.527, 1.707, 5.002

While I enjoy order and regularity, I also enjoy when things are a bit chaotic.

Item Characteristic Curve

Item: 34, delta=-0.529, alpha= 0.296, tau= 0.000, -5.009, -2.301, -3.661, -0.212, 3.192

I aim to tell the truth as often as possible, but I can think of numerous situations that have required me to bend the truth.

Figure 5. *Example Unfolding Items from the Midrange of the Unfolding Conscientiousness Scale*

In summary, the unfolding Conscientiousness model seemed to adequately fit the data, captured an ideal-point response process where it matters most (i.e., at the midpoint of the scale), and was similarly reliable across the Conscientiousness continuum. The same scoring technique that was applied to the Extraversion scale was used here and for all subsequent unfolding scales (i.e., item responses were weighted by the respective item location, or delta, estimate). This process also allowed the unfolding scale to be evaluated using Cronbach's alpha, which was acceptable ($\alpha = 0.88$). In regard to the

convergent-discriminant validity of the measure, scores on this scale correlated most strongly with the BF-10 Conscientiousness scale ($r = 0.60$, $p < .001$) and to a lesser extent with the other Big Five personality measures ($r = 0.09$ to 0.29, all $ps < .05$), further supporting the convergent and discriminant validity of the unfolding Conscientiousness scale (see Table 2). In summary, the unfolding Conscientiousness scale appeared to reliably capture individual differences in Conscientiousness.

Agreeableness

Graphical analysis comparing the observed scores to those that would be expected by the estimated model supported the acceptable model-data fit of the unfolding Agreeableness model (see Figure 6). In regard to the unfolding aspect of the scale, the Agreeableness TCC suggested that the scale captured unfolding. Even though the inflection point of the curve occurred at approximately one standard deviation above the mean, this observation suggested that this scale captured an unfolding item response process. To further support the notion that this scale contained items that capture unfolding, example unfolding items are provided by Figure 7. In regard to measurement reliability, the Agreeableness TIC (see Figure 6) showed that the scale reliably captured trait scores across the Agreeableness continuum but was particularly reliable at discriminating among individuals outside 1 standard deviation from the mean. Thus, at most levels of Agreeableness, the unfolding Agreeableness scale was similarly reliable.
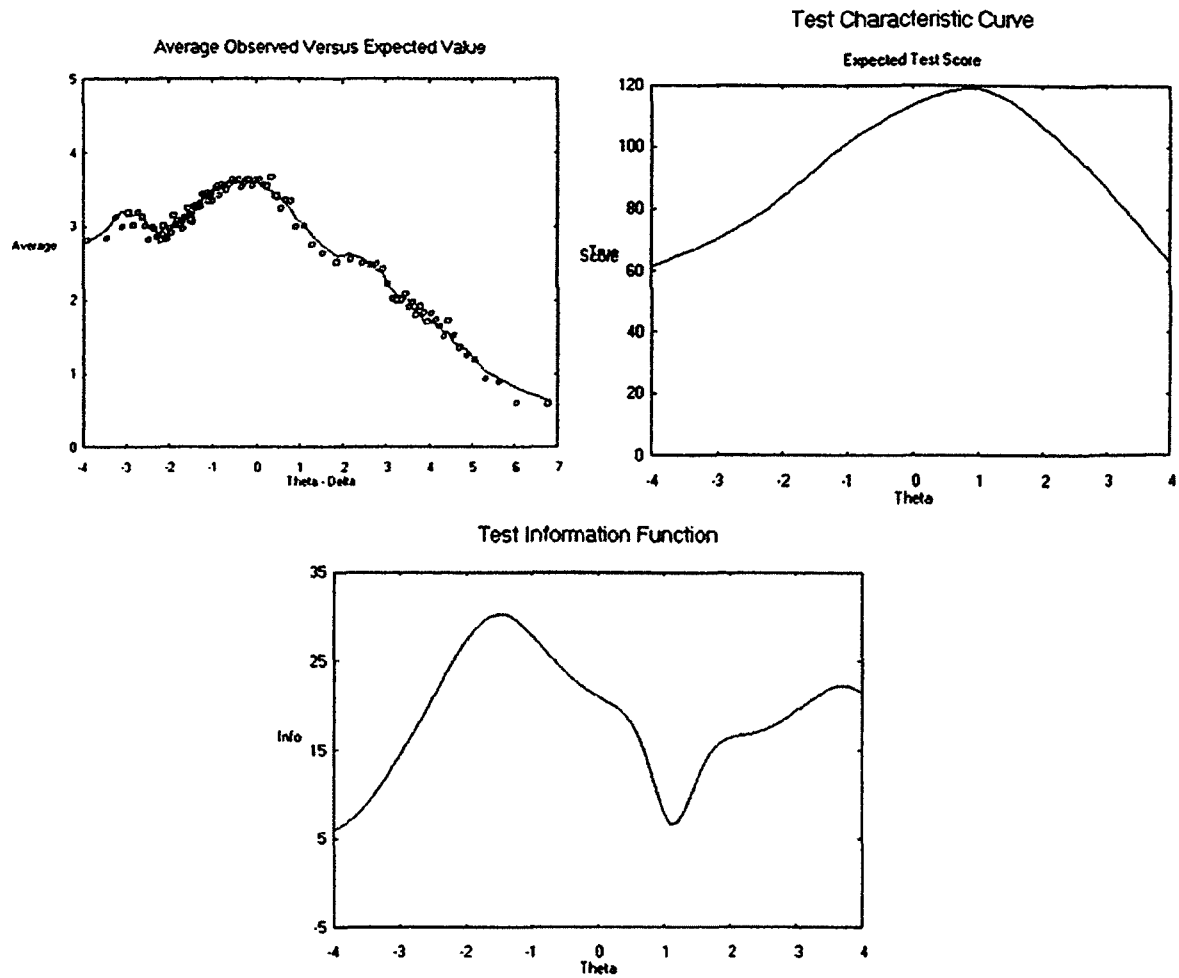
Figure 6. *Model-Data Fit, Test Characteristic Curve, and Test Information Curve for the Unfolding Agreeableness Scale*
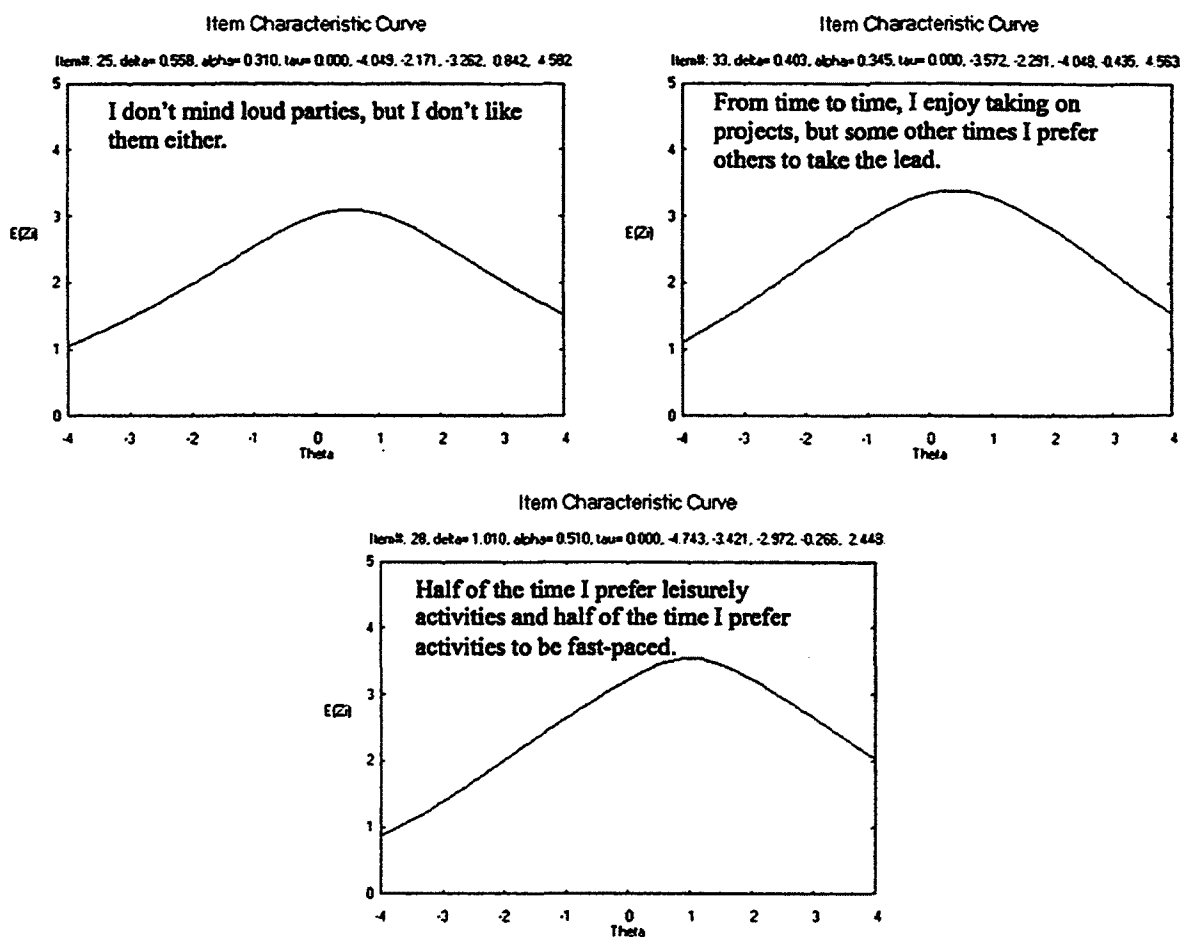
Item Characteristic Curve

Item#: 30, delta= 0.925, alpha= 0.413, tau= 0.000, -3.440, -3.065, -3.905, -1.119, 3.229

I shy away from credit sometimes, but other times it is nice to be recognized.

Item Characteristic Curve

Item# 31, delta=-0.109, alpha= 0.308, tau= 0.000, -4.286, -1.680, -2.333, 0.665, 3.765

Sometimes the work I do is really excellent, other times it is mediocre.

Item Characteristic Curve

Item#: 35, delta= 1.042, alpha= 1.363, tau= 0.000, -3.460, -2.718, -2.231, -1.477, 0.160

I frequently think about how others are doing.

Figure 7. *Example Unfolding Items from the Midrange of the Unfolding Agreeableness Scale*

In summary, the unfolding Agreeableness scale showed acceptable model-data fit, appeared to have captured the ideal-point response process where it matters (i.e., at the midpoint of the scale), and was reliable across the Agreeableness continuum (α = 0.87). In regard to the convergent-discriminant validity of the measure, scores on this scale correlated most strongly with the BF-10 Agreeableness scale (r = 0.53, p < .001) and to a lesser extent with the other Big Five personality measures (r = 0.07 to 0.26, all ps < .05), further supporting the convergent and discriminant validity of the unfolding

Agreeableness scale (see Table 2). In summary, the unfolding Agreeableness scale appeared to reliably capture individual differences in Agreeableness.

Openness to Experience

Graphical analysis comparing the observed scores to those that would be expected by the estimated model supported the acceptable model-data fit of the unfolding Openness to Experience model (see Figure 8). In regard to the unfolding aspect of the scale, the Openness to Experience TCC showed that the scale only marginally captured unfolding. The inflection point of the curve occurs approximately +2.5 SDs above the mean of the scale. Nevertheless, some unfolding items emerged and examples are provided in Figure 9. Lastly, in regard to measurement reliability, the Openness to Experience TIC showed that the scale reliably captured trait scores across the Openness to Experience continuum, but was particularly reliable at discriminating among individuals with low levels (-3 to -1 SDs from the mean). Thus, at most levels of Openness to Experience, the unfolding Openness to Experience scale was similarly reliable.
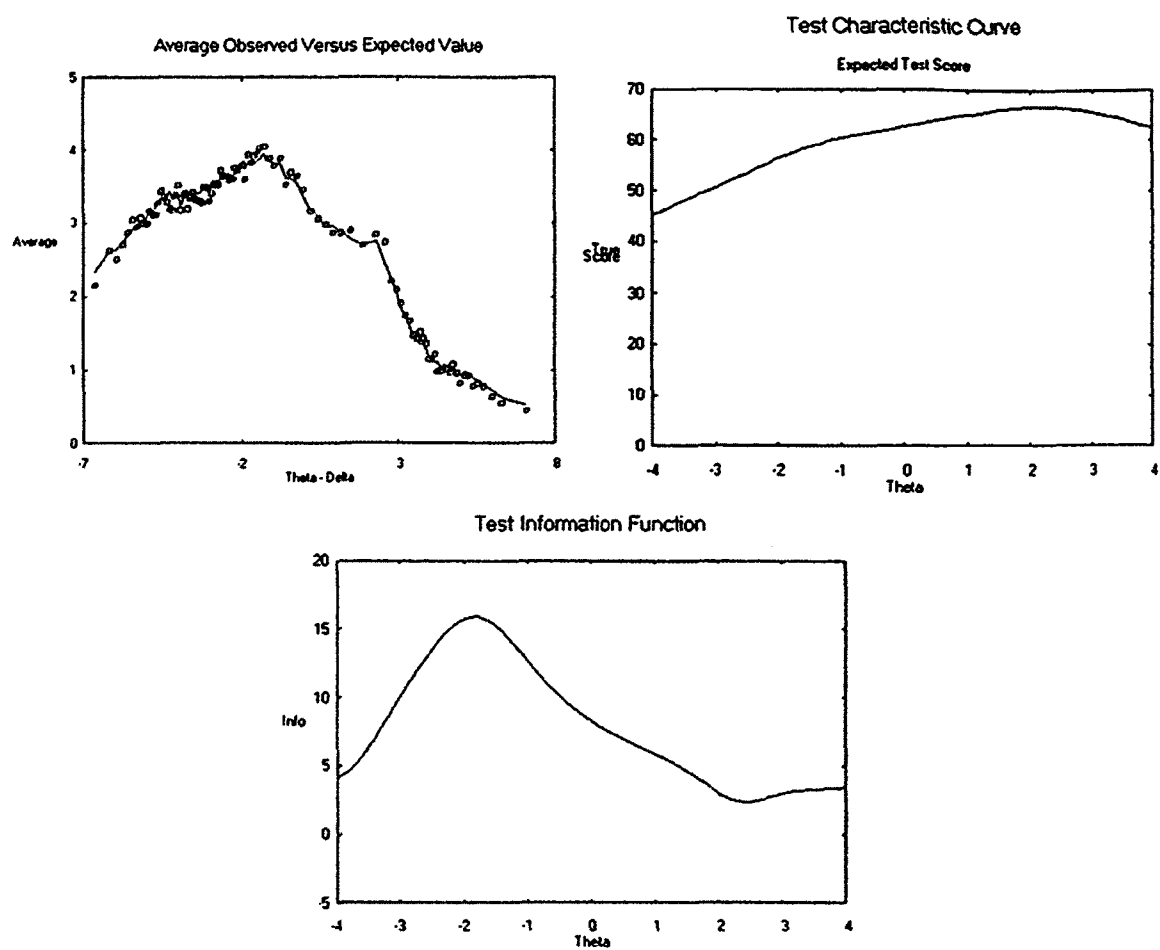
Figure 8. *Model-Data Fit, Test Characteristic Curve, and Test Information Curve for the Unfolding Openness to Experience Scale*

Item Characteristic Curve

Item#: 27, delta= 1.503, alpha= 0.491, tau= 0.000, -6.754, -4.939, -4.636, -2.169, 1.562

I like change, but I also need stability.

E(2)

Theta

Item Characteristic Curve

Item#: 30, delta=-0.826, alpha= 0.165, tau= 0.000, -5.989, -1.897, -2.881, 1.911, 10.216

Sometimes I have difficulty imagining things, but other times I can build mental images.

Theta

Item Characteristic Curve

Item#: 36, delta= 1.047, alpha= 0.284, tau= 0.000, -4.138, -3.149, -5.185, 0.079, 2.560

The line between right and wrong can often be unclear at times.

E(2)

Theta

Figure 9. *Example Unfolding Items from the Midrange of the Unfolding Openness to Experience Scale*

In summary, the unfolding Openness to Experience scale showed acceptable model-data fit, appeared to have captured the ideal-point response process where it matters (i.e., at the midpoint of the scale), and was reliable across the Openness continuum ($\alpha = 0.83$). In regard to the convergent-discriminant validity of the measure, scores on this scale correlated most strongly with the BF-10 Openness scale ($r = 0.45$, $p < .001$) and to a lesser extent with the other Big Five personality measures ($r = 0.20$ to 0.27, all $ps < .05$). While the pattern and strength of correlations support the convergent

and discriminant validity of the unfolding Openness scale, the correlation between openness scales suggests that these scales may capture moderately related phenomena (see Table 2). In summary, the unfolding Openness to Experience scale appeared to reliably capture individual differences in Openness.

Neuroticism

Graphical analysis comparing the observed scores to those that would be expected by the estimated model supported the acceptable model-data fit of the unfolding Neuroticism model (see Figure 10). In regard to the unfolding aspect of the scale, the Neuroticism TCC showed that the scale captured unfolding. The inflection point of the curve occurs approximately at 1.5 standard deviations above the mean. Even though the inflection point of the curve occured at approximately one standard deviation above the mean, this suggested that unfolding occurred for a few items. To illustrate this, example unfolding items are provided in Figure 11. In regard to measurement reliability, the Neuroticism TIC revealed that the scale reliably captured trait scores across the Neuroticism continuum, though it was particularly reliable at discriminating among individuals between -1 and +2 standard deviations from the mean. Thus, at most levels of Neuroticism, the unfolding Neuroticism scale was similarly reliable.

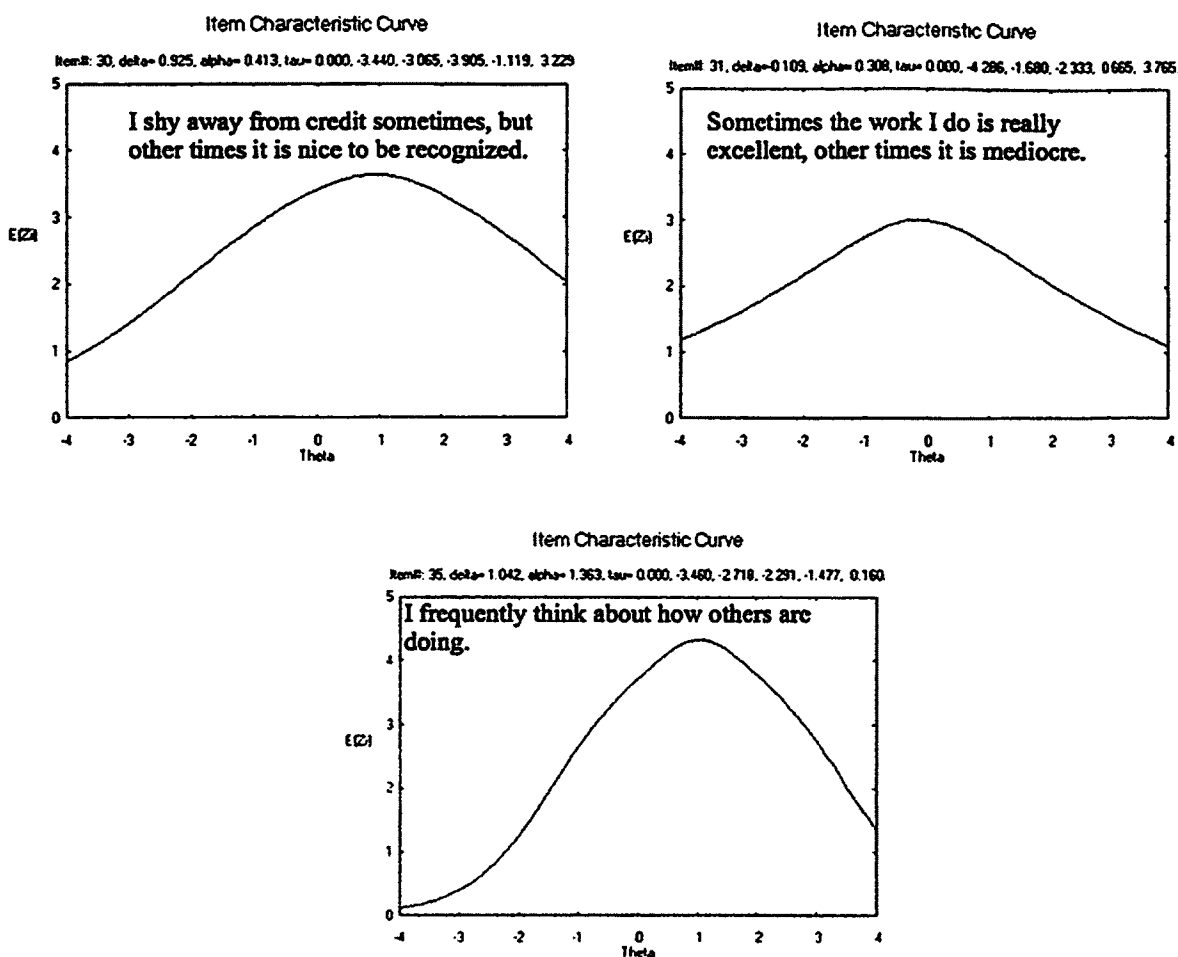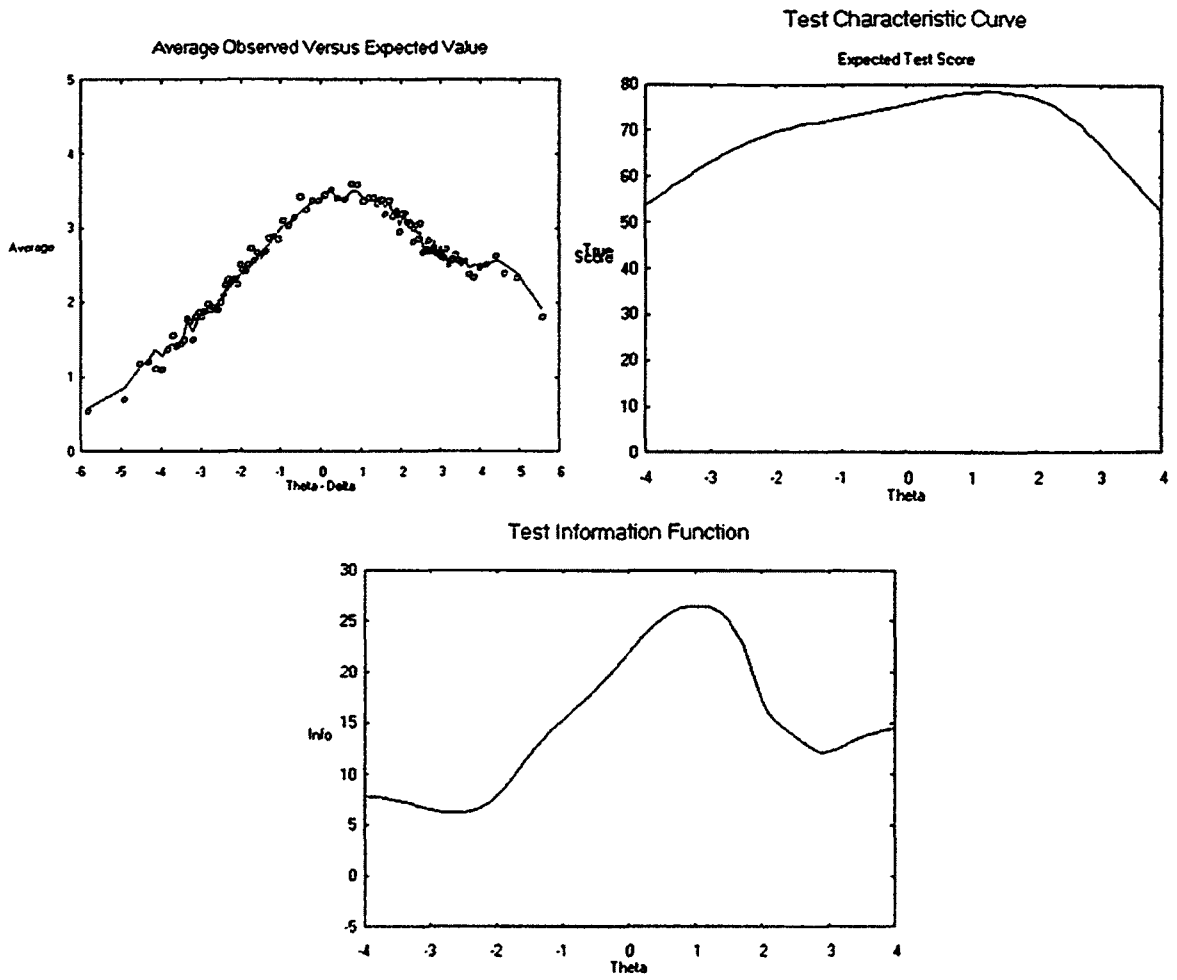Figure 10. *Model-Data Fit, Test Characteristic Curve, and Test Information Curve for the Unfolding Neuroticism Scale*

Item Characteristic Curve

Item#: 26. delta= 0.139. alpha= 0.364. tau= 0.000, -2.179, -1.214, -3.271, 0.921, 4.639.

5

4

E(Z) 3

2

1

0

Occasionally I panic, but I usually do not.

-4   -3   -2   -1   0   1   2   3   4
Theta

Item Characteristic Curve

Item# 27. delta=-0.676, alpha= 0.474, tau= 0.000, -2.799, -2.783, -2.602, -0.262, 2.308

5

4

3

2

1

0

On occasion I feel blue, but most of the time I don't feel blue.

-4   -3   -2   -1   0   1   2   3   4
Theta

Item Characteristic Curve

Item#. 30. delta= 1.024. alpha= 0.473. tau= 0.000, -3.431, -2.169, -1.378, 1.309, 4.358

5

4

E(Z) 3

2

1

0

Half of the time I give in to my urges and half of the time I control myself.

-4   -3   -2   -1   0   1   2   3   4
Theta

Figure 11. *Example Unfolding Items from the Midrange of the Unfolding Neuroticism Scale*

In summary, the unfolding Neuroticism scale showed acceptable model-data fit, appeared to have captured the ideal-point response process where it matters (i.e., at the midpoint of the scale), and was reliable across the Neuroticism continuum ($\alpha = 0.91$). In regard to the convergent-discriminant validity of the measure, scores on this scale correlated most strongly with the BF-10 Emotional Stability scale ($r = -0.75, p < .001$) and to a lesser extent with the other Big Five personality measures ($r = -0.09$ to -0.47, all $ps < .05$), further supporting the convergent and discriminant validity of the unfolding

Neuroticism scale (see Table 2). In summary, the unfolding Neuroticism scale appeared

to reliably capture individual differences in Neuroticism.

Hypothesis Testing

Table 3 shows the results for all 15-regression analyses at each step by each Big

Five factor. Significant effects in Step 1 potentially support the linear model while those

in Step 2 potentially support the proposed alternative non-linear model. Figures 12 - 15

depict the detected quadratic regression effects. Each hypothesis will now be discussed.

Table 3

Regression Results for Each Outcome Variable by Big Five Factor

		Big Five Effect Estimates								
		Extraversion		Conscientiousness		Agreeableness		Openness to Experience		Neuroticism	
Outcome	Predictor Model	β	$R^2(\Delta R^2)$	β	$R^2(\Delta R^2)$	β	$R^2(\Delta R^2)$	β	$R^2(\Delta R^2)$	β	$R^2(\Delta R^2)$
Task Performance	Step 1										
	Intercept	6.101***	.012**	6.100***	.140***	6.099***	.086***	6.189***	.093***	6.101***	.014**
	Linear	.109**		.374***		.293***		.30***		-.118**	
	Step 2										
	Intercept	6.025***	.023** (.011**)ᵃ.02	6.211***	.157*** (.017***)ᵃ.154	6.113***	.086*** (.000)	6.189***	.105*** (.012**)ᵃ.102	6.022***	.023*** (.009**)ᵃ.02
	Linear	.120**		.358***		.290***		.270***		-.127***	
	Quadratic	.105**		-.131***		-.018		-.12**		.092*	
OCB	Step 1										
	Intercept	4.382***	.077***	4.382***	.028***	4.382***	.035***	4.382***	.077***	4.382***	.011**
	Linear	.278***		.167***		.188***		.278***		-.103**	
	Step 2										
	Intercept	4.394***	.077*** (.000)	4.359***	.029*** (.001)	4.392***	.036*** (.001)	4.389***	.077*** (.000)	4.350***	.012* (.000)
	Linear	.276***		.170***		.186***		.276***		-.107**	
	Quadratic	-.015		.027		-.013		-.009		.039	
CWB	Step 1										
	Intercept	1.831***	.030***	1.831***	.177***	1.831***	.121***	1.831***	.033***	1.831***	.107***
	Linear	-.172***		-.421***		-.348***		-.182***		.328***	
	Step 2										
	Intercept	1.828***	.030*** (.000)	1.728***	.203*** (.026***)ᵃ.154	1.799***	.125*** (.003)	1.775***	.042*** (.009**)ᵃ.04	1.826***	.108*** (.000)
	Linear	-.172***		-.402***		-.340***		-.154***		.329***	
	Quadratic	.005		.161***		.057		.100**		-.010	

Note. N = 701. ªRefers to adjusted R^2 values. Boldface values indicate instances where the quadratic regression was significant.
* $p < .05$., ** $p < .01$., *** $p < .001$.

Hypothesis 1: Extraversion and Job Performance

Under the general linear model, Extraversion was expected to positively relate only to OCB. This linear effect was supported (β = .28, p < .001); thus, Hypothesis 1b was supported. However, effects of Extraversion on task performance (β = .11, p < .01) and CWB (β = -.17, p < .001), were also detected; thus, (null) Hypotheses 1a and 1c were rejected.

Under the alternative nonlinear model, Extraversion is expected to be nonlinearly linked to both task performance and OCB in similar ways, such that the relationship is initially positive but becomes weaker as Extraversion increases; the relationship becomes negative when Extraversion increases further (i.e., inverted-U). Additionally, Extraversion is nonlinearly linked to CWB, such that the relationship is initially negative but becomes positive as Extraversion increases but the relationship becomes negative when Extraversion increases further (i.e., U-shaped). None of these hypotheses were supported. However, contrary to the predictions regarding Extraversion and task performance, extreme levels of Extraversion were increasingly predictive of higher levels of task performance behaviors (β = .11, p < .01). The shape of this interaction is depicted in Figure 12. Specifically, individuals with moderate levels of Extraversion evidenced lower levels of task performance compared to individuals scoring high or low on the unfolding Extraversion scale. Thus, Hypothesis 1d was not supported as specified. Also, Hypotheses 1e and 1f were not supported.
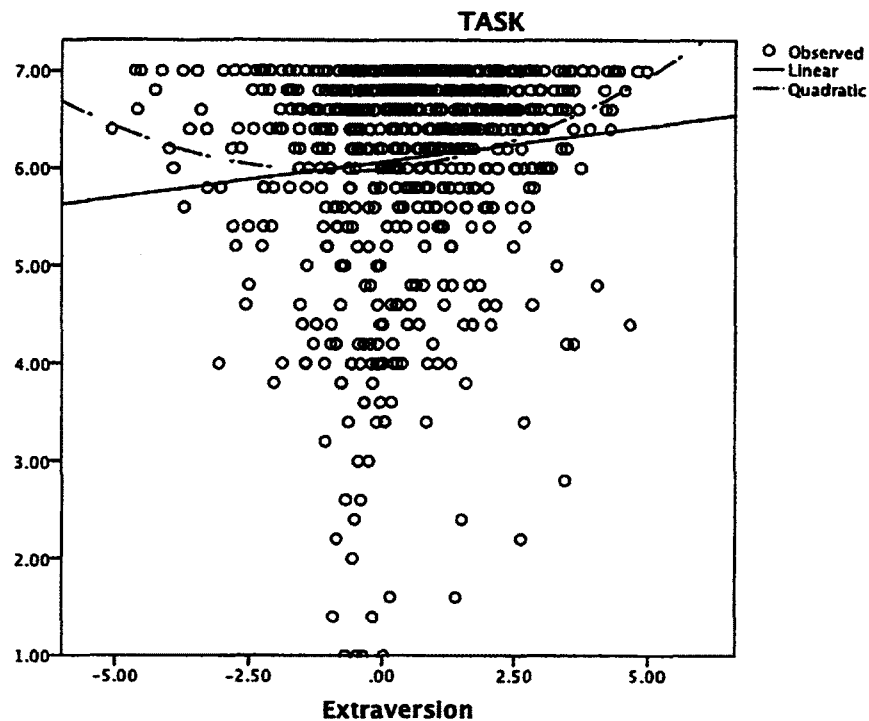
Figure 12. *The Detected Nonlinear Relationship Between Extraversion and Task Performance Behavior*

Hypothesis 2: Conscientiousness and Job Performance

Under the general linear model, Conscientiousness was expected to (a) positively relate to task performance behaviors, (b) positively relate to OCB, and (c) negatively relate to CWB. Each of these effects was supported. Specifically, Conscientiousness was linked positively to task performance behaviors ($\beta = .37, p < .001$), to OCB ($\beta = .17, p < .001$), and negatively to CWB ($\beta = -.42, p < .001$). Thus, Hypotheses 2a, 2b, and 2c were supported.

Under the alternative nonlinear model, Conscientiousness is expected to be nonlinearly linked to both task performance and OCB in similar ways, such that the relationship is initially positive but becomes weaker as Conscientiousness increases; the relationship becomes negative when Conscientiousness increases further

(i.e., inverted-U). Additionally, Conscientiousness is nonlinearly related to CWB, such that the relationship is initially negative but becomes positive as Conscientiousness increases but the relationship becomes negative when Conscientiousness increases further (i.e., U-shaped). Only the nonlinear effects linking Conscientiousness to task performance (β = -.13, p < .001) and CWB (β = .16, p < .001) were supported. Specifically, as Conscientiousness approaches extreme levels, such individuals engage in fewer task performance behaviors and more CWB (see Figure 13). Thus, Hypotheses 2d and 2f were supported. However, Hypothesis 2e was not supported.
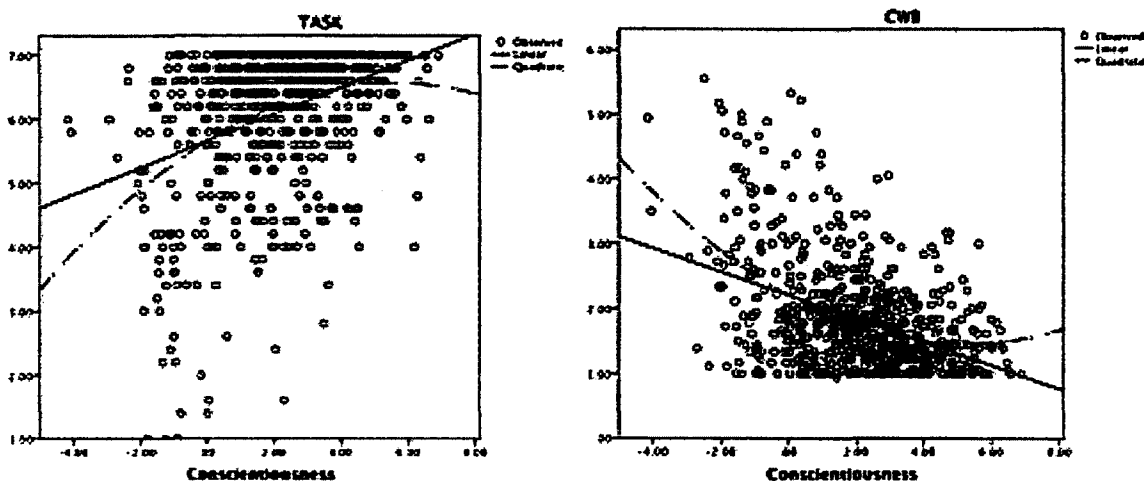
Figure 13. *The Detected Nonlinear Relationships Between Conscientiousness and Both Task Performance Behavior and Counterproductive Work Behavior*

Hypothesis 3: Agreeableness and Job Performance

Under the general linear model, Agreeableness was expected to (a) positively relate to task performance behaviors, (b) positively relate to OCB, and (c) negatively relate to CWB. Each of these effects was supported. Specifically, Agreeableness was linked positively to task performance behaviors (β = .29, p < .001), positively to OCB

(β = .19, p < .001), and negatively to CWB (β = .35, p < .001). Thus, Hypotheses 3a, 3b, and 3c were supported.

Under the alternative nonlinear model, Agreeableness was expected to nonlinearly link to task performance, such that the relationship is initially positive but becomes weaker as Agreeableness increases; the relationship becomes negative when Agreeableness increases further (i.e., inverted-U). Agreeableness and CWB is nonlinearly related to CWB, such that the relationship is initially negative but becomes weaker as Agreeableness increases but the relationship becomes positive when Agreeableness increases further (i.e., U-shaped). None of these effects were supported; thus, Hypotheses 3d, 3e, and 3f were not supported.

Hypothesis 4: Openness to Experience and Job Performance

Under the general linear model, Openness to Experiences was expected to be unrelated to all job performance behaviors. Our results fell contrary to each of these predictions; I found that Openness was (a) positively related to task performance behaviors (β = .30, p < .001), (b) positively related to OCB (β = .28, p < .001), and (c) negatively related to CWB (β = -.18, p < .001). Thus, (null) Hypotheses 4a, 4b, and 4c were rejected.

Under the alternative nonlinear model, Openness to Experience is expected to be nonlinearly linked to task performance such that the relationship is initially positive but becomes weaker as Openness to Experience increases; the relationship becomes negative when Openness to Experience increases further (i.e., inverted-U). However, the link between Openness and OCB, while also nonlinear, is such that the relationship is initially negative but becomes weaker as Openness to Experience increases. It then

becomes positive when Openness increases further (i.e., U-shaped). Lastly, Openness to

Experience is nonlinearly linked to CWB such that there is no relationship when

Openness to Experience is low or moderate. However, the relationship becomes positive

when Openness becomes high or is extremely high. Two nonlinear effects were detected.

First, the data suggested that as Openness increases so does task performance ($\beta = .27$,

$p < .001$). However, the relationship became negative as Openness increased further

($\beta = -.12$, $p < .01$), which is consistent with the alternative model. Second, the data

suggested that as Openness increases, CWB decreases ($\beta = -.15$, $p < .01$). However, the

relationship becomes positive as Openness increases further ($\beta = .10$, $p < .01$). Thus,

Hypotheses 4d and 4f were supported while Hypothesis 4e was not supported. Figure 14

depicts these two nonlinear effects.
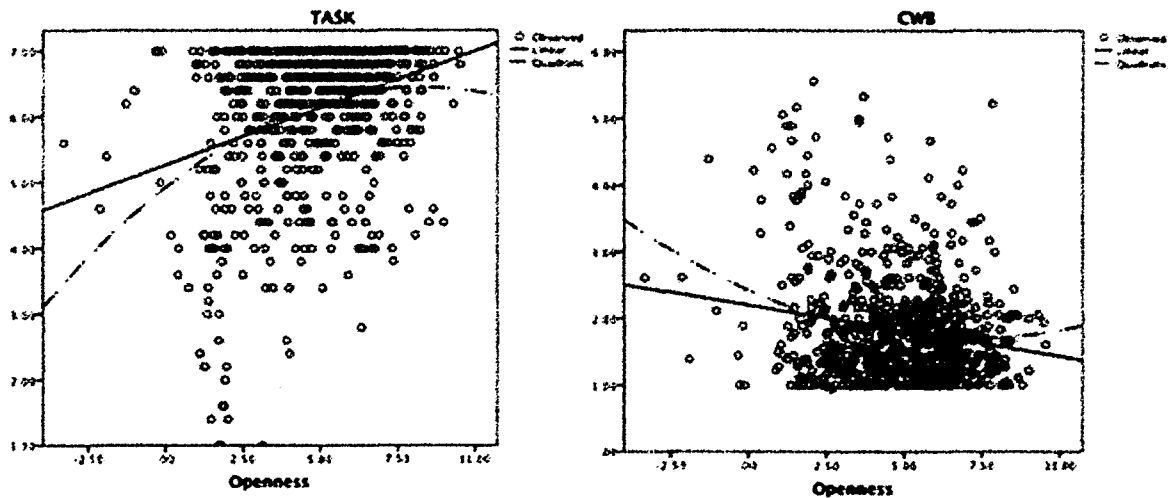
Figure 14. *The Detected Nonlinear Relationships between Openness to Experience and both Task Performance Behavior and Counterproductive Work Behavior*

Hypothesis 5: Neuroticism and Job Performance

Under the general linear model, Neuroticism was expected to (a) negatively

relate to task performance behaviors, (b) negatively relate to OCB, and (c) positively

relate to CWB. Consistent with these expectations, I found a negative relationship linking Neuroticism to task performance behaviors ($\beta = -.12$, $p < .01$). Thus, Hypothesis 5a was supported. I also found a negative link with OCB ($\beta = -.10$, $p < .01$), supporting Hypothesis 5b. Further consistent with expectations, a positive relationship was found linking Neuroticism to CWB, ($\beta = .33$, $p < .001$). Thus, Hypothesis 5c was supported.

Under the alternative nonlinear model, Neuroticism is nonlinearly linked to both task performance and OCB in similar ways, such that the relationship is initially positive but becomes weaker as Neuroticism increases; the relationship becomes negative when Neuroticism increases further (i.e., inverted-U). Additionally, Neuroticism is nonlinearly related to CWB, such that the relationship is initially negative but becomes positive as Neuroticism increases; the relationship becomes negative when Neuroticism increases further (i.e., U-shaped). Contrary to these expectations, only one nonlinear effect was observed linking Neuroticism to task performance and this effect was contrary to the direction predicted based on prior research ($\beta = .10$, $p = .01$) (see Figure 15). Thus, Hypothesis 5d was not supported as specified. Also, Hypotheses 5e and 5f were not supported.
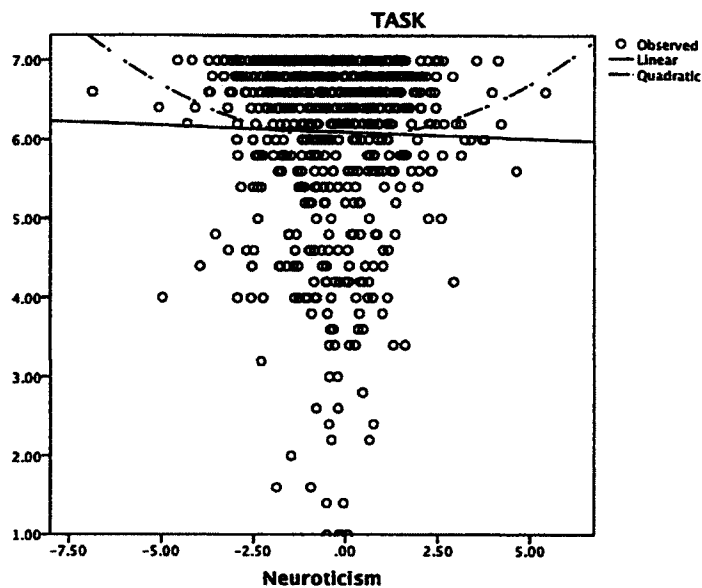
TASK

Figure 15. *The Detected Nonlinear Relationship Between Neuroticism on Task Performance Behaviors*

Specifically, I expected that moderately neurotic individuals would evidence the highest level of task performance behavior. Plotting this relationship revealed that moderately neurotic individuals actually reported engaging in the lowest level of task performance behaviors.

CHAPTER FOUR

DISCUSSION

The functional form of the relationship between personality traits and job performance is both a theoretically and practically important issue. Theoretically, understanding the functional form of the relationship between personality traits and job performance allow for more nuanced theory development by specifying boundary conditions for proposed effects (e.g., traditionally desirable traits may have diminishing returns on utility, or rather trait levels come may have both virtues and vices). Practically, the existence of these effects call into question the use of top-down selection models with regard to personality traits and suggest that more sophisticated selection methods are needed (e.g., dual cut-score methods are needed). Prior to this investigation, nonlinear relationships between the Big Five and job performance behaviors were only tested for Conscientiousness (Carter et al., 2013; Le et al., 2011) and Neuroticism (Le et al., 2011). By systematically investigating the functional form of relationships between each of the Big Five personality traits and job performance behaviors, this study broadens this literature and provides many future directions for research.

The results of this study support the notion that nonlinear relationships between specific Big Five traits and specific job performance behaviors exist. Supporting the notion of diminishing returns (Pierce & Aguinis, 2013), nonlinear relationships with job performance behaviors were found for Conscientiousness and Openness to Experience;

in short, too much Conscientiousness and Openness to Experience lead to less task performance and higher CWB. While the nonlinear effects linking Conscientiousness to both task performance and CWB are consistent with prior literature (Carter et al., 2013), the nonlinear effect linking Openness to Experience and the same criteria are novel. In short, these findings suggest that there are generally adaptive levels of both Conscientiousness and Openness to Experience. Beyond certain extreme points, these traits are likely to be associated with (at best) limited gains in task performance and (at worst) maladaptive workplace behavior. Thus, organizational decision makers may consider investigating these nonlinearities in their settings as selection decisions based on top-down scoring may not generate the expected utilities.

Still other nonlinear effects were observed and opposite of what was predicted. For instance, it was hypothesized that Extraversion would be nonlinearly related to task performance, OCB, and CWB. Prior research suggests that Ambiversion (or moderate levels of Extraversion) can be beneficial in sales positions (Grant, 2013). Grant (2013) argued that Ambiverts are more likely to listen to customers' interests and also less likely to succumb to overconfidence or excitement. However, the pattern of the relationship depicted in Figure 12 suggests that across a variety of jobs, moderate levels of Extraversion result in lower levels of task performance compared to both higher and lower levels of Extraversion. Additionally, contrary to prior research detecting a curvilinear relationship between Neuroticism and task performance which suggested that moderate levels of Neuroticism may be adaptive (Le et al., 2010), this investigation found the opposite; namely, that moderate levels of Neuroticism were linked to lower levels of task performance. This disparity may be due to our different sampling

approaches. Whereas Grant (2013) tested samples from a specific organizational setting (i.e., sales position), I sampled more generally (i.e., conveniently sampled across jobs). Thus, across multiple jobs, Ambiversion may detract from task performance while in the context of sales it may facilitate task performance. Future research replicating these findings may shed light on this disparity.

There were also many failed predictions by the alternative nonlinear model. For instance, whereas prior research supports nonlinear relationships between both Conscientiousness and Neuroticism and OCB, there were no nonlinear effects observed in this study. Indeed, there were no observed nonlinear effects between any of the Big Five and OCB. This issue will be addressed in the limitations section. Nonlinear effects linking Extraversion and Agreeableness to CWB also did not emerge. Instead, many linear relationships approximated by prior research were supported; a point to which I now turn.

Consistent with prior research investigating the relationships between Agreeableness as a predictor and task performance, OCB, and CWB as criteria, each of these relationships aligned with expectations grounded in prior data (Berry et al., 2007; Judge et al., 2013). More specifically, Agreeable individuals were more likely to engage in more task performance and OCB but less CWB. Additionally, all Big Five traits correlated positively with OCB, which (if considered as analogous to OCB) are findings that are consistent with more recent prior meta-analytic research (Judge et al., 2013). More specifically, individuals high (low) on each of the Big Five traits (Neuroticism) are more likely to engage in OCB. Furthermore, Neuroticism was correlated in expected directions with CWB (Berry, Carpenter, & Barratt, 2012; Berry et al., 2007), suggesting

that individuals high on Agreeableness and low on Neuroticism are more likely to avoid CWB. Other findings, while consistent with the linear model, are contrary to the proposed hypotheses. While prior research suggests that Extraversion is largely unrelated to job performance (Mount, Barrick, & Strauss, 1994), the data here suggest that a positive relationship can occur, suggesting that higher levels of Extraversion may be generally adaptive for organizations. More recent data support this link (Judge et al., 2013). Other findings that are contrary to predictions emerged with regard to Openness to Experience and OCB with the data here suggesting that individuals higher on Openness are likely to engage in OCB. Again, more recent data support this link (Judge et al., 2013).

Theoretical Implications

Many researchers have called for tests of nonlinearities between personality and job performance factors (Carter et al., 2013; Grant & Schwartz, 2011; Pierce & Aguinis, 2013). By replicating the nonlinear effects of Conscientiousness on both task performance behavior and CWB and also detecting nonlinear relationships between Openness to Experience and the same outcomes, this study adds to this recently emerging literature. By detecting nonlinear relationships between both Extraversion and Neuroticism as predictors of task performance, this study calls attention to the complexity of estimating nonlinear relationships. I will now address the significance on the nonlinear relationships for job performance theory.

There has been much theoretical work explaining the implications of personality traits for job performance (Barrick et al., 2013; R. Hogan & Shelton, 1998; Tett & Burnett, 2003). The existence of nonlinearities linking these phenomena has significant

implications for refining these theories. Socioanalytic theory assumes that personality traits, when *aligned* with the appropriate criteria, can be related to adaptive organizational behavior and outcomes. For instance, the concept of *Prudence*, which is conceptually and empirically analogous to Conscientiousness (J. Hogan & Holland, 2003), is proposed to be linked to honesty, organizational citizenship, and safety, which are generally adaptive forms of organizational behavior. The results of our study and that of both Carter et al. (2013) and Le et al. (2011) collectively suggest that this proposition (and others like it) should come with a caveat - extreme levels of Prudence (for instance) can have adverse consequences for organizations. Thus, the alignment hypothesis proposed by Hogan may need to be modified. Such a modification is provided by trait activation theory (TAT) (Tett & Burnett, 2003), which posits the process of trait activation. Trait activation explains how situational cues that are trait relevant evoke trait relevant behavior (or behavior that indicates an individual's standing on a trait). TAT predicts that all work situations vary in their relevance for specific traits, with work settings furnishing more trait relevant cues possessing higher levels of situation trait relevance. Situations are high in trait relevance if a person's responses (or lack thereof) to a situation indicate their standing on the trait in question. As situations provide an increasing number of trait relevant cues, they become relevant for a higher level of the trait. For the trait of Conscientiousness, work environments defined in terms of requirements for precise and high quality work, responsible behavior, and norm following furnish cues that evoke Conscientious behavior in the workplace (e.g., higher levels of task performance and lower levels of CWB). Empirical research has shown that job complexity moderates the nonlinear relationship between Conscientiousness and job

performance with higher Conscientiousness leading to adaptive organizational outcomes when job complexity was high (Le et al., 2011). Assuming that job complexity has situation trait relevance for Conscientiousness, then the alignment hypothesis may be true for instances where situations provide cues for trait expression but be false where nonlinearities exist. Such research would contribute to the development of an empirically-based theory of virtue ethics.

Practical Implications

While these nonlinear effects are generally small in magnitude, they may still possess practical importance. To demonstrate the practical importance of these small effects, I conducted analyses similar to those conducted by Carter et al. (2013), which involved three steps: First, for both Conscientiousness and Openness to Experience, the linear and quadratic regression formulas were used to calculate a predicted value of the either task performance behavior or CWB. Second, all individuals were rank-ordered based on their predicted values and then the top 10 or 20 individuals were either "selected in" (for task performance behavior) or "selected out" (for CWB). Third, I calculated the mean and standard deviation of actual task performance behavior and CWB scales for those selected. As can be seen in Table 4, the nonlinear model resulted in both higher levels and less variation in task performance behaviors for both Conscientiousness and Openness to Experience.

Table 4

Observed Scores on Criteria for the Top 10 and Top 20 Individuals Selected on a

Specific Predictor Score Under Linear and Quadratic Models

			Number Selected, n			
		Selection	*n* = 10		*n* = 20	
Predictor	Criterion	Model	*M*	*SD*	*M*	*SD*
Extraversion	Task Performance	Linear	6.62	0.81	6.57	0.73
		Quadratic	6.62	0.81	6.57	0.73
Conscientiousness	Task Performance	Linear	6.16	1.08	6.49	0.86
		Quadratic	**6.84**	**0.25**	**6.80**	**0.29**
	CWB[a]	Linear	3.24	1.54	3.14	1.37
		Quadratic	3.24	1.53	3.14	1.37
Openness to Experience	Task Performance	Linear	6.34	1.00	6.34	0.88
		Quadratic	**6.58**	**0.43**	**6.44**	**0.85**
	CWB[a]	Linear	2.26	1.23	2.44	1.32
		Quadratic	2.26	1.23	2.44	1.32
Neuroticism	Task Performance	Linear	**6.18**	**1.06**	**6.45**	**0.82**
		Quadratic	5.94	1.10	6.31	0.90

Note. [a]For counterproductive work behavior, the top 10 and 20 were selected out as opposed to selected in.

These results suggest that even small effects, such as nonlinear effects, can have practical importance (Cortina & Landis, 2006) even in small sample settings by producing cohorts of workers who will achieve higher levels of task performance relative to cohorts produced by simple linear models. This finding corroborates the results of Carter et al. (2013), who also observed practically significant outcomes for small sample selection when modeling nonlinearities between Conscientiousness and job performance. However, the models yielded equivalent results for predicting CWB, which suggests that quadratic models, though providing better fit to the data (in terms of R^2) may not consistently be of practical importance. The same pattern emerged for the nonlinear relationship linking Extraversion to task performance. Interestingly, the linear

relationship linking Neuroticism to task performance produced cohorts evidencing higher task performance than the quadratic model. Thus, it might be argued that quadratic models may not consistently be of practical importance and could even produce counterproductive outcomes (e.g., cohorts of individuals performing at lower levels).

The nonlinear effects on task performance behavior suggest that practitioners in selection should consider pursuing a double cutoff strategy to screen out applicants (Le et al., 2011). Such a system may be beneficial, as it would address the faking problem. Researchers have noted that fakers tend to inflate their observed scores (Morgeson et al., 2007). Using this updated system, individuals who consistently select extreme response options (e.g., *Agree* or *Strongly Agree*) are more likely to be screened out by these procedures. Thus, by attending to these nonlinearities, we can improve the validity of personality assessments as predictors of job performance. Unfortunately, setting the appropriate cutoff is not an easy task (Berry, Sackett, & Johnson, 2009). Currently, concurrent validation studies represent the design of choice for testing the viability of personality assessments. In such studies, respondents are employees currently working for an organization. It remains unclear how such respondents differ from applicants in terms of responding to these assessments. One might infer that applicants would be more inclined to respond in socially desirable manners, which can both distort the factor structure (Ellingson, Smith, & Sackett, 2001) and inflate mean scores (Hough, 1998), which can affect the setting of cutoffs. Such sources make reliably inferring dual cutoffs problematic using concurrent validation, suggesting that predictive validation studies (which are expensive to conduct) may be more appropriate for this goal (Le et al., 2011).

Additionally, and importantly, the moderating role of job characteristics (e.g., job complexity) must be addressed (Le et al., 2011). The ideal point of Conscientiousness or Openness for a job may vary as a function of job complexity with more complex jobs requiring a higher level of these traits. While evidence suggests that job complexity moderates the nonlinear relationship between Conscientiousness and job performance outcomes (Le et al., 2011), research is needed to test the same idea for Openness to Experience. Ultimately, future research into the moderators of personality-job performance relationships are needed to more reliably estimate both linear and nonlinear relationships. This will allow us to identify the dual cutoffs for jobs.

Further complicating this matter is the issue of a broader assessment of personality functioning that partly taps into maladaptive levels of personality functioning. If setting a dual cutoff implies that individuals are screened out the basis of extreme trait scores, and such scores are empirically linked to psychopathology, then such a strategy may have implications for the Americans with Disabilities Act (ADA). Wu and LeBreton (2011) note that the ADA defines a mental impairment as representing something that substantially limits a major life activity, which includes tasks such as walking, learning, thinking, and working. Wu and LeBreton (2011) argued that personality assessments such as the one developed here are unlikely to violate ADA because such assessments were not designed to diagnose psychopathology. Indeed, many individuals may obtain extreme trait scores on the assessments designed here and still live relatively normal lives, including the ability to secure employment (which is evident in our sample). However, should clinicians develop a library of trait levels that reflect maladaptive personality functioning and such trait levels can be estimated reliably

with broadened assessments such as the one devised here, then collaborative work would be needed to establish the boundary conditions for personality assessment in organizational settings. While some may view this as a significant problem with the practical application of the findings from this study (and others like it), I view this as a necessary progression for the larger field of psychology, which has long been described by fragmentation (Sternberg, 2005). Such collaborative work seems likely to benefit both the field and society at large.

Limitations

One general explanation for the disparities in findings observed in this investigation and previous personality-job performance investigations may have to do with the design of the study adopted here; that is, a single-source single-time-point design. Previous investigations have revealed nonlinear relationships between both Conscientiousness and Neuroticism and OCB. Such findings were not replicated in this investigation. This appears to be due to the use of a same-source design, whereas previous authors (e.g., Carter et al., 2013; Le et al., 2011) utilized a distinct-source design. Such a design, though commonly viewed as inferior to distinct-source designs, can allow for more reliable approximations to true score counterparts (Lance & Siminovsky, 2015). However, within the context of a same-source design, quadratic effects might be severely deflated by common method bias (Siemsen, Roth, & Oliveira, 2010). Unfortunately, the exact source of deflation is unclear from this study. Future research is needed to explore this potential limitation of same-source designs.

In regard to the use of same-source designs, others might suggest that common method variance explains our findings. While item presentation was randomized to

minimize the influence of order effects, some might note that other common method effects are at play. However, a previous study utilizing a same-source design and investigating the impact of impression management effects on personality-workplace behavior links have failed to detect method bias due to impression management (Castille & Buckner, 2015). Nevertheless, this remains a possibility that went untested in this investigation. Other effects may also be at play, such as mood effects. However, mood effects have proved insufficient for causing method bias in previous investigations (Williams & Anderson, 1994). Nevertheless, this alternative explanation was not tested in this study. Impression management and mood effects, if they jointly influence both personality and job performance reports, then such effects may upwardly or downwardly bias the linear correlations investigated here (Siemsen et al., 2010). Importantly though, Siemsen et al. found that quadratic effects cannot be explained by method variance, which is important for this study as this was the primary purpose of conducting this investigation. Thus, it seems likely that the nonlinear effects detected in this study are not due to common method variance. However, the failure to detect nonlinearities linking personality to OCB may be a function of method bias (Siemsen et al., 2010).

Another important limitation to the study involved the construction of the unfolding Big Five personality measures. Considering the absence of clear guidance regarding item selection strategies, idiosyncratic item selection may have introduced error into each of these measurement models. One key problem has to do with improvements in assessing measurement model fit when developing personality measurement models, which are models that by their very nature (e.g., proneness to impression management effects and mood effects) tend to violate the assumptions of

unidimensionality and local independence. Currently, absolute indices of fit are provided to facilitate decision-making regarding improvements in a measurement model. However, these statistics almost always indicate model misfit. As noted by Lord (1968), while we should strive to create models that perfectly explain phenomena, such a goal is unlikely to be achieved in many domains (e.g., personality measurement development and validation). Therefore, we should strive to create models that help to provide meaningful answers to important questions. To do this, research is needed on the development of relative fit indices for IRT models such as the GGUM (Zickar & Broadfoot, 2009). Such indices may help researchers make important decisions regarding the development and refinement of their measurement models. Until such indices are developed, replication of the findings of this study by other researchers can serve as one test of the viability of the unfolding Big Five measurement models presented here. Researchers are also encouraged to further refine the measurement models developed here by writing items that are more informative at trait locations where information is lacking. Though the final assessments appear to have captured variations of trait standings across each Big Five latent dimension, trait levels show that reliability can be improved. Additionally, research has shown that estimating item and person parameters can improve substantially when Markov Chain Monte Carlo GGUM is used rather than GGUM2004 (Wang, de la Torre, & Drasgow, 2015).

Another general limitation regarding the conclusions of this study concerns the use of broad rather than narrow trait measures. Focusing generalizations to the broad trait domain may obscure relationships at lower levels of the trait hierarchy (Guenole, 2014), which may include nonlinearities. Indeed, meta-analytic research has shown that

when narrow, rather than broad traits, are used, predictive precision increases. Thus, future research should address the possible virtues and vices of the narrow traits in the FFM.

In regard to replicating the findings produced by this study, future research should also strive to test the hypotheses put forth by the method variance framework. However, researchers should avoid using distinct-source designs, which are commonly used in the personality and job performance investigations. Research suggests that such designs tend to produce findings that may be partly explained as halo effects (Berry et al., 2012; Carpenter, Berry, & Houston, 2014; Viswesvaran, Schmidt, & Ones, 2005). Instead, future research using multi-source longitudinal designs may allow us to more reliably estimate the functional form of personality-job performance relationships while also accounting for other factors, such as halo effects (Kammeyer-Mueller, Steel, & Rubenstein, 2010).

Another important limitation concerns the implications of the virtues and vices heuristic for personality traits. In the introduction, I argued that dark traits generally reflect extreme levels of basic tendencies. However, by only examining both typical and extreme manifestations of basic tendencies, this assumption was only indirectly tested in this dissertation. Therefore, future research can take the measurement models developed in this dissertation and apply these models to the study of both bright and dark personality tendencies such as the Big Five, dark triad and DSM-IV-based models. If the heuristic is correct, then these measurement models should converge to a common structure of basic dimensions and these models should reliably capture variation at an expected level of these basic dimension (e.g., bright = typical; dark = extreme).

Conclusion

This study represents an early systematic search for nonlinear relationships between the Big Five personality traits and job performance behaviors. This study required the creation of ideal point measurement models, which can reliably capture multiple latent trait levels (i.e., moderate, low/high, and extreme). This overcomes a significant limitation of prior research. Significant nonlinear relationships were detected between (predictors) Extraversion, Conscientiousness, Openness to Experience, and Neuroticism and (criteria) task performance and CWB. Future research is needed using multisource longitudinal designs in order to more rigorously test the causal hypotheses put forth in this investigation.

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APPENDIX A

DEMOGRAPHIC QUESTIONNAIRE

1. What is your age?

2. What is your gender?

3. How many years have you worked at your current primary place of employment?

4. How many years of work experience do you have?

5. What level of education have you completed (1 = middle school; 2 = high school; 3 = 2-year degree; 4 = 4-year degree; 5 = Masters or equivalent; 6 = Ph.D. or equivalent)?

6. What is your current job title?

7. In a separate window, please visit the website www.onetonline.org and enter your job title in the "Occupation Quick Search" toolbar located in the upper-right-hand corner of the screen. A list of occupations will be revealed to you following this search. Enter the title of the occupation with the highest "Relevance Score." If multiple occupations emerge, select the one that appears to be most relevant.

8. Are you a part time or full time employee (1= *part time*; 2 = *full time*)?

9. What sector of employment applies to you (1 = *profit*; 2 = *nonprofit*)?

10. Does your place of employment require the completion of tax forms (e.g., W-9, W-2)?

APPENDIX B

BF-10

How well do the following statements describe your personality? Each statement begins with the phrase, "I see myself as someone who..."

1.   ...is reserved.

2.   ...is generally trusting.

3.   ...tends to be lazy.

4.   ...is relaxed, handles stress well.

5.   ...has few artistic interests.

6.   ...is outgoing, sociable.

7.   ...tends to find fault with others.

8.   ...does a thorough job.

9.   ...gets nervous easily.

10.   ...has an active imagination.

APPENDIX C

TASK PERFORMANCE BEHAVIORS

Describe how frequently you engage in the following activities while at your place of employment.

1. I complete duties as they are assigned.

2. I complete tasks specified in my job description.

3. I take the time to learn skills that are needed in order to do my work.

4. I follow organizational rules and procedures.

5. I avoid distractions that draw my attention away from my duties.

APPENDIX D

ORGANIZATIONAL CITIZENSHIP BEHAVIOR MEASURE

Describe how frequently you engage in the following activities while at your place of employment.

1. Picked up a meal for others at work.
2. Took time to advise, coach, or mentor a co-worker.
3. Helped a co-worker learn new skills or shared job knowledge.
4. Helped a new employee get oriented to the job.
5. Lent a compassionate ear when someone had a work problem.
6. Lent a compassionate ear when someone had a personal problem.
7. Changed vacation schedule, workdays, or shifts to accommodate coworker's needs.
8. Offered suggestions to improve how work is done.
9. Offered suggestions for improving the work environment.
10. Finished something for a co-worker who had to leave early.
11. Helped a less capable co-worker lift a heavy box or other object.
12. Helped a co-worker who had too much to do.
13. Volunteered for extra work assignments.
14. Took phone messages for an absent or busy co-worker.
15. Said good things about your employer in front of others.
16. Gave up a meal and other breaks to complete work.
17. Volunteered to help a co-worker deal with a difficult customer, vendor, or co-worker.
18. Went out of the way to give co-worker encouragement or express appreciation.
19. Decorated, straightened up, or otherwise beautified a common workspace.
20. Defended a co-worker who was being "put-down" or spoken ill of by other co-workers or supervisor.

APPENDIX E

COUNTERPRODUCTIVE WORK BEHAVIOR MEASURE

Describe how frequently you engage in the following activities while at your place of employment.

1. Made fun of someone at work.

2. Said something hurtful to someone at work.

3. Made an ethnic, religious, or racial remark at work.

4. Cursed at someone at work.

5. Played a mean prank on someone at work.

6. Acted rudely toward someone at work.

7. Publicly embarrassed someone at work.

8. Taken property from work with permission.

9. Spent too much time fantasizing or daydreaming instead of working.

10. Falsified a receipt to get reimbursed for more money than you spent on business expenses.

11. Taken an additional or longer break than is acceptable at your workplace.

12. Come in late to work without permission.

13. Littered your work environment.

14. Neglected to follow your boss's instructions.

15. Intentionally worked slower than you could have worked.

16. Discussed confidential company information with an unauthorized person.

17. Used an illegal drug or consumed alcohol on the job.

18. Put little effort in your work.

19. Dragged out work in order to get overtime.

APPENDIX F

ITEM RATING PROTOCOL USED BY SMES

DIRECTIONS

In the excel sheet that has been given the label of your name you will find a list of approximately 900 items, Five Factor Model traits, and definitions. Each of these items has been written to reflect an extremity of each narrow trait of the Five Factor Model of personality. Your task is to assign extremity and fakability ratings to each of these items. For example, the item, "I hate it when people are sloppy" is an item that has been written to reflect an extremely high level of *Order*, which is a facet of the broader trait of *Conscientiousness*. As another example, "My routines are not set in stone. I deviate from them when needed." is an item that has been written to reflect a moderate level of *Order*. Using the key to assign item ratings (which is provided below), you should assign a level that you think is appropriate for the item. For these examples, a rating of "7 - Extremely high level of the dimension" would be assigned to the first example item, and a rating of "4 - Moderate level of the dimension " would be assigned for the second example item. Additionally, you will be asked to rate the fakability of each item (or the extent to which this item could be responded to in a socially desirable manner).

HOW TO PROCEED

You have been assigned a random set of the facets. However, before rating any items you will need to randomize the presentation of items. To do this, first go to the column entitled "NT RAND" and select the first narrow trait (this may be done for you). Next, go to the column entitled "Item RAND," tap on the downward arrow, and sort ascending or descending. This will ensure that the items have been randomized within a narrow trait. Once you have completed assigning ratings, repeat the process for the

subsequent narrow traits. Please do not forget to randomize the items, otherwise the item order suggest the hypothesized item extremity level.

PERSONALTIY EXTREMITY RATING SCALE

(1 - Extremely Low Level of the Dimension to 7 - Extremely High Level of the Dimension)

Place an *x* next to each item if you believe that the item reflects another dimension

FAKABILITY RATING SCALE

(1 - It is not clear at all how to respond to this item to "fake good." To 7 - It is very clear how to respond to this item to "fake good.")

APPENDIX G

INFORMED CONSENT FORM USED IN PRIMARY STUDY

A STUDY ON PERSONALITY IN THE WORKPLACE

The purpose of this study is to test the viability of a personality test and a series of measures of job performance behaviors. Multiple researchers developed these measures, and the statements that you read may not necessarily relate to one another. We have taken steps to ensure that your responses will be confidential, accessible only to the principal investigators or a legally appointed representative. Also, there are no right or wrong answers, so please feel free to be honest in your responses. You will be asked to respond to a series of statements that require you to reflect on your emotions, thoughts, behaviors, and motivations, and also to describe your own behavior in your workplace. You will also be asked to provide non-identifying demographic information. Overall, the survey should take less than approximately 40 minutes to complete.

Before you proceed, please be aware that you may be screened out of the survey for the following reasons:

> *Speeding through pages:* Advancing through a page faster than a reasonable amount of time.

For example, a respondent advances a page that contains several questions in less than three-seconds.

> *Not reading questions:* The survey asks a common sense or common knowledge question that a respondent answers incorrectly, most likely because the respondent is not reading the question and simply selecting answers randomly.

For example, a question states: "Fish swim in water." The respondent disagrees with that statement.

The principal experimenter, Christopher Castille (Email: cmc075@latech.edu), may be reached to answer questions about the research, subjects' rights, or related matters. Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Stan Napper (318- 257-3056)

Dr. Mary M. Livingston (318-257-5066 or 318-257-2292)

I attest by selecting 'I Accept' below that read and understood the following description of the study, "A Personality Test", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

APPENDIX H

SME AND GGUM2004 ITEM PARAMETERS

Content, judged locations, and item-total correlations for each FFM facet

Item Code	AGREEABLENESS	Item Parameters (SME and GGUM2004)							
	Altruism	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ALT1	I am extremely self-centered.	-3	-3.568	0.770	-4.540	-2.464	-2.777	-1.582	-0.035
ALT4	I have been told that I lack consideration for others.	-1.5	-3.786	0.932	-4.337	-2.771	-2.705	-2.221	-1.167
ALT5	From time to time I like to give to charitable organizations.	0	1.988	0.559	-4.327	-3.262	-5.151	-2.903	0.454
ALT6	I sometimes help a friend because it's the right thing to do, other times is because I want something in return.	0	-0.780	0.292	-3.191	-2.364	-2.272	1.111	4.805
ALT7	I frequently think about how others are doing.	1.5	1.042	1.363	-3.60	-2.718	-2.291	-1.477	0.160
ALT8	I worry about how people are doing.	1.5	1.062	1.298	-2.953	-2.930	-2.202	-1.519	0.322
ALT9	Sometimes I think I am too nice for my own good.	2.5	0.858	0.497	-3.968	-2.366	-2.062	-0.749	1.055
ALT10	I live to serve others.	3	1.263	0.683	-3.024	-2.335	-2.107	-0.596	0.765
	Compliance	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
CPLC2	I am not afraid to cause a commotion to get my way.	-2.5	-4.351	0.429	-6.254	-3.662	-3.380	-2.512	-0.403
CPLC4	If someone wrongs me, it is difficult for me to forgive them.	-2	-3.927	0.303	-8.173	-4.964	-4.320	-1.502	-0.132
CPLC5	Sometimes I am easy to satisfy, but other times I can seem a bit pushy.	0	-1.030	0.264	-5.590	-2.499	-3.532	0.794	5.216
CPLC7	People who know me would likely say I am generally a forgiving person.	1.5	1.223	1.438	-2.902	-2.751	-2.392	-1.551	-0.083
CPLC8	I usually try to satisfy others' needs, rather than my own when I sense conflict emerging.	2	0.990	1.078	-3.592	-2.263	-1.985	-0.520	0.573
CPLC9	My friends and family would probably describe me as an extremely calm and easy-going person.	3	1.458	0.406	-3.929	-3.932	-2.960	-1.241	0.569
CPLC10	People who know me would say I am an extremely forgiving person.	3	1.206	1.135	-2.996	-2.371	-2.317	-1.180	0.075
	Modesty	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
MOD1	When I do something well I always seek recognition.	-3	-4.574	0.454	-6.850	-4.397	-4.126	-2.181	0.034
MOD4	If given a choice, I prefer to receive recognition for giving money to a charity	-1	-4.564	0.427	-6.035	-3.991	-3.102	-2.789	0.704
MOD5	I shy away from credit sometimes, but other times it is nice to be recognized.	0	0.925	0.413	-3.440	-3.065	-3.905	-1.119	3.229
MOD6	Sometimes the work I do is really excellent, other	0	-0.109	0.308	-4.286	-1.680	-2.333	0.665	3.765

Item		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
MOD7	times it is mediocre. When I give money to a charity, I am fine with being anonymous	1.5	2.239	0.970	-3.215	-4.990	-3.945	-3.607	-1.511
MOD8	I do not consider myself an above-average person	2	1.413	1.191	-3.272	-3.389	-2.585	-1.348	-0.094
MOD9	When I give money to a charity, I prefer to remain anonymous	2.5	2.398	0.546	-4.906	-4.834	-4.103	-2.679	-0.543
MOD10	I always share the credit I receive on teamwork.	3	2.145	0.723	-4.463	-4.962	-4.667	-3.657	-0.687
Straightforwardness		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
STFD1	I always hide my motives to get what I want.	-3	-4.071	0.695	-5.467	-3.213	-2.668	-1.611	-0.374
STFD3	Manipulating others can be helpful.	-1.5	-3.448	0.537	-4.639	-3.131	-3.721	-0.723	-0.316
STFD4	I use flattery on occasion when dealing with others.	-1	-0.408	0.307	-2.858	-1.285	-3.237	1.110	6.345
FD6	I tend to stick to the rules when trying to get my way with others.	1.5	2.473	0.455	-5.861	-4.39	-5.567	-2.670	1.438
STFD7	I mean what I say.	1.5	2.716	0.507	-7.251	-6.719	-6.483	-4.426	-0.726
STFD9	People often tell me that I am a genuine person.	2.5	1.392	0.849	-3.582	-3.785	-3.730	-1.853	-0.014
Tendermindedness		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
TDMD4	Being a winner is much more important than being cooperative.	-1.5	-3.942	0.716	-5.365	-3.270	-2.456	-2.048	-1.036
TDMD5	Cooperating with others is equally as important as winning.	0	1.403	0.784	-4.664	-3.055	-3.173	-1.686	0.277
TDMD7	When someone is in need I feel as though I have to help.	1.5	1.160	1.434	-3.339	-2.849	-2.578	-1.357	-0.020
TDMD9	I will do anything to cooperate with others.	3	0.883	0.67	-3.305	-1.822	-1.802	0.971	1.735
TDMD10	I always put the needs of others before my own.	3	1.150	1.016	-3.256	-2.493	-2.116	-0.348	0.469
Trust		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
TRST1	I feel that people are always out to get me.	-3	-4.775	0.400	-5.876	-2.983	-3.611	-0.822	-5.913
TRST2	Everyone has hidden intentions.	-2.5	-3.096	0.292	-7.990	-5.314	-5.076	0.780	0.521
TRST6	I find it easier to trust in some people than in others.	0	1.197	0.479	-3.270	-4.071	-4.428	-3.055	1.017
TRST8	I feel the urge to confide in others.	1.5	0.474	0.561	-3.100	-1.100	-1.697	0.121	2.143
TRST9	I always see the good in people.	3	1.084	1.149	-3.265	-2.535	-2.144	-0.861	0.428

Item Parameters (SME and GGUM2004)

CONSCIENTIOUSNESS

Achievement Striving		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ACST2	I avoid situations where I have to work hard.	-2.5	-4.168	1.078	-5.312	-3.208	-2.901	-1.863	-2.238

		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ACST3	I avoid setting goals, but when I do, I set extremely easy goals.	-2	-3.941	0.886	-5.352	-3.238	-2.886	-2.189	-0.398
ACST6	I am fine being an average worker.	0	-4.449	0.382	-6.929	-4.137	-3.428	-2.982	1.312
ACST7	I have a drive to succeed in my work.	1.5	2.374	1.147	-5.166	-4.492	-4.203	-3.324	-1.272
ACST10	I work extremely hard to be the very best at everything I do.	3	3.298	0.802	-6.780	-5.185	-5.165	-3.612	-1.817
Competence		**SME**	**δ**	**α**	**τ_1**	**τ_2**	**τ_3**	**τ_4**	**τ_5**
COMP1	Logic holds people back, I prefer to make spontaneous decisions.	-3	-4.642	0.634	-5.908	-3.835	-2.800	-2.562	-1.006
COMP4	I have a tendency to misjudge situations.	-2	-4.064	0.750	-6.380	-4.088	-2.548	-2.167	-0.738
COMP6	While I often excel in what I do, I also have much to learn to be better.	0	1.528	0.447	-6.293	-4.727	-5.525	-3.114	0.070
COMP8	Most of the time I judge situations correctly, but every once in a while, I do misjudge certain situations.	1.5	0.647	0.267	-7.964	-4.095	-7.094	-0.680	5.672
COMP9	I always think carefully before acting.	3	3.736	0.744	-6.703	-5.767	-5.767	-3.584	-1.726
COMP10	I pride myself on my unwavering ability to act responsibly.	3	2.446	0.996	-5.391	-4.263	-4.075	-2.513	-0.523
Deliberation		**SME**	**δ**	**α**	**τ_1**	**τ_2**	**τ_3**	**τ_4**	**τ_5**
DELB2	I find that most all of my decisions are impulsive.	-2.5	-3.682	0.872	-4.692	-2.903	-2.436	-1.597	-0.238
DELB3	I avoid considering all options when making a decision.	-2	-5.866	0.533	-6.830	-3.653	-4.317	-4.464	-2.452
DELB5	I sometimes make decisions based on instinct rather than facts; and sometimes I prefer facts.	0	-0.455	0.240	-5.584	-2.130	-4.407	0.599	6.755
DELB8	It is best to be careful when a decision has significant consequences.	2	3.578	0.831	-7.979	-5.346	-6.190	-5.292	-3.139
Dutifulness		**SME**	**δ**	**α**	**τ_1**	**τ_2**	**τ_3**	**τ_4**	**τ_5**
DUTI1	Telling the truth is entirely irrelevant unless it fits in with accomplishing my goals	-3	-4.610	0.780	-4.955	-2.727	-3.559	-1.933	-1.967
DUTI4	I have lied to protect other people.	-1	-0.867	0.268	-4.529	-1.544	-5.219	0.122	4.304
DUTI6	I aim to tell the truth as often as possible, but I can think of numerous situations that have required me to bend the truth.	0.5	-0.529	0.296	-5.009	-2.301	-3.661	-0.212	3.192
DUTI8	I believe that telling the truth is often the best way to	1.5	3.742	0.801	-6.611	-6.387	-5.986	-5.087	-2.709

		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
DUTI10	Regardless of the situation, I always tell the truth.	3	4.786	0.362	-8.327	-7.398	-6.866	-3.686	-0.926
Order		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ORD1	I have been told that I am an extremely messy person.	-3	-4.238	0.604	-4.368	-3.094	-4.022	-2.441	-1.234
ORD4	Organization is not a priority for me.	-1.5	-4.082	0.784	-5.076	-3.761	-3.056	-2.270	-0.821
ORD5	While I like order and regularity, I also enjoy when things are a bit chaotic.	0	-0.852	0.261	-4.494	-2.728	-2.527	1.707	5.002
ORD7	I like to plan my days in advance.	1.5	4.884	0.412	-8.864	-6.386	-7.005	-4.785	-1.748
ORD10	I find great comfort in order.	2.5	3.822	0.715	-7.047	-6.046	-5.918	-3.956	-2.004
Self-Discipline		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
SFDN2	My work is always late.	-3	-4.571	1.191	-4.739	-3.143	-2.882	-2.860	-1.218
SFDN4	Although I am capable of motivating myself to complete tasks, I prefer to have someone else prompting me	-1	-4.430	0.549	-5.963	-4.067	-3.850	-2.467	-0.141
SFDN5	I have given up on projects before.	-0.5	-1.016	0.416	-4.185	-1.588	-1.778	-0.014	3.412
SFDN7	More often than not, I depend on myself rather than others for the motivation needed to successfully complete a task	2	4.218	0.470	-8.137	-6.839	-6.157	-5.843	-2.477
SFDN10	When it comes to carrying out my obligations, I will not stop until they are complete.	3	3.511	1.180	-5.674	-5.907	-5.363	-3.712	-2.039

Item Parameters (SME and GGUM2004)

EXTRAVERSION

		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
Activity		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ACT1	I always take my time - even when a faster pace may be needed.	-3	-0.968	0.192	-8.689	-1.076	0.357	3.377	8.995
ACT3	I prefer a slow lifestyle.	-2	-3.058	0.642	-5.567	-4.406	-3.338	-1.810	0.087
ACT5	Half of the time I prefer leisurely activities and half of the time I prefer activities to be fast-paced.	0	1.010	0.510	-4.743	-3.421	-2.972	-0.266	-2.448
ACT8	My lifestyle requires a high energy level.	2	3.550	0.590	-5.918	-4.274	-3.218	-2.188	-0.754
ACT9	I always try to live life to the fullest extent that I possibly can.	2.5	2.737	0.828	-5.542	-4.370	-4.421	-2.304	-0.732
Assertiveness		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ASST1	I hate leading groups.	-3	-3.499	-4.850	0.594	-3.719	-2.614	-2.225	-0.829
ASST3	I would rather follow directions than lead.	-1.5	-4.436	0.419	-7.494	-5.526	-4.115	-2.906	-0.660

Item		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ASST5	From time to time, I enjoy taking charge on projects, but some other times I prefer other to take the lead.	0	0.403	0.345	-3.572	-2.291	-4.048	-0.435	4.563
ASST8	I enjoy taking the lead on new projects.	1.5	2.599	0.713	-5.098	-4.059	-3.472	-1.802	0.093
ASST9	I can always persuade people to follow my lead.	2.5	3.296	0.656	-5.931	-4.559	-4.112	-1.942	0.545
Excitement Seeking		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
EXSK4	If a party is too loud, I will probably leave	-1.5	-5.094	0.361	-8.230	-6.008	-5.932	-4.332	-2.504
EXSK5	I don't mind loud parties, but I don't prefer them either	-0.5	0.558	0.310	-4.049	-2.171	-3.262	0.842	4.584
EXSK7	I tend to seek adventure.	1.5	1.754	0.540	-4.235	-3.104	-2.328	-0.301	1.197
EXSK9	I couldn't live without adventure.	3	1.639	0.487	-5.246	-2.445	-2.291	-0.026	1.308
Gregariousness		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
GRGR1	I am a socially awkward person.	-3	-2.473	0.853	-3.776	-2.457	-2.843	-1.256	-0.499
GRGR4	I sometimes feel uncomfortable when surrounded by a big crowd.	-1	-3.412	0.610	-5.880	-4.384	-4.495	-3.538	-1.468
GRGR5	I prefer to socialize in small groups.	-0.5	-1.330	0.276	-9.102	-5.936	-5.834	-2.414	2.817
GRGR7	I enjoy meeting different people.	1.5	2.437	1.385	-4.736	-4.068	-3.711	-2.280	-1.082
GRGR10	I constantly try to engage with different people.	3	2.095	1.188	-4.095	-3.262	-2.455	-1.485	0.182
Positive Emotion		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
POSE2	Spending time with people who joke around irritates me.	-2.5	-5.250	0.303	-7.016	-3.650	-3.644	-0.877	2.605
POSE5	There are some topics I am optimistic about and others I am pessimistic about.	0	-3.576	0.287	-5.546	-3.493	-4.067	-2.032	0.568
POSE8	I like to focus on the positive side of things.	1.5	2.599	0.631	-5.569	-5.461	-4.727	-2.934	-0.706
POSE10	I am an incredibly joyful person to be around.	3	2.128	0.951	-4.404	-3.349	-3.027	-1.235	0.532
Warmth		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
WARM1	I am incredibly uptight around others.	-3	-2.887	0.715	-4.195	-2.370	-2.018	0.026	0.786
WARM3	I usually find it hard to make friends.	-2	-2.342	1.210	-3.590	-2.463	-1.987	-1.433	-0.477
WARM7	I usually find it easy to make friends.	1.5	2.374	1.454	-3.962	-3.412	-2.981	-2.021	-0.571
WARM10	I am always friendly to people.	3	2.229	0.592	-6.022	-5.122	-4.642	-2.682	-0.151

Item Parameters (SME and GGUM2004)

NEUROTICISM

Item		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
Angry-Hostility		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ANGH2	I am rarely frustrated by anything.	-2.5	-2.813	0.673	-4.919	-3.715	-2.453	-1.392	0.414
ANGH4	I rarely get irritated by others.	-2	-2.016	0.527	-4.687	-3.133	-1.631	-1.118	2.105

Item	Statement	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ANGH6	I am somewhat balanced in my experience of frustration.	0	-1.683	0.609	-5.038	-3.309	-3.819	-0.739	2.108
ANGH8	I get frustrated easily.	1.5	2.614	1.175	-4.152	-2.951	-2.093	-1.522	-0.328
ANGH9	I have a very short temper.	2.5	2.370	0.602	-2.948	-1.477	-1.901	0.205	0.864
Anxiety		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ANXT2	I can adapt to any new situation.	-2.5	-2.209	0.794	-5.285	-4.541	-4.310	-2.203	-0.258
ANXT4	I am relaxed most of the time.	-1.5	-2.344	1.288	-4.390	-3.990	-3.334	-2.426	-0.682
ANXT6	Sometimes I get caught up in my problems, and other times I try not to worry about things that have already happened.	0	0.656	0.334	-4.204	-2.266	-3.864	-0.190	4.349
ANXT8	I get caught up in my problems.	2	2.155	1.077	-4.044	-2.529	-2.442	-1.051	0.363
ANXT10	I always worry about my health.	3	2.056	0.329	-4.954	-2.037	-1.724	1.142	1.454
Depression		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
DEPN1	I love who I am.	-3	-3.865	1.096	-6.544	-5.297	-5.038	-3.810	-2.567
DEPN4	I seldom feel down in the dumps.	-1.5	-1.908	1.064	-3.904	-2.709	-2.210	-1.679	-0.056
DEPN5	On occasion, I feel blue, but most of the time I don't feel blue.	-0.5	-0.676	0.474	-2.780	-2.783	-2.602	-0.262	2.308
DEPN7	I often feel blue.	1.5	2.916	1.419	-3.807	-2.694	-2.420	-1.794	-0.868
DEPN9	I have an extremely low opinion of myself.	3	3.013	1.368	-3.329	-2.504	-2.280	-1.530	-0.871
DEPN10	My mood changes all the time.	3	2.026	1.301	-3.188	-2.067	-1.299	-0.644	0.117
Impulsivity		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
IMP2	People say I have great "self-control."	-3	-4.338	0.489	-7.787	-6.126	-5.515	-3.810	-2.191
IMP4	I have a good amount of control on my cravings.	-1	-2.755	0.556	-6.341	-4.158	-4.645	-2.358	0.518
IMP6	Half of the time I give in to my urges and half of the time I control myself.	0	1.024	0.473	-3.431	-2.189	-1.378	1.309	4.358
IMP7	Sometimes I do things I later regret.	1	2.785	0.531	-5.120	-3.775	-4.222	-1.399	0.785
Self-Consciousness		SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
SFCN1	I never care about how other people see me.	-3	-2.493	0.232	-6.839	-2.102	-1.247	1.290	4.431
SFCN4	I feel comfortable in my own skin.	-1.5	-2.967	1.391	-5.041	-4.377	-3.882	-3.370	-1.550
SFCN5	On occasions, I can be quite bashful.	0.5	3.590	0.330	-6.568	-4.620	-6.330	-2.638	1.392
SFCN8	I get embarrassed easily.	1.5	3.490	0.742	-5.082	-3.845	-3.471	-2.161	-1.146
SFCN10	I am always extremely afraid that I will draw attention to myself.	3	3.561	0.757	-4.810	-3.116	-3.255	-1.572	-1.265

Vulnerability	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
VULN2 — I always keep my emotions under control.	-3	-2.890	0.694	-5.553	-4.897	-3.735	-2.202	-0.468
VULN3 — I rarely panic.	-2	-2.288	0.967	-4.680	-3.299	-3.167	-2.387	-0.603
VULN5 — Occasionally I panic, but I usually do not.	-0.5	0.139	0.364	-2.179	-1.214	-3.271	0.921	4.639
VULN8 — My emotions usually get the best of me.	1.5	2.115	0.888	-3.742	-1.702	-1.493	-0.503	0.415
VULN10 — I can panic extremely easily.	3	2.702	1.264	-3.328	-2.301	-1.872	-1.275	-0.766
OPENNESS TO EXPERIENCE								
			Item Parameters (SME and GGUM2004)					
Action	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
ACTN2 — I have no desire to visit new places.	-3	-4.466	0.783	-5.685	-3.294	-4.689	-1.745	-1.152
ACTN4 — I prefer stability or consistency to variety and change.	-1.5	-0.821	0.224	-5.543	-6.528	-3.679	0.718	5.636
ACTN5 — I like change, but I also need stability.	0	1.503	0.491	-6.754	-4.939	-4.636	-2.169	1.562
Aesthetics	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
AEST2 — Listening to poetry or music seems to be a waste of time.	-2.5	-3.997	0.979	-3.923	-2.696	-2.378	-2.245	-1.216
AEST4 — While listening to music is nice, it is pointless.	-1.5	-4.240	0.814	-3.961	-2.552	-2.854	-1.987	-1.321
AEST6 — There have been times when a song has made me emotional.	0.5	2.667	0.635	-5.475	-4.050	-5.697	-4.102	-2.039
AEST7 — I see some value in art and beauty.	1	3.628	0.975	-6.388	-5.974	-6.085	-4.655	-2.959
AEST9 — Art is the greatest form of expression of all.	3	5.233	0.314	-8.960	-7.597	-7.354	-3.188	-2.134
Fantasy	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
FANT4 — I like to think about real-world problems.	-1.5	2.394	0.789	-5.455	-4.321	-4.821	-2.709	-0.321
FANT5 — Sometimes I have difficulty imagining things, but other times I can build mental images.	0	-0.826	0.165	-5.988	-1.897	-2.881	1.911	10.217
Feelings	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
FEEL1 — People have told me I am emotionally inept.	-3	-5.367	0.424	-5.684	-3.294	-4.689	-1.745	-1.151
FEEL5 — I sometimes can tell how people feel.	-0.5	3.480	0.732	-6.560	-5.667	-6.616	-3.990	-1.421
FEEL7 — For the most part I understand others emotions.	1.5	4.035	0.639	-6.326	-6.765	-6.765	-4.625	-1.592
FEEL9 — I have a deep understanding of others emotions.	3	4.448	0.490	-7.191	-6.933	-6.153	-4.000	-1.769
Ideas	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
IDEA1 — I find theoretical conversations extremely boring.	-3	-3.676	0.865	-4.486	-3.003	-2.823	-1.783	-0.804
IDEA3 — I dislike focusing on difficult problems.	-2	-3.614	0.754	-5.488	-2.942	-2.972	-1.861	0.237
IDEA6 — Sometimes I enjoy solving complex problems.	0.5	2.148	1.120	-4.236	-3.815	-4.034	-2.721	-0.971
IDEA7 — I enjoy solving complex problems.	1.5	2.355	1.056	-4.446	-4.147	-3.916	-2.599	-1.025

IDEA10	I really enjoy trying to tackle the most complex problems imaginable.	3	2.628	0.522	-4.983	-4.058	-3.893	-1.942	0.182
	Values	SME	δ	α	τ_1	τ_2	τ_3	τ_4	τ_5
VALU3	Most criminals are beyond hope for reform and should be kept away from the rest of society	-2	-5.112	0.386	-6.224	-4.995	-3.388	-3.031	-1.583
VALU6	The line between right and wrong is can be unclear at times.	0.5	1.047	0.284	-4.138	-3.149	-5.185	0.079	2.560
VALU7	The U.S. criminal system should do more to rehabilitate criminals	1	4.778	0.375	-7.845	-8.163	-7.847	-4.712	-3.364
VALU8	I tend to vote for the most liberal-minded politicians	1.5	5.100	0.366	-9.779	-8.291	-7.440	-4.186	-0.634