A MULTIFOCAL FRAMEWORK OF PERSONALITY
APPLIED TO TRAINING AND TRANSFER

By

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Psychology

2012

ABSTRACT

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Personality traits are widely used in organizational psychology as a lens to understand the person and to make predictions about work-related outcomes. The trait approach relies on individuals' typical behavioral tendencies and ignores behavioral variation across contexts and situations. The purpose of this dissertation is to propose a multifocal personality framework that enhances the understanding of the person as a whole and increases precision in prediction. The framework proposes that three foci consist of a person's personality system, ranging from the most general level, to the moderate contextualized trait level, to the most specific task/state level. The personality framework is applied in the training context to propose hypotheses about using contextualized and specific traits to predict learning and transfer above and beyond global traits and to implement an intervention to enhance learning and transfer. Results suggest that the personality-based intervention interacts with trainee characteristics to affect learning. Implications and future research directions are discussed.

ACKNOWLEDGEMENT

When I first approached Ann Marie Ryan about my interest in personality, it was January 2007. In these past five years, Ann Marie chaired my master's thesis, comprehensive examinations, and dissertation, gave countless feedback on drafts of manuscripts, and provided sound advices on my career development. With her continuous support, the initial interest culminated in the multifocal personality framework in this dissertation. I am grateful to have worked with and learned from Ann Marie, and the role model she has served as in conducting research as well as in mentoring students and collaborating with others will continue to inspire me in my academic career.

I am also thankful for the support from Kevin Ford. Having collaborated with Kevin on several research projects, I enjoyed the discussions where he challenged me intellectually in such an open and collegial atmosphere. I appreciate that he has treated me as an equal and has made it so easy and fun to talk to him about things in work and life.

Thank you to the other two members of my committee. Thanks to Steve Kozlowski for pushing me to identify an experimental paradigm that I can use for my research career. I have learned a great deal from him on research design during the medical team project that spanned my entire graduate school career here. Thanks to Steve Yelon for his encouragement throughout the process and for his insights during and after the defense. I am thankful to have trained in the Organizational Psychology program at Michigan State University as I had the opportunity to observe and learn from some of the best researchers in the field. Coming to mind is the protagonist in Dr. Louis Cha's novel *the Legend of the Condor Heroes*, who learned his skills from several martial arts masters. Thanks to Rick DeShon for sharing his perspective on research aspirations as well as for his suggestions on how to write effectively and how to respond to

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Personality traits have been utilized in Industrial/Organizational (I/O) psychology as a lens to understand the person at work. The widespread application of personality traits can be seen in meta-analyses of trait effects on outcomes such as job performance (e.g., Barrick & Mount, 1991; Tett, Jackson, & Rothstein, 1991; Barrick, Mount, & Judge, 2001), organizational citizenship behavior (Organ & K. Ryan, 1995), interpersonal and organizational deviance (Berry, Ones, & Sackett, 2007), and leadership (Bono & Judge, 2004; Judge, Bono, Ilies, & Gerhardt, 2002). Despite their popularity, the degree to which personality traits predict important work behavior remains a topic of contention. For example, a panel of five former journal editors from *Personnel Psychology* and *Journal of Applied Psychology* (Morgeson et al., 2007) commented that personality tests have very low validity in predicting job performance. Similarly, Organ and K. Ryan (1995) concluded that trait variables displayed generally weak relationships with organizational citizenship behavior. Thus, it remains an open question how I/O psychologists can enhance prediction of work-related behavior through better understanding and measuring the person.

Variability in behavior across situations (Mischel, 1968) can account for the low correlation between personality traits and work-related behavior. Relying on individuals' generalized behavioral tendencies across situations (Tellegen, 1991), the trait approach does not take into account individuals' variability in personality expressions. Although personality traits can accurately predict aggregated behavior across a wide range of situations, their associations with behavior within a specific context are rather weak (e.g., Allen & Potkay, 1973). Conversely, two areas of personality research suggest that inclusion of intraindividual variability in personality can enable better prediction of behavior. First, by measuring behavioral tendency

within a particular relevant setting, contextualized traits can yield better prediction of outcomes than general traits (e.g., Bing, Whanger, Davison, & Van Hook, 2004; Heller, Ferris, Brown, & Watson, 2009). Second, the degree to which an individual varies his/her personality expressions across situations resembles stable individual differences (Fleeson, 2001; Edwards & Woehr, 2007). Taken together, to better understand how personality affects work-related behavior, personality assessment should include both traits and variability.

Shifting the focus to both trait and variability also enables better understanding of the human experiences at work. As Weiss and Rupp (2011) pointed out, the prevailing paradigm in I/O psychology focuses on people as objects for research and conceptualize constructs as stable properties of people whereby failing to attend to the changes and subjectivity in human experiences at work. Whereas the reliance on personality traits to predict work-related behavior epitomizes the prevailing paradigm, the consideration of individual variability across situations can enable a better understanding of individual unique working experiences.

The primary goal of this paper is to propose a new framework of personality that conceptualizes a personality dimension as a multifocal system that incorporates both traits and variability. Extending from Fleeson's (2001) distributional approach to personality and research on role identity (e.g., Wood & Roberts, 2006; Wood, 2007), this current framework recognizes both individual and situational influences on behavior and organizes behavior at three levels of specificity: (a) general situation blind level; (b) broad social role level; and (c) task/situation level. Following this framework, matching the focus of personality constructs to the outcome of interest (e.g., personality constructs contextualized within the learner role predicting training outcomes) can yield higher precision in prediction than the reliance on global personality traits.

Personality research including traits, consistency, contextualized personality, and personality states is reviewed to render support for the current framework.

The second goal of this paper is to apply the multifocal framework of personality to generating hypotheses about a particular type of work-related behavior, namely transfer of training. *Transfer of training* refers to the application of the knowledge and skills acquired in the learning environment to new contexts and the maintenance of the changes resulted from learning over time (Blume, Ford, Baldwin, & Huang, 2010). Transfer of training is an important work-related behavior as it translates increases in employee knowledge, skills and abilities through training programs (Becker & Huselid, 1998; Lado & Wilson, 1994) to increases in work performance (Goldstein & Ford, 2002). Whereas trainee personality traits can predict training transfer (Blume et al, 2010; Herold, Davis, Fedor, & Parsons, 2002), the consideration of intraindividual variability may enable more accurate prediction and effective intervention, as transfer of training occurs within a situational boundary nested within the work context.

Taken together, this paper has two purposes: (a) proposing a multifocal framework of personality and reviewing relevant literature; (b) applying the multifocal framework to predicting and facilitating transfer of training.

<div align="center">**The Trait Approach and Consistency**</div>

In this section, I provide a brief historical review of the trait approach to personality, present the prevalent view of broad personality traits in the current literature, and discuss implications of the trait approach in I-O research.

The Trait Approach to Personality

Early thoughts on individuals' traits can be traced back to the ancient Greeks. In 400 B.C., Hippocrates introduced his theory of temperament. According to Hippocrates, there were

four types of human temperaments (sanguine, phlegmatic, melancholic, and choleric),

determined by the levels of four bodily fluids (blood, phlegm, yellow bile, and black bile). This

theory, later refined by Galen in 2nd century B.C., was adopted by Eysenck as a basis for his

dimensional theory of traits (Eysenck & Eysenck, 1985).

Before 1920, the term "personality" remained mainly in the discussion of abnormal

psychology (Winter & Barenbaum, 1999). However, the trait concept of personality had emerged

in the literature by 1921, as suggested by Gordon Allport's (1921) review of the literature on

"personality and character", where most of the sources cited in this review involved traits

(Danziger, 1990). For instance, Murphy (1932) defined personality as the "sum of all of an

individual's traits" (p. 386). By 1946, trait had been accepted in the field of personality

psychology as at least a major element of psychology (Winter & Barenbaum, 1999). According

to Allport (1961), "Scarcely anyone questions the existence of traits as the fundamental units of

personality" (p. 332).

Researchers generally agree that a *personality trait* denotes consistent, generalized

patterns of behavior (Winter, John, Stewart, Klohnen, & Duncan, 1998), although the specific

definitions of traits are yet to be agreed upon. Of particular interest is the divide on whether traits

are real entities versus hypothetical constructs (Funder, 1991). A number of psychologists (e.g.,

Funder, 1991; McCrae & Costa, 2008; Tellegen, 1991) argue that the behavioral consistency in

traits allows for the inference about neurological and psychobiological structures. For example,

Tellegen (1991) equated a trait to "an inferred relatively enduring organismic (psychological and

psychobiological) structure underlying an extended family of behavioral dispositions" (p. 13). In

contrast, other authors (e.g., Buss & Craik, 1983; R. Hogan & Shelton, 1998; Saucier &

Goldberg, 1996; Wiggins & Trapnell, 1996) note that traits merely represent descriptors that summarize information about people.

The Big Five Approach to Personality

Although traits were recognized as the basic units for personality, an organizing hierarchy that explicated the relatedness among traits was needed (Allport, 1927). Allport and Odbert (1936) compiled from an unabridged dictionary a list of 4,504 nonjudgmental single-word descriptors ("trait-names") as a resource for personality scale development. Cattell (1943) proposed the lexical hypothesis that "All aspects of human personality which are or have been of importance, interest, or utility have already become recorded in the substance of language" (p. 483). Cattell (1947, 1948) attempted to assess the structure of personality by applying factor analytic techniques to ratings of individuals on lexical terms, resulting in a large number of factors.

Following Cattell, a number of personality researchers (e.g., Fiske, 1949; Tupes & Christal, 1961; Borgatta, 1964; Smith, 1967) conducted factor analytic investigations on personality ratings and independently arrived at five-factor solutions (Digman, 1990). Similar findings emerged that suggested that five major factors underlie most of personality scales (Goldberg, 1981; Digman & Takemoto-Chock, 1981; McCrae & Costa, 1985). Although initially the interpretation of the five factors differed to some extent among personality researchers, the five factors proposed by Costa and McCrae (1985) became generally adopted: Extraversion (sociable, assertive, active, energetic), Agreeableness (cooperative, considerate, nurturing, trusting), Conscientiousness (organized, dependable, achievement-oriented, and persistent), Neuroticism (the opposite of Emotional Stability; insecure, vulnerable, anxious, emotional), and Openness to experience (intellectual, imaginative, cultured, curious). These five factors are

generally found across different theoretical frameworks, using different instruments, and across different cultures (Digman, 1990).

Trait Research in I/O Psychology

The field of I/O psychology started to utilize personality tests in selection around 1920. The earliest personality testing can be traced back to Woodward's Personal Data Sheet (Woodworth, 1917), specifically targeting the identification of World War I military recruits who would be more likely to experience emotional breakdown during military combat. Gradually, the need for predictors for the "will do" as opposed to "can do" aspects of job performance served to drive such use in industries. In the 1950s, personality tests were becoming widely used for selection (Spriegel & Dale, 1953). In a review of the validity of personality inventories in employee selection published from 1919 to 1952, Ghiselli and Barthol (1953) located a total number of 113 studies, approximately 40% unpublished. Using a rough classification of occupational groups, the authors found that "…certain inventories used under certain conditions give good predictive results." However, they also noted a somewhat intriguing finding that personality tests were more predictive in occupational groups where personality would seem to be less important, whereas such tests were less effective in occupational groups where personality would be expected to be influential.

To understand the results found in Ghiselli and Barthol (1953), Guion and Gottier (1965) published a review of the validity of personality inventories in employee selection in civilian settings. To rule out less valid tests and faulty studies, the authors limited their review to works published in *Journal of Applied Psychology* and *Personnel Psychology* from 1952 to 1963. Overall, the relations between various personality tests and work-related outcomes were found to be low and inconsistent. The authors also commented on the lack of general personality theory

related to work, the lack of generalizable evidence in support of the use of personality measures for employee selection, and the need for specific consideration of situations and purposes.

Since the 1990s, the Big Five has been utilized as an organizing framework for investigating the effects of broad personality traits on important work behaviors. Barrick and Mount (1991) found in a meta-analysis that Conscientiousness showed positive relations with all job criteria across various occupational groups. In another meta-analysis, Openness was found to positively relate to both leader emergence and leader effectiveness (Judge et al., 2002). With regard to training research in specific, a second-order meta-analysis by Barrick et al. (2001) showed that training performance was moderately associated with Extraversion ($\rho = .28$), Conscientiousness ($\rho = .27$), and Openness ($\rho = .33$).

Despite the clear intuitive relevance of the role of the person and his/her personality in affecting job-related behaviors, the empirical findings appear to be modest in size at best. Indeed, several I/O psychologists voiced concerns over the low validity of personality traits in the selection setting (Murphy & Dzieweczynski, 2005; Morgeson et al., 2007). How can I/O psychologists better utilize personality constructs to understand behavior at work in general and transfer of training in specific? To address this question, a closer look at the trait approach's focus on behavioral consistency is warranted.

The Trait Approach and Cross-situational Consistency

One of the earliest challenges of behavioral consistency came from Thorndike (1906), who concluded that "...it is evident that the behaviors which are often construed as stable personality trait indicators actually are highly specific and depend on the details of the evoking situations and the response mode employed to measure them (p. 37)". In 1968, Mischel's book entitled *Personality and Assessment* advanced Thorndike's argument. In his monograph, Mischel

summarized the-then personality research and concluded that cross-situational consistency in behavior, a fundamental assumption for trait psychology, received weak support in personality variables. Mischel remarked that although individuals tend to have stable self-views, their specific actions change across situations. Furthermore, as the average of past behavior, a trait is useful in predicting future behavior in similar situations, but is limited when applied to predict future behavior in different new situations. Thus, Mischel asserted that "Global traits and states are excessively crude, gross units to encompass adequately the extraordinary complexity and subtlety of the discriminations that people constantly make" (p. 301).

Mischel's (1968) work ignited the subsequent person-situation debate. Centering on the relative importance of the person versus the situation in determining individual behavior, psychologists debated in the ensuing two decades on whether personality traits exist (e.g., Alker, 1972; Allen & PotKay, 1973; Bem, 1972; Block, 1968; R. Hogan, DeSoto, & Solano, 1977; Fiske, 1974; Mischel & Peake, 1982, 1983; Shweder, 1975). While issues regarding construct validity and measurement of personality traits were discussed, at the center of long-lasting contention was the low correlation between personality traits and single behaviors. The correlation between an objective measure of behavior in one situation and (a) a personality inventory measure or (b) an objective measure of behavior in another situation, dubbed "personality coefficient", rarely exceeded .30 (Mischel, 1969). Block (1977) acknowledged that, although observer and self-ratings of personality can be stable and consistent, there was a lack of evidence for the stability of measures of objective behaviors, and the correlation between objective behaviors and ratings was rather weak. Further, situation impacts how a person will behave, such that behavior within a specific situation may correlate with trait ratings, but the correlation may be drastically different with minor modifications to the situation (Mischel,

1979). As a case in point, Mischel (1979) noted the relationship between delay of gratification and rated intelligence: the length of time a child delayed a reward was negatively related to rated intelligence in the presence of the experimenter (Bem & Funder, 1978) and positively related to rated intelligence when waiting alone (Mischel & Peake, 1982).

Aggregation of behaviors across multiple occasions was proposed by some authors as a solution to the cross-situational consistency criticism. The rationale behind aggregating behaviors across situations rests on the recognition that single behavioral incidents contain both high levels of measurement error and narrow generality (Epstein, 1979). Epstein showed that, across four studies, college students' objective measures of behavior were highly stable when aggregated across multiple events, and such aggregated measure was significantly related to self-report measures on personality inventories, with correlation coefficients ranging from .40 to .60 depending on the match between measured behavior and personality scales. As an example of the effect of aggregation, when participants reported the impulse of stimulus seeking over 30 days across a wide range of situations, the correlation between stimulus seeking recorded on odd days and even days was .77. Such findings, Epstein (1979) argued, demonstrated the cross-situational stability of behavior and supported the use of trait measures to predict behavior without specifying the situations. Similar findings emerged that showed that behavior is general at the aggregate level despite being situationally specific in a single instance (e.g., Cheek, 1982; Moskowitz, 1982, 1988; Moskowitz & Schwarz, 1982; Rushton, Brainerd, & Pressley, 1983).

However, Mischel and Peake (1982) noted that the aggregate approach demonstrated only the temporal stability of behavior instead of cross-situational consistency, as the aggregated behavioral measures across multiple days and multiple occasions in Epstein's (1979) studies represent repeated measures of behaviors in similar situations. To truly examine cross-situational

consistency, Mischel and Peake suggested behavioral indicators of the same trait from different situations should be correlated. Applied to the example of stimulus seeking above, correlation between odd days and even days represented measures of behavior repeated in similar sets of situations, whereas correlation between distinct situations (e.g., stimulus seeking at home versus at a restaurant) would indicate cross-situational consistency. They further described a study investigating conscientious behavior from 63 college students. In their study, observer ratings of the students' conscientious behavior were collected across a number of situations for multiple times. While temporal stability was successfully demonstrated by the high correlations between measures of the same behavior across days, such as lecture attendance measured on two different days, cross-situational consistency was not supported, as shown in the low average correlation (r = .13) among 19 behavioral indicators of conscientiousness. For example, aggregated lecture attendance correlated with aggregated class-note thoroughness at r = .14 and with punctuality to lectures at r = -.03. Mischel and Peake further noted that aggregation of behaviors across situations loses the ability to study situations as psychologically meaningful variables.

As another person-centric approach to resolve the cross-situational consistency issue, Bem and Allen (1974) argued that psychologists need to pay attention to the idiographic organization of personality terms (Allport, 1937) instead of searching for nomothetic traits that apply for all individuals. Cross-situational behavioral discriminativeness, according to the authors, is a result of the mismatch between the psychologist's theory of personality and individuals' unique personality configurations, and thus a trait term may describe some individuals better than others. Offering an intermediate method between idiographic and nomothetic approaches, Bem and Allen proposed that an assessment of an individual's cross-situational consistency on a trait be used as a prerequisite to characterizing that individual with

the trait term. In other words, for individuals who are variable on trait relevant behaviors, the trait is not quite applicable to them, and predictions using the trait for these individuals are likely fruitless. Data collected from 64 students supported their position: correlations among self-report, parent report, peer report, and observer ratings of relevant behaviors were higher for participants who rated themselves as more consistent on relevant traits on both friendliness and conscientiousness. Furthermore, the authors noted an exception in the intercorrelations between the observer ratings of participants' neatness in hair and clothes and other conscientious variables: neatness did not relate to the promptness of returning course evaluation forms and did not correlate with the completion of course readings for low-variability participants, but it was negatively associated for high-variability participants. In addition, neatness had higher positive associations with all trait ratings of conscientiousness for participants with low rather than high variability. The author suggested that the counterintuitive finding on neatness illustrated the failure of the nomothetic trait conception of conscientiousness to account for the unique organization of the participants' conscientious behaviors. Mischel and Peake (1982) took the point a step further and argued that the variability approach cannot resolve the cross-situational consistency issue, as their replication demonstrated weak correlations among 19 behavioral indicators of conscientiousness even for low-variability individuals (also see Bem, 1983).

As a result of the person-situation debate, the interactionist perspective (Bowers, 1973; Endler, 1973; Endler & Magnusson, 1976) that explicitly formulates behavior as a function of the person, the situation, and, more importantly, their interaction has been widely embraced (Funder, 2006). The idea that the confluence of the person and the situation contributes to prediction of behavior can trace back to early psychologists such as Allport, Murray, and Cattell (Griffo & Colvin, 2009). Instead of expecting the rank ordering of behaviors to be consistent

across various situations, representing stable person and situation main effects as the traditional trait perspective would predict, different rank ordering of behaviors is accepted and attributed to the person × situation interaction according to the interactionist perspective. For example, the interactionist will not be troubled upon learning that John is more conscientious than Jane at work and less so than Jane when it comes to house chores, as the apparent inconsistency in behaviors is due to John and Jane's differential sensitivity to the situations. The person by situation interaction has been shown to account for additional variance beyond person and situational main effects (e.g., Endler & Hunt, 1966, 1968, 1969; Mendoza-Denton, Ayduk, Mischel, Shoda, & Testa, 2001). The interactionist perspective also posits that the person plays an important role in selecting and modifying the situation he/she behaves in (Bowers, 1973; Rausch, 1965; Wachtel, 1973).

Based on the interactionist perspective, Bem and Funder (1976) acknowledged the deficiency in the trait approach in that it ignores subtle yet important differences between two seemingly similar situations. They proposed a template-matching method in which a situation is classified in trait terms by experts using a Q sort (see Block, 1961) technique. Specifically, experts provide the personality profile for an ideal individual who will most likely engage in a predetermined behavior in that situation, such as the ideal personality characteristics for delaying gratification without the presence of the experimenter. Bem and Funder showed that the level of similarity between participants' personality Q sort and the situation's template predicted their behavior in the situation. For example, in an experiment on children's delay of gratification, the authors measured the length of time children could resist taking a less favorable snack in order to receive a more favorable snack at a later time. They derived the situation's template – the "ideal" personality profile – from an earlier study. Each child's personality profile is then compared to

12

the template, with the degree of similarity measured as the correlation between the child's Q sort and the template. As expected, the similarity predicted the delay of taking the less favorable snack in the experiment. Bem and Funder also suggested that the similarity in two situations' templates would be associated with the degree of behavioral consistency between the two situations.

Despite the promising rationale behind Bem and Funder's approach, Mischel and Peake (1982) replicated their study on cross-situational consistency but found very different results. Mischel and Peake concluded two key weakness of the template-matching approach. First, this method relies on empirical rather than theoretical predictions and may be unstable when applied on small samples, as was the case in Bem and Funder (1976, Study 1). Second, utilizing template/profile in prediction resembles the complex weighting approach which is prone to compound error and has been shown to fail to predict outcomes better than simple unit weighting approach (e.g., Tellegen, Kamp, & Watson, 1982).

Efforts to address the cross-situational consistency challenge resulted in enhanced understanding of personality. While aggregated behavior can be stable (Epstein, 1979), individuals vary on the extent to which they are consistent across situations (Bem & Allen, 1974) and changes in situational characteristics can affect the observed consistency between situations (Bem & Funder, 1976). However, the critical challenge of the lack of cross-situational consistency remained unresolved. An alternative perspective was introduced in the literature to address the consistency issue from the within-person approach.

Within-person Approach to Consistency

A within-person alternative to consistency has emerged since Mischel (1968) advocated for the study of cognitive processes, within-individual dynamics, and idiosyncratic ways in

which people behave to tackle the failure in finding stable between-person rank-ordering of behavior across situations in personality research. The within-person perspective seeks consistency in terms of a unique situation-behavior profile for each individual such that behavior is assessed within each distinct situation (Mischel & Shoda, 1995; Shoda, Mischel, & Wright, 1994). For example, rather than assessing children's aggressive behavior across different situations, Shoda and colleagues (1994) obtained behavioral ratings (e.g., compliance, aggression) for five distinct situations (e.g., teased by a peer, warned by an adult, punished by an adult) from children with significant adjustment problems in a summer camp over a six-week period. Each child's situation-behavior profile was randomly split into two halves, and correlation between the two random halves, i.e., intraindividual correlation, was significantly positive across children (average *r* ranged from .28 to .47), indicating that the profile tended to be stable within each child. The findings on profile stability suggested that the trait approach's aggregation across situations treats meaningful intraindividual variance as error (Shoda et al., 1994; Wright & Mischel, 1987). The authors further demonstrated that cross-situational consistency was a function of the similarity between two situations: as the shared features between two situations increased, the cross-situational consistency tended to increase.

Building on the findings of Shoda et al. (1994), Mischel and Shoda (1995) proposed the Cognitive-Affective Personality System (CAPS) theory of personality that describes the process by which psychological meaningful features of the situation trigger individual encoding and mediating processes that result in various cognitions, affect, and behavior. Further support for the situation-behavior profile approach was found in a reanalysis of data from Mischel and Peake (1982), as Mischel and Shoda showed that self-perceived consistency was significantly associated with the stability of intraindividual profiles but not cross-situational consistency.

Mischel and Shoda proposed that the correspondence between encountering situations and expressing behaviors can be simplified as "*if…(situation) then (behavior)*" behavioral signatures. Rather than generating a situation-free depiction of an individual's trait (e.g., "Eric tends to behave in a friendly manner"), a behavioral signature notes the within-person consistency of behavior-in-situation (e.g., "If other people act nice to him, Eric will behave in a friendly manner"). For instance, Shoda, Mischel, and Wright (1994) recorded a child's verbal aggression in five different situations, including approached by a peer, teased by a peer, praised by an adult, warned by an adult, and punished by an adult. Within the same child, his/her verbal aggression varied across situations, indicating a weak dispositional influence, but the verbal aggression × situation profile was stable across time points. Put another way, child A may have the tendency to become verbally aggressive when approached by a peer, whereas child B may tend to become verbally aggressive when warned by an adult.

Under this framework, the personality system used to understand an individual should incorporate both the pattern of behavioral signatures, which is the profile consisting of "*if…then…*" behavioral signatures, and the average level of behaviors, which is the traditional personality trait (Mischel & Shoda, 1995).

Unified Between- and Within-person Approaches

Several studies in recent years have started to bridge the gap between the traditional between-person trait approach and the within-person approach to personality. Meaningful trait-level information can be extracted from idiographic variation in behaviors under different situational influences (e.g., Fleeson, 2001; Fournier, Moskowitz, & Zuroff, 2008)

Fleeson (2001) conceptualized personality as the frequency distribution of personality states, where traits capture the mean of the frequency distribution. Personality states are defined

along the same construct spaces as corresponding traits but are transient rather than stable (Fleeson, 2001). For example, while trait agreeableness summarizes whether a person is caring, supportive, nurturing, and friendly *in general*, state agreeableness captures whether the same person is caring, supportive, nurturing, and friendly *at the moment.* Using experience sampling studies, Fleeson showed that the means of the within-person distributions of personality states were stable, supporting the trait perspective (see Epstein, 1979). Characteristics of the distributions' variability including standard deviation, skewness, and kurtosis were both stable and different across individuals, indicating that trait terms are insufficient in capturing how individuals engage in and respond to various situations in characteristically different manners.

Kammrath et al. (2005) established the linkage between *if...then...* behavioral signatures and personality traits (see Mischel & Shoda, 1995). In three studies that involved hypothetical scenarios presented to college students, the authors demonstrated that people's schemas of traits' expressions in behavior are bounded by the situation instead of being situation-free. Specifically, given a trait term, people can generate between-person *if (situation) then (behavior)* patterns. For example, for hypothetical individuals who were characterized as unfriendly, respondents expected them to show low levels of warmth *if* they interact with people who are unfamiliar or of low status, but not *if* they interact with people who are familiar or of high status. Conversely, people can also derive different traits when provided with different behavioral signatures, even though the average level of behavior remained constant. For instance, respondents rated a hypothetical individual higher on shyness if she interacts sociably with peers and unsociably with authority and lower on shyness if she interacts sociably with authority and unsociably with peers.

Whereas Kammrath et al. (2005) demonstrated a corresponding relationship between behavioral signatures and trait perceptions at the nomothetic level, Fournier et al. (2008) examined the nomothetic and idiographic behavioral signatures simultaneously. 113 working adults recruited from the community provided event-contingent surveys that recorded their social interactions over a 20-day period. The authors proposed the complementarity hypothesis in social interaction as the nomothetic behavioral signature: behaviors would conform to the principle of reciprocity on the agentic dimension (e.g., dominance in one party begets submission in the other party) and the principle of correspondence on the communal dimension (e.g., agreeableness in one party begets agreeableness in the other party). The results revealed significant between-person behavioral signatures in general. That is, across individuals, the principles of reciprocity on the agentic dimension and correspondence on the communal dimension were both supported. The results also indicated meaningful idiographic variation almost of the same magnitude as between-person variation. In other words, while all individuals respond to dominant partners in submissive ways, each individual differs on the degree to which he/she adheres to this reciprocity principle. More importantly, the results demonstrated the stability of both nomothetic and idiographic behavioral signatures.

In sum, the personality literature reviewed above indicates that (a) traits reflect an important aspect of personality and capture individuals' behavioral tendencies across a wide range of situations; (b) individuals tend to respond to changes in situations in idiographically consistent manners; (c) personality can be characterized beyond the trait as the mean of the distribution, but also in terms of variability and location. The review above has broad implications for I/O psychology, as the person's typical, situation-blind behavioral tendencies may not appropriately capture the person's behaviors at work. In the context of training and

transfer, relying on personality traits to predict training and transfer resembles the prediction of specific behavior from traits, and thus can be susceptible to the criticisms Mischel levied against the trait approach.

In the following section, I propose a multifocal perspective on personality that incorporates both situational influences and individual dispositions. Instead of viewing the person as being under the constant influence of stable dispositional characteristics, the multifocal perspective acknowledges the person's dynamic responses to changing social contexts. This perspective will serve as a framework to guide the application of personality in I/O research and practice, and the application of the perspective in training transfer will be an initial attempt to examine its feasibility.

A Multifocal Perspective of Personality

The multifocal view of personality builds on Fleeson's (2001) conceptualization of personality as density distribution of personality states and holds that personality varies in specificity ranging from personality states to traits. Rather than focusing on personality states as the sole constituent of personality traits, however, I contend that *personality states can first aggregate and coalesce into intermediate level units that shed important light towards understanding the person*. This concept of level is analogous to the vertical dimension of personality discussed by Buss and Craik (1983).

As an example, personality state distributions can be assessed at different levels of *temporal span,* ranging from momentary states, to daily/weekly/monthly distributions, and to stable traits. The intermediate level units reflect influences from both general trait and situational factors. From a theoretical perspective, the organization of personality states into meaningful intermediate units needs to consider the situation, which has been shown in the review above to

18

interact with traits and influence behavior. Although there are many possible ways the broader context can be defined (e.g., playing sports, traveling, at home), Roberts (2007) argues for the use of social role as the broader context. A social role is defined as "a set of behavioral expectations attached to a position in an organized set of social relationships" (Stryker, 2007, p.1). Roberts (2007) notes that social roles serves as a valuable venue for the study of contextualized personality because social roles span across a variety of situations that are similar in breadth to traits, enable further organization into meaningful dimensions, provide the situational context that guides behavior, and allow the same individual to vary across different roles. Thus, at this level, I focus on personality contextualized within social roles.

Figure 1 presents a schematic depiction of the multifocal perspective of personality, with the example focusing on conscientiousness domain. At the highest level of generality (Level A), conscientiousness is conceptualized as a frequency distribution across various life domains. At a more specific level (Level B), the focus is contextualized personality within broader social roles. A hypothetical person is less conscientious at home, somewhat conscientious at work, and more conscientious in other social settings. Note that this comparison is idiographic and bears no necessary relevance to other individuals. Furthermore, conscientiousness in any particular context or on any particular task can be identified and isolated at Level C. In the example, personality at work is conceptualized into three situational categories: (X) interacting with coworkers; (Y) working on tasks alone; (Z) interacting with customers. The following section reviews research at each level of analysis.

Figure 1. *Schematic Depiction of the Multifocal Perspective of Personality*

Level A: Trait Conscientiousness

Level B: Contextualized Conscientiousness

- - - -   Conscientiousness at home

———   Conscientiousness at work
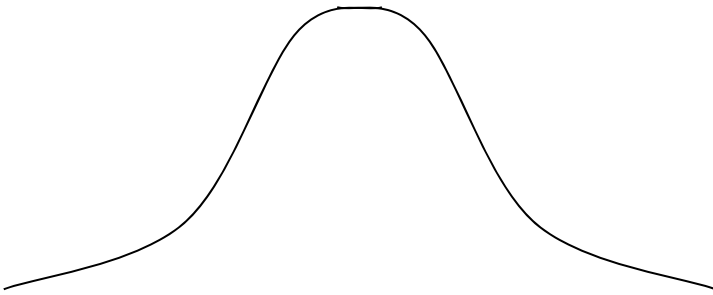
....   Conscientiousness in other social settings
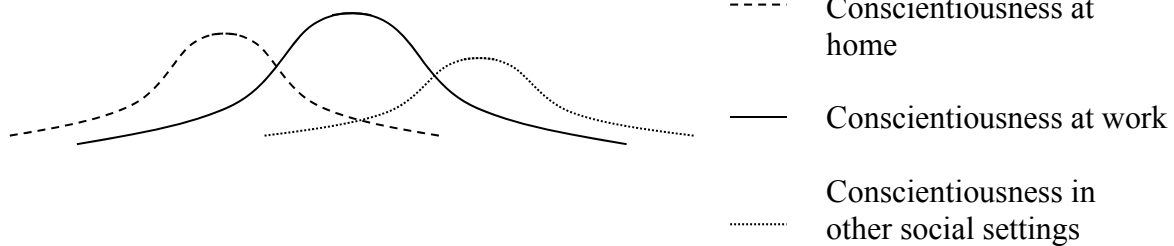
Level C: Task/Situation Specific Conscientiousness

X   Y   Z

X: Conscientiousness interacting with coworkers

Y: Conscientiousness working on routine tasks

Z: Conscientiousness interacting with
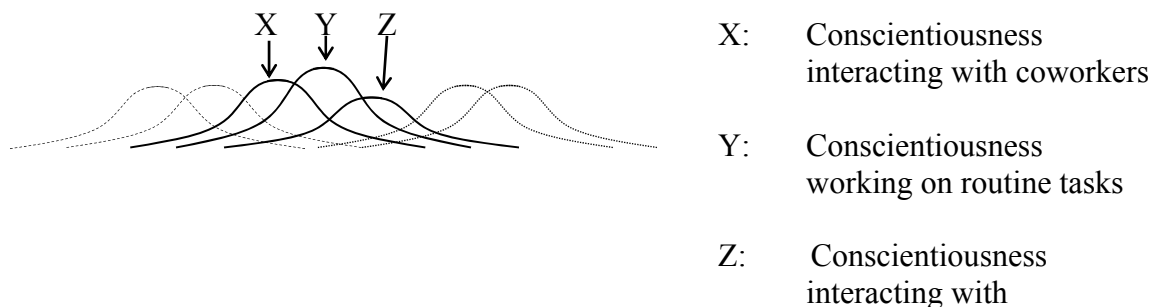
Level A – Trait Level Frequency Approach

At the trait level of generality, the frequency approach to personality is built on the notion that dispositions/traits serve as summary statements about individuals without causal inferences (Hampshire, 1953). Rather than assuming that traits cause individual behavior and result in

consistency, the frequency approach views traits as sociocultural concepts that stem from regularity in behaviors (Buss & Craik, 1980, 1981, 1983). It should be noted that the frequency approach holds an epistemologically distinct view of personality from the prevalent trait approach: rather than assuming that neurological structures *cause* the existence of traits (e.g., Allport, 1966; Costa & McCrae, 2008; Funder, 1991), the frequency approach deliberately avoids causal attributions. Behavioral consistency is further distinguished from dispositional consistency: the former concerns consistency of single acts, whereas the latter concerns the consistency of overall categorized act-trend as a summary (Buss & Craik, 1983). For example, when a person always arrives for work on time, it is an instance of behavioral consistency, as the single act of punctuality is repeated. When the person not only arrives for work on time, but also cleans his/her desk, abides by the rules, and takes care of detailed issues, it is interpreted as dispositional consistency, as different consistent acts coalesce and thus are categorized in a broader category.

On the Level A frequency distribution in Figure 1, whereas single acts may or may not be consistent, the disposition represented by the mean of the distribution tends to be stable (see Epstein, 1979). A personality system at this level involves two key variables: (a) trait, i.e., the average of the frequency distribution; and (b) variability, i.e., the spread of the frequency distribution. While a trait summarizes the person's tendency to perform a category of related acts (e.g., arriving on time, cleaning workspace, abiding by rules, and paying attention to details), the variability on the trait speaks to the person's tendency to perform these acts inconsistently across situations. Individual differences not only manifest in people's relative standing on their typical behavior level, but also exist in between-person differences in how individuals behave consistently across various situations (Bem & Allen, 1974; Fleeson, 2001).

21

Theories and research in personality corroborate the notion that people can differ in the degree to which they are consistent on a particular trait domain. First, the concept of variability is related to *traitedness*, the degree to which a nomothetic trait term differentially applies to each individual (Allport, 1937; Tellegen, 1988), or put another way, "the trait of having versus not having a particular trait" (p. 573, Baumeister & Tice, 1988). Framed in the language of traitedness theory, a person who is variable on state conscientiousness across situations is untraited, whereas a person whose state conscientiousness remains quite stable is traited, regardless of the actual trait level. Second, according to theory on self-monitoring, individuals differ in the degree to which they monitor and express their social behavior, such that some are more adept at changing their behavior to fit the situation while others are more consistent across various situations (Snyder, 1974; Snyder & Cantor, 1980). Other theories have also been proposed to account for the individual difference in varying behaviors to adapt to the situation (e.g., Ferris, Witt, & Hochwarter, 2001; Paulhus & Martin, 1988). Finally, individuals with different traits also self-select into different situations (Diener, Larsen, & Emmons, 1984; Scollon, Kim-Prieto, & Diener, 2003), which further affects the variability in the expression of behaviors (Emmons & Diener, 1986). Unlike these theoretical positions that seek to explain individual differences in variability, the frequency approach does not ascribe to any particular causal mechanism to completely account for the variability from a theoretical point of view. Rather, similar to its conceptualization of the trait level, the frequency approach *describes* individuals' general tendencies to vary across all situations on a personality domain and relies on the regularities in individual behavioral responses and in situations to forecast about their future behaviors.

Edwards and Woehr (2007) adopted a frequency perspective of personality and hypothesized that individuals whose acts vary less on a trait domain would be more predictable, as manifested in a higher association between self and other ratings of personality. The authors assessed participants' personality on the Big Five domains using informant reports with the traditional Likert rating format and using self-reports of relative frequency of acts over the previous six months. Specifically, participants reported the frequency (in percentage) with which any statement (e.g., "I am the life of the party") would describe their behavior at three different levels (i.e., % of the time very accurate, % of the time neither inaccurate nor accurate, and % of the time very inaccurate). For the frequency rating, participants' trait level was the average of frequency ratings, whereas their variability on each trait was assessed as the average within-item standard deviation. Lending support to the hypothesis, participants' self-report trait level from the frequency approach, which showed similar psychometric properties compared to the traditional Likert-type scales, interacted with respective variability in predicting informant ratings of extraversion, agreeableness, and conscientiousness. The results demonstrated the additional information psychologists can gather about a person by considering the variability of his/her act distribution at the most general level.

The variability in the frequency approach at the highest level has also been shown to moderate the effect of the mean trait level. Fleisher, Woehr, and Edwards (2007) focused on the effects of personality on teammate ratings of individual task performance in a business simulation. The study showed that, beyond the main effect of the average conscientiousness level, the variability in conscientiousness obtained from the frequency approach moderated the effect of mean-level conscientiousness, such that the effect of conscientiousness on performance was stronger for individuals whose conscientiousness was less variable.

23

Level B – Contextualized Trait

Whereas the frequency approach at the most general level describes individual personality across all situations, behavioral tendencies in different broad contexts may differ from each other. Contextualized personality offers more detail about a person's personality system and enables a closer look at between-person difference on variability at the general level. In the example in Figure 1, Level B, a person's general conscientiousness distribution can be decomposed into several contextualized conscientiousness subdistributions, such as conscientiousness at home, at work, and in other social roles.

Although past research has used the terms of identity and self-conceptions (e.g., Donahue, Robins, Roberts, & John, 1993; Roberts & Donahue, 1994), the phenomenon of interest here extends beyond how a person construes himself/herself and pertains to a person's actual frequency of behavior as if it were objectively available. The self-report method is but one approach to estimate the person's distribution. Researchers have adopted the term "contextualized trait" to refer to a person's typical behavioral tendency within a social role context (e.g., Heller, Ferris, Brown, & Watson, 2009, Wood, 2007). From the conceptual level, the contextualized trait is a person's mean on his/her frequency distribution on the trait dimension within a particular role.

A number of studies have indicated the advantages in conceptualizing and investigating contextualized traits within social roles. As one of the first studies that examined the effects of role-contextualized traits, Roberts and Donahue (1994) hypothesized that contextualized traits would differ across social roles because social role contexts impose structure and prescribe norms which are further internalized (Stryker & Statham, 1985). Based on the bandwidth-fidelity tradeoff (Cronbach & Gleser, 1957), which states that a general measure would predict a variety

of behavior with lower accuracy whereas a narrower measure would only predict a corresponding behavior but with higher accuracy, Roberts and Donahue also hypothesized that contextualized traits would predict role-specific outcomes more accurately. They obtained contextualized self-ratings from 89 middle-aged women across social roles such as friend and worker and found support for both hypotheses above. Ratings differed significantly across social roles. More importantly, the pattern of relationships between personality and outcomes conformed to expectation: context-free traits correlated moderately with all outcomes across roles, whereas contextualized traits correlated strongly with outcomes specific in that role but not in other roles. For example, general positive affect was moderately associated with satisfaction with marriage and at work, but work-specific positive affect was highly associated with satisfaction at work. The authors suggested using contextualized trait measures to predict outcomes specific to roles to maximize prediction.

Donahue and Harary (1998) surveyed readers of a popular magazine on psychology on their general traits and contextualized traits such as in work role, in partner role, and in friend role on the Big Five domain. Using multivariate analysis of variance, the within-subjects effects of roles interacted with Big Five traits in affecting respondents' self-report contextualized trait levels, in addition to the main effects of roles and traits. The results suggested that social roles exerted trait-specific influence on contextualized traits (Donahue & Harary, 1998). For example, regarding the effects of work role, work contextualized conscientiousness, extraversion, emotional stability, and to a lesser extent, agreeableness were significantly higher than the corresponding general traits, but work contextualized openness was significantly lower than general openness.

Wood and Roberts (2006) shed light on the linkage between general and role-contextualized traits. The authors proposed a personality model that has different levels of specificity in nature but focuses only on the mean level (e.g., "I am generally friendly" at the general level, "At work I am unfriendly" at the role level) without modeling individual difference in variability. Undergraduate students who belong to various social organizations provided ratings of their general and role-contextualized (in romantic relationships; in social organizations) extraversion and emotional stability. In support of their model, general traits captured the commonality between the two contextualized traits, whereas contextualized traits mediated the relationship between generalized traits and role-specific outcomes (role burnout, satisfaction, performance). Further, a follow-up survey from a subsample of the participants indicated that changes in role experiences affected corresponding contextualized traits, which in turn affected general trait levels. For example, change in positive experience within a role was associated with change in contextualized extraversion, whereas contextualized extraversion at Time 1 predicted general extraversion at Time 2, after controlling for general extraversion at Time 1.

Research in I/O psychology has documented the advantage of contextualizing personality traits over general traits in predicting outcomes of interest, although such approach has been termed *frame-of-reference* rather than contextualized personality. Conscientiousness at school, corresponding to the student role, was more strongly associated with school performance (college cumulative GPA) than general conscientiousness in undergraduate students (Schmit, A. M. Ryan, Stierwalt, & Powell, 1995). Further, conscientiousness at school showed incremental validity in predicting undergraduate academic performance, above and beyond general conscientiousness (Bing, Whanger, Davison, & Van Hook, 2004). Field studies also lent support

26

to the benefit of contextualizing traits over general traits. Work-contextualized extraversion and openness to experience predicted supervisor ratings of customer service managers' job performance significantly better than corresponding general trait measures (Hunthausen, Truxillo, Bauer, & Hammer, 2003). Customer service associates' job performance, as rated by their supervisors, was associated with their work-contextualized extraversion and conscientiousness but not their general extraversion and conscientiousness (DeGroot, & Kluemper, 2007). Contextualized traits also showed higher relationships with job satisfaction, work frustration, turnover intention, and absenteeism than general traits (Bowling & Burns, 2010). The work-contextualized approach has been applied to traits other than the Big Five. Examining the effects of contextualization on core self-evaluations, the fundamental beliefs one holds about one's self-worth and competence (Judge, Locke, & Durham, 1997; Judge, Locke, Durham, & Kluger, 1998), Bowling, Wang, Tang, and Kennedy (2010) compared the associations between general/contextualized core self-evaluations and work outcomes such as job satisfaction and organizational commitment. Although they did not find significant differences between the general and contextualized core self-evaluations in terms of relationships with work outcomes, contextualized core self-evaluations provided incremental prediction of the outcomes above and beyond the general measure. In a meta-analysis, work locus of control was found to correlate with work outcomes such as job satisfaction, affective commitment, and burnout more strongly than general locus of control (Wang, Bowling, Eschleman, 2010).

Lievens, De Corte, and Schollaert (2008) offered an alternative explanation for the effects of contextualizing personality. Undergraduate students filled out items on conscientiousness and two facets of conscientiousness with two within-person conditions: at work and at school, and they reported their GPA as criterion. Using random sampling from the available responses, the

authors demonstrated that, when respondents adopted different between-person frames-of-reference, with some reporting work-contextualized personality and other reporting school-contextualized personality, the validities of personality measures on GPA monotonically increased as the percentage of respondents reporting school-contextualized personality increased. In addition, when respondents adopted different frames-of-reference within-person, such that the same respondent reported work-contextualized personality on some items and school-contextualized personality on other items, the validities of personality measures on GPA monotonically increased as the percentage of items were responded to with the school context in mind. Although the authors argued that "Use of a frame of reference further leads to higher validity as a result of the reduction of between-person variability and within-person inconsistency" (p.268), their studies only demonstrated that increased between-person variability and within-person inconsistency in responding *can* reduce validity, instead of showing that participants actually engaged in such responding behavior. A closer look at the argument by Lievens et al. (2008) revealed the assumption that participants would not be capable of reporting their general trait level but would need to interpret personality items with a particular context. A viable alternative explanation can be generated that is consistent with the current framework (also see Wood & Roberts, 2006; Wood, 2007): a person's typical behavior within a role context differs from his/her typical behavior across various contexts, and such difference varies across individuals. The person × role interaction that is extraneous to the prediction of the person's future behavior within the same role context is removed by assessing contextualized personality.

The research reviewed above pertains primarily to the level of contextualized personality within social roles, i.e., the mean of frequency distributions on Level B. Yet only limited research has focused on variability. Specifically, two types of variability are of interest here: (a)

28

variability of the mean of frequency distribution across different roles, and (b) variability of behaviors within the frequency distribution for a particular role. Next, I discuss each type of variability in detail.

Level B – Contextualized Distribution

Variability across different contextualized traits is conceptually and statistically related to variability at Level A. A number of studies have documented that contextualized traits vary across different social roles (e.g., Donahue & Harary, 1998; Roberts & Donahue, 1994). For example, a survey of 147 married couples revealed that respondents were significantly more conscientious, more open to experience, and less extraverted at home (Heller et al., 2009). If roles influence contextualized traits to the same extent for each individual, then the variability across different contextualized traits merely represents the main effect of roles. Thus, to use variability across contextualized traits as a parameter to meaningfully describe a person's personality system, there should be sizeable between-person differences in the variability. Bleidorn (2009) demonstrated such between-person difference using a bottom-up approach by obtaining personality states at the occasion level nested within roles and aggregated to the role level. The author conducted an experience sampling study on 52 undergraduate students, with each participant reporting their personality states and the associated social roles six times a day for 10 consecutive days. The study revealed significant effects of roles, such that respondents were in general more conscientious and neurotic when they were in a student's role and more extraverted, agreeable, and open to experience when in a friend's role. More importantly, the associations between the focal roles (friend and student) and personality states varied significantly across respondents. In other words, the within-person regression slopes predicting personality states from the focal roles differed significantly as a function of the respondent, with

29

some individuals demonstrating stronger associations than others. For example, while some individuals were more conscientious in the friend role, other individuals became less conscientious as they took on the friend role. The differential variability across individuals was not associated with the achievement or affiliation goals participants possessed (Bleidorn, 2009).

A number of papers have investigated variability across different role-contextualized traits as a dispositional factor. Donahue and colleagues (1993) tested two opposing hypotheses regarding variability on role-contextualized traits: (a) intraindividual variability reflects individuals' flexible and adaptive responses to rules and expectations of different social roles (e.g., Gergen, 1971; Snyder, 1974) versus (b) intraindividual variability represents a lack of integration caused by intrapsychic conflicts (e.g., Lecky, 1945; Block, 1961). Using both cross-sectional and longitudinal studies, the authors found support for the second hypothesis that intraindividual variability, assessed as the proportion of variance in contextualized trait ratings that was not shared across the roles, was associated with poor emotional adjustment and difficulty in socialization. Several other studies have also reported undesirable effects of intraindividual variability measured using the same method, such as correlating negatively with role authenticity and positively with role conflict (Sheldon, R. M. Ryan, Rawsthorne, & Ilardi, 1997) as well as correlating negatively with emotional adjustment and psychological well-being (Diehl, Hastings, & Stanton, 2001).

However, Baird, Le, and Lucas (2006) showed that the method used to assess cross-role personality variability by Donahue et al. (1993) confounded error variance with true within-person variability. They measured participants' contextualized personality in six social roles, including friend, romantic partner, family member, worker, student, and stranger, and derived an unconfounded index for intraindividual variability across roles, which was unrelated to well-

being. In addition, the authors found that intraindividual variability was positively associated with other indicators of intraindividual variability, including: (a) the difference between self-report and informant-report of Big Five traits and (b) the difference on trait levels measured at two different time periods using experience sampling methodology. Further, intraindividual variability was stable over time. The authors suggested that intraindividual variability, measured as the variability across social role contexts, represents a broad, global trait. Similarly, Heller, Watson, Komar, Min, and Perunovic (2007) proposed to study role-based within-individual variability in personality in juxtaposition with between-individual variability in traits with multilevel modeling, examining the linkage between variability and dispositional factors such as self-monitoring and lack of self-esteem.

Variability of personality states within a particular role-contextualized trait, on the other hand, warrants further discussion as it has received limited research attention. It is reasonable to expect one's trait-related behavior to vary within a particular role for at least two reasons. First, a role comprises situational variations that are similar in breadth to one's general experience (Roberts, 2007). For instance, the state openness of an employee is likely to change from a task that is mundane and repetitive to one that is highly challenging and requires creative solutions. Second, a role often constitutes a cluster of subroles and each subrole presents its own norms, goals, and expectations. For example, the role of a family member can be categorized further into subroles such as a son, a husband, a father, and a brother; the role of a worker can be divided into subroles such as a colleague and a subordinate. Two recent studies that focused on Level C distributions of personality states at work illuminate the variability at Level B; they are summarized in the next section.

Level C – Task/Situation-contingent State Personality

Huang and A. M. Ryan (2011) investigated the extent to which customer service employees' personality states at work are associated with situational characteristics using experience sampling methodology. Service employees reported their personality states in interpersonal interactions at work and the situational characteristics. Workers' state conscientiousness varied with the demand of the task, and their state extraversion and agreeableness also varied with the friendliness of the interactional partner; all three associations differed significantly across individuals. That is, although there were a general nonzero association between a personality state and the situation, individuals differed in the strength of this association such that the personality state was more closely related to the situation in some individuals than others. Their study also included three different types of interactional partners: (a) coworker, (b) supervisor, and (c) customer. Average state conscientiousness, state extraversion, and state agreeableness differed significantly between interactions with customers and interactions with supervisors and coworkers (see Huang, 2009). Additional analysis on the dataset, conducted for the purpose of the present manuscript, revealed that service employees differed significantly in the extent to which their average personality states varied from one role to another.

The potential benefit in examining the contingency between situation characteristics and personality states was further elucidated in Minbashian, Wood, and Beckmann (2010), which focused on task-contingent conscientiousness, defined as the association between state conscientiousness and task demand. The authors argued that task-contingent conscientiousness may represent a stable individual difference variable that enables prediction of adaptive performance. They conducted an experience sampling study on 123 managers at work over a

three-week period. On average, managers' state conscientiousness was positively associated with task demand, and the association varied significantly across individuals. Trait conscientiousness and need for cognition predicted task-contingent conscientiousness, such that individuals with low conscientiousness and high need for cognition had stronger within-person associations between task demand and state conscientiousness. Further, task-contingent conscientiousness was associated with adaptive performance on a cognitive letter ordering task, controlling for trait conscientiousness and need for cognition.

It should be noted that how one identifies and defines the situation at Level C can be a point of debate. The situation is likely determined by the practical purpose. For example, a customer service training intervention may target service employees' Level C distributions of state agreeableness when interacting with customers, whereas a workplace safety survey can focus on workers' state conscientiousness when operating machinery.

Summary of the Multifocal Personality Framework

In sum, building on Fleeson's (2001) distributional view of personality states and research on contextualized personality within social roles (e.g., Wood & Roberts, 2006), the multifocal framework of personality integrates the consistent and variable aspects of one's personality expression and proposes three levels of specificity where one's behavioral distributions may be examined. An individual's personality on any particular domain, such as agreeableness, may be characterized not only as the typical behavioral tendency, but also the degree to which the behavioral tendency varies across contexts and fluctuates together with specific task characteristics.

In the next section, I will place the multifocal framework of personality in the context of training and transfer and discuss how the framework can be utilized to predict and facilitate

training and transfer. The training context affords a unique opportunity to put the personality framework to test because it enables a closer look at trainees' personality expressions in a bounded setting rather than examining across a wide range of settings. Thus, the Level B distribution *in learning contexts* can be evoked to provide prediction of trainees' behaviors in the training setting. Furthermore, in subsequent transfer of learned knowledge and skills, trainees' personality can play an important role in determining the amount of attention and effort they exert to the transfer task, as well as the degree to which trainees continue to work on the transfer task in the face of difficulty and setbacks. As an additional behefit, the training environment allows for the intervention and assessment of trainees' personality states.

Personality, Training Outcomes, and Transfer of Training

Prior to the 1990s, the majority of training evaluation has followed Kirkpatrick's (1976) four-level approach, examining training outcomes as trainee reactions, learning, behavior, and organizational results in sequence, with each prior level serving as a causal determinant of each later level (Alliger & Janak, 1989). A seminal article by Kraiger, Ford, and Salas (1993) laid the foundation for subsequent conceptualization of training outcomes. Kraiger et al. (1993) argued that training outcomes are multidimensional in nature and proposed three broad categories of training outcomes, including cognitive, skill-based, and affective outcomes. Each category of outcome consists of specific constructs. Cognitive outcomes include declarative knowledge, knowledge organization, and cognitive strategies; skill-based outcomes include skill compilation and automaticity; affective outcomes include attitudinal and motivational factors. While cognitive and skill-based outcomes were already assessed to indicate learning, the identification of affective outcomes provided new grounds for understanding the effects of training. Furthermore, the delineation of the three broad training outcomes facilitates investigations of the

nomological network around the training outcomes (e.g., Kozlowski et al., 2001). A number of

studies have examined how personality can influence learning (e.g., Lievens, Harris, van Keer, &

Bisqueret, 2003; Stewart, Carson, & Cardy, 1996) and moderate the effects of training

interventions (e.g., Cheramie & Simmering, 2008; Gully, Payne, Coles, & Whiteman, 2002).

While training outcomes provide important venues for training evaluation (Kraiger et al.,

1993), organizations essentially pay closer attention to transfer of training (Goldstein & Ford,

2002). Transfer of training extends beyond the boundary of the training program. The study of

transfer, in its early years of research development, was focused in the educational field,

pertaining to how learning in one domain can influence learning in other domains (Thorndike,

1933). Researchers have proposed different dimensions in which transfer processes can differ.

Gagne (1965) distinguished between *lateral* and *vertical transfer.* Lateral transfer involves

generalization of learned skills/knowledge across a variety of situations, whereas vertical transfer

refers to compilation of skills/knowledge towards acquisition of a superordinate skill or piece of

knowledge. Royer (1979) proposed the notion of *near* versus *far transfer*, capturing the degree to

which stimulus complex of the transfer situation is similar to the learning situation. Barnett and

Ceci (2002) further specified the contexts in which far transfer can occur. A far transfer exists

when knowledge and skills learned are generalized to a new *knowledge domain* (e.g., from

psychology to physics), a new *physical context* (e.g., from workplace to church), a different

temporal context (e.g., from the current session to five months later), a new *social context* (from

individual to large group), and a new *modality* (from written to oral). Yelon and Ford (1999)

proposed two additional dimensions that may affect the transfer process. First, a training

program can vary on skill adaptability, ranging from *closed skills* training to *open skills* training.

In closed skills training, trainees follow and model clearly prescribed set of behaviors, with

limited leeway to deviate from the proper way of performing, as can be seen in the example of motor skills training. In contrast, trainees of open skills training, such as interpersonal and leadership training, typically receive generalized principles and need to develop individualized ways to apply the principles. Second, the transfer context can differ on *the degree of supervision*, ranging from highly supervised to highly autonomous.

Geared toward understanding transfer in the organizational setting, Baldwin and Ford (1988) delineated two components of transfer: generalization and maintenance: *generalization* involves the application of knowledge and skills learned from the training setting to different settings, people, and situations, whereas *maintenance* pertains to the extent to which trainees manage to retain the knowledge and skills over time (see Blume et al., 2010). Organizational researchers have incorporated these two components in their investigation of the transfer phenomenon. For example, Richman-Hirsch (2001) studied transfer of customer service skills training in terms of both components: maintenance was defined as the use of specific trained behaviors on the job over time, whereas generalization was operationalized as the application of customer service behaviors to interactions with coworkers.

Baldwin and Ford's (1988) review of the transfer literature provides a framework for understanding how personality factors can influence training transfer. The authors proposed three classes of antecedents: trainee characteristics, work environment, and training design. Trainee characteristics consist of factors such as ability, personality, and motivation, whereas work environment variables consist of various support and opportunity to use the trained skills. In Baldwin and Ford's framework (see Figure 2), trainee characteristics and work environment affect transfer through two pathways. First, these antecedents influence the degree to which trainees learn, which in turn affect two components of transfer, including the generalization of

36

learning knowledge and skills to the job and the maintenance of knowledge and skills over time.

Second, both trainee characteristics and work environment exert direct effects on training

transfer. In other words, factors such as personality and supervisory support may lead to the

accrual of knowledge and skills on the job, beyond what they contribute through increased

learning.

Figure 2. *Reproduced Conceptual Framework from Baldwin and Ford (1988)*
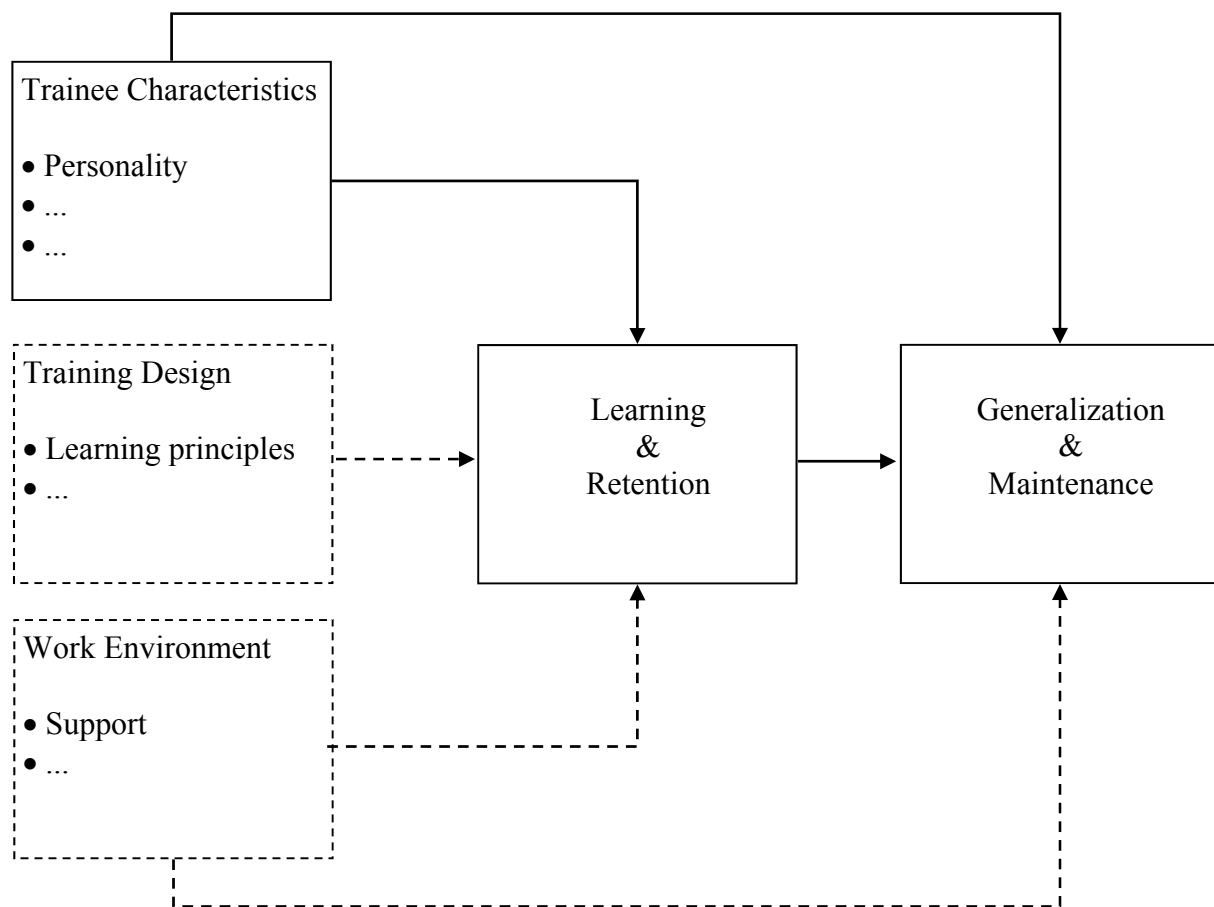
Note. Solid lines and boxes will be investigated in the present study; dashed lines and boxes will

not.

Traits, Learning, and Transfer

In this section, I will review how three trainee characteristics can influence training outcomes, including two Big Five personality traits: (a) conscientiousness, and (b) openness to experience, and a stable motivational trait, (c) mastery goal motivation.

It should be noted that the effects of Big Five traits have been studied extensively in the personnel selection setting. Training proficiency, primarily in the form of proficiency ratings by raters (e.g., Barrick & Mount, 1991), is one of the criteria used to validate personality traits. Several meta-analytic studies (e.g., Barrick & Mount, 1991; Barrick et al., 2001; Salgado, 1997) have reported positive relationships between conscientiousness and training proficiency (e.g., $\rho =$ .23, Barrick & Mount, 1991) and between openness and training proficiency (e.g., $\rho = .25$, Barrick & Mount, 1991). Furthermore, Schmidt, Shaffer, and Oh (2008) simultaneously examined the effects of cognitive ability, conscientiousness, and emotional stability in a meta-analytic path analysis and discovered that conscientiousness predicted training performance over and above cognitive ability. However, these effects may not accurately reflect the relationships between personality traits and training outcomes because individuals may have had preexisting difference on the rated criteria prior to the training. Therefore, the review below will be directed towards studies that assessed the effects of traits on training outcomes in the training literature, with preexisting difference on the outcomes minimized either by design or by control.

Conscientiousness

Conscientiousness encompasses characteristics such as persistent, hardworking, dependable, and achievement-oriented. As conscientious individuals tend to set higher standards for their performance and tend to strive for excellence (Costa & McCrae, 1992), conscientiousness trainees can be more motivated to learn (Gellatly, 1996). Thus,

consciousness serves as a distal antecedent to individuals' proximal motivational states (Kanfer, 1991; Barrick, Mount, & Strauss, 1993). Two specific motivational mechanisms have been investigated in the literature: (a) self-efficacy and self-deception, and (b) motivation to learn.

Self-efficacy and self-deception. Martocchio and Judge (1997) proposed two conflicting pathways through which conscientiousness can affect learning. They argued that while conscientiousness can foster a stronger sense of self-efficacy, it can simultaneously lead to a biased view of one's achievement, termed self-deception. In a field study of software training, the authors found support for their hypotheses. Whereas highly conscientious trainees reported having higher levels of self-efficacy, which in term led to greater learning, these trainees also tended to show higher levels of self-deception, which were detrimental to learning. Interestingly, conscientiousness had a negative relationship with a composite measure of learning.

Adding the consideration of time, Lee and Klein (2002) argued that self-deception is a stable trait whose effect may be mitigated as the inaccurate perception becomes discounted by new, incongruent information as training progresses over time. Their study of an undergraduate international business course supported the notion: whereas self-efficacy positively predicted learning at both the early and later stages of training, self-deception negatively predicted learning only at the early stage but not at the later stage. In addition, although conscientiousness was positively associated with learning at the later stage, neither self-efficacy nor self-deception mediated such relationship.

Motivation to learn. Trainee's motivation to learn has been proposed as another mediating mechanism through which conscientiousness affects learning. Drawing from Vroom's (1964) expectancy theory, Colquitt and Simmering (1998) argued that highly conscientiousness

39

trainees would (a) perceive higher expectancy to achieve the learning tasks due to assessment of personal resources in relation to task requirements; and (b) place a higher valence in learning due to stronger achievement orientation. The authors studied trainees over a six-week management course and found support for the notion: expectancy and valence partially mediated conscientiousness's effect on motivation to learn, which further predicted actual learning. Thus, a conscientiousness-motivation-learning linkage was delineated.

The focal role of motivation to learn received a closer examination in a meta-analytic path analysis by Colquitt, LePine, and Noe (2000). The authors argued that motivation to learn serves to connect distal antecedents such as conscientiousness, anxiety, training climate and learning outcomes such as declarative knowledge and skill acquisition. The meta-analytic finding regarding the effects of conscientiousness, however, was counterintuitive. Although conscientiousness was positively associated with motivation to learn, which further predicted acquisition of knowledge and skills, the effects of conscientiousness on these two learning outcomes were around zero ($rc = -.01$, k = 3 and $rc = -.05$, k = 6). Although based on small numbers of studies, the meta-analytic findings suggest that conscientiousness may have mixed effects on learning outcomes.

Conscientiousness and learning. The overall null effect of conscientiousness on learning warrants further consideration of the situation under which learning occurs. Situational strength may account for the weak effects of conscientiousness on training outcomes. As an umbrella term, situational strength indicates the presence of various situational characteristics that restrict the expression of non-cognitive individual differences (Mischel, 1977; Mullins & Cummings, 1999; Snyder & Ickes, 1985; Weiss & Adler, 1984). Based upon a review of published literature, Meyer, Dalal, and Bonaccio (2010) proposed a four-facet structure for situational strength,

including (a) *clarity*, the extent to which cues pertaining to responsibilities are clearly presented;

(b) *consistency*, the extent to which different performance cues are compatible with each other;

(c) *constraints*, the extent to which an individual is bounded by external forces beyond his/her

control; and (d) *consequences*, the extent to which the individual's behavior can lead to positive

or negative implications. Situational strength, as measured by the perceived autonomy at work,

moderated the effects of personality factors on managers' job performance, such that

conscientiousness and extraversion were more strongly associated with managers' performance

when they work in a more autonomous work environment (Barrick & Mount, 1993). At the

occupation level, situational strength also moderates the relationship between conscientiousness

and job performance, such that stronger meta-analytic association was found in occupations with

weaker situational strength (Meyer, Dalal, & Bonaccio, 2009).

A typical training environment may possess characteristics that resemble a strong

situation, as the trainee receives clear instructions to learn (clarity) and compatible goals

(consistency), with limited control of the learning environment (constraints). Sometimes, the

trainee also expects reward for effective learning while facing negative consequences for failing

to learn (consequences). Thus, the effects of personality may be restricted in such a training

setting.

Not all training activities, however, occur in strong situations. For example, employees

may engage in voluntary training to update themselves on some technical issues, and more and

more informal training materials exist online for individuals to advance their knowledge and

skills. Training activities in weak situations warrant the investigation of personality's influences

on learning and transfer. A particular weak training situation is learner-controlled computer-

based training, where learners are provided with the content, pace, and amount of feedback in the

training environment. The role of personality factors such as conscientiousness can be more pronounced relative to a constrained training environment.

Hypothesis 1(a): In a learner-controlled training environment, trainee trait conscientiousness will predict acquisition of knowledge and skills.

As noted above, the transfer context enables personality to further exert influence. As trainees transition from the learning setting to the transfer setting, the degree to which they are motivated to apply the newly acquired knowledge and skills can influence how well they perform the transfer tasks. As a distal antecedent to such motivation, personality variables may influence the transfer outcome. The effect of conscientiousness on transfer likely resembles its hypothesized effect on learning. Conscientious individuals are more likely motivated to apply the knowledge and skills they just acquired, and they may persist in their effort despite temporary setbacks and difficulties. Other typical conscientious behaviors that may enhance transfer behavior include making plans to implement new skills and trying to be more attentive to the transfer tasks. Indeed, a meta-analysis showed a moderate relationship between conscientiousness and transfer ($N = 433$, $k = 5$). Thus:

Hypothesis 1(b): In a learner-controlled training environment, trainee trait conscientiousness will predict transfer of training.

Openness to experience

Openness to experience involves a tendency to be curious, imaginative, and intellectual. Whether in a training setting, where new information is imparted, or in a transfer setting, where the trainee sees an opportunity to practice the newly acquired skills, individuals high on the

openness factor are more likely to appreciate the novelty of the tasks and environment, tolerate the ambiguity, and respond with a heightened level of interest (Tesch & Cameron, 1987). For instance, openness predicted managers' training performance after cross-cultural training (Lievens et al., 2003). In addition, openness has been found to relate to undergraduate academic performance (Chamorro-Premuzic & Furnham, 2008).

Openness can also facilitate the effect of training interventions in enhancing learning. Using computer simulation training, Gully et al. (2002) found that openness moderated the effect of error encouragement training intervention on knowledge and skill acquisition, such that individuals high, as opposed to low, in openness benefited more from error encourage training.

Further, trainees whose behavioral tendencies include the openness towards new concepts and ideas are more ready to experiment with the newly acquired skills in new contexts. Therefore, individuals high on openness can more readily apply the newly acquired knowledge and skills to the transfer tasks. These trainees may also come up with novel solutions to problems at hand when adapting to the transfer context takes more than simple application of trained knowledge and skills.

Given the general tendency for openness to enhance learning and transfer, it is expected openness will serve as a distal antecedent to learning and transfer in the present context.

Hypothesis 2: In a learner-controlled training environment, trainee trait openness will predict (a) acquisition of knowledge and skills; and (b) transfer of training.

Trait mastery goal orientation

Trait mastery goal orientation originates from Dweck and colleages' research on people's lay theories of intelligence (e.g., Dweck, 1986; Dweck & Leggett, 1988; Heyman & Dweck,

1992; Licht & Dweck, 1984). When individuals believe their intelligence is malleable, they will seek to improve their competency by setting mastery goals (Dweck, 1986). Trait mastery goal orientation captures the relatively stable dispositional proclivity to increase one's competency in a given activity (Button, Mathieu, & Zajac, 1996). Brett and VandeWalle (1999) examined the effect of trait goal orientation in a presentation skills training for MBA students. The authors showed that mastery goal orientation was positively related to students' content goals relevant to skill development. These developmental goals subsequently predicted greater training performance.

Empirical research generally supports the positive effect of mastery orientation on training performance (e.g., Orvis, Fisher, & Wasserman, 2009; Sujan, Weitz, & Kumar, 1994; Towler & Dipboye, 2001), as mastery oriented individuals tend to seek challenges (Sujan et al., 1994), engage in metacognitive activities (Ford, Smith, Weissbein, Gully, & Salas, 1998; Schmidt & Ford, 2003), exert more effort to the tasks at hand (Fisher & Ford, 1998), and stay on the task after receiving feedback (VandeWalle, Cron, & Slocum, 2001). Payne, Youngcourt, and Beaubien (2007) examined mastery goal orientation as a distal predictor of learning in a meta-analytic study. The results indicate that mastery goal orientation is positively associated with learning ($\rho = .16$, $k = 43$, $N = 8,676$), although the overall size of the effect was small.

Relative to the number of studies examining the effects of trait mastery goal orientation on learning outcomes reviewed above, only several published studies included the effects of trait mastery goal orientation on transfer. Ford et al. (1998) examined whether learning strategies mediated the effects of mastery and performance goal orientation on learning outcomes and transfer performance. Using computer simulation training, the authors found that high mastery goal orientation resulted in better learning strategies applied, which further led to better learning

44

and transfer. Similarly, Fisher and Ford (1998) showed that trainees predisposed to mastery goal orientation exerted more effort and learned better in a multiple cue probability task. However, mastery goal orientation did not have a significant effect on the application of learned knowledge. B. S. Bell and Kozlowski (2002) further showed that the effect of mastery goal orientation on performance on a simulation task is moderated by cognitive ability, such that goal orientation was more strongly associated with performance for high ability individuals. Finally, B. S. Bell and Kozlowski (2008) showed that trait mastery goal orientation affected transfer through intrinsic motivation.

Hypothesis 3: In a learner-controlled training environment, trainee trait mastery goal orientation will predict (a) acquisition of knowledge; and (b) transfer of training.

Hypotheses 1 through 3 propose the effects of global personality traits on knowledge acquisition and transfer of training. Next, I will discuss specific traits that can better predict learning and transfer.

Bandwidth-fidelity tradeoff

In psychological measurement, *bandwidth-fidelity dilemma* describes the tradeoff in between obtaining general information on a broad cluster of individual attributes or characteristics and achieving a high degree of precision on a specific attribute or characteristic (Cronbach & Gleser, 1957; Shannon & Weaver, 1949). Greater fidelity comes at the expense of bandwidth and vice versa. Researchers disagree on whether broad or narrow personality measures should be used to predict job performance and enable selection of qualified employees. Some argue for the use of narrow traits (e.g., Hough, 1992; Tett, Jackson, Rothstein, & Reddon, 1994), as relying on broadband traits risk masking the predictive validity of the most relevant

facets (Hough, 1998) and potential curvilinear relationships (Paunonen & Nichol, 2001). Others advocate the use of broadband traits as job performance is inherently complex and multidimensional (Ones & Viswesveran, 1996; J. Hogan & Roberts, 1996). Extant research generally supports the broadband approach: Compound personality measures showed higher predictive validities for overall job performance than homogeneous personality variables (Hough & Oswald, 2005). However, facets within the same personality factor differ in predictive validities when used to predict narrowly-defined job performance. For example, within conscientiousness, the achievement facet was a better predictor for sales effectiveness than the dependability facet (Hough & Oswald, 2005).

The notion that the bandwidth of the predictor and the outcome need to be matched to maximize prediction (J. Hogan & Roberts, 1996; Ones & Viswesvaran, 1996; Schneider, Hough, & Dunnette, 1996) can illuminate the prediction of training outcomes from trainee personality. On the predictors' side, both conscientiousness and openness are broadband personality measures (Paunonen, Jackson, Trzebinski, & Forsterling, 1992) that encompass several facets (Costa & McCrae, 1995). On the other hand, the assessment of training outcomes represents a much narrower dimension than overall job performance, depending on specific learning behavior within a specific context. Thus, better predictions of training outcomes may be achieved by examining relevant narrower traits under conscientiousness and openness.

Researchers have identified two primary aspects for conscientiousness: (a) dependability, that is, being organized, responsible, and dutiful; and (b) achievement orientation, that is, being industrious and perseverant (Barrick & Mount, 1991; Digman, 1990; Hough, 1992), although evidence of more narrow facets exists (e.g., Roberts, Chernyshenko, Stark, & Goldberg, 2005). Through meta-analysis, Hough (1992) found that achievement orientation was a better predictor

46

of people's important work/life outcomes than dependability. A study of U.S. law enforcement training showed dependability and achievement provided incremental validity in predicting the training course scores (Vasilopoulos, Cucina, & Hunter, 2007). However, dependability accounted for more variance in training course scores than achievement did. It should be noted that the greater effect of dependability may have less to do with learning and more to do with the particular training context in law enforcement that requires dependability (Pogrebin & Poole, 1991).

In the context of training, achievement orientation may constitute the driving factor in conscientiousness in enhancing learning outcomes. Individuals high on achievement orientation may perceive the training activities as an opportunity to increase their skill sets and to become more effective, which can lead to greater achievement in the long run. Achievement oriented trainees are more likely to rely on their typical approaches in life – responding in effortful and perseverant ways – when facing difficulties in learning. Therefore, achievement orientation may predict learning better than conscientiousness.

In the transfer context, achievement oriented individuals may view the knowledge and skills as a means to achieve better performance and to obtain greater success. They are also more likely to accept the challenges in transferring and seek out additional opportunities to practice the new skills.

Hypothesis 4: In a learner-controlled training environment, trainee trait achievement orientation will predict acquisition of (a) knowledge and skills; and (b) transfer of training above and beyond trait conscientiousness.

Personality scholars have disagreed on the exact scope and definition of openness to experience (Digman, 1990; Barrick & Mount, 1991), which encompasses several related aspects such as intelligence, flexibility of ideas, educational aptitude, intellectual curiosity, and artistic/creative interests (Costa & McCrae, 1995; Goldberg, 1981; Hogan, 1986; John, 1989). Within openness, the specific facets may have differential relationships with learning outcomes in the employee training context. In particular, intellectual curiosity (McCrae & Costa, 1985; John & Srivastava, 1999) can directly impact how trainees perceive the training program.

Intellectually curious individuals tend to possess a receptive attitude to new things and ideas and tend to devote attention resources to learn and explore the task that stimulated their interest (Loewenstein, 1994; Silvia, 2006). Intellectual curiosity can also play a key role in motivating the person to continue to explore the learning tasks (Litman, 2005; Spielberger & Starr, 1994), which may be particularly important in learner-controlled training environment. Compared to trait openness to experience, intellectual curiosity can more accurately capture the trainee's tendency to engage in the mastery of training materials. When given the opportunity for optional materials, or feedback regarding their progress, curious individuals may be more ready to explore new content and reassess their learning. When attempting to transfer, individuals high on curiosity are more likely tempted to try out the new knowledge and skills.

Hypothesis 5: In a learner-controlled training environment, trainee trait curiosity will predict (a) acquisition of knowledge and skills and (b) transfer of training above and beyond trait openness.

Multifocal Framework of Personality Applied to the Training and Transfer

The hypotheses above pertain to the effects of general traits on learning outcomes and transfer. The general form of the hypotheses can be stated as: given the trainee's typical patterns of behavior across all situations, how likely will he/she (a) learn effectively from the training and (b) subsequently manage to apply the skills and knowledge. Following the multifocal personality framework, the effects of general trait variables hypothesized above incorporate a mismatch of foci in prediction. For example, trait conscientiousness is situated at the most general level (i.e., Level A), far removed from how conscientious the trainee is in the particular training and transfer contexts (i.e., Level C). The mismatch provides a potential explanation for the weak and inconsistent relationships between trait variables and training outcomes/transfer.

Hypothetically, if one could measure a trainee's state conscientiousness (including both achievement orientation and dependability), state openness, and state mastery goal orientation within the training context, such measurement would shed great light on the trainee's knowledge and skill acquisition. Similarly, measurement of the trainee's distributions of personality states within the transfer context, if available, would allow accurate prediction of transfer. However, measurement of each trainee's state personality distribution in situ can be cumbersome and practically challenging.

Rather than relying on Level C distributions, contextualized traits at Level B can be assessed to enable prediction of Level C distributions. Both the training and transfer contexts fall under the broader learner role. A person's typical behavioral tendency and variability in the learner role are likely to permeate to the Level C contexts. Therefore, Level B role-contextualized distributions can serve as a parsimonious proxy for Level C distributions. When

49

used for prediction, Level B traits have advantage over Level A traits due to their proximity to the behaviors of interest. As role-contextualized trait measures such as conscientiousness, extraversion, core self-evaluations, and locus of control have been shown to predict criteria better than the corresponding general trait measures (Bowling et al., 2010; DeGroot, & Kluemper, 2007; Hunthausen et al., 2003; Wang et al., 2010), it is reasonable to expect that role-contextualized trait measures outperform general trait measures in predicting learning outcomes and transfer.

Hypothesis 6: In a learner-controlled training environment, role-contextualized conscientiousness will yield a stronger relationship with (a) acquisition of knowledge and skills; and (b) transfer of training than general conscientiousness.

Hypothesis 7: In a learner-controlled training environment, role-contextualized openness will yield a stronger relationship (a) acquisition of knowledge and skills; and (b) transfer of training than general openness.

Hypothesis 8: In a learner-controlled training environment, role-contextualized mastery goal orientation will yield a stronger relationship with (a) acquisition of knowledge and skills; and (b) transfer of training than general mastery goal orientation.

The bandwidth-fidelity argument can be similarly applied in Level B constructs, such that a narrower construct domain such as achievement orientation will have stronger linkage with the outcomes than the broader construct domain.

Hypothesis 9: In a learner-controlled training environment, role-contextualized achievement orientation will yield a stronger relationship with (a) acquisition of knowledge and skills; and (b) transfer of training than role-contextualized conscientiousness.

Hypothesis 10: In a learner-controlled training environment, role-contextualized intellectual curiosity will yield a stronger relationship with (a) acquisition of knowledge and skills; and (b) transfer of training than role-contextualized openness.

The multifocal personality framework also underscores the insufficiency in predicting behavior with the mean of frequency distribution. Including the variability of the distribution together with the mean will likely enhance prediction. For instance, two individuals may have the same level of trait conscientiousness, i.e., they have the same mean on the state conscientiousness distribution at Level A, but the variability of their distributions are quite different. Figure 3 below illustrates the difference. Person A's state conscientiousness at Level A remains quite stable across situations, whereas Person B's state conscientiousness at Level A fluctuates across time and situations. Put in the transfer context, Person A is more likely than Person B to behave in a manner consistent with their common mean level. In other words, when using the general trait (i.e., the mean value) to predict transfer, Person A's trait value carries more information about how he/she may behave than Person B's trait value does. Therefore, the variability of the person's personality distribution at Level A can moderate the effect of the corresponding trait level, such that the more variable or inconsistent the person is across situations, the less accurate his/her trait can predict transfer. Analogously, the same moderating effect can occur on Level B variability as well. That is, the more variable a person is on a contextualized trait domain at Level B, the less accurate this person's contextualized trait can predict his/her behavior. In the current study, I will explore these potential moderating effects.

Figure 3. *Hypothetical Level A Distributions: Same Trait Level and Different Variability*

Person A

Person B

Conscientiousness Distribution at Level A
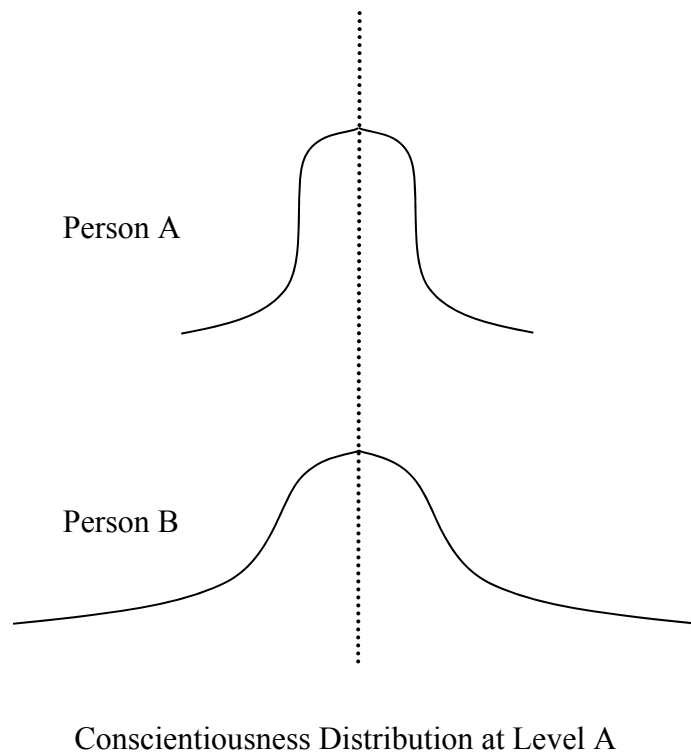
Intervention Based on the Multifocal Framework of Personality

After identifying important factors that facilitate or inhibit transfer of training, training

scholars have searched for interventions that can enhance transfer. A large number of studies

have focused on how training design and delivery can affect learning and transfer. Much

research evidence has accumulated that meta-analytic investigations have been conducted for

training design characteristics such as overlearning (Driskell, Willis, & Copper, 1992) and

practice; for methods of training delivery (Arthur, Bennett, Edens, & S. T. Bell, 2003; Sitzmann,

Kraiger, Stewart, & Wisher, 2006); and for special training approaches such as behavior

modeling (Taylor, Russ-Eft, & Chan, 2005) and error management training (Keith & Frese,

2008).

Pre and posttraining interventions typically accompany the main training session without modifying the training design and delivery. A large number of studies examined posttraining interventions that provide tools and mechanisms for trainees to effect transfer after the completion of the training session. For example, relapse prevention/self-management interventions (e.g., Gist, Bavetta, & Stevens, 1990; Gist, Stevens, & Bavetta, 1991; Stevens, Bavetta, & Gist, 1993; Wexley & Baldwin, 1986) enable the trainees to formulate cognitive and behavioral strategies to maintain successful transfer and avoid reverting to pretraining status. As another example, goal-setting intervention (e.g., Richman-Hirsch, 2001; Stevens et al., 1993; Werner, O'Leary-Kelly, Baldwin, & Wexley, 1994) focuses on using goals to motivate trainees towards transfer. However, Blume et al. (2010) failed to find significant meta-analytic effects for either relapse prevention or goal-setting.

Pretraining interventions utilize the pretraining period as a window to affect learning and transfer. Research has shown that providing optimistic rather than realistic preview of the training program (see Hicks & Klimoski, 1987) can enable trainees to better transfer skills for interpersonal feedback (Karl & Ungsrithong, 1992). Framing the purpose of the training as opportunity to learn (Martocchio, 1992) or as remediation of performance insufficiency (Quinones, 1995) prior to the training has also been shown to influence efficacy or motivation, but the effects of framing on transfer remain unclear (Baldwin, Ford, & Blume, 2009).

Two recent studies have implemented interventions specifically targeted at trainees' learning states, that is, the state analogs of more stable trait variables. B. S. Bell and Kozlowski (2008) examined the effect of error framing on trainees' state mastery goal orientation. Specifically, the intervention framed errors as a natural part of the training process instrumental for learning rather than negative consequences to be avoided (see Keith & Frese, 2005). Bell and

Kozlowski found that error framing interacted with trait mastery goal orientation to affect state mastery goal orientation, such that trainees low rather than high on trait mastery goal orientation benefited more from error framing. State mastery goal orientation in turn affected motivation, learning, and transfer. Weissbein, Huang, Ford, and Schmidt (2011) designed a pretraining intervention on the state analog of locus of control. By highlighting trainees' internal controllable attributions, the intervention resulted in higher motivation to learn, which in turn led to greater posttraining practice activities and better transfer performance.

Research by B. S. Bell and Kozlowski (2008) and Weissbein et al. (2011) demonstrated the possibility to identify and influence the state analog of a trait variable. However, there lies a difference between these two *relatively stable* traits of mastery goal orientation (Button et al., 1996) and locus of control (Rotter, 1990) and the *stable* Big Five traits that some argue to be biologically based latent temperaments unswayed by experience (McCrae et al., 2000). Can a similar intervention be devised on the state analogs of the stable personality traits?

While no research has directly sought to affect personality states, a number of studies have documented changes in personality traits due to significant life experiences (e.g., Roberts, 1997; Roberts, Caspi, & Moffitt, 2003; Scollon & Diener, 2006), lending support to the possibility that the momentary instantiation of traits (i.e., personality states) can be changed. The goal of the intervention is to move the trainee's Level C distribution of state conscientiousness in the training and transfer contexts. The intervention targets at three levels of the personality framework, addressing the trainee's self-concept at Level A, role salience at Level B, and potential task-state contingency at Level C. Because the pretraining period offers an opportunity to affect both learning and transfer, the intervention will be introduced prior to the training. Next,

I explore three mechanisms for the transfer intervention through which personality states may change.

Role salience

A first factor to consider for the personality-based intervention is the degree to which the trainee perceives a salient personality-inducing role in the training and transfer contexts. As reviewed above, role context influences role-contextualized personality (Donahue & Harary, 1998; Heller et al., 2007; Roberts & Donahue, 1994). That is, the mean of a Level B distribution is associated with the role context. In general, employees tend to be more conscientious when in the work role than in general (Donahue & Harary, 1998), and students tend to be more conscientious when in the academic setting than as a friend (Bleidorn, 2009; Theakston, Heller, Komar, & Lee, 2006). Thus, when a conscientiousness-inducing role context such as the learner role is salient rather than obscure, trainees may behave in a more conscientious manner.

Steele and Heller (2005) demonstrated that priming individuals about different social roles can result in different self-views and different behaviors. In their study, undergraduate students completed a personality inventory after being asked to write about their experiences as either friends or students. Participants in the friend condition rated themselves as more agreeable on the inventory and tended to cooperate more in a subsequent prisoner's dilemma task, relative to participants in the student condition.

Thus, the first component in the current intervention is the priming of the relevant role for the training and transfer contexts. Trainees in the intervention condition will receive the priming of learner's role prior to the training, whereas trainees in the control condition will receive no priming.

Trait self-conception

Affecting the trainee's self-conception of his/her traits prior to the training session is the second factor in the personality-based intervention. Self-conception is the conscious reflection of one's quality for the purpose of defining oneself (Hoelter, 1985; Markus & Wurf, 1987). Although there are several approaches to studying self-conceptions, such as general assessment of a single dimension (e.g., global self-esteem) and open-ended exploration of how a person views himself/herself (e.g., "Who am I") (see Hoelter, 1985), the current intervention focuses on how individuals perceive themselves on the trait dimensions of interest.

Absent external priming and manipulation, people can generate reasonably accurate self-conceptions of their traits (Funder, 1987, 1995), as suggested by the self-other correlation of trait ratings (e.g., Funder & Dobroth, 1987; Hayes & Dunning, 1997; Watson, 1989). However, self-conceptions are also malleable, capable of being modified after the person engages in activities such as social comparison (Morse & Gergen, 1970), strategic self-presentation (Jones, Rhodewalt, Berglas, & Skelton, 1981), and responding to questions pertaining to self-conception (Fazio, Effrein, & Falender, 1981). For instance, after responding to questions about extraversion in an interview, participants perceived themselves as more extraverted and also behaved in a more extraverted fashion, relative to those who responded to questions about introversion (Fazio et al., 1981). Markus and Wurf (1987) attributed such malleability to the differential accessibility of self-conceptions. They noted that most individuals may possess self-conceptions as introverts at some times and extraverts at other times. A trait-relevant external activity, such as the one in Fazio et al. (1981), activates but one part of self-conceptions in working memory, which influences subsequent behavior.

Approached from the multifocal personality framework, a person's trait self-conception in the absence of external influences resembles his/her mean of the Level A distribution. With appropriate priming, the person's self-conception may deviate from the mean to either end of the distribution.

This second component of the intervention depends on the activation of people's positive self-conceptions on conscientiousness, openness, and mastery goal orientation. Trainees in the intervention group will be primed prior to the training about the positive end of the distributions on the three construct domains, whereas trainees in the control group will receive no such priming.

Task/situation-contingent personality states

Inducing the appropriate task/situation-contingent personality states is the third factor in the personality-based intervention. Personality states are situation-contingent (Fleeson, 2007; Huang & A. M. Ryan, 2011; Minbashian et al., 2010). That is, individuals' personality states fluctuate around their respective trait levels, and such fluctuations across individuals are contingent on the situation characteristics. For instance, customer service workers show higher levels of state extraversion when interacting with friendly others (Huang & A. M. Ryan, 2011), and managers heighten their state conscientiousness due to increased task demand (Minbashian, et al., 2010). More importantly, these studies demonstrated that people can differ on the degree to which their personality states are task/situation-contingent. Minbashian et al. (2010) showed that individual differences in task-contingent conscientiousness predicted task performance above and beyond trait conscientiousness, such that managers who tended to respond to difficult tasks with higher levels of state conscientiousness performed better on a simulated task. Thus, I will adopt task-contingent conscientiousness as a leverage to affect training and transfer.

This component of the intervention will focus on coupling the elevation of state consientiousness (both achievement orientation and dependability) with increased task demand in learning. Individuals in the intervention condition will be primed to associate heightened state conscientiousness with task difficulty, whereas individuals in the control condition will not receive such priming.

It should be noted that by connecting heightened state conscientiousness with task difficulty, the intervention is analogous to a "*if... then...*" behavioral signature – e.g., "If I encounter increased task demand, I will respond to the challenge by focusing more on achievement". Experience sampling studies (Fleeson, 2001; Huang & Ryan, 2011) have shown that an average individual tends to increase his/her state conscientiousness when facing a strong task demand. Minbashian et al. (2010) further demonstrated that the between-person difference in tendency to elevate one's state conscientiousness in response to increased task demand represent an individual difference variable that can predict adaptive performance. Distinct from individuals' innate tendency to elevate their state conscientiousness in response to task demand, the intervention focuses on strengthening this "*if...then...*" contingency.

In sum, the proposed intervention will focus on three aspects of the personality system: (a) highlighting the role relevant for the training and transfer context; (b) influencing self-conceptions of traits instrumental to learning and transfer; and (c) connecting elevated state conscientiousness with task demand.

Hypothesis 11: Trainees in the intervention group will have (a) greater acquisition of knowledge and skills; and (b) better transfer than trainees in the control group.

As the training intervention targets an individual's conscientiousness distributions, the effectiveness of the intervention may depend on the person's conscientiousness. Analogous to a

ceiling effect, it is difficult to observe strong effect of the intervention when a trainee is already highly conscientious, and the intervention may yield greater benefit for trainees with low conscientiousness. Therefore, a moderating hypothesis is proposed:

Hypothesis 12: The effects of the intervention will be moderated by trainee conscientiousness, such that the intervention will have stronger effects on (a) acquisition of knowledge and skills; and (b) transfer of training for trainees with lower conscientiousness.

METHOD

Training Program

A self-paced, computer-based training program was used to teach trainees about the game of Mahjong. The training program started by introducing the history and the current popularity of the game, followed by specific knowledge points on the naming of tiles, the various combinations of tiles, the definition of wining hand, the general progression of the game, and the basic winning strategies. The training materials and subsequent assessment were presented in MediaLab 2008 (Jarvis, 2008). Each trainee read on a computer screen at his/her own pace about the rules of Mahjong. Trainees had the option to utilize several quizzes in between sections of training material to assess their learning. Each quiz tested whether trainees mastered a declarative knowledge point presented in the prior section. For example, after the naming of tiles, trainees could take the optional quiz that assessed whether they could recall the names of three tiles. Trainees received feedback on each quiz answer and they could choose to review relevant material after the feedback. Trainees could also choose to view several optional video clips, which last around 2 minutes each. Overall, the training program provided trainees with learner control over the content, sequence, and pace of material (Friend & Cole, 1990; Niemiec, Sikorski, & Walberg, 1996). It is worth noting that the training program presented novel materials that gradually increased in complexity and difficulty. As such, trainee effort and volition were expected to play a role in both their self-paced learning and subsequent transfer.

Participants and Procedure

375 students from the psychology undergraduate participant pool at Michigan State University signed up for the study online as an opportunity for extra course credits. After signing up for the study, potential participants could follow a web link to the survey website where they

could read the informed consent information and decide if they would like to participate in the study. 325 out of the 375 students viewed and agreed to the informed consent information. 293 participants subsequently completed the pretraining questionnaire while the other 32 students aborted for unknown reasons. Of the 293 participants, 70 of them did not sign up or show up for a lab session, resulting in a sample pool of 223 participants who completed both the pretraining questionnaire and the lab session. Due to technical issues, data from four participants were lost, and 219 cases were retained. Participants who indicated they had never learned the game before and had no knowledge of the basic rules were retained in the final sample, reducing the sample size to 186.

After signing up for the study, participants followed a web link to a survey website where they filled out the pretraining survey (Appendix A). At the end of the pretraining survey, they received a link to an eight-minute self-administered general cognitive ability test. They also signed up for a lab session to attend.

After participants arrived for the training session, they were greeted by an experimenter who was blind to the conditions of the study. After being seated in front of a computer, each participant was prompted on the computer screen to fill out a short questionnaire (Appendix B), under the pretext of obtaining additional information about participants' personality. Participants were randomly assigned to either the intervention or the control condition (see Intervention section below).

Upon completing the intervention/control measure, participants were redirected by the software program to the self-paced training program. Participants were informed that they could take as long as they deemed necessary to study the material, and that they had full control of the content, pace, and sequence of the material. They were also informed that they would have the

opportunity to play Mahjong against three computer players upon completion of the training, with the final scores recorded as part of the experiment.

Midway through the learning session, participants received a personality state measure assessing their momentary states during training (Appendix C). As a process measure, the training program automatically recorded the amount of time each participant spent on training. Participants also filled out a posttraining assessment (Appendix D). After that, participants played the computer game Mah Jongg (Bloem, 2007) for 45 minutes and the final scores were recorded by the experimenter.

Upon the completion of the experiment, the participants were thanked, debriefed, and excused. The experimenter recorded their extra credits.

Pretraining Measures

Level A Measures

Level A measures assessed participants' global, context-blind behavioral tendency. As part of the scale instruction, respondents were asked to reflect on themselves as they were in general. To capture both the typical level and the variability of a respondent's personality distribution, the frequency-based personality measurement approach by Edwards and Woehr (2007) was employed. Given the stem of an item, such as "I turn plans into actions", respondents were asked to recall their behavior in general over the past six months and to report the percentage of time each response category was descriptive of them. The response categories include: *% very inaccurate*; *% neither inaccurate nor accurate*; and *% very accurate*. Respondents were reminded of a total of 100% across the three response categories, with the sum automatically computed and displayed on the survey website. For example, a hypothetical respondent may respond to a particular item by allocating 20% to "very inaccurately", and 50%

to "neither inaccurately nor accurately", and the sum in the corresponding *Total* box would be 70 in red. Once the respondent assigned 30% to "very accurately", the sum in the *Total* box would become 100 in black.

The scoring method for respondents' global trait level came from Edwards and Woehr (2007). Each response level was assigned a weight: (very inaccurate = .01, neither inaccurate nor accurate = .03, and very accurate = .05), multiplied to the corresponding reported percentage. The use of this weighting scheme was to ensure the resulting item score is comparable to a typical 5-point Likert scale, ranging from 1 = very inaccurate to 5 = very accurate (Edwards & Woehr, 2007). Following the example above, the hypothetical respondent may receive a 3.2 (i.e., $= 20 \times .01 + 50 \times .03 + 30 \times .05$) from his/her response on that particular item, with the highest possible value of 5 and lowest possible value of 1. Variability at the item level was assessed as the standard deviation of the distribution, which was averaged across items to derive variability at the scale level (Edwards & Woehr, 2007; also see Kane, 1986). Scale psychometric properties will be reported in the Results section.

Conscientiousness. Conscientiousness and its achievement orientation facet were assessed using scales from International Personality Item Pool (IPIP; Goldberg, 1999; Goldberg et al., 2006). IPIP provides items that map on established scales. Conscientiousness was assessed using items from the IPIP version of NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992). The 10-item scale has been shown to be reliable, with a Cronbach's alpha of .81 (IPIP, 2011). To shorten the pretraining survey, five items were selected from the scale. Because inclusion of both positively and negatively-worded items may introduce a methods factor and reduce scale internal consistency (DiStefano & Motl, 2006), all five positively-worded items on the scale were selected. An example item is "Pay attention to details".

Achievement orientation has been previously investigated using NEO-PI scales of *achievement striving* (e.g., Moon, 2001). In the current study, items from the 10-item IPIP counterpart of achievement striving were used (Cronbach's alpha = .78; IPIP, 2011). Five out of the seven positively-worded items were randomly selected into this measure. An example item is: "Do more than what is expected of me".

Openness. Openness to experience was also assessed using the IPIP scale of openness mapped on to NEO-PI-R. The 10-item scale has been shown to be reliable (Cronbach's alpha = .82; IPIP, 2011). All five positively-worded items on the openness scale were selected. An example item is "Have a vivid imagination".

The facet of intellectual curiosity under the openness factor was assessed using the IPIP version of NEO-PI-R's intellect. Cronbach's alpha for the 10 item measure was .86 (IPIP, 2011). Similarly, all five positively-worded items on the scale were included. An example item is "Like to solve complex problems".

Mastery goal orientation. Mastery goal orientation was measured using five items adopted from VandeWalle (1997). The original items pertain specifically to the work context (i.e., Level B), and items were reworded to be context general (see B. S. Bell & Kozlowski, 2008). An example item is "I enjoy challenging and difficult tasks where I'll learn new skills." B. S. Bell and Kozlowski (2008) reported Cronbach's alpha of .85 for their context general version of mastery goal orientation.

Level B Contextualized Measures

Level B measures assessed respondents' behavioral tendencies specific to the learning context. Level B measures also adopted the same frequency-based measurement. The item stems remained identical to Level A measures, but the scale instruction differed from them slightly.

Specifically, following the completion of Level A measures, participants were given instructions on the Level B measures. Consistent with Hunthausen et al.'s (2005) instruction, respondents were instructed to think about the way they behave *in learning contexts* when responding to these items.

Demographics

Participants reported their demographic information at the end of the personality questionnaire, including race, gender, and age. Participants were also asked to report their cumulative GPA as a potential control variable for general cognitive ability (see B. S. Bell & Kozlowski, 2008).

Participants with all levels of prior experience of Mahjong were allowed to participate in the present study. Two items included in the demographics section enabled the screening of respondents who had previously learned the rules of Mahjong. Participants were asked: (a) whether they had learned to play the game before and (b) the degree to which they knew the rules of Mahjong.

General Cognitive Ability Measure

Participants' general cognitive ability was assessed as a potential control variable using Wonderlic Cognitive Ability Pretest, formerly known as Wonderlic Personnel Test – Quicktest (WPT-Q, Wonderlic, 2011). WPT-Q scores strongly correlate with the Wonderlic Classic Cognitive Ability Test (WPT) (Wonderlic, 2011). WPT-Q is typically administered online in an unsupervised testing environment.

After completing the demographic information, the survey website displayed to each participant an individual PIN number and a link to Wonderlic's online testing website. Participants were informed that the test, which would take eight minutes, assessed their

"problem-solving skills". After entering the PIN, participants answered 30 questions online within eight minutes. Perhaps due to this additional degree of complexity associated with this step, only around 70% of respondents completed WPT-Q.

Intervention and Control Measures

The goal of the intervention was to move the trainee's Level C distribution of state conscientiousness toward the positive end, thereby increasing problem-solving behaviors in the training and transfer situations. The intervention of the current study took the form of psychological measures. The intervention utilizes priming (e.g. Asendorpf, Banse, & Mucke, 2002; Bowles & Meyer, 2008) and the force-agreement scale effect (FASE; Petrocelli, Martin, & Li, 2010) on all three levels of a trainee's personality.

Based on research that individuals will search their memory for information consistent with their biased responses (Albarracín & Wyer, 2000; Salancik & Conway, 1975), Petrocelli and colleagues (2010) created the forced-agreement scale to utilize such biased information scanning and retrieval to influence individuals' self-perceptions. Instead of using the typical Likert scale anchors from "*strongly disagree*" to "*strongly agree*", the authors used a scale anchored from "*agree somewhat*" to "*agree completely*" in measuring respondents' personality traits. By forcing the participants to agree at least somewhat to measures of need for cognition and sensation seeking, Petrocelli et al. (2010) showed that the forced-agreement scale affected subsequent thought-responses and behavior. Analogously, the current intervention relied on the force-agreement scale to solicit positive identity about the learner role and positive self-conceptions on conscientiousness.

Priming was the second technique employed in the current intervention. Participants first responded to questions about their past roles as a learner. As being in a learner's role such as a

student is associated with heightened level of conscientiousness than other domains (Bleidorn, 2009), responses to conscientiousness items immediately after would likely be positively influenced. The effect of priming, coupled with the forced-agreement scale effect, could result in a self-conceptions of conscientiousness biased towards the positive end.

The intervention consisted of three components: *learner role salience*; *conscientiousness self-conception*, and *task contingent state conscientiousness*. These three components were administered as three measures under a pretext of obtaining more detailed information about the participant's personality.

Role salience

The first component of the intervention targeted the participants' identity as a learner. Participants were instructed to think about their past roles as a learner, with a few common learning situations listed as examples. They then responded to three Likert-type items about the salience of their identity as a learner. The identity salience scale was adapted from Callero's (1985) scale, which has been validated and adopted in research on other identities (see Farmer & van Dyne, 2010). An example item is "My role as a learner is an important part of who I am." The FASE scale was used, ranging from "somewhat agree" to "completely agree", thus forcing respondents to at least somewhat agree with the statements.

In addition to role salience, Powell and Greenhaus (2010) argued that role salience has frequently been measured in terms of role involvement (e.g., Eddleston, Veiga, & Powell, 2006; Frone, Russell, & Cooper, 1995; Lobel & St. Clair, 1992) as "both constructs stress the psychological importance an individual assigns to a role" (p. 521). Thus, five more items were adapted from Amatea, Cross, Clark, and Bobby (1986) in this intervention. The scale by Amatea et al. (1986) has been validated in previous studies and also has been used to measure work role

salience (Winkel & Clayton, 2010). Items were modified to emphasize the respondent's current role as a researcher. An example item is "It is important to me that I can achieve something of importance in my role as a learner." Similar to other scales used in the study, psychometric properties of the intervention measures will be analyzed and reported in the Results section.

Self-conception of conscientiousness

This component of the intervention addressed how participants view themselves in terms of conscientiousness in general. The similarity between this self-conception and the pretraining measure of Level A conscientiousness lies at the construct domain, in that both utilized the trait conscientiousness domain. The difference, however, is that the intervention directly sought to temporarily affect how respondents view themselves.

Eight items selected from the IPIP on the trait conscientiousness domain were included in this intervention. This component included none of the items previously used in the pretraining measure to avoid repetition. The FASE scale was used to positively skew participants' response process. Negatively-worded items have been reversed to ensure consistency of the FASE effect. An example item is "Follow through with my plans."

Task-contingent state conscientiousness

The task-contingent state conscientiousness component of the intervention aimed to form an association between heightened level of state conscientiousness and the training. Following Minbashian et al.'s (2010) conceptualization, the intervention focused on participants' state conscientiousness when facing difficult and challenging tasks, which likely appeared during training. The FASE scale was again be employed.

The intervention asked the respondents to think about past engagement in learning tasks that were difficult, especially under time pressure (see Minbashian et al., 2010), and to respond

in comparison to other tasks. Items were adapted from Minbashian et al. (2010), tapping on task efficiency, systematicity, effort, and focus. An example item is: "I approached the difficult tasks more systematically than other tasks."

Control condition

Respondents randomly assigned to the control condition completed filler items instead of the three intervention components described above. Considering the length of the intervention measures and their instructions, the 20-item self-deception scale from the Balanced Inventory of Desirable Responding (BIDR Version 6; Paulhus, 1991) was used as a control measure. Self-deception captures the honest but positively biased self-view (Paulhus, 1984). The scale were assessed on a 5-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The same pretext of obtaining more information about the participant's personality was used prior to the measure.

<div align="center">

Personality States Measures

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Midway through the training session, participants were asked to report their personality states during the training, including state conscientiousness, state openness, and state mastery goal orientation. Similar to other studies that measured personality states using Big Five markers (e.g., Huang & Ryan, 2011; Fleeson, 2001), trainees were asked to report their personality states within a short period of time (i.e., after the training started). Specifically, the instruction asked participants to reflect on themselves after they started reading about Mahjong and before the start of the survey page. Scale options ranged from 1 = Very inaccurate to 5 = Very accurate.

State Conscientiousness and State Openness

Personality adjectives from Goldberg's (1992) Big Five markers were used to measure trainees' state conscientiousness and state openness. Sample items are "responsible" and "curious".

State Mastery Goal Orientation

State mastery goal orientation were assessed using the four-item scale from Horvath, Scheu, and DeShon (2001) ($\alpha = .83$ from B. S. Bell & Kozlowki, 2008). A sample item is "The opportunity to learn new things about Mahjong is important to me."

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Posttraining and Transfer Measures

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The posttraining survey comprised two major components: (a) self-regulatory mechanisms during training; and (b) training outcome variables.

Self-regulatory Mechanisms

The role of self-regulatory processes was explored as a potential means for understanding how personality and personality-based intervention affect learning and transfer. Specifically, I included three self-regulatory variables – (a) effort, (b) persistence, and (c) attention – that have been shown to influence learning in Sitzmann and Ely's (2011) meta-analysis.

Effort. Effort represents the amount of time trainees spend on learning the material (Fisher & Ford, 1998; Wilhite, 1990). In the current study, effort was captured as the amount of time each trainee spent on training materials, optional quizzes, feedback and review, and optional video clips. This time measure did not include time spent on personality state measures during training. The time measure was automatically recorded by the MediaLab program.

Persistence. Persistence represents trainees' continued effort towards learning in the face of difficulty and boredom (Elliot, McGregor, & Gable, 1999). Persistence was measured using

the four-item scale from Elliot et al. (1999), adapted to the current study context. A sample item is "Regardless of whether or not I liked the material on Mahjong, I worked my hardest to learn it". The authors reported Cronbach's alpha of .89 in their original study.

Attention. Attention reflects the degree to which trainees focus their cognitive resources on the learning task (Zimmerman, 2000). Attention was measured using seven items adapted from Kanfer and Ackerman (1989) and Kanfer, Ackerman, Murtha, Dugdale, and Nelson (1994). A sample item is "I let my mind wander while learning the Mahjong material".

Posttraining self-efficacy and motivation to transfer

Kraiger et al. (1993) emphasized the importance of affective and motivational training outcomes. Several studies have indicated that posttraining self-efficacy (e.g., Ford et al., 1998; Gist et al., 1991; Kozlowski et al., 2001) and motivation to transfer (e.g., Stevens & Gist, 1997; Tziner, Haccoun, & Kadish, 1991) can influence transfer behavior. Although not the focus of the current study, the roles of posttraining self-efficacy and motivation to transfer were explored in the current study.

Posttraining self-efficacy was measured prior to the assessment of declarative knowledge and strategic knowledge. Five items were adapted from Ford et al. (1998) to measure the degree to which participants feel confident in following the rules and instructions to play Mahjong. An example item is "I am confident in my understanding of the rules of Mahjong."

Motivation to transfer was measured before knowledge assessment. Three items from Stevens and Gist (1997) and one additional item from Warr, Allen, and Birdi (1999) were adapted to the current context. An example item is "I am motivated to apply what I just learned to playing Mahjong".

Declarative and Strategic knowledge

The measure for declarative knowledge was extracted from the key points of the learning material, focusing on the extent to which trainees can recognize and recall the material. The measure contained 25 items. Nine true or false questions assessed whether trainees understood and recognize the rules and strategies of the game. A sample question is "One should declare as many Chows/Pungs/Kongs as possible in order to improve one's tiles. (False)". Ten recall items asked trainees to type in the names of tiles and combinations. Six multiple choice items assessed whether participants can identify the correct procedures in the game.

Strategic knowledge, on the other hand, focused on whether trainees can successfully determine the correct strategy to use in a given situation, based on the rules taught in the training session. The test consisted of 30 multiple-choice items. Each option for each multiple choice item was an actual hand in Mahjong, consisting of various tiles, and trainees needed to determine if a potential action could be performed on that hand in a beneficial way. Thus, instead of remembering and recognizing the materials in the game, trainees needed to apply the knowledge and strategies to arrive at a decision for each hand. As such, the strategic knowledge assessment had a higher level of difficult than the declarative knowledge assessment.

Transfer Measure

Each trainee played the computer-based game Mah Jongg (Bloem, 2007) for 45 minutes, with the percentage of hands they won recorded as the transfer measure. The trainee played against three computer players in multiple hands. Three key characteristics of the game qualify the game score as a transfer measure. First, the game differed from the learning setting in modality (see Barnett & Ceci, 2002). Whereas trainees focused on reading, watching, and memorizing in the training session, they needed to play the game hands-on in the transfer

session. Second, whereas trainees were instructed to learn about the game in the training section, they were explicitly told to perform in the transfer section, as they understood that their scores in the game would be recorded as the outcome of the study. Third, playing the game involved complex combination of the rules taught in the training session, and trainees would determine the appropriate action based on their tiles at hand and the tiles the computer players discarded. In this regard, the transfer session was an extension of the strategic knowledge assessment: rather than being presented with static hands of Mahjong as in the strategic knowledge assessment, trainees could manage their hands from the beginning of the play and follow through on the plans they made in the dynamic game environment. Finally, the game entailed time pressure such that the trainee had only four seconds to determine what actions to take on a discarded tile. Therefore, these psychological features enabled the assessment of trainees' ability to transfer the knowledge in the lab setting.

Data Screening

The data from 186 participants (N = 96 for intervention, N = 90 for control) were screened for insufficient effort responding (Huang, Curran, Keeney, Poposki, & DeShon, in press). Insufficient effort responses result from participants' lack of motivation to comply with the instruction of a survey and to provide accurate survey responses. Huang et al. found that overly fast response time to surveys can serve to detect insufficient effort responding. In the present study, cases were detected based on overly-fast responding in the lab session. Specifically, participants were screened on the following basis: (a) spending less than 1.5 seconds on more than two posttraining assessment items; or (b) spending less than 1.5 seconds on more than 5 of the manipulation items. As a result, two participants were removed from each condition.

Participants' responses on the pretraining questionnaire were also screened for insufficient effort responding, using problematic response patterns (Huang et al., in press). Specifically, responses were excluded from further analysis for assigning all 100% to a single response category for more than 30 of the 50 personality items, as an easy way to get through the questionnaire would be to assign 100 to any cell in a given row.

After the screening, data from 177 individuals were retained, including 92 from intervention condition and 85 from control condition.

RESULTS

The psychometric properties of measures were first evaluated to provide information about the validity and reliability of measures.

Personality measures

Internal consistency estimates for personality measures are presented in Table 1, along with means and standard deviations. All global and contextualized traits were measured in a reliable manner, Cronbach's α's > .77.

Table 1. *Descriptive Statistics for Trait and Contextualized Measures*

	Cronbach's α	M	SD
Trait conscientiousness	.82	3.88	0.53
Trait openness	.80	3.87	0.61
Trait mastery	.90	3.85	0.67
Trait achievement	.87	3.98	0.57
Trait curiosity	.77	3.64	0.64
Contextualized conscientiousness	.88	3.98	0.62
Contextualized openness	.80	3.82	0.69
Contextualized mastery	.91	3.78	0.70
Contextualized achieve	.88	4.00	0.64
Contextualized curiosity	.83	3.63	0.72

For each item domain, participants reported their frequency distribution of behavior over the last six month. Thus, standard deviation of participants' frequency distribution was obtained to indicate their variability on each item domain (Edwards & Woehr, 2007). As each personality variable was measured with five items (i.e., frequency distributions), internal consistency estimate for each scale was estimated with the five standard deviations of frequency distributions. As Table 2 shows, all variability measures were assessed reliably.

Table 2. *Descriptive Statistics for Variability of Trait and Contextualized Measures*

	Cronbach's α	M	SD
SD trait conscientiousness	.74	1.30	0.30
SD trait openness	.79	1.15	0.39
SD trait mastery	.83	1.21	0.43
SD trait achievement	.82	1.22	0.34
SD trait curiosity	.74	1.23	0.36
SD contextualized conscientiousness	.82	1.21	0.39
SD contextualized openness	.78	1.14	0.43
SD contextualized mastery	.87	1.26	0.45
SD contextualized achieve	.82	1.16	0.41
SD contextualized curiosity	.80	1.24	0.40

Self-regulatory processes and affective outcomes

A confirmatory factor analysis was conducted on items for motivational processes and training outcomes to ensure these scales measured at the same time were conceptually distinct. Specifically, a four-factor model was fitted to seven items for attention, four items for persistence, five items for posttraining self-efficacy, and four items for motivation to transfer. The model yielded good fit to the data, $\chi^2(164) = 289.91$, CFI = .94, RMSEA = .06, SRMR = .06. Loadings of all items on their respective factor were significant. Average loadings were .69 for attention, .78 for persistence, .83 for posttraining self-efficacy, and .82 for motivation to transfer. Scale scores were created as the mean of items on the scale, with descriptive statistics and internal consistency presented in Table 3. All four variables were measured reliably. In addition, Table 3 also includes descriptive statistics for effort, which was operationalized as the number of minutes spent on training activities.

Table 3. *Descriptive Statistics for Self-regulatory Processes and Affective Training Outcomes*

	Cronbach's α	*M*	*SD*
Persistence	.83	3.63	0.90
Attention	.87	3.16	0.91
Effort (time in training)	---	25.36	6.84
Post self-efficacy	.91	3.08	0.95
Motivation to transfer	.88	4.06	0.80

Personality states

A confirmatory factor analysis was performed to ensure the validity of personality state measures (state conscientiousness, state openness, and state mastery goal orientation). Based on the rule of thumb of 10 cases per parameter estimated for structural equation modeling (e.g., Kline, 2004), the current sample of 177 was quite small for estimating a model with 24 observed items. Thus, item parcels (Williams & O'Boyle, 2008) were created to reduce the number of parameters estimated in the model. Specifically, each item parcel consists of two nonadjacent items on the same scale, reducing the number of observed variables to 12 in the confirmatory model. The model provided reasonable fit to the data, $\chi^2(51) = 118.25$, CFI = .93, RMSEA = .08, SRMR = .06. All item loadings were significant. Average loadings for state conscientiousness, openness, and mastery goal orientations were .66, .78, and .82. Descriptive statistics are presented in Table 4. All three personality state measures were assessed reliably, with Cronbach's α's > .75.

Table 4. *Descriptive Statistics for Personality State Measures*

	Cronbach's α	*M*	*SD*
State conscientiousness	.77	4.07	0.54
State openness	.86	3.81	0.62
State mastery	.75	3.60	0.73

Declarative and strategic knowledge

Item analyses were performed on both declarative knowledge and strategic knowledge items to ensure the two scales were measured reliably. Two items were dropped from the 25-item declarative knowledge measure due to negative corrected item-total correlations, improving Cronbach's alpha from .71 to .74. On the strategic knowledge measure, six items with negative corrected item-total correlations were removed from the 30-item scale, increasing Cronbach's α from .62 to .70. After the removal of problematic items, Cronbach's α for each scale was above the .70 criteria deemed acceptable for research purpose (e.g., Nunnally, 1978). Scale scores for these two variables were calculated as percentage of items responded to correctly (see Table 5).

Table 5. *Descriptive Statistics for Training Outcomes and Transfer*

	Cronbach's α	*M*	*SD*
Declarative knowledge	.74	69.98	18.30
Strategic knowledge	.70	50.67	15.07
Transfer performance	---	15.47	17.06

Intervention and control measures

Although not the focus of the study, psychometric properties of the intervention measures could indicate the strength of the intervention. Thus, the intervention group's responses to the three intervention measures were first examined using exploratory factor analysis with principal axis factoring and promax rotation (n = 92). A three-factor solution was specified, explaining 54% of variance in responses. Factor loadings are presented in Table 6. With the exception of two items, all items loaded on their expected factors. Informed by the exploratory factor analysis results, three scales were created: manipulated trait conscientiousness (6 items, Cronbach's α = .83), manipulated contextualized conscientiousness (8 items, Cronbach's α = .86),

and manipulated task contingent conscientiousness (4 items, Cronbach's α = .78). Descriptive

statistics for the intervention measures are presented in Table 7.

Table 6. *Factor Loadings from Exploratory Factor Analysis for Intervention Measures*

	Conscientiousness measures under intervention		
	Trait	Contextualized	Contingent
Item 1		.57	
Item 2		.55	
Item 3		.81	
Item 4		.55	
Item 5		.53	
Item 6		.64	
Item 7		.82	
Item 8		.76	
Item 9			.50
Item 10	.48		
Item 11			
Item 12	.67		
Item 13	.71		
Item 14	.76		
Item 15	.61		
Item 16	.48		
Item 17			.60
Item 18			.67
Item 19			.73
Item 20			.51

Note. Loadings below .40 are not displayed.

Table 7. *Descriptive Statistics for Intervention and Control Measures*

	Cronbach's α	*M*	*SD*
Manipulated trait consc	.83	3.61	0.70
Manipulated contextualized consc	.86	3.75	0.68
Manipulated task contingent consc	.78	3.33	0.75
Self-deception	.68	3.12	0.46

Note. consc = conscientiousness

The control group's responses to the self-deception measure was also subjected to a reliability analysis (n = 87). Initial analysis of all 20 self-deception items revealed weak overall interitem correlation, Cronbach's α = .61. Five items with negative corrected item-total correlation were removed from the scale, increasing Cronbach's α to .68. Descriptive statistics are also presented in Table 7.

Potential control variables

Among the 177 individuals retained for analysis, only 124 completed the cognitive ability test WPT-Q, and only 107 self-reported their cumulative GPA. The correlation between these two variables was moderate, r = .40, n = 70. In light of the large proportion of missing data on WPT-Q and GPA, neither variable was controlled for the hypotheses testing section below. Instead, WPT-Q was entered as a control variable in exploratory analysis in a later section.

Preliminary analysis

Descriptive statistics and variables intercorrelations are presented in Appendix E. As expected, treatment condition did not significantly correlate with any of the pretraining variables, attesting to the success of the random assignment.

Hypotheses Testing

The effects of the intervention were examined as an initial step in analysis, as the presence of a strong intervention, analogous to a strong situation, could restrict the range of trainee behavior and thus weaken the effects of global and contextualized traits. Hypothesis 11 states that the intervention group will score higher on knowledge acquisition and on transfer than the control group. Independent samples t tests were conducted to examine the hypothesis, with results in Table 8. The analyses did not reveal any significant between-group difference on the outcome variables. Thus, Hypothesis 11 was not supported.

80

Table 8. *Independent Samples t tests between Intervention and Control Conditions*

	Treatment M(SD)	Control M(SD)	t(175)	p	Cohen's d
Hypothesis 11					
Declarative knowledge	70.77(17.32)	69.12(19.38)	0.60	0.55	0.09
Strategic knowledge	50.29(14.94)	51.09(15.29)	-0.35	0.73	-0.05
Transfer	16.62(17.83)	14.22(16.20)	0.93	0.35	0.14
Exploratory analyses					
State conscientiousness	4.07(0.54)	4.07(0.55)	0.10	0.92	0.01
State openness	3.76(0.61)	3.86(0.62)	-1.14	0.26	-0.17
State mastery	3.65(0.69)	3.55(0.78)	0.95	0.34	0.14
Persistence	3.59(0.92)	3.68(0.89)	-0.68	0.50	-0.10
Attention	3.16(0.92)	3.17(0.91)	-0.14	0.89	-0.02
Time in training	24.64(6.22)	26.13(7.42)	-1.45	0.15	-0.22
Post self-efficacy	3.16(0.92)	3.00(0.99)	1.08	0.28	0.16
Motivation to transfer	3.99(0.86)	4.13(0.72)	-1.17	0.24	-0.18

Exploratory analysis was conducted to determine whether the intervention resulted in different levels of personality states and self-regulatory processes during training as well as affective outcomes after training. Results (see Table 8) also failed to indicate any significant between-group difference. Therefore, the intervention did not appear to exert any main effect on trainees.

Because the intervention targeted on a person's self-perceptions of his/her conscientiousness across three levels of specificity, respondents' conscientiousness could interact with the intervention. Hypothesis 12 proposes that the effects of the intervention would depend on trainee conscientiousness, such that the intervention will exert stronger effect for trainees with low rather than high conscientiousness. The hypothesis was examined using moderated regression. Specifically, a hierarchical regression model was run for each outcome variable, with treatment and mean-centered trait conscientiousness in the first block and treatment by trait

consientiousness in the second block. Results are presented in Table 9. The pretraining

intervention did not interact with trainees' trait conscientiousness to affect either knowledge

acquisition or transfer, thus providing no support for Hypothesis 12.

Table 9. *Moderated Regression for Trait Conscientiousness × Treatment Interaction*

	B	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge					
Intercept	69.04	---	<.01	---	---
1. Trait conscientiousness	-2.06	-.06	.56	.00	.75
1. Treatment	1.73	.05	.53		
2. Trait c × Treatment	1.78	.04	.73	.00	.74
DV = strategic knowledge					
Intercept	50.88	---	<.01	---	---
1. Trait conscientiousness	-5.59	-.20	.06	.01	.50
1. Treatment	-0.63	-.02	.78		
2. Trait c × Treatment	6.90	.17	.11	.02	.11
DV = transfer					
Intercept	14.19	---	<.01	---	---
1. Trait conscientiousness	-0.85	-.03	.80	.02	.20
1. Treatment	2.66	.08	.30		
2. Trait c × Treatment	-6.13	-.13	.21	.01	.21
Exploratory analysis					
DV = Effort (time)					
Intercept	26.02	---	<.01	---	---
1. Trait conscientiousness	-2.96	-.23	.02	.02	.26
1. Treatment	-1.44	-.11	.16		
2. Trait c × Treatment	4.71	.25	.02	.03	.02

Additional exploratory analyses were performed to assess whether trait conscientiousness

interacted with the intervention in influencing personality states, self-regulatory processes, and

affective training outcomes. Only one significant interaction emerged: the intervention interacted

with trait conscientiousness in affecting trainee effort, i.e., the number of minutes trainees spent

on training materials (Table 9). The pattern of interaction was unexpected (Figure 4): for

trainees with high trait conscientiousness, the intervention group spent about as much time on training as the control group, yet for trainees with low trait conscientiousness, the control group spent significantly more time on training than the intervention group. Taken together, this interaction explained 3% of variance in time in training. It might be possible that trainees with low conscientiousness tended to engage in off-task thoughts and thus spend longer time on the training material, and the intervention was effective in reducing such off-task thoughts, resulting in the pattern of interaction. However, this notion was not supported on respondents' self-report attention.

Figure 4. *Trait Conscientiousness × Treatment Interaction on Effort*
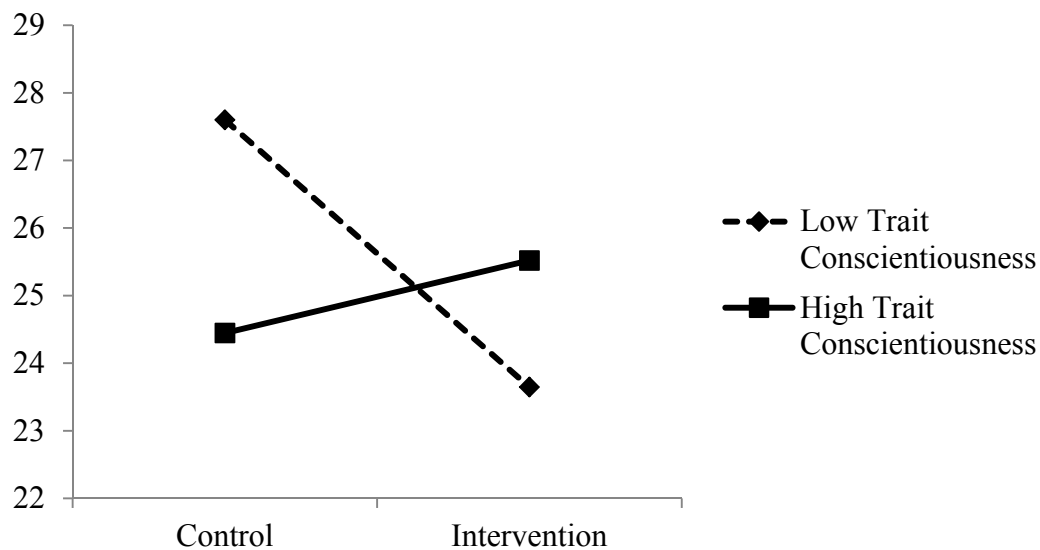
Given the general absence of effects of the intervention, Hypotheses 1 through 10 were evaluated in the entire sample. Table 10 presents correlation coefficients between predictors and outcome variables. For the complete correlation matrix, see Appendix E.

Table 10. *Correlation between Predictors and Outcomes*

	Declarative knowledge	Strategic Knowledge	Transfer
Trait conscientiousness	-0.03	-0.09	-0.11
Trait openness	0.10	-0.02	-0.03
Trait mastery	0.13	0.02	-0.04
Trait achievement	0.04	-0.06	-0.14
Trait curiosity	0.19*	0.13	0.03
Contextualized consc	0.04	0.03	-0.15*
Contextualized open	0.05	0.04	-0.05
Contextualized mastery	0.06	0.07	-0.05
Contextualized achieve	0.09	0.05	-0.09
Contextualized curiosity	0.13	0.18*	0.05

Note. * $p < .05$

Hypotheses 1, 2 and 3 propose that trait conscientiousness, openness, and mastery goal orientation will positively predict: (a) knowledge acquisition, and (b) transfer. Zero-order correlations in Table 10 suggest that the hypotheses were not supported. Multiple regression analyses with these three global trait variables as predictors also failed to reveal significant effects (Table 11), suggesting that trait conscientiousness, openness, and mastery goal orientation did not uniquely predict learning or transfer. Thus, Hypotheses 1 through 3 were not supported.

Table 11. *Multiple Regression for Hypotheses 1-3.*

	β	p	R^2	p for R^2
DV = declarative knowledge			.03	.14
Trait conscientiousness	-.14	.11		
Trait openness	.04	.71		
Trait mastery	.18	.09		
DV = strategic knowledge			.01	.47
Trait conscientiousness	-.13	.14		
Trait openness	-.05	.63		
Trait mastery	.12	.28		

Table 11 (cont'd)

	β	p	ΔR²	p for ΔR²
DV = transfer			.01	.54
Trait conscientiousness	-.12	.17		
Trait openness	-.00	.97		
Trait mastery	.03	.82		

Hypotheses 4 states that, based on the bandwidth fidelity tradeoff, the more specific trait achievement orientation can predict learning and transfer above and beyond the general trait conscientiousness. Although achievement orientation had a nonsignificant zero-order correlation with all learning outcomes, it was possible that the part of variance in achievement orientation that is unrelated to trait conscientiousness could significantly add to the prediction of outcomes. Hierarchical regression was employed to evaluate this possibility. Specifically, in a hierarchical regression model, trait conscientiousness was entered in the first block and trait achievement orientation was entered in the second block. The change in R^2 and the associated significance level was interpreted for the incremental effect of achievement orientation.

Results are presented in Table 12. Adding trait achievement orientation did not add to the prediction of either knowledge acquisition or transfer. Thus, Hypothesis 4 was not supported.

Table 12. *Hierarchical Regression for Hypothesis 4.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Trait conscientiousness	-.16	.17	.00	.66
2. Trait achievement	.17	.15	.01	.15
DV = strategic knowledge				
1. Trait conscientiousness	-.11	.38	.01	.25
2. Trait achievement	.02	.84	.00	.84
DV = transfer				
1. Trait conscientiousness	-.14	.11	.01	.15
2. Trait achievement	.18	.09	.01	.26

In a similar vein, Hypothesis 5 proposes that trait curiosity will predict learning and transfer above and beyond trait openness. Hierarchical regression revealed that trait curiosity predicted acquisition of declarative and strategic knowledge above and beyond trait openness, yet the effect was not significant when predicting transfer (see Table 13). Thus, Hypothesis 5(a) received support whereas 5(b) was not supported.

Table 13. *Hierarchical Regression for Hypothesis 5.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Trait openness	-.02	.84	.01	.20
2. Trait curiosity	.20	.03	.03	.03
DV = strategic knowledge				
1. Trait openness	-.15	.11	.00	.77
2. Trait curiosity	.22	.02	.03	.02
DV = transfer				
1. Trait openness	-.07	.43	.00	.67
2. Trait curiosity	.07	.45	.00	.45

Hypotheses 6 through 8 focus on the enhanced precision in predicting learning and transfer from using personality measures contextualized within the learner role relative to global traits. Again, hierarchical regression was used to assess the additional variance in knowledge acquisition and transfer explained by adding contextualized personality measures above and beyond global personality traits.

Results on contextualized conscientiousness failed to support Hypothesis 6 (see Table 14). Despite a marginally significant increase in R^2 in predicting strategic knowledge ($\Delta R^2 = .02$, $p = .07$), contextualized conscientiousness did not significantly predict declarative knowledge or transfer.

Table 14. *Hierarchical Regression for Hypothesis 6.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Trait conscientiousness	-.12	.25	.00	.66
2. Contextualized consc	.13	.24	.01	.24
DV = strategic knowledge				
1. Trait conscientiousness	-.23	.03	.01	.25
2. Contextualized consc	.20	.07	.02	.07
DV = transfer				
1. Trait conscientiousness	-.01	.96	.01	.15
2. Contextualized consc	-.15	.18	.01	.18

Tests for Hypotheses 7 and 8 yielded nonsignificant results as well (Tables 15 and 16). Contextualized openness and mastery goal orientation did not incrementally predict knowledge acquisition or transfer, after controlling for their respective traits.

Table 15. *Hierarchical Regression for Hypothesis 7.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Trait openness	.18	.20	.01	.20
2. Contextualized openness	-.09	.50	.00	.50
DV = strategic knowledge				
1. Trait openness	-.19	.16	.00	.77
2. Contextualized openness	.21	.13	.01	.13
DV = transfer				
1. Trait openness	.04	.76	.00	.67
2. Contextualized openness	-.09	.51	.00	.51

Table 16. *Hierarchical Regression for Hypothesis 8.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Trait mastery	.27	.07	.02	.09
2. Contextualized mastery	-.16	.26	.01	.26

Table 16 (cont'd)

	β	p	ΔR²	p for ΔR²
DV = strategic knowledge				
1. Trait mastery	-.14	.32	.00	.83
2. Contextualized mastery	.19	.20	.01	.20
DV = transfer				
1. Trait mastery	-.01	.95	.00	.58
2. Contextualized mastery	-.04	.79	.00	.79

Finally, Hypotheses 9 and 10 pertained to the bandwidth-fidelity tradeoff applied to contextualized personality. For Hypothesis 9, contextualized achievement orientation did not incrementally predict knowledge acquisition or transfer, thus failing to support the hypothesis. Results are presented in Table 17.

Table 17. *Hierarchical Regression for Hypothesis 9.*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Contextualized consc	-.10	.43	.00	.61
2. Contextualized achieve	.17	.17	.01	.17
DV = strategic knowledge				
1. Contextualized consc	-.01	.95	.00	.65
2. Contextualized achieve	.05	.66	.00	.66
DV = transfer				
1. Contextualized consc	-.21	.09	.02	.05
2. Contextualized achieve	.08	.53	.00	.53

For Hypothesis 10, contextualized curiosity accounted for 4% variance in strategic knowledge above and beyond contextualized openness (p < .01), but the effects in explaining declarative knowledge ($\Delta R^2 = .02$, $p = .09$) and transfer ($\Delta R^2 = .01$, $p = .11$) were nonsignificant, albeit in the predicted direction (see Table 18).

Table 18. *Hierarchical Regression for Hypothesis 10.*

	β	*p*	ΔR^2	*p for* ΔR^2
DV = declarative knowledge				
1. Contextualized openness	-.06	.53	.00	.48
2. Contextualized curiosity	.17	.09	.02	.09
DV = strategic knowledge				
1. Contextualized openness	-.14	.17	.00	.56
2. Contextualized curiosity	.27	.01	.04	.01
DV = transfer				
1. Contextualized openness	-.17	.11	.00	.47
2. Contextualized curiosity	.16	.11	.01	.11

Exploratory analyses – Personality States

A primary focus of the current paper is the expression of a trainee's personality in personality states during training, which would subsequently influence learning and transfer. Exploratory analyses were performed to understand the role of state conscientiousness, state openness, and state mastery goal orientation in the learning and transfer process. As an initial step, multiple regression analysis was utilized to determine whether personality states could predict learning and transfer. Correlation between state personality and outcomes are presented in Table 19, and regression results are presented in Table 20.

Table 19. *Correlations between Personality States and Outcomes.*

	Declarative knowledge	Strategic Knowledge	Transfer
State conscientiousness	0.10	0.14	-0.14
State openness	0.01	0.06	-0.01
State mastery	0.33*	0.14	0.11

Table 20. *Multiple Regression Predicting Outcomes from Personality States.*

	β	p	R^2	p for R^2
DV = declarative knowledge			.13	<.01
State conscientiousness	.01	.90		
State openness	-.18	.04		
State mastery	.41	<.01		
DV = strategic knowledge			.03	.15
State conscientiousness	.11	.19		
State openness	-.05	.61		
State mastery	.12	.18		
DV = transfer			.05	.02
State conscientiousness	-.23	.01		
State openness	.00	.97		
State mastery	.20	.02		

The results indicated that, taken as a whole, personality states in conscientiousness, openness, and mastery goal orientation accounted for significant variance in declarative knowledge acquisition and transfer performance, whereas their prediction of strategic knowledge was not significant. Specifically, state mastery goal orientation positively predicted acquisition of declarative knowledge as well as transfer performance. Surprisingly, state conscientiousness negatively predicted transfer. While it might seem plausible that a trainee could channel his/her state conscientiousness into activities unrelated to mastery of the training material, and thereby resulting in a negative effect, the positive correlation ($r = .41$) between state conscientiousness and state mastery goal orientation suggests otherwise. Furthermore, the positive effect of state mastery goal orientation on declarative knowledge and negative effect of state conscientiousness on transfer remained significant after controlling for the three self-regulatory mechanisms (i.e., persistence, attention, and effort).

The relevance of state personality variables in the training and transfer process enabled further examination of their predictors. That is, can individual personality instantiation in the

specific training context be traced back to the person's global traits, or, as Hypothesis 6 through 8 suggested, to one's contextualized traits? Thus, three hierarchical regression analyses were used to examine whether personality traits contextualized in the learner's role can predict personality states above and beyond global traits.

Results in Table 21 revealed that, while global trait variables significantly predicted their corresponding states, only contextualized openness predicted state openness above and beyond the corresponding global trait. Contextualized conscientiousness and mastery goal orientation did not predict their state counterparts above and beyond their respective global traits.

Table 21. *Hierarchical Regression Predicting States from Global and Contextualized Traits*

	β	p	ΔR^2	p for ΔR^2
DV = State consc				
1. Trait consc	.15	.16	.07	<.01
2. Contextualized consc	.16	.13	.01	.13
DV = State openness				
1. Trait openness	-.07	.59	.06	<.01
2. Contextualized openness	.37	<.01	.04	<.01
DV = State mastery				
1. Trait mastery	.35	.01	.10	<.00
2. Contextualized mastery	-.04	.80	.00	.80

Exploratory Analyses – Understanding Transfer

This set of exploratory analyses focused on understanding transfer performance. The failure to find significant personality effects on transfer in the present study may be due to the fact that the transfer task heavily depended on learning and thus limited the influence of trainees' volition. Affective outcomes can serve as proximal variables to understand the influence of distal variables on transfer (Colquitt et al., 2000). Thus, examining the role of affective training

outcomes, specifically motivation to transfer and posttraining self-efficacy, can shed light on the extent to which the transfer task afforded opportunities for personality to exert influence.

A multiple regression analysis was conducted to examine the effects of declarative knowledge, strategic knowledge, motivation to transfer, and posttraining self-efficacy on transfer (Table 22). Together, these four variables explained 13% of variance in transfer. However, only declarative knowledge and strategic knowledge significantly predicted transfer, whereas posttraining self-efficacy and motivation to transfer showed no significant influence.

Table 22. *Multiple Regression Predicting Transfer from Training Outcomes*

	β	p	R^2	p for R^2
Declarative knowledge	.25	.01		
Strategic knowledge	.18	.03	.13	<.01
Posttraining self-efficacy	.00	.97		
Motivation to transfer	-.11	.20		

Additional exploratory analyses were performed to understand what factors in the present study may predict transfer performance, controlling for knowledge acquisition. The results revealed that state conscientiousness negatively predicted transfer above and beyond knowledge acquisition, $\beta = -0.19$, $\Delta R^2 = .04$, $p < .01$ (Table 23). However, this significant effect is counterintuitive and opposite to what was expected. As the transfer task necessitated trainees' constant adjustment to new information, the negative effect of state conscientiousness on transfer could be analogous to the finding that trait conscientiousness impedes adaptive performance (LePine, Colquitt, & Erez, 2000). That is, when the individual focused on getting organized, being planful, and maintaining order, he/she might fail to recognize opportunity for change, resulting in lower transfer performance.

92

Table 23. *Hierarchical Regression Predicting Transfer*

	β	p	ΔR^2	p for ΔR^2
Declarative knowledge	.21	.01	.12	<.01
Strategic knowledge	.21	.01		
State conscientiousness	-.19	<.01	.04	<.01

Exploratory Analyses – Intervention Measures

The effect of the intervention likely depended on the degree to which trainees bought in to the content of the intervention, such that they would temporarily perceive heightened levels of conscientiousness at three specific levels. Therefore, it is plausible that, controlling for trainees' global conscientiousness (i.e., measured prior to the training intervention), the degree to which they perceived themselves as conscientious under the intervention condition can serve as a surrogate for the effectiveness of the manipulation, i.e., a measure of manipulation strength, which can potentially predict learning and transfer. This set of analyses explores this possibility, using data from trainees in the intervention group, $N = 92$.

Examination of the correlation (see Table 24) indicates that trainees' manipulated conscientiousness at trait level was significantly correlated with their global ($r = .42$) and contextualized conscientiousness ($r = .37$) whereas their manipulated task contingent conscientiousness was significantly associated with their contextualized conscientiousness ($r = .23$). In terms of relationships with learning and transfer, only manipulated task contingent conscientiousness was significantly correlated with declarative and strategic knowledge acquisition (rs $= .23$ and $.26$).

Table 24. *Correlations between Personality, Intervention Measures, Learning, and Transfer*

	1	2	3	4	5	6	7
1. Trait	--						
2. Contextualized	.77**	--					
3. Mnp. trait	.42**	.37**	--				
4. Mnp. contextualized	.14	.18	.27**	--			
5. Mnp. contingent	.15	.23*	.52**	.42**	--		
6. Declarative	-.01	.12	.07	-.05	.23*	--	
7. Strategic	.04	.16	.08	.04	.26*	.55**	--
8. Transfer	-.20	-.17	-.09	.01	.06	.28**	.28**

Note. N = 92. ** $p < .01$; * $p < .05$. Mnp. = Manipulated.

Next, hierarchical regression was used to examine whether trainees' manipulated trait, contextualized, and task-contingent conscientiousness could predict learning and transfer. To rule out the effects of trainees' personality, their global and contextualized conscientiousness were first partialed out from the outcome variables. While manipulated global and contextual conscientiousness did not explain additional variance in the outcome variables, manipulated task-contingent conscientiousness was able to account for additional variance in declarative knowledge and strategic knowledge. That is, under the intervention, trainees' belief that they would elevate their state conscientiousness in response to task demand did impact their subsequent knowledge acquisition. Results of the analyses for task-contingent conscientiousness are presented in Table 25.

Table 25. *Hierarchical Regression Predicting Transfer from Intervention Measures*

	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge				
1. Mnp. global	-.23	.15	.00	.94
2. Mnp. contextualized	.25	.13	.04	.06
3. Mnp. task contingent	.21	<.05	.04	<.05

Table 25 (cont'd)

DV = strategic knowledge

1. Mnp. global	-.19	.25	.00	.68
2. Mnp. contextualized	.25	.12	.04	.05
3. Mnp. task contingent	.23	.03	.05	.03
DV = transfer				
1. Mnp. global	-.15	.35	.04	.06
2. Mnp. contextualized	-.08	.64	.00	.77
3. Mnp. task contingent	.10	.33	.01	.33

Note. N = 92. Mnp. = Manipulated.

Exploratory Analyses – Control Measures

Although not the focus of the current study, the role of self-deception in the training and transfer process was also explored in the control group ($n = 87$). Participants' self-deception was positively associated with their global conscientiousness, achievement orientation, curiosity, mastery goal orientation, as well as their corresponding contextualized traits (*r*'s ranging from .21 to .30, *p*'s < .05). Moreover, self-deception was positively related to state conscientiousness, state openness, and state mastery goal orientation, (*r'*s =.28, .38, and .31, respectively, *p*'s < .02) and negatively related to the amount of time spent on training ($r = -.25, p = .02$). However, self-deception was not a significant predictor of declarative knowledge, strategic knowledge, or transfer (*r'*s = -.07, -.15, and -.14, respectively, *p*'s > .20). Controlling for self-deception, global or contextualized conscientiousness failed to predict knowledge acquisition or transfer.

Exploratory analyses – Personality Distributions

One advantage of using frequency-based personality assessment instead of Likert-type scales is the availability of additional indicators of an individual's personality distribution, such as variability and skewness. Exploratory analyses were conducted to address three questions: (a) whether the effect of a trait as mean of the person's personality distribution depends on the

variability of the distribution; (b) whether the effect of a contextualized trait depends on the

person's global trait distribution; and (c) whether the intervention depends on the trainees'

variability of conscientiousness distributions at both the global trait level and contextualized trait

level. These three questions rest on the premise that, if a person's personality distribution at

either the global trait level or the contextualized level is more variable (i.e., has a large standard

deviation), then the mean of the distribution characterizes the person less accurately.

Moderated regression was used to examine the three questions above. Although most of

the results were nonsignificant, one significant interaction emerged: the mean of global trait

conscientiousness distribution interacted with the standard deviation of the same distribution to

impact transfer, such that global trait conscientiousness had a positive effect on transfer for

individuals with high standard deviation on the trait distribution, whereas global trait

conscientiousness had a negative effect on transfer for individuals with low standard deviation

(see Figure 5). Furthermore, the standard deviation of contextualized conscientiousness

negatively predicted transfer above and beyond this interaction. Results are presented in Table

26.

Table 26. *Hierarchical Regression Predicting Transfer*

	β	p	ΔR^2	p for ΔR^2
1. M trait Conscientiousness	.03	.79	.01	.15
2. SD trait Conscientiousness	-.01	.94	.01	.15
3. M × SD	.16	.04	.02	.05
4. SD contextualized consc	.21	.02	.03	.02

Figure 5. *Trait Conscientiousness Mean by Standard Deviation Interaction on Transfer*
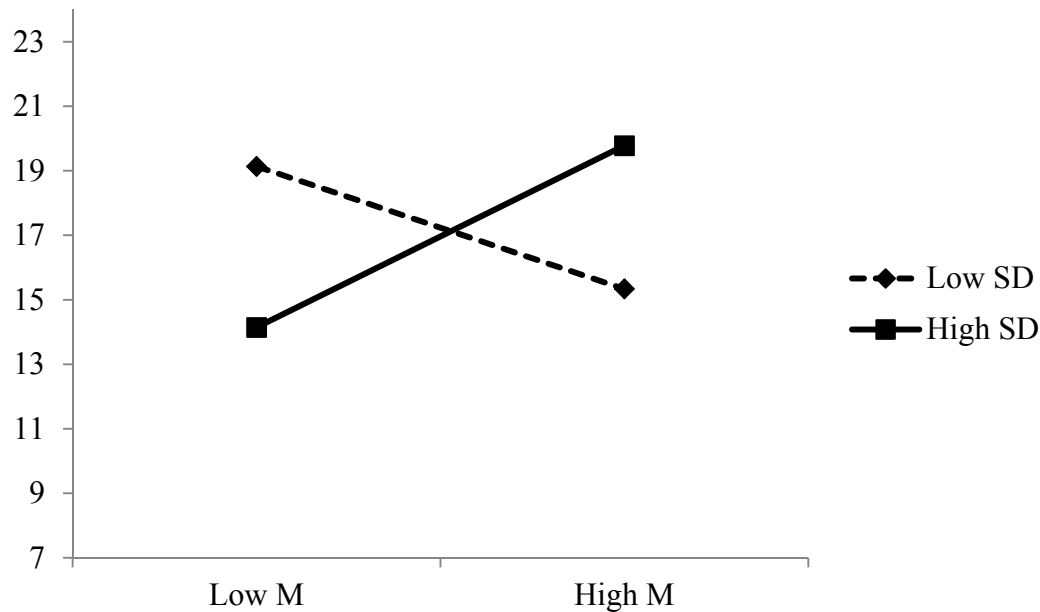
The pattern of the interaction appears puzzling. Based on trainees' global conscientiousness distribution, the mean had a slight negative effect for trainees with high variability (i.e., standard deviation), whereas a positive effect of the mean emerged for trainees with high variability. The current result, combined with the negative effect of state conscientiousness on transfer found earlier, points to the possibility that conscientiousness may actually impede performance on the transfer task.

Additional analysis was conducted to probe the nature of the standard deviation of conscientiousness distributions at both the global and contextualized levels. The standard deviation on global conscientiousness was negatively related to the mean of global conscientiousness ($r = -.70, p < .01$). Similarly, the standard deviation on contextualized conscientiousness was negatively associated with the mean of contextualized conscientiousness ($r = -.51, p < .01$). Thus, the more variable one's distribution of global or contextualized

conscientiousness, the lower he/she tended to be on corresponding global or contextualized conscientiousness. In addition, the standard deviation on global and contextualized conscientiousness correlated negatively with almost all the trait and contextualized trait variables in the study, as well as state conscientiousness during learning. Their relationships with other personality states, self-regulatory processes, and training outcomes were not significant.

Furthermore, the standard deviation in both trait conscientiousness and contextualized conscientiousness correlated negatively with the proxy variable used earlier to detect insufficient effort response pattern – the number of 100% respondents assigned to a single response category in the pretraining questionnaire (rs = -.27 and -.51, ps < .01). More importantly, while unrelated to personality states, self-regulatory processes, or training outcomes, this proxy variable was negatively associated with transfer performance (r = -.19, p < .01). It might be possible that standard deviation in trait conscientiousness and contextualized conscientiousness inadvertently tapped on participants' effort.

In light of the unexpected pattern of moderating effect of the standard deviation of global trait conscientiousness, as well as the suspected influence of insufficient effort responding on this standard deviation measure, a new set of exploratory analysis was performed to remove participants who might have engaged in insufficient effort responding. Specifically, individuals who scored one standard deviation or more below the mean on SD of global trait conscientiousness were screened from the data, resulting in a subsample of 151 individuals. All hypotheses were reexamined, with the ones receiving significant or marginal support noted below in Table 27.

Table 27. *Results of Hypothesis Testing in Subsample*

	ΔR^2	p
DV = declarative knowledge		
H2a: Trait openness	.03	.04
H3a: Trait mastery	.05	<.01
H4a: Trait achievement above trait conscientiousness	.02	.06
H5a: Trait curiosity above trait openness	.02	.07
H9a: Contextualized achievement above contextualized c.	.03	.03
DV = strategic knowledge		
H5a: Trait curiosity above trait openness	.03	.03
H6a: Contextualized conscientiousness above trait c.	.04	.02
H10a: Contextualized curiosity above contextualized o.	.05	<.01
DV = transfer		
H10a: Contextualized curiosity above contextualized o.	.02	<.10

Note. c. = conscientiousness; o. = openness. N = 151. All individuals scored higher than -1 SD below the mean (15 percentile) on the standard deviation of global trait conscientiousness distribution.

Exploratory Analyses – WPT-Q Subsample

Cognitive ability has been found to be an important predictor for training performance and transfer of training (e.g., Blume et al., 2010; Colquitt et al., 2000). In the current study, cognitive ability significantly predicted acquisition of declarative knowledge (r = .34, p < .01) and strategic knowledge (r = .41, p < .01) as well as transfer performance (r = .20, p = .03). Controlling for trainees' cognitive ability may help reveal the unique effects of trainees' personality. Although missing data prevented the use of cognitive ability in the hypothesis testing section above, scores on WPT-Q were used as control variable in the first set of exploratory analyses.

To understand the pattern of missingness on WPT-Q, the associations between missingness on WPT-Q and key study variables were examined. Respondents who missed WPT-

Q (n = 53) did not score differently on any predictor or process variables than respondents who completed WPT-Q (n = 124). Among the 107 respondents who reported their GPA, those having completed WPT-Q (n = 70; *M* for GPA = 3.37, SD = 0.50) did not have different levels of GPA than those who missed WPT-Q (n = 37; *M* for GPA = 3.22, SD = 0.47). However, individuals who did not complete WPT-Q scored significantly lower on declarative knowledge and strategic knowledge (Table 28) than those who completed WPT-Q. The results suggest that the missingness on WPT-Q might not be random. Thus, the missing values were not imputed. Instead, the exploratory analysis focused on the subsample of trainees who completed WPT-Q (n = 124).

Table 28. *Independent Samples t Tests for Groups with and without WPT-Q Scores*

	WPT-Q missing M (SD)	WPT-Q finished M (SD)	*t*	Cohen's d
Declarative	65.16 (21.63)	72.04 (16.35)	2.08*	0.38
Strategic	46.81 (15.29)	52.33 (14.73)	2.26*	0.37
Transfer	14.32 (17.87)	15.96 (16.75)	0.58	0.10

Note. n = 53 for WPT-Q missing; n = 124 for WPT-Q finished.

This exploratory analysis examined Hypotheses 11 and 12 simultaneously, controlling for trainees' mean-centered WPT-Q scores. After entering WPT-Q scores in the first block of a hierarchical regression analysis, trait conscientiousness, the intervention, and the trait conscientiousness × intervention interaction were entered in subsequent blocks. In addition, it is possible that trainees' cognitive ability interacted with the intervention. Thus, the product term between cognitive ability and the intervention was entered in the final block of analysis. Table 29 presents the results.

Table 29. *Exploring Interactions Involving Intervention*

	B	β	p	ΔR^2	p for ΔR^2
DV = declarative knowledge					
Intercept	71.86	---	<.01	---	---
1. *g*	0.78	.19	.08	.12	<.01
2. Trait conscientiousness	-7.73	-.24	.04	.01	.29
3. Intervention	-0.07	-.00	.98	.00	.96
4. Trait c × Intervention	12.07	.26	.03	.03	<.05
5. *g* × Intervention	1.77	.27	.01	.04	.01
DV = strategic knowledge					
Intercept	52.86	---	<.01	---	---
1. *g*	1.20	.33	<.01	.17	<.00
2. Trait conscientiousness	-5.97	-.21	.07	.00	.72
3. Intervention	-1.52	-.05	.53	.00	.58
4. Trait c × Intervention	12.21	.29	.01	.04	.02
5. *g* × Intervention	1.03	.18	<.10	.02	<.10
DV = transfer					
Intercept	15.78	---	<.01	---	---
1. *g*	0.54	.13	.26	.04	.03
2. Trait conscientiousness	-6.70	-.21	<.10	.02	.12
3. Intervention	0.22	.01	.94	.00	.92
4. Trait c × Intervention	5.46	.12	.36	.01	.40
5. *g* × Intervention	0.80	.12	.30	.01	.30

Note. n = 124.

While the intervention did not manifest any main effect on knowledge acquisition, trait conscientiousness significantly moderated the intervention's impact on acquisition of declarative and strategic knowledge. Furthermore, trainees' cognitive ability interacted with the intervention's effect on knowledge acquisition as well, with a significant effect on declarative knowledge and a marginal effect on strategic knowledge. In contrast, the interactions did not predict transfer performance. Figures 6-7 present the interactions on declarative knowledge, and Figures 8-9 present the interactions on strategic knowledge.

Figure 6. *Trait Conscientiousness × Intervention on Declarative Knowledge Acquisition*
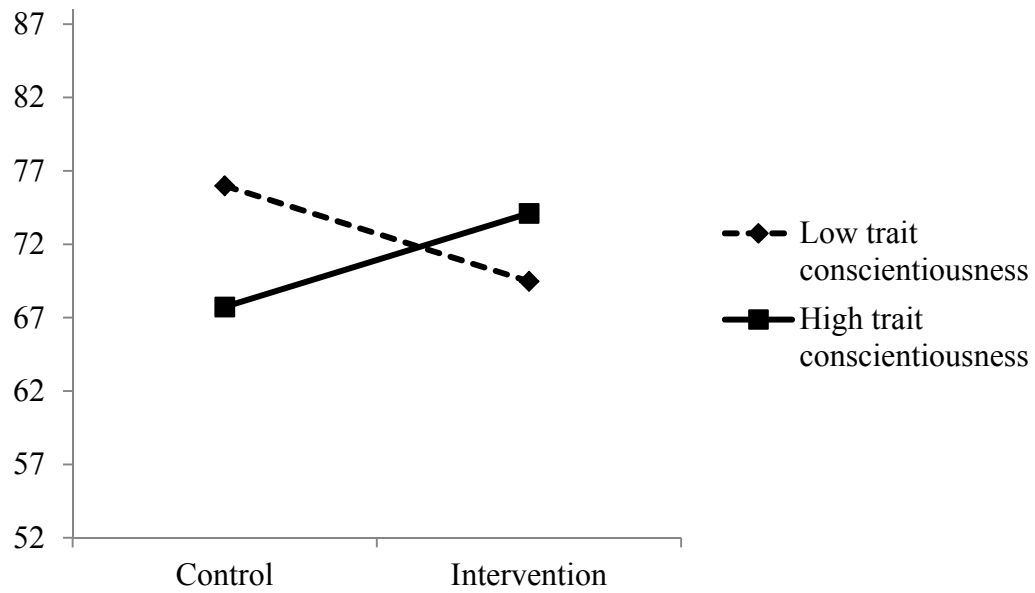
Figure 7. *g × Intervention on Declarative Knowledge Acquisition*
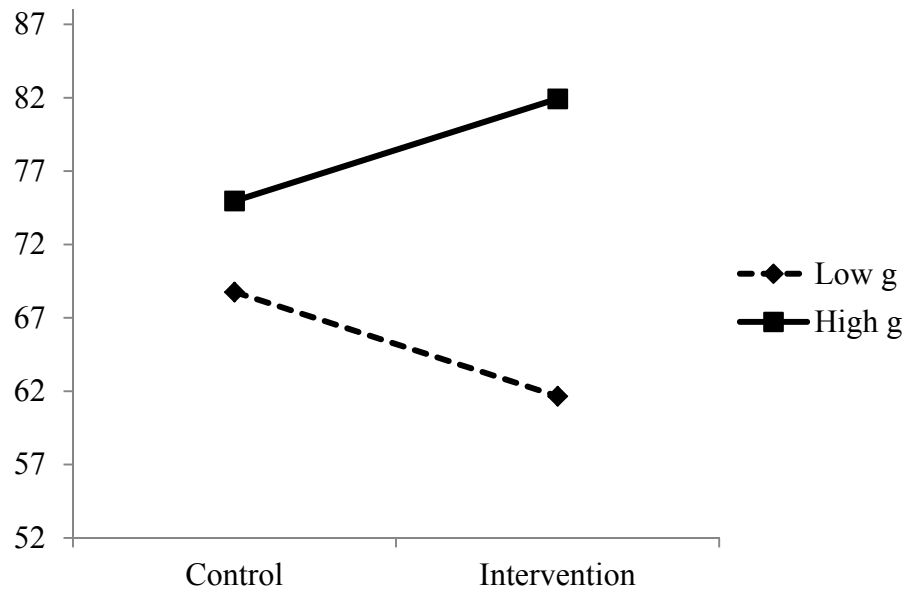
Figure 8. *Trait Conscientiousness × Intervention on Strategic Knowledge Acquisition*
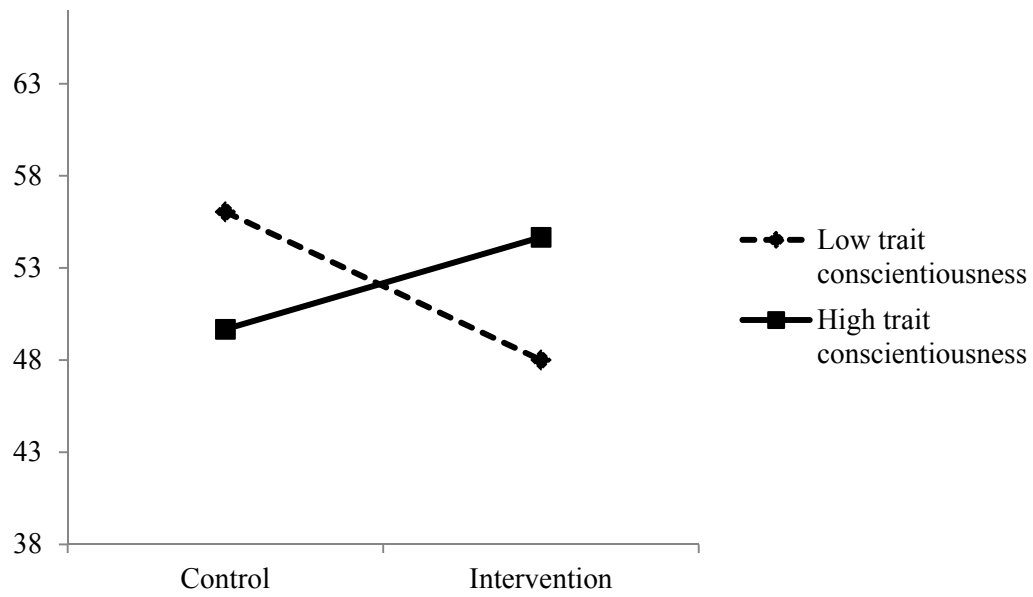
Figure 9. *g × Intervention on Strategic Knowledge Acquisition*
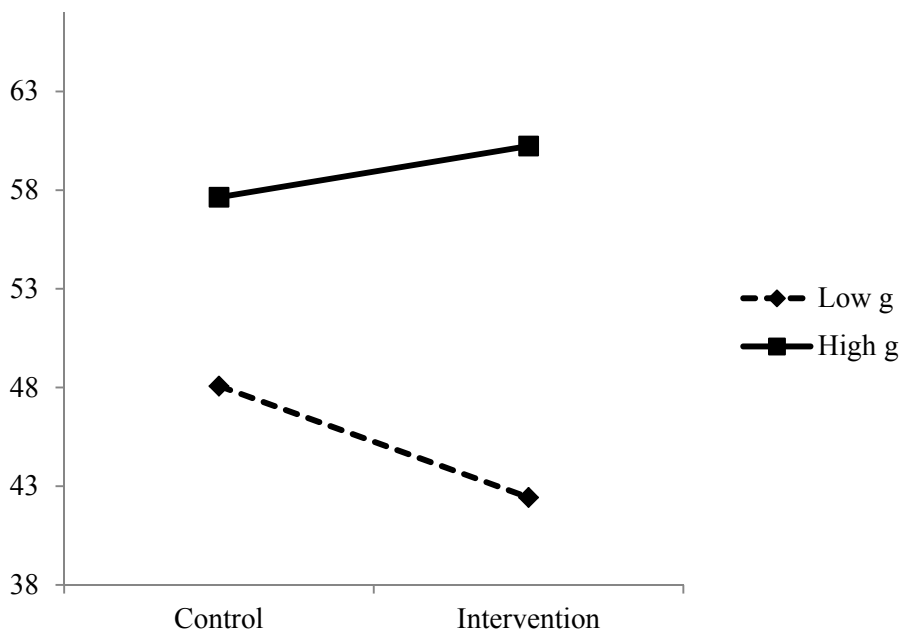
As the interaction between the intervention and trait conscientiousness revealed, the intervention, relative to the control condition, enhanced learning for trainees high on conscientiousness, whereas the same intervention seemed to hinder learning for trainees low on conscientiousness. The patterns of interaction paralleled the effect of the trait conscientiousness × intervention interaction on trainee effort reported earlier in Figure 4.

The interaction between treatment and cognitive ability indicated that, relative to the control condition, the intervention led to lower learning for trainees with low cognitive ability, whereas the expected benefit of the intervention only surfaced in trainees with high cognitive ability. The interaction effects were in addition to a general positive effect of cognitive ability on learning.

Given the importance of the intervention × trait conscientiousness and intervention × cognitive ability interactions in predicting learning, Hypotheses 1 through 10 were reexamined in this subsample above and beyond the last block in the regressions in Table 29. The results remained largely the same as the hypothesis testing section. Compared to the original hypotheses testing results, the only difference emerged in the effects of trait openness on declarative knowledge acquisition: trait openness accounted for 5% additional variance in declarative knowledge ($B = 5.33$, $\beta = 0.21$, $p < .01$), supporting Hypothesis 2. It is noteworthy that adding trait curiosity to the model explained additional 3% of variance above and beyond trait openness, $p < .05$, providing further support to Hypothesis 5(a).

DISCUSSION

Much of the discussion on personality in the organizational psychology has focused on the trait approach, relying on the typical and consistent pattern of individual behavior to understand the person and to predict future behavior. Research in personality psychology has shown that the person's variation across contexts and situations on a trait domain indicates a stable individual difference. This dissertation proposes a personality framework that examines personality at different foci depending on the level of generality/specificity under investigation. A personality system on a given construct domain, viewed with the highest level of generality, resembles a frequency distribution of construct-relevant states across all situations and contexts. When viewed from the moderate level of specificity, the personality distribution within a particular role context can provide more accurate portrayal of the person and lead to better prediction. When approached with high specificity, momentary states on a particular task or in a particular context may enable precise understanding and prediction in that narrow situation. The personality framework is applied to the learner-controlled training context. The hypotheses focus on three areas: (a) global traits' effects on learning and transfer; (b) contextualized traits' effects on learning and transfer, above and beyond corresponding global traits; and (c) the effects of a personality-based intervention on learning and transfer.

Findings and Implications

The study hypotheses were examined based on data from 177 undergraduate students in a computer-based training study. Tests of the hypotheses based on the entire sample did not yield any significant effects regarding the personality-based intervention, and the hypotheses on traits and contextualized traits were largely unsupported as well. However, the prediction based on bandwidth-fidelity tradeoff in Hypotheses 5(a) and 10(a) received support for knowledge

outcome measures: trait curiosity predicted knowledge acquisition above and beyond trait openness, and learner-role contextualized curiosity explained additional variance in knowledge acquisition above contextual openness. On the one hand, the nonsignificant effects of global trait openness in predicting learning are likely the result of mismatching the bandwidth of predictor and outcome: in the training context, the openness factor contains extraneous information about the person that is not necessarily conducive to learning. For example, scoring high on other facets of openness such as imagination and artistic interests may contribute little to facilitate learning. In contrast, curiosity can heighten the trainee's interest and motivate the trainee towards the training tasks (Gagne & Medsker, 1996; Reio & Wiswell, 2000), and thereby enhance learning.

Additional analyses on the full sample shed light on the role of personality states in the learning and transfer process. State mastery goal orientation during training positively predicted acquisition of declarative knowledge as well as transfer, whereas state conscientiousness during training negatively predicted transfer performance. Taken together, personality states provide an additional set of lens to understand the trainee in situ and serve as a linkage between more general personality constructs and specific trainee behaviors.

Although personality states were found relevant in the training and transfer process, precise prediction of personality states in the training context is still elusive. Instead of finding support for the added precision from using contextualized traits, examination of the relationships between the global trait, the contextualized trait, and the corresponding state revealed different patterns depending on the personality domain. First, contextualized openness predicted state openness above and beyond global trait openness. Second, in the presence of trait mastery goal orientation, contextualized mastery goal orientation failed to add to the prediction of state

106

mastery goal orientation. Finally, global trait conscientiousness and contextualized conscientiousness predicted state conscientiousness almost equally well. Therefore, the results did not allow for a confident conclusion as to whether contextualized trait outperforms global trait in predicting outcomes in the current context.

The exploratory analysis focusing on predicting transfer revealed that the affective outcomes of posttraining self-efficacy and motivation to transfer did not predict transfer performance. This finding is inconsistent with prior findings in the literature regarding the role of affective training outcomes (e.g., Blume et al., 2010; Colquitt et al., 2000; Ford et al., 1998). Perhaps the transfer task relied too much on cognitive learning and information processing that trainees' motivation and affect played little additional role, thereby limiting the influences of personality variables. Interestingly, trainees' state conscientiousness during training negatively predicted transfer, after controlling for knowledge acquisition. The negative effect of state conscientiousness may be due to the nature of the transfer task, as it required trainees to frequently analyze new information and make adjustments accordingly. As LePine et al. (2000) noted, highly conscientious individuals, due to their tendency to be planful, organized, and pay attention to order, can overemphasize maintaining current order and fail to adapt to novel situations. It is quite likely that being in a state of conscientiousness during the training permeated in the transfer setting and influenced trainees' decision making, particularly adaptability. If that was the case, the hypothesized positive effect of having high state conscientiousness during transfer attempts was likely negated by the negative effect of state conscientiousness on adaptive performance. This scenario would necessitate future investigations to specify the level of adaptability involve in transfer of training.

The subsample analysis on the intervention group revealed that the measure of task-contingent conscientiousness, obtained under the manipulation in the intervention condition, positively predicted acquisition of declarative and strategic knowledge. This finding echoes Minbashian et al. (2010) in highlighting the predictive validity of the extent to which a person tends to elevate his/her state conscientiousness in response to difficult/challenging/urgent tasks. However, two distinctions set apart Minbashian et al. (2010) and the current finding. First, Minbashian and colleagues assessed task-contingent conscientiousness using experience sampling methodology, and the current study assessed the construct using a self-report measure, after participants were subjected to priming and FASE scale manipulations. In the current study, while it is possible that participants endorsed task-contingent conscientiousness because of the pretraining intervention, it is also likely that their endorsement came from their innate proclivity, just as Minbashian et al. (2010) assessed, or more possibly, originated from the combination of both factors. Second, whereas Minbashian et al. examined adaptive performance on a cognitive task, the current findings centered on knowledge acquisition instead.

Taken together, findings of the personality's influences on learning and transfer lend support to the use of the multifocal personality framework: whereas personality traits were limited in their capability to predict learning and transfer, personality states and situation-state contingencies can account for variance in these outcomes. For example, state conscientiousness and mastery goal orientation predicted transfer performance. Thus, identification of the roles of state conscientiousness, state mastery goal orientation, and task-contingent conscientiousness offers a direction for future research and application.Regarding personality distributional properties as predictors of learning and transfer, the trait conscientiousness $M \times SD$ interaction was quite unexpected. Two competing explanations can be proffered. If the standard deviation

on trait conscientiousness distribution truly reflected the trainee's dispositional tendency, its moderating effect may again be tied to the adaptive nature of the transfer task. If the trainee's global conscientiousness is characterized by high consistency across various situations (i.e., low *SD*), then being high on trait conscientiousness means the person tends to be highly organized, dependable, and planful, regardless of situations and contexts. As noted above, this situation-blind expression of conscientiousness is a negative predictor of adaptive performance. In contrast, being disorganized and haphazard, and consistently so, may turn out beneficial in adaptive contexts. However, if the trainee's global conscientiousness distribution has a large *SD*, then the individual may dynamically adjust his/her conscientiousness expression to fit in the situation. In this case, being high on trait conscientiousness means having greater range of potential behavior to cope with various situations. Beyond the trait conscientiousness $M \times SD$ interaction, the main effect of the standard deviation of contextualized conscientiousness distribution can be interpreted in a similar vein.

Before putting too much stock into the explanation above, a second explanation must be considered. The distributional rating format required much more respondent effort than typical Likert-scale items. It is likely that standard deviation in measurement captured participant effort. The associations between these two *SD* measures and the number of 100% used in the pretraining questionnaire pointed to this possibility. Furthermore, after removing cases characterized by very low *SD* on trait conscientiousness, more hypotheses were supported, adding some credibility to this alternative explanation.

Finally, the subsample analyses on trainees who also completed the cognitive ability assessment revealed an interesting pattern of interaction. The effects of the intervention on declarative and strategic knowledge were in the hypothesized direction for trainees with high

trait conscientiousness, yet the control condition somehow outperformed the intervention condition when the trainees were low on trait conscientiousness. Perhaps responding to the self-deception statements in the control condition immediately before training triggered low conscientious trainees to modify their behaviors temporarily. For example, "It would be hard for me to break any of my bad habits" might have primed the trainee to reflect on past deficiencies and to implement correction while "Once I've made up my mind, other people can seldom change my opinion" could have prompted the trainee to execute decisions in a more determined manner.

The moderating effect of cognitive ability on the intervention is another reason for the nonsignificant main effect of the intervention. Trainees who were high on cognitive ability benefited from the intervention, yet those who had low cognitive ability were impeded by the intervention. It is possible that by priming low g trainees their past roles as learners, their past failures in learning were highlighted, resulting in low pretraining self-efficacy and subsequent suboptimal knowledge acquisition.

Limitations and Future Research Directions

Several limitations of the present study should be noted. First, interpretation of the study findings needs to be bounded by the particular sample and study characteristics. In terms of the sample, undergraduate students participated in the experiment in exchange for course credits. Some of the participants might be motivated to complete the study as a means to obtain extra credits rather than being genuinely interested in learning and subsequent transfer. The difference in trainee motivation between the current study and a voluntary training setting warrants further replication and exploration of the relevant personality hypotheses in a field sample. Aside from

participant motivation, the overall characteristics of an undergraduate sample, such as high

cognitive ability and education attainment, may limit the generalizability of the current findings.

The sample characteristics also posed a constraint on the role context at Level B of the

personality measures. It is possible that some participants may have failed to see himself/herself

as a learner in the current study. Under such circumstances, the contextualized measure might

have been irrelevant to this individual. Indeed, the reliance on a somewhat artificial role of the

learner in the present study, dictated by the sample characteristics, may have limited the effects

of Level B contextualized traits. When workers attend work-related training activities and

subsequently transfer to their jobs, it is possible that a role that the trainees can readily endorse,

i.e., the work role, may bring better prediction of learning and transfer.

In terms of study characteristics, the time commitment of the study, around 2.5 hours, as

well as the complexity in rating one's behavioral frequencies, may have restricted the possible

range of participant personality. For instance, the standard deviation of trait conscientiousness in

the present sample was quite small, at 0.53, which may be attributed to the attrition in the study

process. For example, a less conscientious participant might decide not to go through the self-

rating process for the pretraining questionnaire, or might not care to attend the lab session he/she

signed up for. Indeed, among students who signed up for a lab session, only 85% of them

showed up. Thus, the restriction on conscientiousness might have attenuated the relationship

between conscientiousness and outcomes.

Second, as in many training studies, the current study utilized a single training program

and a single transfer task. Therefore the conclusions need to be tampered by the unique

characteristics of the training and transfer tasks. Both the training and transfer tasks were

cognitively challenging, as can be seen from the high relationships with cognitive ability and the

low scores on transfer performance. As noted above, the emphasis on cognitive processing may have limited the effects of trainee personality. Furthermore, the transfer task can be classified as open skills transfer (Yelon & Ford, 1999), as it required trainees to apply the knowledge they acquired in a dynamic environment with constantly changing stimuli. The adaptability component of the transfer task also helped explain the negative effect of state conscientiousness in the study. Contrasting to Kozlowski et al. (2001) that demonstrated that the positive effect of mastery goal orientation on adaptive posttraining performance was mediated by posttraining self-efficacy, the current study showed nonsignificant effects of trait mastery goal orientation and posttraining self-efficacy. The difference between the present findings and Kozlowski et al.'s (2001) might also be due to the different types of training and transfer tasks used.

Third, the transfer task and transfer measure might have posed constraints on the effects of personality. The transfer task occurred immediately after the training, presenting no opportunities for trainees to practice. As Weissbein et al. (2011) showed, the effect of a pretraining intervention on transfer can be mediated through trainee practice after training. Thus, employing a far transfer task that provides trainees ample opportunity to review and practice the learned materials may enhance the effect of the intervention, as well as allowing the personality variables to manifest their influences. In addition, the transfer measure, which was the percentage of games trainees won during their 45-minute games, might not be an optimal measure of actual transfer behavior. As outcomes of the game could be influenced not only by strategy and skills but also by luck, the transfer measure could contain unrelated error variance due to luck. Coding of trainees' game playing behavior, such as critical decisions or degree to which they advanced their hands, may enable a closer look of transfer.

112

Finally, absent a manipulation check, whether the intervention was effective at moving participants' state conscientiousness in the desired direction remains unclear. Although in general no main effects of the intervention were observed, the complex pattern of interactions found in the exploratory analyses indicated at least some trainees benefited from the intervention. The inability to track down each trainee's attentiveness to the intervention and to screen those who did not heed the intervention led to the difficulty in ascertaining the effect of the intervention. It was also impossible to disentangle trainee personality from intervention on trainees' responses to the task-contingent conscientiousness measured under the intervention. Future studies might utilize repeated measures design as a means to assess manipulation's effect. In addition, future studies may include a stronger form of personality state intervention, using video examples (e.g., Weissbein et al, 2011) or behavioral modeling (Taylor, Russ-Eft, & Chan, 2005) to demonstrate how trainees can elevate their personality states.

Taken together, findings and limitations of the present study suggest for critical considerations in future investigations with regards to samples, training design, and transfer task and environment. In terms of sample characteristics, the examination of the multifocal personality effects may need to be conducted in a motivated sample within an identifiable role context, such as employees who participate in on-the-job training as part of their job, or researchers partaking training workshops targeting key research competencies. In terms of training design, the training program needs to provide sufficient opportunity and time for trainees to learn and practice, and thus enabling personality to exert influence, while the training materials may be moderately difficult, but should not be so cognitively-laden as to preclude any personality effects. In terms of the transfer task and environment, examining transfer with some

time lag after training may enable personality to influence transfer through optional practice, and reducing the perceived demand on transfer may enhance the effects of personality.

Limitations aside, the current findings highlight the potential benefit in applying the multifocal framework of personality in studying work behavior. Specifically, the closer examination of personality states as well as situation-state contingencies may prove useful in predicting and understanding other phenomena such as emotional labor in service provision and team performance. For example, Huang and Ryan (2011) demonstrated that service employees tend to elevate their state extraversion when interacting with friendly others. If service provision requires service employees maintain a heightened state of extraversion, then training interventions may be designed to decouple or deemphasize the friendliness-extraversion contingency. As another example, the prevalent approach to studying team personality has focused on individuals as entities with fixed amounts of global traits (e.g., LePine, 2003; Porter et al., 2003). Following the current personality framework, the team context may influence team members' personality states. Thus the study of personality states in teams and the degree to which personality states become homogeneous within teams may provide a new set of lens to understand team process and behavior.

Conclusion

This paper proposed a multifocal framework of personality that conceptualizes personality as frequency distribution of states at three levels of specificity. The personality framework was applied to training research to generate predictions on training and transfer beyond the prevalent trait approach. A computer-based training with a near transfer task in the laboratory setting revealed complex effects of personality traits, states, and a personality-based priming intervention. The use of the multifocal personality framework in understanding work

behavior can enhance prediction by enabling a closer matching between the personality predictor and the outcome. Organizational psychologists can integrate the research on contextualized traits, situational contingencies, and personality states into the current personality trait research to bring a better understanding of the dynamic person at work.

APPENDICES

Online Pretraining Measures

Note: Description in italics was not shown on the actual survey.

Please estimate the relative frequency that each of three response categories (very inaccurate, neither accurate nor inaccurate, and very accurate) reflects your behavior with respect to each statement over the past six months. Make sure you **consider all possible social contexts** when responding (e.g., at home, in social activities, at school). Assign percentage values to the highlighted response categories such that the total sums to 100%. The sum of frequency will be calculated automatically in the Total column.

Example: An example statement is "Start conversations". Of all the opportunities you've had to display this behavior across various contexts in the past 6 months, think of how frequently this statement was descriptive of your actual behavior at each of the three levels. If you feel that "Start conversations" was very descriptive of your behavior 40% of the time, somewhat descriptive of your behavior 35% of the time, and not at all descriptive of your behavior 25% of the time, then your response would look like:

	% very accurate	% neither inaccurate nor accurate	**% very inaccurate**	*Total*
Start conversations	40	(35)	25	*100*

Actual Survey:

Please estimate the relative frequency that you displayed each of the following behavior **across all possible social contexts** over the past six months:

	% very accurate	% neither inaccurate nor accurate	**% very inaccurate**	*Total*
Level A Conscientiousness – IPIP NEO				
1. Pay attention to details.				
2. Am always prepared.				
3. Get chores done right away.				
4. Carry out my plans.				
5. Make plans and stick to them.				
Level A Achievement-striving – IPIP NEO				
6. Go straight for the goal.				
7. Turn plans into actions.				
8. Plunge into tasks with all my heart.				

	% very accurate	% neither inaccurate nor accurate	% very inaccurate	Total
9. Do more than what's expected of me.				
10. Set high standards for myself and others.				
Level A Openness to experience – IPIP NEO				
11. Believe in the importance of art.				
12. Have a vivid imagination.				
13. Carry the conversation to a higher level.				
14. Enjoy hearing new ideas.				
15. Look for a deeper meaning in things.				
Level A Intellect – IPIP NEO				
16. Like to solve complex problems.				
17. Am interested in abstract ideas.				
18. Love to read challenging material.				
19. Can handle a lot of information.				
20. Enjoy thinking about things.				
Level A Mastery Goal Orientation – VandeWalle (1997)				
21. Am willing to select a challenging assignment that I can learn a lot from.				
22. Look for opportunities to develop new skills and knowledge.				
23. Enjoy challenging and difficult tasks where I'll learn new skills.				
24. Development of my ability is important enough to take risks.				
25. Prefer situations that require a high level of ability and talent.				

You will now see the same items you just filled out before. **This time**, please consider only your behavior **in learning contexts**, such as taking classes, learning new skills, and exploring new software programs. Please estimate the relative frequency that each of three response categories (very inaccurate, neither accurate nor inaccurate, and very accurate) reflects your behavior with respect to each statement over the past six months. Make sure you **consider only learning-related contexts** when responding. Assign percentage values to the highlighted response categories such that the total sums to 100%.

Actual Survey:
Please estimate the relative frequency that you displayed each of the following behavior **in learning contexts** over the past six months:

	% very accurate	% neither inaccurate nor accurate	% very inaccurate	Total
Level B Conscientiousness – IPIP NEO				
26. Pay attention to details.				

27. Am always prepared.		
28. Get chores done right away.		
29. Carry out my plans.		
30. Make plans and stick to them.		
Level B Achievement-striving – IPIP NEO		
31. Go straight for the goal.		
32. Turn plans into actions.		
33. Plunge into tasks with all my heart.		
34. Do more than what's expected of me.		
35. Set high standards for myself and others.		
Level B Openness to experience – IPIP NEO		
36. Believe in the importance of art.		
37. Have a vivid imagination.		
38. Carry the conversation to a higher level.		
39. Enjoy hearing new ideas.		
40. Look for a deeper meaning in things.		
Level B Intellect – IPIP NEO		
41. Like to solve complex problems.		
42. Am interested in abstract ideas.		
43. Love to read challenging material.		
44. Can handle a lot of information.		
45. Enjoy thinking about things.		
Level B Mastery Goal Orientation – VandeWalle (1997)		
46. Am willing to select a challenging assignment that I can learn a lot from.		
47. Look for opportunities to develop new skills and knowledge.		
48. Enjoy challenging and difficult tasks where I'll learn new skills.		
49. Development of my ability is important enough to take risks.		
50. Prefer situations that require a high level of ability and talent.		

Demographics

You are about to reach the end of this survey. Please answer a few additional questions about yourself.

1. Have you ever learned to play the game of Mahjong (also known as Mah Jongg)?
   Note: the game of Mahjong refers to a four-person competitive game, not the tile-matching solitaire computer game)?

- o Yes
- o No

2. How would you describe your knowledge of the game of Mahjong?
   - o Beginner – I do not know the basic rules
   - o Intermediate – I know most of the rules
   - o Advanced – I know the rules very well

3. What is your current cumulative GPA?
   - o My current cumulative GPA is _____
   - o Prefer not to disclose

4. Gender
   - o Male
   - o Female
   - o Prefer not to disclose

5. Age
   - o I am … _____ years old
   - o Prefer not to disclose

6. Ethnicity
   - ☐ Hispanic/Latino
   - ☐ White
   - ☐ Asian
   - ☐ Black or African American
   - ☐ American Indian or Alaska Native
   - ☐ Native Hawaiian or Other Pacific Islander
   - ☐ Other – please specify your ethnicity:
   - ☐ Prefer not to disclose

Pretraining Intervention/Control

Note: Description in italics was not shown on the actual survey.

Intervention Measures Administered to the Experimental Group

This research study focuses on understanding how learner personality may affect training outcomes. Oftentimes, general psychological measures such as the one you filled out online may not be sufficient in capturing the specifics of an individual's personality. The following 20 items are designed to enable a closer look at your personality. Please reflect on yourself and recall specific instances to support your response.

Role salience

Think about your past roles as a learner, and answer the following questions accordingly. Your role as a learner may involve tasks such as reading before a class, participating in coursework-related discussions, completing homework assignments, as well as learning new skills from a workshop and exploring new software programs.

Indicate your agreement with the following statements, using the scale provided below.

1	2	3	4	5
Somewhat Agree		Mostly Agree		Completely Agree

Callero (1985)
1. I would feel a loss if I were forced to give up learning.
2. For me, being a learner means more than just studying.
3. My role as a learner is an important part of who I am.

Amatea et al. (1986)
4. It is important to me that I can achieve something of importance in my role as a learner.
5. It is important to me to feel successful in learning.
6. I expect to make as many sacrifices as are necessary in order to advance in learning new skills.
7. I value being involved in learning activities.
8. I expect to devote a significant amount of my time to developing the skills necessary to advance as a learner.

Trait self-conception
Now, think about yourself in life in general, across different social contexts (e.g., at home, in social activities, at school). Rate your agreement with the following statements.

121

Conscientiousness alternative items – IPIP Conscientiousness
1. I complete tasks successfully.
2. I do things according to a plan.
3. I am exacting in my work.
4. I finish what I start.
5. I follow through with my plans.
6. I put my mind on the task at hand.
7. I never give up.
8. I am highly motivated to succeed.

Task contingent state conscientiousness
Please recall your **past learning experiences** where you encounter difficult tasks, especially under time pressure. Rate the following statements, comparing to other less difficult, less urgent tasks.

Minbashian et al. (2010)
1. I worked on the difficult tasks more efficiently than other tasks.
2. I approached the difficult tasks more systematically than other tasks.
3. I worked harder on the difficult tasks than other tasks.
4. I was more focused on the difficult tasks than other tasks.

Control Measures Administered to the Control Group

This research study focuses on understanding how learner personality may affect training outcomes. Oftentimes, general psychological measures such as the one you filled out online may not be sufficient in capturing the specifics of an individual's personality. The following 20 items are designed to enable a closer look at your personality. Please indicate how much you agree with each statement using the scale below.

1	2	3	4	5
Not True		Somewhat True		Very True

1. My first impressions of people usually turn out to be right.
2. It would be hard for me to break any of my bad habits. *(R)*
3. I don't care to know what other people really think of me.
4. I have not always been honest with myself. *(R)*
5. I always know why I like things.
6. When my emotions are aroused, it biases my thinking. *(R)*
7. Once I've made up my mind, other people can seldom change my opinion.
8. I am not a safe driver when I exceed the speed limit. *(R)*
9. I am fully in control of my own fate.
10. It's hard for me to shut off a disturbing thought. *(R)*

11. I never regret my decisions.
12. I sometimes lose out on things because I can't make up my mind soon enough. *(R)*
13. The reason I vote is because my vote can make a difference.
14. My parents were not always fair when they punished me. *(R)*
15. I am a completely rational person.
16. I rarely appreciate criticism. *(R)*
17. I am very confident of my judgments.
18. I have sometimes doubted my ability as a lover. *(R)*
19. It's all right with me if some people happen to dislike me.
20. I don't always know the reasons why I do the things I do. *(R)*

APPENDIX C

Personality State Measures during Training

Please reflect on yourself after you started reading about Mahjong and before the start of this survey page. Rate the extent to which each of the following words/statements accurately describe you during this period of time.

1	2	3	4	5
Very Inaccurate	Moderately Inaccurate	Neither Inaccurate Nor Accurate	Moderately Accurate	Very Accurate

State Conscientiousness (Goldberg, 1992)

1. Organized
2. Responsible
3. Hardworking
4. Conscientious
5. Thorough
6. Systematic
7. Negligent *(R)*
8. Careless *(R)*
9. Lazy *(R)*
10. Sloppy *(R)*

State Openness (Goldberg, 1992)

11. Intelligent
12. Analytical
13. Reflective
14. Curious
15. Imaginative
16. Creative
17. Sophisticated
18. Innovative
19. Intellectual
20. Complex

State Mastery Goal Orientation (Horvath, Scheu, & DeShon, 2001)

21. I prefer to work on aspects of this experiment that force me to learn new things.
22. I am willing to work on challenging aspects of this experiment that I can learn a lot from.
23. The opportunity to learn new things about Mahjong is important to me
24. On this task my goal is to learn how to play Mahjong as well as I can.

Posttraining Measures

Please recall your thoughts and actions **when you were learning** how to play Mahjong just now. Indicate your agreement with the following statements.

1	2	3	4	5
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

Persistence – Adapted from Elliot, McGregor, & Gable (1999)
1. When I became confused about something I was reading, I went back and tried to figure it out.
2. Regardless of whether or not I liked the material on Mahjong, I worked my hardest to learn it.
3. When something that I was reading got difficult, I spent extra time and effort trying to understand it.
4. I tried to learn all of the material "inside and out," even if it was boring.

Attention – Adapted from Kanfer & Ackerman (1989) and Kanfer et al. (1994)
5. I daydreamed while learning the Mahjong material.
6. I let my mind wander while learning the Mahjong material.
7. I took "mental breaks" during the learning period.
8. I lost interest in the learning material for short periods.
9. I thought about other things that I have to do.
10. I did not focus my total attention on learning the Mahjong material.
11. I thought about other things that have happened in the past few days.

Now, please reflect on how your feel regarding the Mahjong material **right now**. Indicate your agreement with the following statements.

1	2	3	4	5
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

Posttraining self-efficacy – Adapted from Ford et al. (1998)

This set of questions asks you to describe how you feel about your capabilities for playing Mahjong.

1. I can meet the challenges of playing Mahjong.
2. I am confident in my understanding of the rules of Mahjong.
3. I can deal with the decisions surrounding the game of Mahjong.
4. I am certain that I can manage the requirements of playing Mahjong.

5. I am confident that I can cope with the game of Mahjong if the game becomes more complex.

Motivation to transfer

This set of questions asks about your intention in applying the materials you just learned in the actual game.

Adapted from Stevens and Gist, 1997
1. I will put in as much effort as possible to achieve a high score in playing Mahjong.
2. I am motivated to apply what I just learned to playing Mahjong.
3. I plan to be very persistent in playing Mahjong.
Adapted from Warr et al. (1999)
4. I feel very committed to apply what I have learned to playing Mahjong.

Table 30. *Descriptive Statistics and Intercorrelations for Study Variables.*

	M	SD	1	2	3	4	5	6	7
1.Intervention	0.52	0.50	**---**						
2.Trait cons.	3.88	0.53	.07	***.82***					
3.Trait achie.	3.98	0.57	.10	.77	***.87***				
4.Trait open.	3.87	0.61	.03	.37	.52	***.80***			
5.Trait curio.	3.64	0.64	.08	.35	.49	.58	***.77***		
6.Trait mast.	3.85	0.67	.04	.53	.71	.63	.69	***.90***	
7.RC cons.	3.98	0.62	.06	.72	.68	.38	.43	.60	***.88***
8.RC achie.	4.00	0.64	.12	.62	.77	.57	.52	.72	.79
9.RC open.	3.82	0.69	.03	.34	.51	.83	.60	.67	.47
10.RC curio.	3.63	0.72	.13	.34	.51	.54	.82	.72	.47
11.RC mast.	3.78	0.70	.13	.50	.68	.60	.66	.85	.62
12.State cons.	4.07	0.54	.01	.26	.34	.16	.37	.39	.26
13.State open	3.81	0.62	-.09	.01	.11	.23	.18	.21	.09
14.State mastery	3.60	0.73	.07	.00	.14	.12	.29	.32	.08
15.Persistence	3.63	0.90	-.05	.11	.16	.08	.08	.22	.09
16.Attention	3.16	0.91	-.01	.01	-.01	-.01	.03	.05	.03
17.Effort (Time)	25.36	6.84	-.11	-.07	-.12	.01	-.16	-.06	-.06
18.Declarative	69.98	18.30	.05	-.03	.04	.10	.19	.13	.04
19.Strategic	50.67	15.07	-.03	-.09	-.06	-.02	.13	.02	.03
20.Self-efficacy	3.08	0.95	.08	.01	.12	.16	.24	.18	.08
21.Motivation	4.06	0.80	-.09	.03	.13	-.05	.04	.16	.07
22.Transfer	15.47	17.06	.07	-.11	-.14	-.03	.03	-.04	-.15
23.SD trait cons.	1.30	0.30	-.01	-.70	-.51	-.19	-.22	-.29	-.41
24.SD trait achie.	1.22	0.34	-.05	-.55	-.73	-.37	-.37	-.52	-.40
25.SD trait open.	1.15	0.39	-.01	-.23	-.35	-.64	-.38	-.38	-.19
26.SD trait curio.	1.23	0.36	.06	-.20	-.28	-.24	-.32	-.27	-.18
27.SD trait mast.	1.21	0.43	.02	-.38	-.46	-.37	-.39	-.56	-.24
28.SD RC cons.	1.21	0.39	.04	-.49	-.41	-.19	-.18	-.24	-.51
29.SD RC achie.	1.16	0.41	-.02	-.39	-.54	-.33	-.30	-.44	-.35
30.SD RC open.	1.14	0.43	.00	-.17	-.30	-.45	-.29	-.31	-.12
31.SD RC curio.	1.24	0.40	.07	-.20	-.29	-.26	-.28	-.34	-.13
32.SD RC mast.	1.26	0.45	.06	-.27	-.40	-.33	-.34	-.46	-.21
33. Mnp cons.	3.61	0.70	---	.42	.44	.10	.23	.34	.37
34. Mnp RC cons.	3.75	0.68	---	.14	.21	.20	.19	.27	.18
35. Mnp TC cons.	3.33	0.75	---	.15	.26	.12	.31	.13	.23
36. Self-deception	3.12	0.46	---	.30	.28	.17	.22	.30	.29
37. Wonderlic	24.56	3.98	-.02	-.05	.08	-.07	.18	.03	-.03

Table 30 (cont'd)

	8	9	10	11	12	13	14	15	16	17
1.Intervention										
2.Trait cons.										
3.Trait achie.										
4.Trait open.										
5.Trait curio.										
6.Trait mast.										
7.RC cons.										
8.RC achie.	*.88*									
9.RC open.	.65	*.80*								
10.RC curio.	.64	.68	*.83*							
11.RC mast.	.81	.72	.83	*.91*						
12.State cons.	.31	.19	.39	.42	*.77*					
13.State open	.19	.31	.25	.26	.44	*.86*				
14.State mastery	.12	.17	.28	.26	.41	.46	*.75*			
15.Persistence	.12	.05	.10	.18	.40	.26	.44	*.83*		
16.Attention	.04	-.04	.05	.07	.30	.12	.23	.44	*.87*	
17.Effort (Time)	-.09	-.07	-.08	-.07	.06	-.06	.17	.35	.11	---
18.Declarative	.09	.05	.13	.06	.10	.01	.33	.45	.32	.33
19.Strategic	.05	.04	.18	.07	.14	.06	.14	.37	.34	.31
20.Self-efficacy	.13	.18	.25	.16	.26	.36	.40	.39	.45	-.08
21.Motivation	.07	-.05	.04	.11	.35	.23	.54	.60	.48	.16
22.Transfer	-.09	-.05	.05	-.05	-.14	-.01	.11	.16	.08	.05
23.SD trait cons.	-.34	-.17	-.16	-.24	-.16	-.01	.07	-.08	.04	-.01
24.SD trait achie.	-.47	-.35	-.33	-.45	-.25	-.12	-.14	-.11	.04	.05
25.SD trait open.	-.30	-.50	-.29	-.34	-.06	-.10	.02	-.01	.05	.01
26.SD trait curio.	-.18	-.17	-.19	-.18	-.11	-.02	.11	.09	.11	.13
27.SD trait mast.	-.32	-.30	-.32	-.44	-.32	-.12	-.13	-.08	.01	-.04
28.SD RC cons.	-.34	-.16	-.13	-.24	-.15	-.04	.13	-.03	.03	.08
29.SD RC achie.	-.53	-.30	-.33	-.44	-.25	-.13	.01	-.05	-.06	.11
30.SD RC open.	-.23	-.44	-.24	-.25	-.09	-.11	.04	.05	-.01	.15
31.SD RC curio.	-.25	-.21	-.36	-.31	-.18	-.09	.04	-.01	-.04	-.02
32.SD RC mast.	-.35	-.32	-.39	-.51	-.26	-.19	-.04	-.06	-.01	.09
33. Mnp cons.	.38	.13	.27	.33	.17	.00	-.05	.03	.01	.00
34. Mnp RC cons.	.32	.21	.30	.36	.12	.12	.12	.11	.02	.08
35. Mnp TC cons.	.34	.14	.32	.27	.12	.05	.00	.07	.11	-.04
36. Self-deception	.27	.20	.21	.26	.28	.38	.31	.01	.18	-.25
37. Wonderlic	.06	.02	.15	.08	.10	.08	.19	.03	.23	-.09

Table 30 (cont'd)

	18	19	20	21	22	23	24	25	26	27
1.Intervention										
2.Trait cons.										
3.Trait achie.										
4.Trait open.										
5.Trait curio.										
6.Trait mast.										
7.RC cons.										
8.RC achie.										
9.RC open.										
10.RC curio.										
11.RC mast.										
12.State cons.										
13.State open										
14.State mastery										
15.Persistence										
16.Attention										
17.Effort (Time)										
18.Declarative	*.74*									
19.Strategic	.54	*.70*								
20.Self-efficacy	.44	.29	*.91*							
21.Motivation	.46	.25	.40	*.88*						
22.Transfer	.31	.30	.13	.06	---					
23.SD trait cons.	.06	.06	.01	.02	.16	*.74*				
24.SD trait achie.	.03	.11	-.08	-.10	.12	.70	*.82*			
25.SD trait open.	-.01	.05	-.03	.05	.08	.38	.56	*.79*		
26.SD trait curio.	.08	.10	.01	.01	.14	.36	.50	.65	*.74*	
27.SD trait mast.	.02	.09	.04	-.08	.12	.42	.61	.57	.58	*.83*
28.SD RC cons.	.11	.15	.09	.00	.22	.59	.54	.45	.53	.47
29.SD RC achie.	.04	.11	-.01	-.08	.17	.43	.62	.57	.59	.62
30.SD RC open.	.05	.09	-.06	-.01	.16	.27	.45	.81	.69	.56
31.SD RC curio.	.02	-.02	-.01	-.08	.10	.23	.41	.52	.66	.57
32.SD RC mast.	.11	.08	.03	-.06	.08	.30	.49	.51	.54	.72
33. Mnp cons.	.07	.08	.09	.01	-.09	-.19	-.20	.04	-.11	-.21
34. Mnp RC cons.	-.05	.04	.07	.01	.01	.05	-.02	-.12	.00	-.14
35. Mnp TC cons.	.23	.26	.16	.09	.06	.07	-.06	-.06	-.10	.00
36. Self-deception	-.07	-.15	.13	.14	-.14	-.03	-.12	-.07	.00	-.15
37. Wonderlic	.34	.41	.33	.24	.20	-.04	-.04	.06	.09	.06

Table 30 (cont'd)

	28	29	30	31	32	33	34	35	36	37
1.Intervention										
2.Trait cons.										
3.Trait achie.										
4.Trait open.										
5.Trait curio.										
6.Trait mast.										
7.RC cons.										
8.RC achie.										
9.RC open.										
10.RC curio.										
11.RC mast.										
12.State cons.										
13.State open										
14.State mastery										
15.Persistence										
16.Attention										
17.Effort (Time)										
18.Declarative										
19.Strategic										
20.Self-efficacy										
21.Motivation										
22.Transfer										
23.SD trait cons.										
24.SD trait achie.										
25.SD trait open.										
26.SD trait curio.										
27.SD trait mast.										
28.SD RC cons.	*.82*									
29.SD RC achie.	.68	*.82*								
30.SD RC open.	.47	.68	*.78*							
31.SD RC curio.	.46	.72	.65	*.80*						
32.SD RC mast.	.51	.75	.61	.73	*.87*					
33. Mnp cons.	-.26	-.25	.03	-.19	-.24	*.83*				
34. Mnp RC cons.	-.01	-.17	-.08	-.18	-.19	.27	*.86*			
35. Mnp TC cons.	-.03	-.20	-.10	-.18	-.14	.52	.42	*.78*		
36. Self-deception	-.12	-.14	-.11	-.07	-.07	---	---	---	*.68*	
37. Wonderlic	.09	.02	-.01	-.03	-.01	-.02	.09	.34	-.17	---

Note. Cronbach's α presented along the diagonal, italicized and bolded.
For variables 1 through 32, $N = 177$: when $|r| >= .18$, $p < .01$; when $|r| >= .13$, $p < .05$.

For correlations involving Wonderlic (variable 37), $N = 124$: when $|r| > .21$, $p < .01$; when $|r| >= .15$, $p < .05$.

For correlations involving manipulated measures (variables 33 to 35), $N = 92$: when $|r| > .27$, $p < .01$; when $|r| >= .21$, $p < .05$.

For correlations involving self-deception (variable 36), $N = 87$: when $|r| > .28$, $p < .01$; when $|r| >= .22$, $p < .05$.

RC = Role-Contextualized; cons. = conscientiousness; achie. = achievement orientation; open. = openness; curio. = curiosity; mast. = mastery goal orientation; declarative = declarative knowledge; strategic = strategic knowledge; self-efficacy = posttraining self-efficacy; motivation = motivation to transfer; SD = standard deviation (variability); mnp = manipulated; TC = task-contingent.

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144

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