

Abstract
A CONDITIONAL REASONING MEASURE OF GOAL ORIENTATION:
PRELIMINARY DEVELOPMENT
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DECEMBER, 2009
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Self-report measures of goal orientation are susceptible to response distortion, which leads to inaccurate assessments of an individual's goal setting and task choice motivations. Conditional reasoning measures provide an indirect way to assess implicit cognitions associated with personality constructs. In the study, a conditional reasoning measure of goal orientation was preliminarily developed. This measure attempted to indirectly assess an individual's implicit theory of intelligence, which is the foundation of goal orientation theory. Data were collected from 185 students at a mid-sized southeastern university in the United States. The psychometric properties of the measure were evaluated. Additionally, this study demonstrated a validation process of the new measure, utilizing a series of anagrams as the criterion measure of task choice (persistence) and task performance.

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A CONDITIONAL REASONING MEASURE OF GOAL ORIENTATION:
PRELIMINARY DEVELOPMENT

A Thesis

Presented To

The Faculty of the Department of Psychology
East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

M.A. Psychology (Industrial/Organizational Psychology concentration)

by

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December, 2009

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Contents

CHAPTER I: REVIEW OF THE LITERATURE.....	6
<i>Goal Orientation Theory</i>	7
<i>Goal Orientation Research</i>	9
<i>Task Engagement and Motivation</i>	9
<i>Learning Strategies</i>	10
<i>Goal Setting and Planning</i>	12
<i>Performance Feedback</i>	13
<i>Knowledge Acquisition and Performance</i>	14
<i>Research Summary</i>	15
<i>Goal Orientation Measurement</i>	15
<i>Factor Structure</i>	15
<i>Response Distortion</i>	25
<i>Summary</i>	27
CHAPTER II: Measurement via Conditional Reasoning	28
<i>Integrating CR and Goal Orientation</i>	31
CHAPTER III: Study	32
<i>Method</i>	32
<i>Participants</i>	32
<i>Measures</i>	33
<i>Self-report measures</i>	33
<i>Two-factor goal orientation measure</i>	34
<i>Three-factor goal orientation measure</i>	34
<i>Four-factor goal orientation measure</i>	34
<i>General self-efficacy measure</i>	35
<i>Anagram Exercises</i>	35
<i>Procedure</i>	37
<i>Analyses</i>	38
CHAPTER III: Results.....	39
<i>Item Analysis of the CRT-GO</i>	39
<i>Post-hoc Coding Scheme</i>	40
<i>Exploratory Factor Analysis</i>	40
<i>Confirmatory Factor Analysis</i>	42
<i>Construct Validity</i>	43
<i>Manipulation Check</i>	45
<i>Task-specific self-efficacy</i>	46
<i>Criterion-Related Validity</i>	47
CHAPTER IV: Discussion	48
<i>Limitations and Future Research</i>	50
<i>Conclusions</i>	51

CHAPTER I: REVIEW OF THE LITERATURE

The importance of the distinction between implicit and explicit cognitions in personality has recently returned to the forefront of psychology (Greenwald & Banaji, 1995; James & Mazerolle, 2002). Although there has been substantial debate as to the validity of this distinction and whether it can be distinguished through measurement (cf., Doshier, 1998; Draine & Greenwald, 1998; Greenwald & Draine, 1998; Merikle & Reingold, 1998), it is now apparent that *explicit cognitions*, cognitions that operate in conscious awareness, are not the sole contributors to an individual's personality and subsequent behavior (Greenwald, 1992). In contrast, *implicit cognitions*, cognitions that operate unconsciously and are unavailable to self-report or introspection, appear to play a critical role in human behavior (James, 1998; James & Mazerolle, 2002). Though this area has only recently received renewed attention, implicit cognitions have been shown to be relevant within the domains of morality (Chiu, Dweck, Tong, & Fu, 1997), obesity (Roefs & Jansen, 2002), substance abuse (Ames & Stacy, 1998; Stacy, Ames, Sussman, & Dent, 1996), age differentiation (Hummert, Garstka, O'Brien, Greenwald, & Mellot, 2002), prejudice (Brauer, Wasel, & Niedenthal, 2000), attitudes, stereotypes, self-esteem, and self-concept (Greenwald et al., 2002; Greenwald & Farnham, 2000), aggression (James et al., in press), achievement motivation and fear of failure (James, 1998), and goal orientation (Dweck & Leggett, 1988). Of all of these topics, it is the implicit cognitions related to goal orientation and, more accurately, the behavioral preferences that stem from these cognitions, that have received the most vigorous and recent study.

The purpose of this study is to examine the prevalent issues related to goal orientation and its measurement. Following this theoretical and psychometric overview, a new measurement method – one that can be utilized to assess the implicit cognitions at the foundation of goal

orientation – will be introduced. This will be followed by a discussion of the proposed initial validation of the measure.

Goal Orientation Theory

At the foundation of goal orientation theory are two contrasting, and mutually exclusive, implicit theories of intelligence (Dweck & Leggett, 1988). The *incremental* theory maintains that intelligence is a malleable attribute. Individuals subscribing to this theory hold the implicit belief that intelligence can be controlled and, through this control, improved upon. In contrast, the *entity* theory maintains that intelligence is a fixed attribute. Individuals subscribing to this theory believe that intelligence cannot be controlled and any effort to do so is futile. Based upon empirical observations, Dweck and Leggett theorized that these two implicit theories of intelligence engender two distinct behavioral orientations: learning and performance.

The incremental theory is theorized to engender a *learning goal orientation* (see Figure 1; Dweck, 1986). The implicit belief in a malleable intelligence generates a cognitive framework through which individuals view effort as an opportunity for improvement. Thus, these individuals are oriented towards engaging in activities by which they can develop their competence. The entity theory is theorized to lead to a *performance goal orientation*. In contrast to the incremental theory, the implicit belief in a fixed intelligence generates a cognitive framework through which individuals view effort as an opportunity to either prove or disprove their ability. Thus, these individuals are oriented towards engaging in activities in which they will demonstrate their competence and receive positive evaluations of their fixed intelligence. Moreover, they are oriented towards avoiding activities in which they will fail to demonstrate their competence and receive negative judgments regarding their fixed intelligence.

These contrasting orientations are theorized to lead to specific behavior patterns based upon the perceived probability of success in the pending task (Dweck & Leggett, 1988). Based

upon this assessment, performance oriented individuals are theorized to employ one of two distinct behavior patterns. When performance oriented individuals feel that they cannot succeed in the pending task (i.e., low self-efficacy) they will demonstrate an *avoidance* behavior pattern. This pattern is highlighted by attempts to disengage and withdraw from the current situation or, at the very least, derogate the task itself. Essentially, this withdrawal behavior is an attempt to evade the perceived threat of possibly receiving negative judgments, from others or oneself, of the 'fixed' attribute. In contrast, performance oriented individuals who feel that they will succeed in the pending task (i.e., high self-efficacy) will demonstrate an *engagement* behavior pattern. This pattern is highlighted by active commitment to the imminent task with the intent of completion. In essence, this engagement behavior is an attempt to garner positive judgments of the 'fixed' attribute.

The theoretical framework presented by Dweck and Leggett (1988) provides no behavioral distinction for individuals that are learning oriented. Because of the belief in intelligence as a malleable attribute, these individuals frame failure as being equally as much of a learning experience as is success. Thus, for these individuals the probability of success plays no role in their decisions with regard to task engagement. Put simply, based upon the theory provided by Dweck and Leggett, the relationship between the learning orientation and behavior is not moderated by the perceived probability of success.

Goal Orientation Research

This basic phenomenon described by Dweck and Leggett (1988) has been studied under numerous labels including task and ego orientations (Nicholls, 1984), mastery and ability orientations (Ames, 1984), mastery and performance orientations (Harackiewicz & Elliot, 1993), growth and validation seeking (Dykman, 1998), and learning and performance orientations (Dweck & Leggett, 1988). Regardless of the label, the fundamentals are the same. Research typically utilizes learning settings for examining the relationship between the contrasting orientations and topics such as motivation to learn, learning strategies, goal setting and planning, feedback, and knowledge acquisition and performance. Though a complete review of all goal orientation research is beyond the scope of this proposal and unnecessary for the methodological critique, the following is intended to provide a basic summary of research that has been completed in these numerous areas of relevance.^{1,2}

Task Engagement and Motivation

The primary aspect of goal orientation theory is the engage/avoid behavior pattern. From this pattern, it is hypothesized that learning oriented individuals should actively engage in learning tasks more so than performance oriented individuals (Dweck & Leggett, 1988). Along these lines, in a study of fifth- and sixth-grade students, Meece, Blumenfeld, and Hoyle (1988) examined the relationship between goal orientation and learning activities. They observed that the learning orientation was positively related to active engagement in the task ($r = .70$) and negatively related to superficial task engagement ($r = -.43$). In contrast, the performance orientation was found to have a negative relationship with active engagement ($r = -.39$) and a positive relationship with superficial engagement ($r = .71$). Similarly, in a study of undergraduates engaged in a learning task, Fisher and Ford (1998) observed a negative

relationship between the learning orientation and off-task attention (-.17) while observing a positive relationship between the performance orientation and off-task attention (.34).

As with actual task engagement, task-related motivation is another area in which the two orientations are often hypothesized to exhibit differing relationships. It is often hypothesized that learning oriented individuals should demonstrate more task-related motivation than performance oriented individuals (Elliott & Dweck, 1988). Following these lines of thought, Colquitt and Simmering (1998), in an examination of college undergraduates enrolled in a management class, observed a positive relationship between the learning orientation and motivation to learn across time ($r = .47$ at time 1 and $r = .47$ at time 2) while also observing a negative relationship between the performance orientation and motivation to learn across time ($r = -.22$ at time 1 and $r = -.20$ at time 2). Towler and Dipboye (2001) found similar, but weaker, results in their experimental study involving undergraduates attending a mock lecture. Results from this study indicated that the learning goal orientation had a modest relationship with motivation to learn ($r = .27$), whereas the performance goal orientation had no significant relationship with motivation to learn ($r = .02$). Nevertheless, overall it appears that, as theory suggests, the differing goal orientations are differentially related to task engagement and motivation to engage in educational activities. Learning oriented individuals appear to be more motivated and ready to vigorously engage in learning tasks while individuals possessing a performance orientation appear to be less motivated and ready to only cursorily engage in learning tasks.

Learning Strategies

Once engaged in a learning task, numerous cognitive strategies are available. When employed correctly, these strategies allow for improved processing and retention of information. Thus, many researchers have hypothesized that learning oriented individuals should, in an

attempt to garner greater task mastery, employ cognitive learning strategies more readily than performance oriented individuals. Along these lines, Ford, Smith, Weissbein, Gully, and Salas (1998) examined college undergraduates participating in a 2-day radar tracking simulation. Of particular interest to these researchers was metacognition, the knowledge and control over one's learning-related cognitions. They observed that the learning orientation had a positive relationship with metacognition ($r = .22$) while no relationship was found between the performance orientation and metacognition. Similarly, in a questionnaire-based study of the study habits of college students, Wolters (1998) noted a positive relationship between the learning orientation and metacognition ($r = .45$) while noting a negative relationship between metacognition and the performance orientation ($r = -.30$).

Likewise, in a study of seventh-grade students, Ablard and Lipschultz (1998) examined the relationship between the two orientations and self-regulated learning strategies, a construct analogous to metacognition. In their study, the learning orientation was found to have a positive relationship with self-regulated learning ($r = .36$), whereas no relationship was found to exist between self-regulated learning and the performance orientation. Additionally, in a study examining learning effort, Fisher and Ford (1998) noted that the learning orientation was positively related to elaboration of information ($r = .29$) but unrelated to rehearsal (i.e., practicing in an attempt to prevent errors). Furthermore, the performance orientation was unrelated to elaboration but had a positive relationship with rehearsal ($r = .23$). Overall, as one might expect, the results from these studies suggest that learning oriented individuals utilize more effective learning strategies whereas students exhibiting the performance goal orientation fail to utilize these strategies.

Goal Setting and Planning

In accordance with the theoretical foundations, and in line with the theory's namesake, learning oriented individuals should focus upon improvement of their ability and thus set goals that are facilitative of this focus (Dweck & Leggett, 1988). In contrast, those with a performance goal orientation should focus upon demonstrations of competence and thus set goals that are related to the validation of their ability. Along these lines, Brett and VandeWalle (1999) examined the relationship between goal orientation and goal setting in a sample consisting of MBA students enrolled in a 2-day training program. They observed a positive relationship between the learning orientation and the setting of skill refinement and skill development goals ($r = .31$ and $.28$ respectively), while observing no relationship between the learning orientation and the setting of personal comparison and task avoidance goals. Additionally, while the performance goal orientation was found to be unrelated to the setting of skill refinement and skill development goals, a positive relationship was found between the performance goal orientation and the setting of personal comparison and task avoidance goals ($r = .37$ and $.22$ respectively). In a similar study, Phillips and Gully (1997) examined the relationship between goal orientation and goal setting in regard to test performance. In their sample of college undergraduates, they observed a significant positive relationship between the learning orientation and goal setting ($r = .14$) while the performance goal orientation had no relationship.

Not all studies relating goal orientation and goal setting have focused upon academic settings. In a study of medical salespersons, VandeWalle, Brown, Cron, and Slocum (1999) found that the learning orientation was positively related to the planning of both sales territories ($r = .44$) and sales accounts ($r = .37$). Furthermore, they found that the performance orientation had no significant relationship with territory planning and only a moderate relationship with

account planning ($r = .20$). Overall, the pattern seems clear and in line with the theoretical foundation. Individuals with a learning orientation are more likely to set goals that relate to the increasing of competence whereas individuals with a performance orientation are more likely to set goals that relate to the presentation of success.

Performance Feedback

The relationship between goal orientation and feedback is another area of study that is favorable to research. Theoretically, learning oriented individuals should be more accepting of feedback in that they view it as a tool for increasing competence. In contrast, performance oriented individuals should view feedback with greater caution, as it may be a possible source of negative evaluations of their ability. As follows, in a study of the feedback-seeking behaviors of students enrolled in a business administration class, VandeWalle and Cummings (1997) observed a positive relationship between the learning orientation and the seeking of feedback ($r = .39$), while observing a negative relationship between the performance orientation and the seeking of feedback ($r = -.34$). Additionally, the learning orientation was shown to have a negative relationship with the perceived cost of feedback seeking ($r = -.38$) and a positive relationship with the perceived value of feedback ($r = .36$). In contrast, the performance goal orientation had a positive relationship with the perceived cost of feedback ($r = .47$) and a negative relationship with the perceived value of feedback ($r = -.26$). Thus, in line with the theoretical foundation, it appears that learning goal oriented individuals are more accepting of feedback and view it as a useful tool for improving their proficiencies while performance goal oriented individuals are less accepting of performance related feedback in that it invites critical evaluations of their fixed ability.

Knowledge Acquisition and Performance

Although the theoretical foundation does not overtly relate to the areas of knowledge acquisition and performance, from the strength of the relationships discussed above (e.g., metacognition, task engagement) it is logical to assume that learning oriented individuals would have superior performance over performance oriented individuals in these areas. In a study that focused upon training, Bell and Kozlowski (2002) found that the learning orientation was positively related to knowledge acquisition ($r = .22$) while the performance orientation had no relationship with the acquisition of knowledge. Similar results were found in a study by Chen, Gully, Whiteman, and Kilcullen (2004). Here the learning orientation had a significant positive relationship with academic performance ($r = .13$) while the performance orientation had no relationship. Thus, although a direct effect does appear to exist, it is not of any great strength.

Even though the direct effect appears weak, the indirect effect is much more evident. In a previously noted study that examined college undergraduates participating in a radar tracking simulation (Ford et al., 1998), it was determined that metacognition, a strong correlate of the learning orientation, was positively related to knowledge acquisition ($r = .32$), training performance ($r = .36$), and final performance ($r = .27$). Thus, the learning orientation, though not directly related to knowledge acquisition and performance ($r = .18$ and $.15$ respectively; both non-significant), was related via metacognition. Similarly, in their study of medical salespersons, VandeWalle et al. (1999) noted that the learning orientation had a significantly positive relationship with effort ($r = .33$) though the performance orientation was found to have no relationship ($r = .07$). Moreover, as one would expect, effort was found to highly correlate with sales ($r = .64$). Overall, in general, although goal orientation does not directly impact performance, its indirect effect is impressive. Individuals exhibiting the learning goal orientation

are more likely to employ strategies and behaviors that facilitate of knowledge acquisition and performance.

Research Summary

In accordance with the basic theoretical framework, goal orientation has been examined in numerous topical areas. Research studies have continually illustrated the expected relationships between goal orientation and topics such as motivation to learn, learning strategies, goal setting and planning, feedback, and knowledge acquisition and performance. Although all of these studies have had what appears to be substantial success, numerous problems exist within the methodologies that are typically employed, and these problems hamper the growth and understanding of this construct.

Goal Orientation Measurement

Despite the seeming success that researchers in this area have experienced, the measurement systems employed by most researchers contain inherent errors. Of paramount concern is the factor structure of most goal orientation instruments. Most measures (e.g., Baranik, Barron, & Finney, 2007; Button, Mathieu, & Zajac, 1996; VandeWalle, 1997) are constructed of multiple factors which directly conflict with the theoretical foundation. Moreover, these multi-factor measures, though seeming to be psychometrically sound on the surface (i.e., strong internal consistency; appropriate exploratory and confirmatory factor analytic results), generate untenable and contradictory results. Additionally, implementation of self-report measures, and the response distortion they engender, in the evaluation of a construct where impression management is a critical component (i.e., performance goal orientation) further draws into question the quality of these measures.

Factor Structure

Two types of measures have been used predominately in goal orientation research: a two-factor model (e.g., Button et al., 1996; Sujan, Weitz, & Kumar, 1994) and a three-factor model (e.g., Midgley, Kaplan, Middleton, Maehr, Urdan, Aderman, Anderman, & Roeser, 1998; VandeWalle, 1997). More recently, a four-factor model has also been introduced (Baranik, Barron, & Finney, 2007). All of these instruments utilize similar self-report items in an attempt to identify the particular goal orientation to which an individual prefers. The two-factor model simply evaluates the learning and performance orientations separately whereas the three-factor model evaluates the learning orientation and a bifurcated performance orientation. In the three-factor model maintains the learning orientation as it is in the two-factor model but splits the performance orientation into a performance-prove orientation and a performance-avoid orientation. The four-factor solution expands on this by splitting the learning orientation into learning-prove and learning-avoid orientations. Regardless, these measures all engender the same fundamental failings.

Two-factor Model. Numerous two-factor models of goal orientation exist (e.g., Button et al., 1996; Sujan et al., 1994). However, all of these measures function in a very similar manner in that they typically utilize the self-report format with Likert-type response scales. For instance, the Button et al. (1996) measure consists of 16 items, 8 items for each of the two orientations. Responses are based upon a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). High agreement with an item is intended to be indicative of the particular orientation being measured. A sample item for the learning orientation is “The opportunity to learn new things is important to me,” and a sample item for the performance orientation item is “I feel smart when I can do something better than most other people.”

Of principal concern with the two-factor measure is the interrelationship of the factors. Studies employing this measure repeatedly find that responses to the two scales are mathematically unrelated to one another (i.e., uncorrelated; orthogonal). For example, from the previously cited studies utilizing the Button et al. (1996) measure, the average correlation between the two factors was -.03, ranging from -.16 (Colquitt & Simmering, 1998) to .10 (Chen et al., 2000), all non-significant. Thus, this measure evaluates the two orientations as two *independent* factors (see Figure 2a). This independence allows for a schism between the measurement and theory. The theory posits that individuals who subscribe to the incremental theory of intelligence are oriented towards learning while individuals holding the *opposite* theory of intelligence, the entity theory, are oriented towards performance. The theory makes no allowance for the possibility that an individual could be oriented towards both learning and performance (see quadrant 1 in Figure 2a) or towards neither (see quadrant 3 in Figure 2a). In fact, from the specific intelligence theory/goal orientation relationship stated in the theory, the orientations should be mutually exclusive as are their precursors. If a two-factor model is to be used, the factors should have, at the very least, a moderate negative correlation thus ensuring few individuals being classified as having both the learning and performance orientations (see Figure 2b). Regardless, the instrument developed by Button et al. contradicts the theoretical foundation upon which it is said to be based in that it allows individuals to be classified as both learning and performance oriented.

The actual implications of simultaneously having both a high (or low) learning and performance goal orientation have not been adequately discussed in the literature. Button et al. (1996) suggested that attempts to use a single scale to measure goal orientation, with the learning

and performance orientations representing opposite ends of the continuum, would lead to ambiguous results. Specifically, they stated that:

“...a mid-scale response could suggest that one holds both a learning goal and performance goal orientation, or that one has *neither* orientation, or any other ‘tie’ predilection along the scale.” (p. 29)

However, the results that arise from individuals possessing both a learning and performance orientation are equally ambiguous. If an individual exhibits high scores in both the learning and performance orientation we are left wondering as to which implicit cognition the individual subscribes. The theory clearly states that each of the implicit cognitions leads to a specific behavioral orientation. A measure that allows individuals to score highly on in both orientations is a measure that contradicts theory.

More egregious than the theoretical shortcoming is the prescriptive failing that arises from the uncorrelated factors. Researchers utilizing the two-factor model typically identify what appear to be appropriate results when, in fact, they are contradictions. All too often researchers report that, as they hypothesized, the learning orientation was found to have a positive relationship with variable X while the performance orientation was found to have a negative relationship with said variable. Yet, if the factors are uncorrelated, some individuals in the study sample will be high on both the learning and performance orientations. Thus, a prescriptive contradiction occurs. What does it mean for individuals to be high on both orientations? What prediction can be made about individuals who are high (or low) on both the performance orientation and the learning orientation? Will they exhibit high levels of variable X or will they have low levels of X?

For example, Colquitt and Simmering (1998) utilized the Button et al. (1996) measure in a longitudinal study of the relationship between goal orientation and motivation. As with other studies utilizing this measure, no relationship was found between the learning and performance factors ($r = .16$, ns). From their results, they noted that the learning orientation had a significantly positive relationship with motivation to learn at both time 1 ($r = .47$) and time 2 ($r = .47$). From this, they concluded that the 'higher' individuals are on learning orientation, the more motivated they are to learn. In contrast, they noted that the performance orientation had a significantly negative relationship with motivation to learn at both time 1 ($r = -.22$) and time 2 ($r = -.20$). Thus, they concluded that the 'higher' individuals are on performance orientation the less motivated they are to learn. Here a prescriptive contradiction has been reached. With the two orientations being unrelated to one another, some individuals in the sample are measured as being 'high' on both orientations. Thus the question arises: Are these individuals motivated to learn or not? Based on the correlations between the learning orientation and motivation to learn one would conclude yes, but based on the correlation between the performance orientation and motivation to learn one would conclude no. A clear behavioral prediction regarding future behavior cannot be made.

This pattern of results appears all too often in goal orientation research. In a training study utilizing the Button et al. (1996) measure, Fisher and Ford (1998) found that the learning orientation had a significant negative relationship with off-task attention ($r = -.17$), while the performance orientation had a significant positive relationship with off-task attention ($r = .34$). Moreover, they noted that the learning orientation had a significant positive relationship with elaboration ($r = .29$), while the performance orientation had a significant negative relationship with elaboration ($r = -.20$). As with the other studies, there was no relationship between the two

orientations ($r = .10$, ns), thus there is a prescriptive contradiction. Are the individuals who score 'high' on both orientations going to focus their attention off-task or not? Are they going to utilize elaboration techniques or not? In a similar study, Ford et al. (1998) noted a significant positive relationship between the learning orientation and self-efficacy ($r = .31$) and a significant negative relationship between the performance orientation and self-efficacy ($r = -.27$). Again, there was no relationship between the two goal orientation scales ($r = -.06$ ns), thus again there is again a contradiction. It is this contraction that appears in almost all goal orientation studies that utilize a two-factor measure. There is never any discussion regarding the confusing nature of the results. In fact, the results are typically reported as being a successful indication of the utility of goal orientation when applied to the particular research topic.

Three-factor Model. The three-factor model of goal orientation presents an even greater theoretical schism along with similar mathematical contradictions. This model posits that goal orientation is actually composed of three independent factors (see Figure 3; Vandewalle, 1997). The first factor is consistent with the learning orientation as described by the two-factor model. However, the second and third factors represent a division of the performance orientation into a 'prove' dimension and an 'avoid' dimension. The performance-prove dimension is intended to represent individuals with a performance orientation who desire to prove their competence while the performance-avoid dimension is intended to represent individuals with a performance orientation that desire to avoid the disproving of their competence. Like the two-factor model, this model engenders the same mathematical contradictions; however, it also represents a greater schism from the theoretical model.

Little theoretical explanation has ever been provided regarding the bifurcation of the performance orientation. In his paper documenting the development of his three-factor model of goal orientation, VandeWalle (1997) stated that:

“...the position is taken that the desire to gain approval and demonstrate ability constitutes a different goal from the desire to avoid disapproval and demonstration of low ability. Thus, both a *prove* dimension (gaining favorable judgments) and an *avoid* dimension (avoiding unfavorable judgments) for a performance goal orientation are conceptualized.” (p. 999)

Although it is true that the desire to gain approval is different from the desire to avoid disapproval, the bifurcating of the performance orientation is completely atheoretical. The original theory states that performance oriented individuals will engage a task in an attempt to gain favorable judgments if they believe that they will succeed *and* they will avoid a task in an attempt to evade unfavorable judgments if they expect to fail (Dweck & Leggett, 1988). Thus, individuals will set ‘prove’ goals if they think that they will succeed and ‘avoid’ goals if they think that they will fail. There is no explanation given as to *why* the entity theory of intelligence would simultaneously engender two drastically different orientations without the intervention of a second variable. Along with many other researchers, there appears to be confusion regarding the role that self-efficacy plays in the theoretical model and instead embeds it into the model via the creation of the performance-prove and performance avoid orientations. Although this may be an interesting method for evaluating the moderating effect of self-efficacy, there is no guarantee that the individuals are relating their confidence in present ability to the current task. It is quite possible that, based upon the wording of the items, the instrument is evaluating an individual’s previous experiences. For example, individuals who have regularly experienced situations in

which they perceived a high probability of success may be evaluated as having the performance-approach goal orientation whereas individuals that have regularly experienced situations in which they perceived a low probability of success may be evaluated as having the performance-avoid goal orientation. In truth, with no theoretical linkage, we cannot know what is happening with the measure.

Ignoring the theoretical schism, the three-factor model encounters the same mathematical contradictions as the two-factor model. For example, VandeWalle and Cummings (1997), utilizing the VandeWalle (1997) measure, examined the relationship between goal orientation and feedback-seeking behaviors. In the second study presented in their paper, no relationship was found between the learning orientation and performance-prove orientation ($r = .02$, ns). Thus, similar to the two-factor measure, this instance of the three-factor measure features individuals scoring 'high' on both the learning and performance-prove dimensions. As they hypothesized, the learning orientation had a significant negative relationship with perceived cost of feedback ($r = -.38$) and the performance-prove orientation had a significant positive relationship with perceived cost of feedback ($r = .18$). So, the 'higher' individuals score on learning orientation the less likely they are to perceive feedback as threatening. In contrast, the 'higher' individuals score on the performance orientation the more likely they are to perceive feedback as threatening. Once again, a prescriptive contradiction has been reached. Are those individuals that score 'high' on both factors going to perceive feedback as a threat or not? Based on the correlations between the learning orientation and perceived cost of feedback one would conclude 'no,' but based on the correlation between the performance orientation and perceived cost of feedback one would conclude 'yes.'

As with the two-factor models, this pattern of results is appears in numerous three-factor goal orientation studies. For example, in their examination of the relationship between goal orientation and performance feedback, VandeWalle et al. (2001) found no significant relationship between the performance-prove orientation and the performance-avoid orientation ($r = .08$). Yet, the performance-prove orientation had a significant positive relationship with the difficulty of set goals ($r = .21$) while the performance-avoid orientation had a significant negative relationship with the difficulty of the set goals ($r = -.30$). Thus, individuals that score highly on the performance-prove dimension are more likely to set more difficult goals while the individuals that score highly on the performance-avoid dimension are more likely to set less difficult goals. What does this imply for the individuals that scored 'high' in both orientations? Are these individuals setting easy or difficult goals? Elliot and Church (1997) encountered a similar pattern of problematic results in their study detailing the development of their own three-factor goal orientation measure. With their measure, the learning orientation and performance-avoid orientation were found to be unrelated to one another ($r = .11$, ns). However, the learning orientation was found to have a significant positive relationship with competence expectations (.36) while the performance-avoid orientation was found to have a significant negative relationship with competence expectations ($r = -.21$). Again, the mathematical contradiction presents itself. Do individuals that score highly in both the learning orientation and the performance-avoid orientation have higher or lower competence expectations?

An equivalent contradiction is found in a study of the relationship between goal orientation and academic interest/performance. In this study, Harackiewicz and colleagues (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000) utilized a modified version of a three-factor measure (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997). Interestingly, a significant

positive relationship was found to exist between the performance-prove and the performance-avoid dimensions ($r = .24$). Thus, individuals that scored high on one of these scales were more likely to score high on the other, and vice versa (see Figure 3). This in itself is a problem in that it generates even more high/high classifications than measures with uncorrelated factors. Yet, this finding is exacerbated when one notes that the performance-prove dimension had a significant positive relationship with mid-semester performance expectations ($r = .17$) and final grades ($r = .14$), while the performance-avoid orientation had a significant negative relationship with mid-semester performance ($r = -.13$) and final grades ($r = -.11$).

One of the most egregious examples comes from a study examining the relationship between goal orientation and task engagement patterns. In this study, Meece et al. (1988) found the learning orientation to have no significant relationship with the performance-prove dimension ($r = .13$, ns). However, the learning orientation was shown to have a significant negative relationship with superficial engagement ($r = -.43$) while the performance-avoid orientation was shown to have a significant positive relationship with superficial engagement (.33). Moreover, while the performance-prove and the performance-avoid dimensions were shown to have a significant positive relationship with one another ($r = .29$), these two dimensions had significant differential relationships with active engagement ($r = .21$ and $-.39$ respectively). Again, we are left wondering about the nature of the predictive relationship.

Four-factor model. A four-factor model has recently been introduced in the literature (Baranik, Barron, & Finney, 2007; Elliot & McGregor, 2001). This model bifurcates learning goal orientation into learning-prove and learning-avoid orientations in addition to the bifurcation of performance goal orientation (see Figure 4). Unfortunately, as with the three-factor model, there is no theoretical reasoning provided for why the incremental theory would engender two

distinct orientations. Moreover, Dweck and Leggett (1998) theorized that regardless of the difficulty level of the task given, individuals subscribing to the incremental theory will always engage in the task because hard work and persistence is believed to lead to personal improvement. Therefore, learning oriented individuals should not avoid a challenging achievement situation as suggested by the four-factor model. Thus, as with the two- and three-factor models, the four-factor model explicitly ignores the foundation of goal orientation and attempts to create bifurcations of the orientations when none can exist. Although extensive empirical research has not yet been compiled using this factor structure, if the measures are developed with orthogonal factors, similar psychometric anomalies would be expected to emerge.

Response Distortion

Regardless of the atheoretical nature of the measures and the prescriptive contradictions that are engendered, a further shortcoming arises from the prevalent use of self-report measures for evaluating goal orientation. With response scales typically ranging from 1 (strongly disagree) to 7 (strongly agree), these questionnaires typically utilize statements such as “The opportunity to learn new things is important to me” for assessing the learning goal orientation and “I feel smart when I do something without making any mistakes” for assessing the performance goal orientation (Button et al., 1996). These types of measures are used regularly despite the fact that research has clearly established the proclivity for distortion with these types of items (e.g., Barrick & Mount, 1996; Dicken, 1960; Thornton & Gierasch, 1980). There are two primary sources of distortion with this type of self-report measure – impression management and self-deception – both of which are particularly relevant to the measurement of goal orientation (Barrick & Mount, 1996; Paulhus, 1984).

Self-Deception. Self-deception is an unintentional distortion of responses that arises from the dispositional tendency to view oneself favorably (Barrick & Mount, 1996). In relation to goal orientation and the nature of the implicit cognitions, the problem is less apparent. An individual may hold the entity theory of intelligence and is thus oriented towards performance. However, this individual may explicitly believe that the items used to assess the learning goal orientation are more descriptive and appropriate. Thus, the individual incorrectly completes the measure as if possessing a learning goal orientation. Although the intent is to respond accurately, the individual may actually be responding inaccurately.

Impression Management. Unlike self-deception which is unintentional, impression management denotes the intentional distortion of responses to engender what is believed to be a better and more socially acceptable response (Barrick & Mount, 1996). In relation to the performance goal orientation, the possibility of incorrect measurement via impression management is apparent. Performance goal oriented individuals are predisposed to seek positive evaluations and avoid negative ones (Dweck & Leggett, 1988). Thus, when presented with a self-report type questionnaire that deals with learning questions, in what is typically a learning setting, there is no guarantee that the responses provided by individuals are not intentionally distorted in an attempt to gain more favorable judgments. In fact, participants may realize that they are participating in an experiment regarding learning and are being judged in some manner. Thus, performance oriented individuals may willingly alter their answers in an effort to produce what they believe to be better responses. Thus, the very nature of the variables being measured conflicts with the nature of the measurement tools.

Summary

There is clearly something amiss with the measurement systems that are typically used to evaluate goal orientation. The initial concern lies in the fact that the measures that are currently employed are not rooted in the theoretical foundation – measures with multiple factors is incongruent with the theory. However, the atheoretical nature of the measures is not nearly as troubling as the contradictory empirical results that are present within numerous studies. Although there is no clear answer regarding what is causing prescriptive contradictions, the self-report items used in these measures, or the measurement of the behavioral orientation and rather than the implicit intelligence theory, there is a method that can unite the theory and measurement of goal orientation.

CHAPTER II: MEASUREMENT VIA CONDITIONAL REASONING

Two primary changes are required to alleviate the noted errors and inconsistencies that exist in current goal orientation research. First and foremost, to correct the mathematical contradictions associated with multi-factor models, utilization of a measurement instrument that is unidimensional in design is required. The nature of the incremental and entity theories precludes the possibility of possessing both simultaneously. Thus, measurement of these theories, or even the behavioral orientations which they generate, must not be done with multifactor measures. Moreover, to correct for the errors engendered by response distortion and measure the implicit cognitions, a new measurement system is required.

Several methods have been developed for the purpose of directly evaluating implicit cognitions, including the Implicit Association Test (IAT; Greenwald, McGee, & Schwartz, 1998) and the Thematic Apperception Test (TAT; Morgan & Murray, 1935). Although both of these methods are unique in their methodology, they all share the common characteristic of being time consuming to utilize and evaluate (Greenwald, Nosek, & Banaji, 2003). Thus, it is understandable that research in the area of goal orientation has shied away from direct measurement of the incremental and entity theories. However, a new measurement system, one which is more efficient, has been designed specifically to measure implicit cognitions. This system, designed by James and colleagues (James, 1998), utilizes inductive reasoning problems to determine which set of implicit cognitions bias an individual's reasoning. To better understand the nature of the conditional reasoning format, a brief discussion of the role implicit cognitions play in reasoning is required.

First and foremost, it is important to note that both the incremental theory and the entity theory are, in essence, cognitive biases that distort an individual's reasoning (James, 1998).

Thus, the reasoning of an individual who subscribes to the incremental theory differs considerably from the reasoning of an individual who subscribes to the entity theory. Whereas individuals subscribing to the incremental theory frame new tasks as opportunities to learn and grow, individuals subscribing to the entity theory regard new tasks as opportunities to be judged by both oneself and others. Similarly, individuals who subscribe to the incremental theory believe that learning from failure is preferable to not trying at all, whereas individuals subscribing to the entity theory conclude that not trying at all is preferable to negative judgments of their competence. Essentially, individuals who subscribe to the incremental theory differ from those who subscribe to the entity theory in terms of the adjectives they use to frame relevant situations, the arguments for and against engaging in these situations, and the assumptions they make about what will happen in these situations. These differences highlight the fact that the reasoning of these two different types of individuals is designed to justify behavior via the enhancement of the rational appeal of the behaviors. As James et al. (2005) point out, these individuals are generally unaware of this intent of this rationalization and, for them, their reasoning is completely rational and unbiased.

A new measurement system designed by James (1998), termed *conditional reasoning*, is specifically designed to determine what types of implicit cognitions are instrumental in shaping a person's reasoning. This system assesses whether reasoning based upon certain implicit cognitions (i.e., those associated with achievement motivation and fear of failure) is judged by respondents to be logical or illogical. This assessment is based upon inductive reasoning problems which typically require respondents to determine which conclusion most logically follows from a set of premises. However, unlike traditional inductive reasoning problems, conditional reasoning problems are 'laced' with the implicit cognitions which they are designed

to measure. This item offers reasons for Hannah choosing to perform a particular vault. An inference is required in order to explain why she chose the difficult vault. In order to reach a solution, individuals must first eliminate the illogical alternatives (A and D) and then select what they regard as the most reasonable explanation from the remaining options. Because reasoning is biased by their particular implicit cognitions regarding intelligence (i.e., incremental or entity), the apparent rationality of each option will vary. What appears logical to an individual who subscribes to the incremental theory would be viewed as irrational by an individual who subscribes to the entity theory, and vice versa. In this example, alternative A illustrates the incremental theory of intelligence. Individuals who subscribe to this theory are inclined to view intelligence as following from effort, thus, alternative A appeals to them because the explanation of why Hannah chose to perform the difficult vault is compatible with their implicit theory of intelligence – Hannah is striving for improvement in the face of failure. In contrast, individuals who subscribe to the entity theory are disposed to view intelligence or ability as being fixed, thus, they are not inclined to accept alternative A as the most logical explanation for this scenario. Consequently, they are drawn to alternative C because the explanation includes the gaining of favorable judgments of others via task achievement as being a predominant factor for Hannah choosing the difficult vault. Whereas individuals subscribing to the incremental theory tend to focus on options that revolve around improving capabilities, those subscribing to the entity theory typically focus on options that revolve around fixed ability.

The objective nature of the conditional reasoning system circumvents the noted confounds that plague standard self-report testing formats. Because each question is framed in terms of solving a reasoning problem, the conditional reasoning format is not susceptible to the distortion that is often engendered by traditional self-report measures (Barksdale, 2004;

LeBreton, Burgess, & James, 2000; Lebreton, et al., 2007). Idiosyncratic biases, evidenced by impression management and self-deception, are not introduced into the assessment process because the task itself is impersonal in nature. In direct contrast to traditional self-report formats, which require individuals to assign meaning to a series of subjective descriptive statements, the object of conditional reasoning is to obtain the 'correct' solution to a series of inductive reasoning problems. In this respect, performance on the Conditional Reasoning test provides a reflection of reasoning competence; however, it is a type of reasoning that carries important implications for future behavior.

Integrating CR and Goal Orientation

The indirect measurement associated with conditional reasoning provides a method of assessing implicit theory of intelligence, which is the foundation of goal orientation theory. Identification of an individual's theory of intelligence assists in interpreting behavioral patterns that emerge in achievement situations, and subsequently the person's goal orientation. This form of implicit cognition measurement provides two advantages over existing self-report measures. First, conditional reasoning (CR) measures give researchers the opportunity to identify an individual's implicit cognitions in an indirect fashion, thereby gaining knowledge of theory of intelligence without the interference of response distortion. This is a significant improvement over self-report measures that attract a substantial amount of response distortion to the point where its measurement becomes useless. Secondly, this measurement method allows a single factor to be evaluated, which is congruent with the goal orientation theory established by Dweck and Leggett (1988). Therefore, sound psychometric results should emerge with the elimination of anomalies associated with multiple factor structures that have been used in the past.

CHAPTER III: STUDY

The purpose of the study was to attempt to construct and validate a conditional reasoning measure of goal orientation using task choice in an achievement situation as the criterion. A conditional reasoning measure of goal orientation (CRT-GO) was developed to assess the implicit cognitions associated with goal orientation (i.e., incremental and entity theories of intelligence). Additionally, the CRT-GO was developed to provide an alternative to self-report measures of goal orientation that is more psychometrically sound because of its indirect nature, eliminating the possibility of response distortion. This preliminary validation study assessed the performance of each CRT-GO item as well as the internal consistency of the measure. Self-report goal orientation instruments are not equipped to measure implicit cognitions, since such cognitions are unconscious in nature and not available to self-report. Two forms of validity were assessed in this study. First, construct validity was assessed by comparing CRT-GO results to a series of self-report goal orientation measurement dimensions, explicit theory of intelligence items, and a general self-efficacy measure. Using these constructs, convergent and divergent construct validity was assessed. Second, criterion-related validity was evaluated in a concurrent manner, using task choice as the criterion.

Method

Participants

All participants were East Carolina University undergraduate psychology students. The study was posted on East Carolina University's research participant pool website, and students were able to volunteer to participate in the study. Completing the study counted towards partial fulfillment of the research participation requirement for psychology majors. Overall, 214 participants completed the study. Twenty-nine cases were excluded from analysis, leaving 185 valid cases to be analyzed. The primary reason cases were excluded was due to response

repetition on the self-report goal orientation items (i.e., selecting the same extreme response option for every item on the page). Other reasons for cases being excluded include significant missing data (i.e., missing an entire page of the CRT-GO measure), English as a second language, and explicit lack of engagement in the study.

Measures

CRT-GO. Construction of the conditional reasoning (CR) items was in accordance with the method used by James (1998) to generate achievement motivation CR items. For each item, an achievement situation was created based on a specified life domain; work, academics, or athletics. The situation described either successful or unsuccessful performance and/or task choice decision (i.e., easy/difficult task) in an achievement situation. Each item provided four response options. A response alternative was created to reflect each of the two theories of intelligence that are at the foundation of goal orientation theory: incremental and entity. Additionally, two illogical response alternatives were created for each item to preserve the indirect nature of the measure. The illogical items provided additional response options other than those that reflect the constructs of interest (incremental and entity theory of intelligence), making the true goal orientation options less transparent. In total, twenty conditional reasoning items were constructed (see Appendix A). The items were reviewed by Industrial/Organizational psychology graduate students to evaluate face validity. An aggregate score resulting from the 20 conditional reasoning items was used as a one-factor scoring scheme for the measure. Each response pertaining to incremental theory of intelligence was given a +1. Each response pertaining to entity theory of intelligence was given a -1. And each illogical response was given a 0. Thus, possible scores on the measure range from -20 to +20.

Self-report measures. Three self-report items pertaining to an individual's theory of intelligence was provided to participants (see Appendix B). These items were used to explicitly

evaluate each participant's theory of intelligence. In addition, goal orientation items and general self-efficacy items from existing self-report measures were utilized. Responses to these items allowed comparison between self-report responses, conditional reasoning responses, and the criterion.

Two-factor goal orientation measure. The self-report instrument established by Button, Matheiu, and Zajac (1996) that measures a two-factor structure of goal orientation was used in this study. Eight of the instrument's items measure learning orientation and eight items measure performance orientation. Responses were made on a 5-point Likert agreement scale (1 = *strongly disagree* to 5 = *strongly agree*). In initial use of the measure by Button, Matheiu, and Zajac (1996), each performance orientation item had a relatively strong relationship with the other seven performance orientation items in the measure ($r = .33$ to $.51$). Additionally, each item had a weak relationship to no relationship with the eight learning orientation items in the measure ($r = -.19$ to $.01$). Cronbach's alpha was $.85$ for the LGO dimension and $.77$ for the PGO dimension.

Three-factor goal orientation measure. This study also utilized a self-report instrument created by VandeWalle (1997) that measures three-factor structure of goal orientation. Five of the measure's items reflect a performance-prove orientation, five items reflect a performance-avoid orientation, and six items reflect a learning orientation. Responses were made on a 5-point Likert scale (ranging from 1 = "*strongly disagree*" to 5 = *strongly agree*). In initial use of the measure by VandeWalle, Cronbach's alpha was $.88$ for the LGO dimension, $.84$ for the PPGO dimension, and $.83$ for the PAGO dimension.

Four-factor goal orientation measure. To measure the four-factor structure of goal orientation, this study used a self-report instrument from Baranik, Barron, and Finney (2007). Four items measure performance-prove orientation and performance-avoid orientation,

respectively. Also, the measure includes four mastery-prove items and eleven mastery-avoid items. Responses were made on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). In initial use of the measure by Baranik, Barron, and Finney (2007), Cronbach's alpha was .89 for the MAP dimension, .74 for the MAV dimension, .88 for the PAP dimension, and .77 for the PAV dimension.

General self-efficacy measure. The general self-efficacy self-report measure created by Chen, Gully, and Eden (2001) as a potential improvement from the existing general self-efficacy measure established by Sherer and colleagues (1983) was used in this study. The Sherer measure of general self-efficacy had demonstrated low content and discriminant validity, unable to distinguish between self-efficacy and self-esteem constructs. Therefore, a new general self-efficacy measure was created (Chen et. al, 2001). The eight item measure was scored on a 5-point Likert agreement scale (1 = *strongly disagree* to 5 = *strongly agree*). Validation results revealed that the new measure is assessing a unidimensional construct, and yielding higher content and predictive validity than the existing measure (Chen, 2001). Cronbach's alpha was .88 for the measure.

Anagram Exercises. To assess reaction to achievement situations, participants completed a series of anagram solving exercises of varying difficulty levels as an achievement event (see Appendix C). Anagrams are strings of letters that, when the letters are rearranged, create a word. Multiple anagram lists at ten difficulty levels were compiled using an anagram dictionary (Collins, 2005). The level of difficulty was in accordance with the number of letters in the anagram; the more letters an anagram consisted of, the higher its difficulty level. Each exercise consisted of 30 anagrams, all of the same difficulty level (i.e., the same number of letters). Some anagrams had more than one correct response, and in such situations, two response fields were

provided. The purpose of the anagram task was to create a challenging achievement situation that was believed to be associated with intelligence (Thompson, 1973).

The criterion variable utilized in this study was the point in which the participant decided to return to a level one anagram exercise (i.e., 4 letter anagrams). Participants completed eight rounds of anagram exercises of increasing difficulty, and had the option to go back to the easiest anagram level (i.e., level one) before the beginning of each round. Choosing to go back to the easiest anagram difficulty level demonstrates disengagement from the task, and can be used to monitor the tendencies of learning and performance oriented individuals when faced with task choice in an achievement situation. Additionally, task efficacy was measured after each round, which provided assessment of participant's efficacy at the round of disengagement. It is hypothesized that performance oriented individuals will disengage from the task once their efficacy decreases to avoid appearing incompetent in the task.

Procedure

The study took place during a one hour-long session. Once all participants arrived and consent forms were read and signed, the study moderator read the instructions aloud. The study was referred to as an ‘anagram and general reasoning ability test’ study in order to preserve the true indirect nature of the goal orientation assessment via the conditional reasoning measure. The instructions stated that participants would first complete a series of anagram exercises, followed by a series of paper and pencil surveys, and the study would culminate with a brief quiz (that served as a vehicle for checking debrief comprehension). The instructions provided the definition of an anagram, and participants were informed that the researcher would evaluate the difficulty level of each anagram exercise as well as how many anagram responses were correct. Participants were told that this information was being collected to evaluate the relationship between anagram performance and inductive reasoning.

Initially, each participant was given an anagram exercise containing anagrams with 4-letters and was asked to work on it for three minutes. For each subsequent round, two choices were available; go up a level of difficulty or return to the first level (e.g., level one). Once participants returned to level one, they had to remain at that level for the remainder of the exercises, as stated in the verbal instructions. This represented permanent disengagement from the task. For learning oriented individuals, it was expected that level of difficulty would not dissuade them from engaging in the difficult levels of the anagram exercises. However, performance oriented individuals were expected to disengage from the task once their task efficacy decreased, to avoid displaying incompetence in the task.

Upon the completion of the administrations, the CRT-GO as well as the self-report theory of intelligence and goal orientation items was given. Once completed, a short debriefing quiz was administered before participants left.

Analyses

The primary purpose of this study was to explore the psychometric properties of the conditional reasoning measure of goal orientation (CRT-GO). Item analyses were investigated, including the item-total correlations and internal consistency. Internal consistency was calculated using Cronbach's alpha. The frequency of response to each response option was assessed. Specifically, the frequency of illogical responses was assessed to determine if any were ineffective in deterring participants from choosing them. Also, the frequency of learning and performance goal orientation response options was assessed for each item to investigate the response distribution.

The secondary purpose of this study was to attempt to validate the conditional reasoning measure of goal orientation (CRT-GO) and evaluate if it truly assesses implicit cognitions that are predictive of behavior- as outlined by Dweck and Leggett (1988). To do this, behavior associated with the anagram exercises was identified and four constructs were measured (goal orientation, general self-efficacy, theory of intelligence, and task self-efficacy). Construct and criterion-related validity were assessed using this data.

CHAPTER III: RESULTS

The results of this study are presented as follows: First, the psychometric properties of the CRT-GO are reported. Then, the relationship between the CRT-GO and existing self-report goal orientation measures is assessed to determine construct validity. Finally, findings related to the criterion-related validity of the CRT-GO measure, as well as the existing self-report goal orientation measures, is presented.

Item Analysis of the CRT-GO

Item analyses were conducted on the twenty CRT-GO item responses from 184 valid cases in order to identify the most effective items. Items were coded under a one-factor coding scheme: incremental response = 1, entity response = -1, distracter response = 0. Overall, the distribution of scores was slightly skewed in the negative direction, toward the entity responses ($sk_p = -.101$). The distribution was also slightly heavier in the tails, as indicated by the kurtosis estimate ($K = .207$). Neither of these results was extreme enough to cause concern or warrant further investigation.

All twenty CRT-GO items were assessed on their discrimination indices (see Table 1). Only one item satisfied the .30 criterion of discrimination established by Nunnally and Bernstein (1994), so the standard was adjusted and the top seven items with a discrimination index of .20 and above were retained and identified as the best performing CRT-GO items. This modification of the item inclusion standard was justified because of the novelty of the measure. Cronbach's alpha reliability coefficient for the seven selected CRT-GO items was .481, which does not meet the standard of .70 that constitutes adequate reliability for tests in early developmental stages (Nunnally & Bernstein, 1994). The scenario presented in each of the seven CRT-GO items described situations in which the character experienced successful or unsuccessful performance, represented in one of three life domains identified for this study (i.e., academics, work, athletics).

No items describing task choice (i.e., easy versus difficult) performed well enough to qualify as adequate items.

Post-hoc Coding Scheme

Due to the low reliability coefficient that resulted from the one-factor coding scheme, the response coding was expanded to a two-factor scheme to determine if the change in coding would lead to an increase in reliability. For this coding scheme, each incremental response was given a 1 for the incremental factor, and each entity intelligence response was given a 1 for the entity factor. Illogical responses were not coded in this process. As a result of the two-factor coding scheme, the Cronbach's alpha reliability coefficient for each factor was .530, with all twenty CRT-GO items included. This is marginally better than the .481 associated with the initial coding scheme. However, when the seven best performing items were identified using item discrimination indices, the resulting reliability coefficient was .473. Therefore, the best seven performing items as identified by the one-factor coding scheme were used for all subsequent analyses involving the CRT-GO, due to the marginally superior reliability as compared to the two-factor coding scheme.

Exploratory Factor Analysis

Although the inter-item correlations for all items were below .30 (the general standard for inclusion in an exploratory factor analysis), an exploratory factor analysis was conducted to determine the CRT-GO's factor structure.

A factor analysis using the seven best CRT-GO items (using the one-factor coding scheme) yielded an inconclusive factor structure (see Figure 6). Using Kaiser's criterion to retain factors (eigenvalue >1), it seemed that a two-factor solution fit the data best (eigenvalue of the first factor was 1.79, the eigenvalue of the second factor was 1.10). However, since the second

component had an eigenvalue close to 1, it was not clear if the second component was significant. Therefore, an r-squared test (Nelson, 2005) was conducted to see how well the eigenvalues plotted on a graph fit a straight line, and if the exclusion of one or more component scores significantly improved the fit. The underlying explanation for using an r-squared test is that evaluating the scree plot and eigenvalues, as suggested by Cattell (1966), may not result in a clear understanding of how many true factors are present. For example, the scree plot (see Figure 6) of the eigenvalues for extracted components doesn't illustrate a clear bend or break in the plot, which would indicate the point in which components are no longer significant and therefore should not be retained. Therefore, when all eigenvalues are regressed onto a linear function, the resulting r-squared value will identify how well all eigenvalues fit the line. Then, the highest component eigenvalue is dropped from the regression analysis and the resulting r-squared will indicate how well the remaining component eigenvalues fit the line. Once the r-squared indicates a good fit (an r-squared of .80 or higher), then it may be concluded that the factors included in that particular regression analysis are not representing significant variance, and that those eigenvalues that were excluded from that analysis are representing significant variance.

For the seven best CRT-GO items, the r-squared for all plotted eigenvalues was .731 (see Figure 7) and removal of the first eigenvalue resulted in the r-squared for the remaining eigenvalues to rise to .967 (see Figure 8). The r-squared associated with removal of the first eigenvalue was .967, which is larger than the .80 criterion indicated by Nelson (2005) and illustrates that the remaining components have a good fit to the linear function, and therefore do not contain significant variance that could be considered an additional factor. Most likely, the eigenvalues that fit the linear function well represent error, due to the high unique variance

between items (as seen by the inter-item correlations). Taking this evidence into account, it is concluded that a one-factor model is the best fit for the CRT-GO.

Confirmatory Factor Analysis

Despite the CRT-GO's low reliability, a confirmatory factor analysis was conducted to demonstrate the principle. The one-factor model failed to converge after 1000 iterations. This was expected due to the unreliability of the measure. Alternative models were not attempted because the *a priori* factor structure for the CRT-GO was conceptualized as being a one-factor model, and the exploratory factor analysis suggested a one-factor solution.

A confirmatory factor analysis was conducted on participant responses to the Button, Matheiu, and Zajac (1996) two-factor measure. Results indicate that a two-factor solution fits the data well, $\chi^2 = (120, N = 184) = 893.476, p < .001, CFI = .926, RMSEA = .055$. Hu and Bentler (1999) state that RSMEA values of .06 or less indicate a good model fit relative to the model degrees of freedom. The RMSEA for this measure satisfies this model fit standard. However, the authors also stated that CFI values greater than .95 may be indicative of good model fit. For this situation, the two-factor solution has marginally adequate fit.

Participant responses to the VandeWalle (1997) three-factor measure were used to conduct a confirmatory factor analysis. Results indicate that a three-factor model fits the data well, $\chi^2 = (78, N = 184) = 759.329, p < .001, CFI = .975, RMSEA = .039$. The RMSEA and CFI statistics for the three-factor solution indicate good model fit.

A confirmatory factor analysis was conducted on the participant responses to the Baranik, Barron, and Finney (2007) four-factor measure. Results indicate that a four-factor model fits the data well, $\chi^2 = (153, N = 181) = 1581.581, p < .001, CFI = .959, RMSEA = .05$. Both the RMSEA and CFI statistics indicate adequate fit of the four-factor solution.

Construct Validity

Despite the poor performance of the CRT-GO items, subsequent analyses were still conducted for demonstrative purposes. The seven best performing CRT-GO items as identified by the discrimination indices were used for all subsequent analyses involving the CRT-GO measure.

To address the second research question of this study, convergent validity of the CRT-GO instrument as a measure of goal orientation was evaluated by correlating CRT-GO scores with existing self-report goal orientation measures. Resulting correlations (see Table 3) with the Button, Matheiu, and Zajac (1996) two-factor measure ($r = .061, ns$), VandeWalle (1997) three-factor measure ($r = .064, ns$), and Baranik, Barron, and Finney (2007) four-factor measure ($r = .071, ns$) does not indicate adequate construct validity. However, low correlations are typically observed between implicit and explicit measures (Greenwald & Banaji, 1995; McClelland et al., 1989). Additionally, due to the unreliability of the CRT-GO measure, attenuation may be a factor in this relationship (Crocker & Algina, 1986). Attenuation would weaken the true correlations between the construct measured in the CRT-GO and the same constructs that were measured in the existing self-report measures. However, it is assumed that the major reason for the low correlations is because of the low reliability of the CRT-GO.

Construct validity was examined by assessing various relationships among the existing self-report goal orientation measures and their respective dimensions (i.e., LGO, PGO, PPGO, PAGO). See Table 3 for correlations among all variables included in the study. As expected, a significant positive relationship between the LGO dimensions of both the Button et al. measure and the VandeWalle measure demonstrates high construct validity ($r = .794, p < .01$). A similar relationship was found between the PAGO dimensions of the VandeWalle measure and the

Baranik et al. measure ($r = .773, p < .01$). Additionally, significant positive relationship between the PPGO dimensions (from the VandeWalle measure and the Baranik et al. measure) also demonstrate construct validity ($r = .383, p < .01$). These relationships were expected because these identically-labeled dimensions were assumed to be measuring the same construct.

In addition to the expected relationships among existing self-report measures and their goal orientation dimensions, two sets of unexpected results were also found. First, the relationship between LGO (Button et al.) and LPGO (Baranik et al.) dimensions was significant ($r = .707, p < .01$). This finding suggests that the LGO and LPGO dimensions are measuring similar constructs. Alternatively, there was no relationship between LGO (Button et al.) and LAGO (Baranik et al.) dimensions ($r = .016, ns$). This suggests that the LGO and LAGO dimensions are not measuring similar constructs at all. The same type of relationship was found between VandeWalle's LGO dimensions and Baranik et al. LPGO ($r = .749, p < .01$) and LAGO ($r = .03, ns$). This brings into question the relevance of the LAGO dimension and its contribution to goal orientation theory. Because the LPGO dimension is so highly correlated with the LGO factor, it seems that the LAGO dimension is not contributing significantly to the LGO dimension, from which it was derived.

Examination of divergent validity was conducted by assessing the relationship between general self-efficacy and the existing goal orientation measures used in this study. Divergent validity was evaluated using a hetero-trait, hetero-method approach which assesses the relationship between instruments that are measuring different traits with different measurement methods. Overall, the positive relationships between general self-efficacy and Button et al.'s LGO dimension ($r = .447, p < .01$), VandeWalle's LGO dimension ($r = .485, p < .01$), and Baranik et al.'s LPGO dimension ($r = .426, p < .01$) suggest that general self-efficacy and the

learning goal orientation dimension and its bifurcated dimensions may be measuring constructs similar to the construct that general self-efficacy is measuring. Non-significant relationships were found between general self-efficacy and Button et al.'s PGO dimension ($r = -.045, ns$), VandeWalle's LAGO dimension ($r = -.139, ns$), and Baranik et al.'s PPGO dimension ($r = .011, ns$). A significant relationship was found between general self-efficacy and VandeWalle's PPGO dimension ($r = -.185, p < .05$).

Divergent validity (using the hetero-trait, hetero-method approach) was also used to assess the relationship between the self-report theory of intelligence items and the existing goal orientation measure dimensions. Results showed a significant relationship between incremental theory of intelligence and LGO (Button et al.'s dimension, $r = .363, p < .01$; VandeWalle's dimension, $r = .376, p < .01$). This relationship was expected because, according to the original goal orientation theory proposed by Dweck, learning goal oriented individuals subscribe to an incremental theory of intelligence. It is suspected that the correlation remain in the medium range because theory of intelligence is an implicit cognition, therefore it cannot be fully captured in a self-report format.

An additional expected result regarding the relationship between theory of intelligence and goal orientation was that entity theory of intelligence was significantly related to learning goal orientation, as measured by Button et al.'s LGO dimension ($r = .104, p < .05$). This also supports Dweck's original goal orientation model.

Manipulation Check

The anagram exercise used as a simulation of an achievement situation was evaluated to determine its effectiveness. It was expected that, consistent with goal orientation theory, the learning goal dimensions of each self-report measure would be positively correlated with the level of anagram difficulty completed. The CRT-GO measure was not used to assess the

effectiveness of the criterion manipulation due to its low reliability. A positive relationship was demonstrated with the LGO dimension of the Vandewalle (1997) measure ($r = .151, p < .05$) and the LPGO dimension of the Baranik, Barron, and Finney (2007) ($r = .206, p < .01$).

Additionally, there was a positive (although non-significant) relationship with the Button, Matheiu, and Zajac (1996) LGO dimension and the criterion ($r = .124, ns$). These correlations demonstrate that the anagram exercise was an effective simulation of an achievement situation.

Task-specific self-efficacy

According to previous research, task-specific self-efficacy should have had an effect on the performance oriented participants in the study. If a performance oriented individual had a low efficacy in the anagram task, it was expected that these individuals would disengage from the task and return to the level one anagram (i.e., the easiest). The reason for this expected relationship is because performance oriented individuals make social comparisons with their peers. Therefore, if performance oriented participants had little confidence in their ability to perform the anagram task and felt they were performing worse than the others in their study session, they should be more likely to disengage from the task.

The influence of task efficacy on task choice in this simulated achievement situation was further evidence that the manipulation was effective. Overall, 95.2% of people reported a low task efficacy (i.e., not confident about being successful at the next level of anagram difficulty) when they disengaged from the task. The majority of participants disengaged in round 5 and 6 (46.8% of participants). Furthermore, 23.4% ($N = 43$) never disengaged from the task (i.e., never went back to level one).

A strong indication that the anagram exercise served as an effective achievement situation simulation was the relationship between both types of PGO and the participants' task

self-efficacy at the round quit (i.e., the round in which the participant disengaged from the task). VandeWalle's PPGO and PAGO dimensions were negatively related to task self-efficacy at round quit (PPGO, $r = -.275$, $p < .01$; PAGO, $r = -.204$, $p < .05$).

Criterion-Related Validity

Despite the less than desired reliability of the seven most effective CRT-GO items, the measure's criterion-related was examined by assessing the correlation between responses on the 7 best performing CRT-GO items and the criterion (round in which the participant quit and disengaged from the task by returning to level one). The correlation was significant ($r = -.150$, $p < .05$) in the opposite direction of what was expected. This result indicates that the higher the CRT-GO score (toward incremental theory of intelligence), the more likely the participant was to disengage from the task in an earlier round. This is opposite of what was anticipated, since incremental theorists consistently engage in difficult tasks in order to gain mastery of the task. This result is difficult to interpret due to the low reliability of the seven-item CRT-GO measure.

The only significant relationship between the criterion and the existing self-report goal orientation dimensions was VandeWalle's LGO dimension ($r = .151$, $p < .01$) and Baranik's LPGO dimension ($r = .206$, $p < .01$).

CHAPTER IV: DISCUSSION

This thesis was conceptualized as an attempt to create an indirect measure of goal orientation. The application of Conditional Reasoning to goal orientation is a logical progression in the measurement of the construct due to its implicit foundation (i.e., theory of intelligence). Results of this preliminary attempt indicate that further investigation of goal orientation theory should be conducted in order to adequately revise the CRT-GO items and understand their psychometric behavior.

The anagram exercises functioned as an effective manipulation of an achievement situation. Overall, participants were challenged by the increasing level of anagram difficulty, and their task self-efficacy was affected. The effectiveness of the anagram exercise was demonstrated by the positive correlation between existing LGO dimension self-report measures and the criterion. This indicates that participants scoring higher on the LGO dimension engaged in the anagram tasks for more rounds than those scoring lower in the LGO dimension. This was true for the Button, Matheiu, and Zajac (1996) LGO dimension and the VandeWalle (1997) LGO dimension, respectively.

The major shortcoming of this study was the unreliability of the CRT-GO measure. Three potential reasons for the poor psychometric properties exist. First, the items were written based on two broad achievement categories; task performance (i.e., successful/unsuccessful) and task choice (i.e., easy/difficult). All seven of the best performing CRT-GO items were associated with the task performance aspect of achievement. Therefore, none of the task choice items performed well. A possible reason for this is individuals may not be aware of why they choose a specific task over another (i.e., easy task versus difficult task). According to goal orientation theory, theory of intelligence drives task choice depending on which goal orientation approach a person

uses to make decisions in achievement situations. However, theory of intelligence is an implicit cognition, one that is not readily available in an individual's conscious. Therefore, it is possible that individuals base their decisions on the theory of intelligence for which they subscribe, but due to its implicit nature, these individuals are not aware of the unconscious process they go through when choosing an achievement task. If this is the case, then using task choice as an achievement scenario may not elicit the appropriate responses that will reflect an individual's theory of intelligence and by consequence, their goal orientation.

An additional potential shortcoming of the CRT-GO items themselves is the utilization of multiple life domains, not all of which may be relevant to the theory of intelligence framework. For example, a portion of the CRT-GO items were written as an athletic achievement scenario. The items assume that respondents are using their implicit theory of intelligence to guide their response to the item. However, it is possible that an individual's theory of intelligence does not apply to the athletic domain. Similarly with work domain, most participants in the study probably had limited work experience, in which case their implicit cognitions in regards to intelligence in the workplace may not fit into their cognitive schema.

The final potential reason for the CRT-GO's lack of reliability may be the placement of the measures within the progression of the study's one hour session. In this study, the achievement task was completed first, followed by the administration of the measures (i.e., CRT-GO). A logistical adjustment may have improved responses to the CRT-GO. It's possible that participants were mentally fatigued by the time they were given the measures, which was approximately 30 minutes into the study session. The anagram exercise was cognitively taxing and may have contributed to participants not paying full attention to the CRT-GO item scenarios and responses.

Limitations and Future Research

Future research should focus on revising the CRT-GO measure to improve its psychometric properties. In the original 20-item CRT-GO measure, 7 item scenarios demonstrated the character in the scenario making a decision about what type of task to pursue (i.e., easy or difficult). Of those 7 items, only one had a discrimination index above .20 (item 15). Therefore, it is possible that this type of item, those that make the inferential leap from intelligence theory to actual goal orientation rationalization, may not be effective.

Another area in which future research should be dedicated is to the improvement of the anagram manipulation as a simulation of an achievement situation. Correlations between the self-report goal orientation items and the criterion measure of achievement (the highest level of anagram difficulty completed by the participants) were moderately significant for the LGO items, and not significant for the PGO items. A higher positive relationship between the LGO items and the criterion is desired (in the .4 to .5 range). More emphasis on participant performance (i.e., anagram answers will be scored and compared to other participants) may create a stronger achievement situation for which the social component associated with performance goal orientation to be maximized.

Another approach to assessing the anagram manipulation is to include a metacognition measure. Metacognition is utilized when one takes an active role in the process of learning (Yeo, Loft, Xiao, & Keiwitz, 2009). Therefore, when an individual actively assesses the level of understanding in a task and adjusts accordingly, that is an example of metacognition activity. Research states that when metacognition is used in a task, this promotes performance of learning goal oriented individuals (VandeWalle, 2001; Yeo et al., 2009). Due to the single administration of the series of anagrams in this study, it is possible that the participants did not have a chance to

activate metacognition to complete the task. Therefore, if metacognition isn't a factor, perhaps the manipulation should be expanded to include two anagram-solving sessions in order for metacognition to be useful in distinguishing between learning and performance goal orientated individuals in terms of task difficulty (DeShon & Gillespie, 2007; Yeo, Loft, Xiao, & Kiewitz, 2009).

The relationships between various self-report goal orientation factors to assess convergent validity of each measure produced inconsistent results. Further investigation of the self-report goal orientation measures and their relationship with the underlying goal orientation construct is needed to confer whether or not they are truly measuring goal orientation. In addition to the measures as a whole, assessment of each "factor" and how it acts in relationship with other variables (including other identified factors) will also develop understanding of their nature and functionality.

Conclusions

Conditional reasoning instruments have been successfully developed to measure psychological constructs such as aggression. This study's initial attempt to develop a CR measure of goal orientation did not meet the criteria necessary to be considered a reliable measure. Future revision of existing CRT-GO items may lead to psychometric improvement. Further, the study's anagram exercises were an effective achievement situation manipulation. Therefore, this manipulation can be used for future CRT-GO validation attempts.

References

- Ablard, K. E., & Lipschultz, R. E. (1998). Self-regulated learning in high-achieving students relations to advanced reasoning, achievement goals, and gender. *Journal of Educational Psychology, 90*, 94-101.
- Ames, A. L., & Stacy, A. W. (1998). Implicit cognition in the prediction of substance use among drug offenders. *Psychology of Addictive Behaviors, 12*, 272-281.
- Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. *Journal of Educational Psychology, 76*, 478-487.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.
- Baranik, L. E., Barron, K. E., & Finney, S. J. (2007). Measuring goal orientation in a work domain: Construct validity evidence for the 2 x 2 framework. *Educational and Psychological Measurement, 67*, 697-718.
- Barksdale, C. D. (2004, April). *Coached faking with the conditional reasoning test of aggression*. Poster presented at the annual conference of the Society of Industrial and Organizational Psychology, Chicago, IL.
- Barrett, L. F., Tugade, M. M., & Engle, R. W. (2004). Individual differences in working memory capacity and dual-process theories of the mind. *Psychological Bulletin, 130*, 553-573.
- Barrick, M. R., & Mount, M. K. (1996). Effects of impression management and self-deception on the predictive validity of personality constructs. *Journal of Applied Psychology, 81*, 261-272,
- Bell, B. S., & Kozlowski, W. J. (2002). Goal orientation and ability: Interactive effects on self-efficacy, performance, and knowledge. *Journal of Applied Psychology, 87*, 497-505.

- Brauer, M., Wasel, W., & Niedenthal, P. (2000). Implicit and explicit components of prejudice. *Review of General Psychology, 4*, 79-101.
- Brett, J. F., & Atwater, L. E. (2001). 360-degree feedback: Accuracy, reactions, and perceptions of usefulness. *Journal of Applied Psychology, 86*, 930-942.
- Brett, J. F., & Vande Walle, D. (1999). Goal orientation and goal content as predictors of performance in a training program. *Journal of Applied Psychology, 84*, 863-873.
- Button, S. B., Mathieu, J. E., & Zajac, D. M. (1996). Goal orientation in organizational research: A conceptual and empirical foundation. *Organizational Behavior and Human Decision Processes, 67*, 26-48.
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*, 245-276.
- Chen, G., Gully, S.M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods, 4(1)*, 62-83.
- Chen, G., Gully, S. M., Whiteman, J., & Kilcullen, R. N. (2000). Examination of relationships among trait-like individual differences, state-like individual differences, and learning performance. *Journal of Applied Psychology, 85*, 835-847.
- Chiu, C., Dweck, C. S., Tong, J. Y., & Fu, J. H. (1997). Implicit theories and conceptions of morality. *Journal of Personality and Social Psychology, 73*, 923-940.
- Collins, W. (2005). *Collins internet-linked dictionary of anagrams*. HarperCollins Publishers.
- Colquitt, J. A., & Simmering, M. J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of Applied Psychology, 83*, 654-665.

- Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. New York: Holt, Rinehart and Winston.
- Dicken, C. F. (1960). Simulated patterns on the California Psychological Inventory. *Journal of Counseling Psychology, 7*, 24-31.
- Dosher, B. A. (1998). The response-window method-Some problematic assumptions: Comment on Draine and Greenwald (1998). *Journal of Experimental Psychology: General, 127*, 311-317.
- Draine, S. C., & Greenwald, A. G. (1998). Replicable unconscious semantic priming. *Journal of Experimental Psychology: General, 127*, 286-303.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256-273.
- Dykman, B. M. (1998). Integrating cognitive and motivational factors in depression: Initial tests of a goal-orientation approach. *Journal of Personality and Social Psychology, 74*, 139-158.
- Elliott, E. S., & Dweck, C.S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*, 5-12.
- Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*, 218-232.
- Elliot, A., & McGregor, H. A. (2001). A 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*, 501-519.
- Fisher, S. L., & Ford, J. K. (1998). Differential effect of learner effort and goal orientation on two learning outcomes. *Personnel Psychology, 51*, 397-420.

- Ford, J. K., Smith, E. M., Weissbein, D. A., Gully, S. M., & Salas, E. (1998). Relationships of goal orientation, metacognitive activity, and practice strategies with learning outcomes and transfer. *Journal of Applied Psychology, 83*, 218-233.
- Greenwald, A. G. (1992). New look 3: Unconscious cognition reclaimed. *American Psychologist, 47*, 766-779.
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*, 4-27.
- Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review, 109*, 3-25.
- Greenwald, A. G., & Draine, S. C. (1998). Distinguishing unconscious from conscious cognition-Reasonable assumptions and replicable findings: Reply to Merikle and Reingold (1998) and Doshier (1998). *Journal of Experimental Psychology: General, 127*, 320-324.
- Greenwald, A. G., & Farnham, S. D. (2000). Using the implicit association test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology, 79*, 1022-1038.
- Greenwald, A. G., McGhee, D. E., & Schwatz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*, 1464-1480.
- Greenwalk, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85*, 197-216.

- Harackiewicz, J. M., & Elliot, A. J. (1993). Achievement goals and intrinsic motivation. *Journal of Personality and Social Psychology, 65*, 904-915.
- Harackiewicz, J. M., Barron, K. E., Carter, S. M., & Elliot, A. J. (1997). Predictors and consequences of achievement goals in the college classroom: Maintaining interest and making the grade. *Journal of Personality and Social Psychology, 73*, 1284-1295.
- Harackiewicz, J. M., Barron, K. E., Tauer, J. M., Carter, S. M., & Elliot, A. J. (2000). Short-term and long-term consequences of achievement goals: Predicting interest and performance over time. *Journal of Educational Psychology, 92*, 316-330.
- Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.
- Hummert, M. L., Garstka, T. A., O'Brien, L. T., Greenwald, A. G., & Mellott, D. S. (2002). Using the implicit association test to measure age differences in implicit social cognitions. *Psychology and Aging, 17*, 482-495.
- James, L. R. (1998). Measurement of personality via conditional reasoning. *Organizational Research Methods, 2*, 131-163.
- James, L. R., & Mazerolle, M. D. (2002). *Personality in work organizations*. Thousand Oaks, CA: Sage Publications.
- James, L. R., McIntyre, M. D., Glisson, C. A., Green, P. D., Patton, T. W., LeBreton, J. M., Frost, B. C., ... & Williams, L. J. (in press). A conditional reasoning measure for aggression. *Organizational Research Methods*.
- LeBreton, J. M., Burgess, J. R. D., & James, L. R. (2000, August). Measurement issues associated with Conditional Reasoning tests of personality: Deception and faking. In J. M. LeBreton & J. F. Binning (Co-Chairs), *Issues and innovations in personality*

- assessment*. Invited symposium conducted at the annual meeting of the American Psychological Association, Washington, D.C.
- Meece, J. L., Blumenfeld, P. C., & Hoyle, R. H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology, 80*, 514-523.
- Merikle, P. M., & Reingold, E. M. (1998). On demonstrating unconscious perception: Comment on Draine and Greenwald (1998). *Journal of Experimental Psychology, General, 127*, 304-310.
- Middleton, M. J., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An underexplored aspect of goal theory. *Journal of Educational Psychology, 89*, 710-718.
- Midgley, C., Kaplan, A., Middleton, M., Maehr, M., Urdan, T., Anderman, L. H., ... & Roeser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23*, 113-131.
- Nelson, L.R. (2005). Some observations on the scree test, and on coefficient alpha. *Thai Journal of Educational Research and Measurement, 3(1)*, 1-17.
- Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*, 328-346.
- Nunnally, J., and Bernstein, I. (1994). *Psychometric theory (3rd ed)*. New York: McGraw Hill.
- Phillips, J. M., & Gully, S. M. (1997). Role of goal orientation, ability, need for achievement, and locus of control in the self-efficacy and goal-setting process. *Journal of Applied Psychology, 82*, 792-802.
- Roefs, A., & Jansen, A. (2002). Implicit and explicit attitudes toward high-fat foods in obesity. *Journal of Abnormal Psychology, 111*, 517-521.

- Sherer, M., Maddux, J.E., Merchandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R.W. (1982). The self-efficacy scale: Construction and validation. *Psychological Reports, 51*, 663-671.
- Stacy, A. W., Ames, S. L., Sussman, S., & Dent, C. W. (1996). Implicit cognition in adolescent drug use. *Psychology of Addictive Behaviors, 10*, 190-203.
- Sujan, H., Weitz, A. A., & Kumar, N. (1994). Learning orientation, working smart, and effective selling. *Journal of Marketing, 58*, 39-52.
- Thompson, R.B. (1973). The relationship of intelligence, spelling, and selected aspects of reading to the solving of anagrams. *ETD collection for University of Nebraska - Lincoln*. Paper AAI7325492.
- Thornton, G. C., III., & Fierasc, P. F., III. (1980). Fakability of an empirically derived selection instrument. *Journal of Personality Assessment, 44*, 48-51.
- Towler, A. J., & Dipboye, R. L. (2001). Effects of trainer expressiveness, organization, and trainee goal orientation on training outcomes. *Journal of Applied Psychology, 86*, 664-673.
- VandeWalle, D. (2001). Why wanting to look successful doesn't always lead to success. *Organizational Dynamics, 30*(2), 162-171.
- VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement, 57*, 995-1015.
- VandeWalle, D., & Cummings, L. L. (1997). A test of the influence of goal orientation on the feedback-seeking process. *Journal of Applied Psychology, 82*, 390-400.

- VandeWalle, D., Brown, S. P., Cron, W. L., & Slocum, J. W. (1999). The influence of goal orientation and self-regulation tactics on sales performance: A longitudinal field test. *Journal of Applied Psychology, 84*, 249-259.
- VandeWalle, D., Cron, W. L., & Slocum, J. W. (2001). The role of goal orientation following performance feedback. *Journal of Applied Psychology, 86*, 629-640.
- VandeWalle, D., Ganesan, S., Challagalla, G. N., & Brown, S. P. (2000). An integrated model of feedback-seeking behavior: Disposition, context, and cognition. *Journal of Applied Psychology, 85*, 996-1003.
- Wolters, C. A. (1998). Self-regulated learning and college students' regulation of motivation. *Journal of Educational Psychology, 90*, 224-235.
- Yeo, G., Loft, S., Xiao, T., & Kiewitz, C. (2009). Goal orientations and performance: Differential relationships across levels of analysis and as a function of task demands. *Journal of Applied Psychology, 94*, 710-726.

Footnotes

¹It will be argued later in this paper that the measures that are typically employed in goal orientation research are atheoretical and generate results that are mathematically nonsensical. Thus, this review focuses solely upon the basic correlational data in an attempt to demonstrate basic trends in the literature.

²Unless otherwise noted, all reported correlations are significant ($p < .05$).

³Only a small handful of studies actually evaluate the engagement pattern as theoretical stated (i.e., moderated by self-efficacy). Most studies ignore the efficacy component when conducting their observations/experiments.

⁴The use of self-efficacy as a direct effect and not a moderator of goal orientation is another theoretical contradiction.

⁵Despite the potential problems that arise with the implementation of self-report measures to evaluate personality, the measurement of the actual orientation is in itself fundamentally unsound. Until recently, implicit cognitions could not be reliably measured via questionnaires. Thus, research into the area of goal orientation has focused upon the orientations themselves and not the implicit intelligence theories from which they arise. This distance from the source of behavior, along with the problematic nature of self-report questionnaires, allows for a substantial amount of error to be introduced to the measurement. Moreover, it is the implicit theories of intelligence that are driving the behavior, not the orientations. These orientations describe behavioral predispositions which themselves arise from the implicit theories. Measuring the orientations is inappropriate in that these orientations are simply descriptions of preferences for particular behavior sets.

Figure 1. The general goal orientation model (Dweck, 1986)

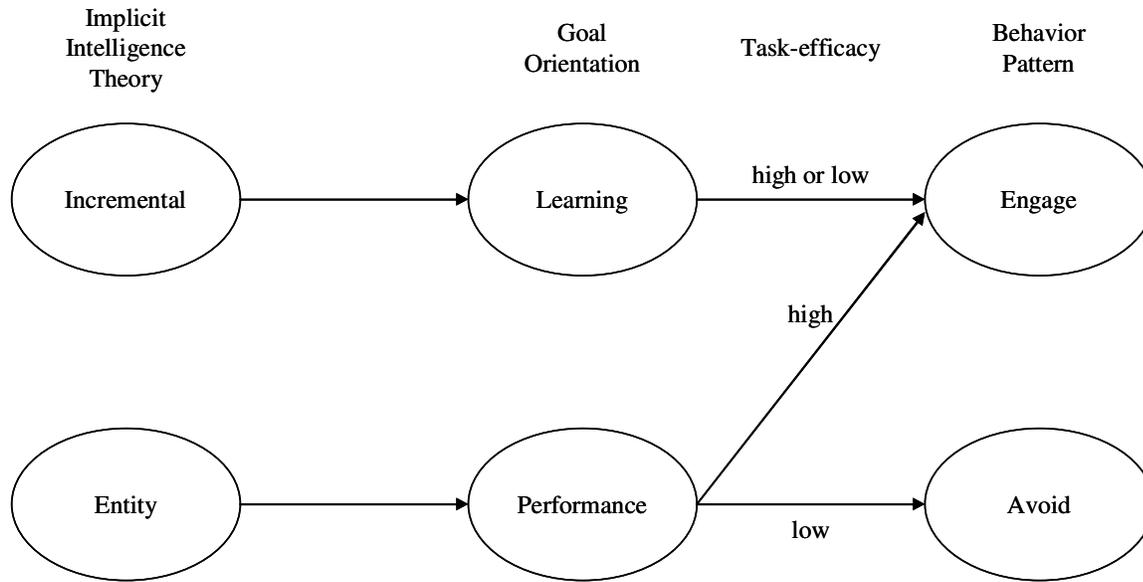


Figure 2. The statistical relationship between independent learning and performance orientations

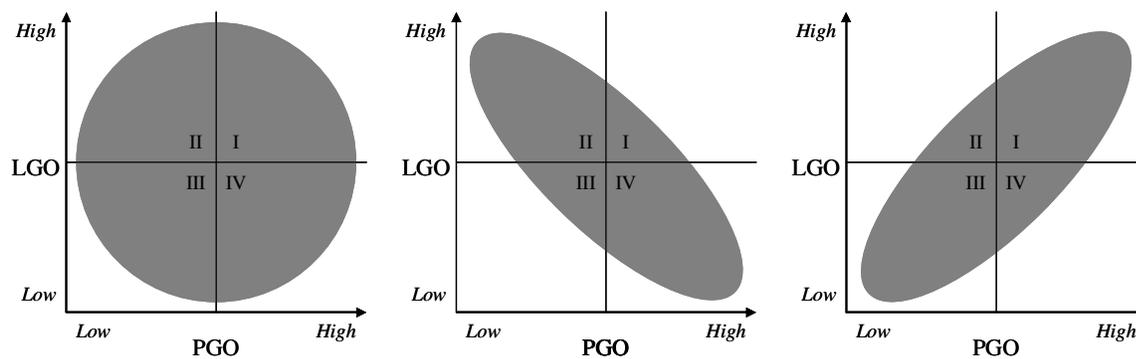


Figure 3. The three-factor model suggested by Vandewalle (1997)

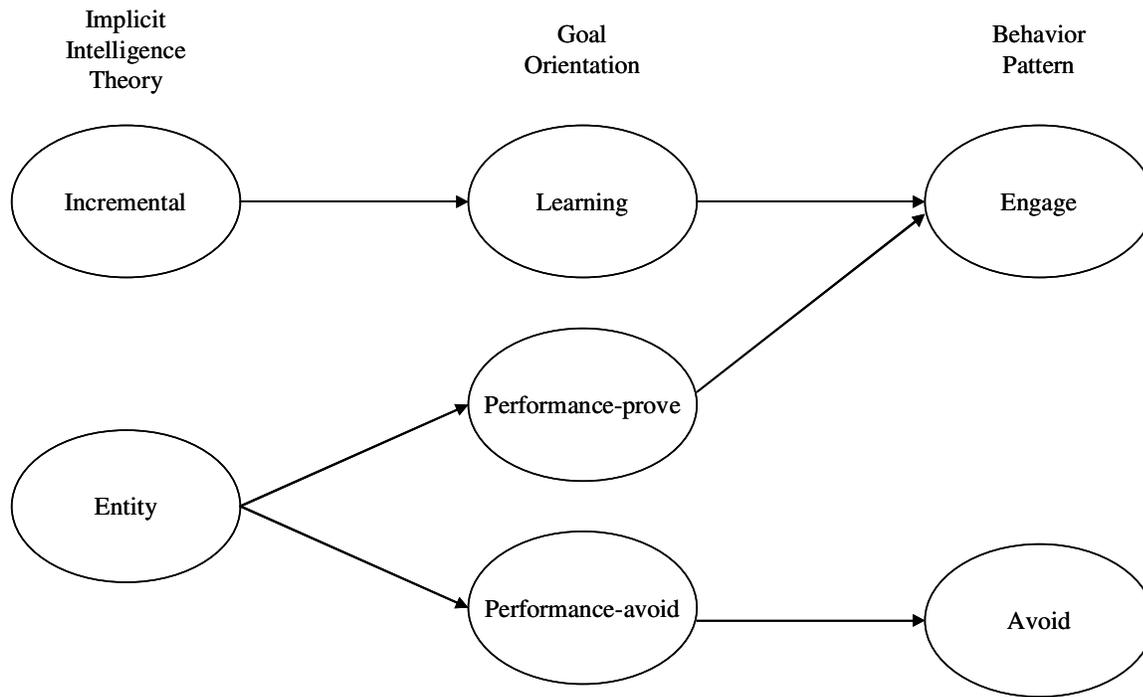


Figure 4. The four-factor model suggested by Elliot & McGregor, 2001

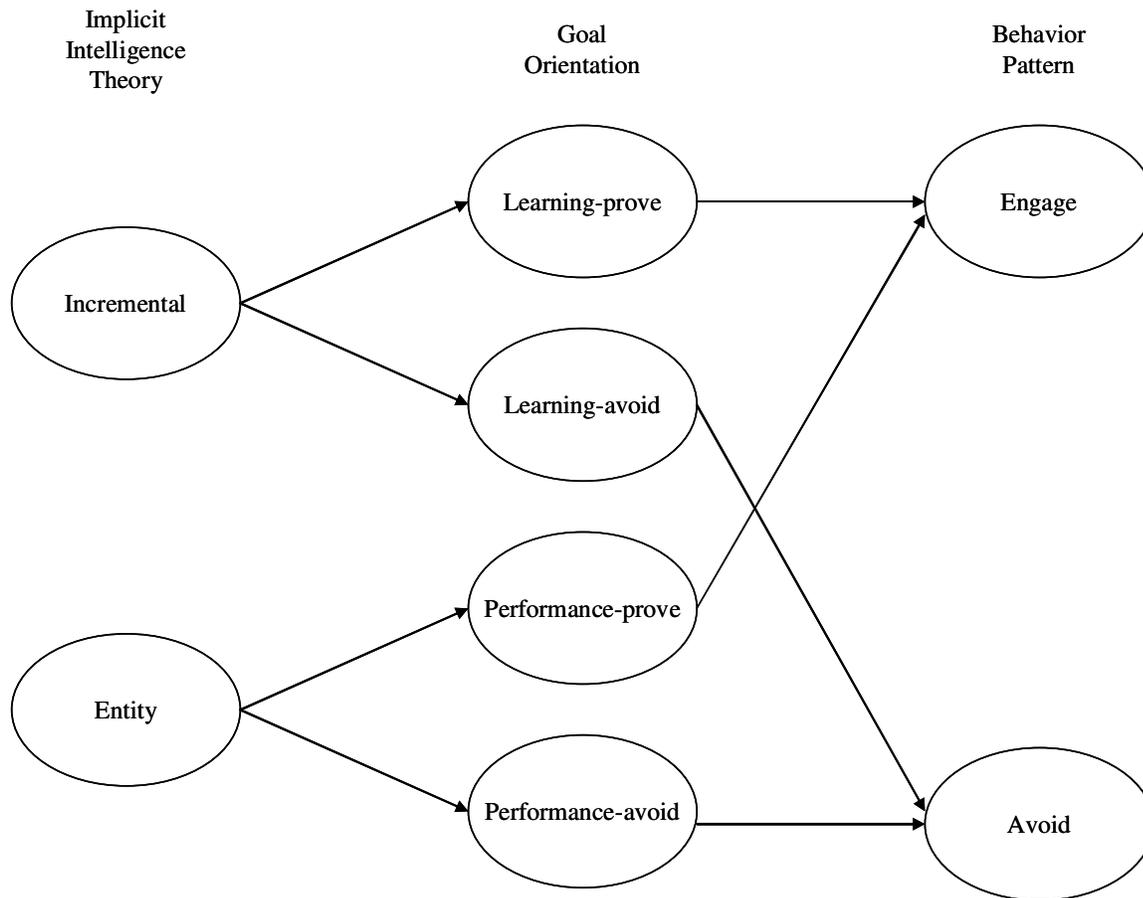


Figure 5. A sample conditional reasoning item

Hannah is a vault-specialist on her gymnastics team. In a recent competition, her team was just behind the first place team with one vault to go. Hannah had a decision to make: she could either (1) perform a moderately difficult vault or (2) she could perform a very difficult vault that was worth more points. Hannah decided to perform the very difficult vault that she had performed perfectly in the past three weeks of practice.

What is the most accurate inference to make regarding Hannah's decision to perform the more difficult vault?

- a. Hannah has only been in gymnastics for one year.
 - b. Hannah chose the very difficult vault instead of the moderately difficult vault because she knew all the work she put in would make her successful.
 - c. Hannah chose the very difficult vault because she knew she had the ability to perform it well as she had done in past competitions.
 - d. Hannah flipped a coin to decide which vault to perform.
-

Figure 6. Scree Plot of 7 Best CRT-GO Items

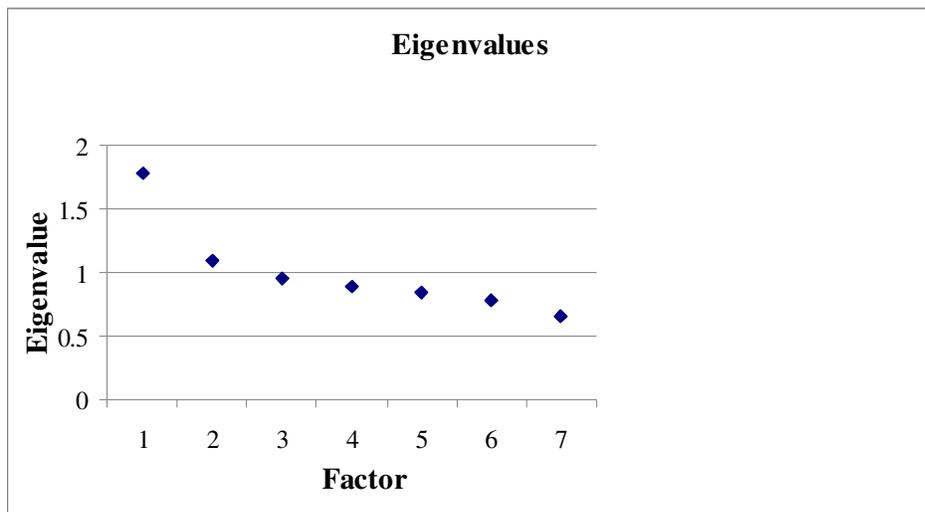


Figure 7. R-squared Test, All Eigenvalues Included

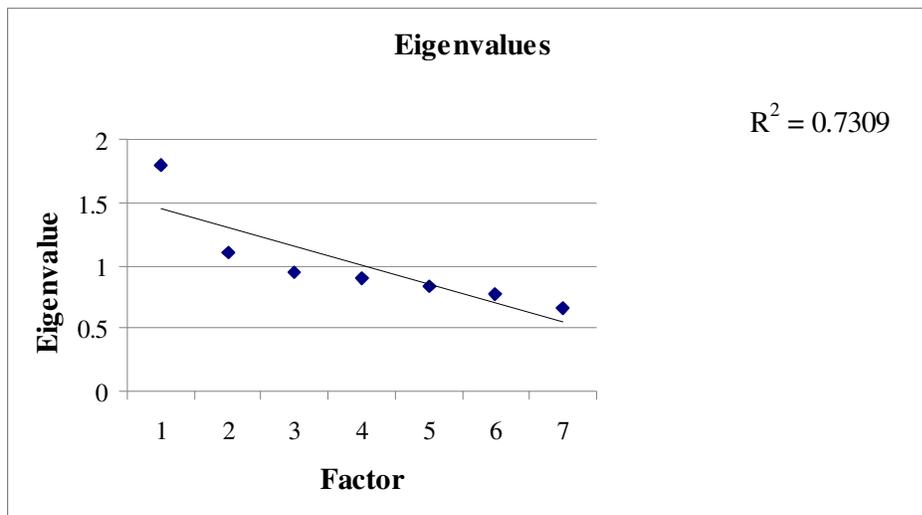


Figure 8. R-squared Test, Excluding First Eigenvalue

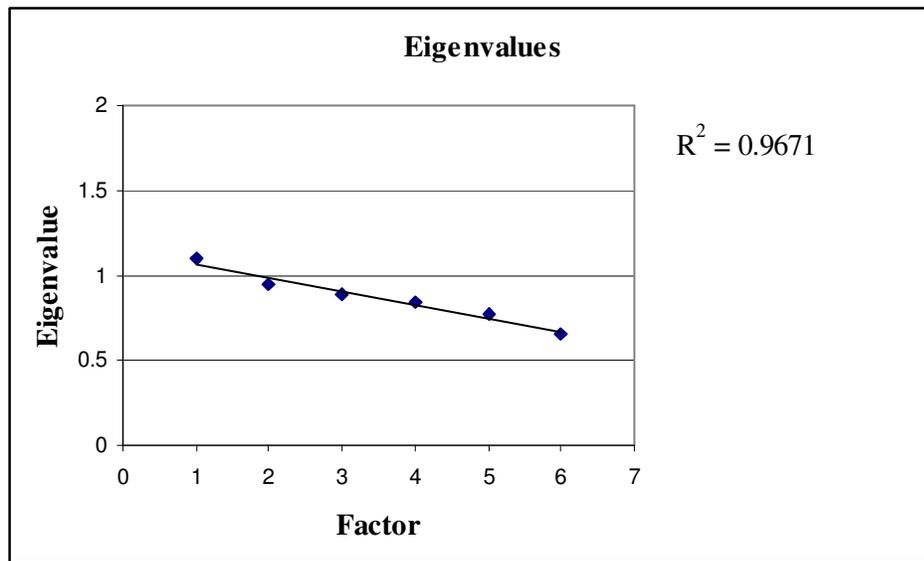
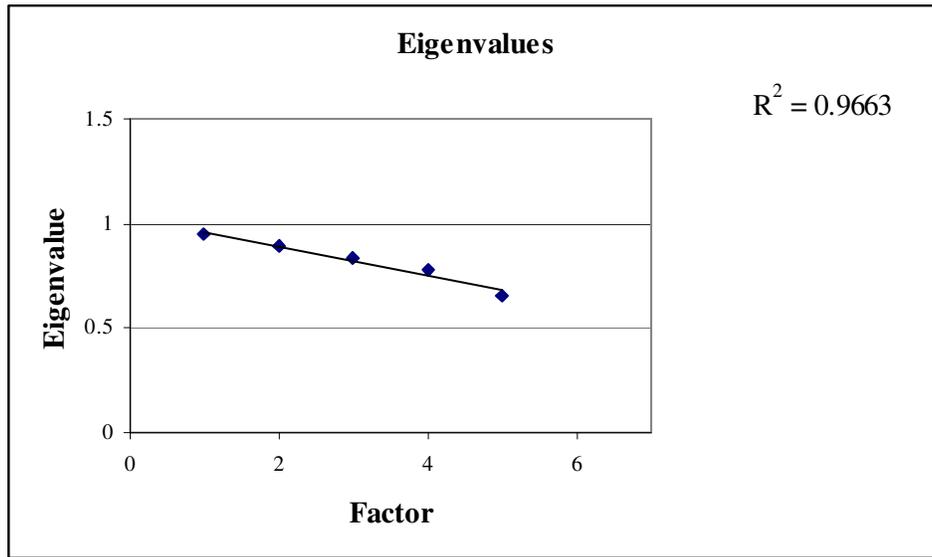


Figure 9. R-squared Test, Excluding First Two Eigenvalues



Appendix A: Conditional reasoning measure of goal orientation (CRT-GO)

2. Hannah is a vault-specialist on her gymnastics team. In a recent competition, her team was just behind the first place team with one vault to go. Hannah had a decision to make: she could either (1) perform a moderately difficult vault or (2) she could perform a very difficult vault that was worth more points. Hannah decided to perform the very difficult vault that she had performed perfectly in the past three weeks of practice.

What is the most accurate inference to make regarding Hannah's decision to perform the more difficult vault?

- a. Hannah has only been in gymnastics for one year.
 - b. Hannah chose the very difficult vault instead of the moderately difficult vault because she knew all the work she put in would make her successful.
 - c. Hannah chose the very difficult vault because she knew she had the ability to perform it well as she had done in past competitions.
 - d. Hannah flipped a coin to decide which vault to perform.
3. Chris had been accepted to an Ivy League school's engineering program. He was also accepted to an engineering program at a local state university where both of his parents are faculty members and he knows many of the engineering faculty. Chris decided to attend the local state university.

What is the most accurate inference to be made regarding Chris's decision to attend the local state University?

- a. Chris drew-straws to decide on where to go to school.
 - b. Chris chose the local state University because he was afraid of doing poorly with the high expectations of the Ivy League school.
 - c. Chris chose the local state University because he knows the program director and can get immediate hands-on experience in his lab, allowing him to gain more knowledge of engineering.
 - d. Chris didn't like the Ivy League school's mascot.
4. Whitney has just been hired for an assembly line position in an automobile manufacturing plant. This is her first experience with such a position. After just two days on the job, her supervisors notice that she is completing her tasks with incredible ease.

Which statement reflects the most likely cause of Whitney's skill?

- a. Unlike her coworkers, Whitney spent a considerable amount of time reading the operator's manual for the machine that she is assigned to use.
- b. Whitney wore the correct clothes.
- c. Whitney is naturally bright and would have done well in any new job at this level.
- d. Whitney's brother is a florist.

5. After earning his Bachelor's degree in biology, James was debating whether to attend graduate school and get a Ph.D. in biochemistry or to get a job as a laboratory technician at a local environmental survey company. His older brother, who had always gotten worse grades than James, has a law degree. James decided to enroll in a biochemistry Ph.D. program.

What is the most accurate inference to be made regarding James' choice to enroll in the biochemistry Ph.D. program?

- James chose to get his Ph.D. because he wanted to show that he could out-perform his brother in academics.
 - James purchased a car that matched the school's colors.
 - James chose to get his Ph.D. because he wanted to learn more about his discipline and master the science.
 - James had inheritance money and didn't need to rush to get a job.
6. Lauren is an undergraduate in a physics class. She just received her first exam grade and earned an A. This was the highest score in the class.

What is the most accurate inference to be made about why Lauren received such a high grade?

- Lauren has a natural ability for understanding math and physics equations.
 - Lauren is a music major.
 - Lauren studied very hard for the exam and joined a physics study group.
 - Lauren studied from an old version of the textbook.
7. Tiffany is having a hard time in her college organic chemistry class. She studies all the time and still manages to get mostly F's on the tests and quizzes. She is starting to think that she should just drop the course.

What is the most accurate inference to be made regarding Tiffany's performance in organic chemistry?

- Tiffany is wasting her time studying because she doesn't have the intelligence level necessary to comprehend organic chemistry in an effective manner.
 - Tiffany needs to keep working hard. The more effort she puts in, the more improvement she'll see in her grades.
 - Tiffany should not have chosen a section of organic chemistry that started at 10 a.m.
 - Tiffany wanted to take biology.
8. Tim is a consultant for a financial firm. He has recently been assigned the task of assisting a new pet supply company that is struggling financially. He finds that helping this company is an extremely difficult assignment.

What is the best explanation for Tim's difficulty?

- a. Tim doesn't have the necessary skills to be a successful consultant for the new company.
 - b. Tim isn't really a consultant.
 - c. Tim hasn't done the proper research, and hasn't put in enough hours to successfully turn the new company around.
 - d. The new company played a trick on him.
9. At halftime during a university's basketball game, fans may volunteer to attempt a series of shots from around the court. Joe, being an enthusiastic student, offers to try his hand at the contest. He makes almost every shot.

What is the most plausible explanation for Joe's success?

- a. Joe has an innate ability to play basketball.
 - b. Joe was eating popcorn.
 - c. Joe wore a university jersey.
 - d. Joe shoots baskets at home on a regular basis, allowing him to be prepared.
10. Each student in Rose's high school history class was to choose a topic to present to the class the following week. The teacher commented that one particular topic was a difficult one to prepare for and present. Rose chose the difficult topic.

What is the most accurate inference to be made regarding Rose's choice to present the difficult topic?

- a. Rose chose the difficult topic because if she didn't get a good grade on the presentation, the teacher might give her a break because it was a difficult topic.
 - b. Rose spilled coffee on her sweatshirt.
 - c. Rose works at the local mall.
 - d. Rose chose the difficult topic because she wanted to be challenged and learn more about the topic despite the chance of a bad grade.
11. Erika is described by her supervisor as being a hard working saleswoman, whereas Wanda is considered a "natural" in sales. They both put in equal amount of hours in the office. When they are both nominated for a sales award, Erika wins.

What is the most accurate inference to be made about why Erika received the award over Wanda?

- a. Wanda's husband sent her flowers at work.
 - b. Erika participates in Hawaiian shirt Fridays.
 - c. Even with Erika's hard work, she is still a natural saleswoman.
 - d. Erika has worked hard to excel in sales and earn the award.
12. Derek tried out for his high school's varsity basketball team. Although Derek thought that he worked hard during the try-outs, when the roster was announced, he did not make the team.

What is the most accurate inference to be made about why Derek didn't make the team?

- a. Derek didn't spend enough time working hard in practice.
- b. Derek's TV was broken.
- c. Derek didn't really want to play basketball anymore.
- d. Derek just isn't a natural athlete, no matter how much work he put in.

13. William works at a telecommunications firm. While on the job, he consistently displays a low level of job performance. Recently, he was passed over for a promotion.

What is the most accurate inference to be made about why William was passed over for the promotion?

- a. William hasn't worked hard enough to master his current position.
- b. William's meals weren't prepared correctly.
- c. William doesn't have the intelligence necessary to be successful in the promotional position.
- d. William forgot to take out the trash.

14. Sean is a salesman at a large sales company and is well respected by his peers. His supervisor gave him a choice between being promoted as a leader of his workteam or applying for a job as a supervisor of three workteams. Sean chooses to apply for the supervisory position overseeing three teams.

What is the most accurate inference to be made regarding Sean's decision to apply for the supervisory position?

- a. Sean wanted a better desk.
- b. Sean has the work ethic to be successful at the supervisory level.
- c. Sean knows he has the inherent ability to be a successful supervisor.
- d. Sean's gym membership was close to expiring.

15. Jenna is a graduate student studying biology. To fulfill her thesis requirement, she has the option to complete a complex study or a simple study. Jenna chooses the complex thesis option. By the expected date of her graduation, she is far behind schedule and is not able to graduate on time while struggling with the massive amount of work the complex thesis option requires.

What is the most accurate inference to be made regarding Jenna's trouble with her complex thesis?

- a. Jenna developed a drug problem.
- b. Jenna has trouble reading.
- c. Jenna didn't realize how much work it would require completing the complex thesis and just didn't work hard enough to get it done.

- d. Jenna chose the complex thesis because she figured if she didn't succeed in completing the thesis, her advisor may give her a break because it was a hard topic.

16. John is an employee of a computer software company. After meeting with his superiors, John is offered a promotion. The bosses say that the new position will be more challenging than those for his current position. John decides to take the promotion, even though the pay is only slightly higher. At his next six month evaluation, it is determined that John is succeeding at his new assignments.

What is the most accurate explanation for John's successful adjustment?

- a. The company hired new employees.
- b. Throughout his career at the software company, John has gotten smarter, enabling him to complete more complex tasks
- c. John actually never changed jobs.
- d. The promotional job really wasn't much different from John's previous position.

17. Dana is a new customer service representative at a computer call center. Because she had the highest scores in training, she was able to choose her initial work station. Dana could either provide customer service via the phone or provide customer service via email. Dealing with customers over the phone is much more difficult than dealing with customers via email. Dana chooses to work with customers over the phone and does a very poor job.

What is the most accurate inference that could be made about Dana's poor performance?

- a. Dana doesn't have the inherent ability to deal with customers over the phone.
- b. The call center had an insufficient amount of parking spaces.
- c. Dana has stopped working as hard as she did in training.
- d. Dana was unable to find a babysitter.

18. Liz is a senior computer science major at a small college. She had an exam last Monday. Liz spent the entire weekend before the exam with her friends. Once the grades were posted, Liz found out that she received an A.

What is the most accurate inference to be made regarding Liz's grade on the exam?

- a. Liz misread her grade.
- b. Liz studied while hanging out with her friends.
- c. Liz has a natural ability to work with computers and didn't need to spend much time studying.
- d. Liz has supernatural abilities.

19. Kristin is a journalist who has been working for a large city's newspaper for almost two years. She is offered the front page for one of her stories. However, the deadline is very close and may be nearly impossible to meet. Kristin accepted the story, but failed to meet the deadline.

What is the most accurate inference to be made regarding Kristin's missed deadline?

- a. Kristin's house was unusually large.
 - b. Kristin wasn't prepared for the work that was associated with completing a front page story within strict deadlines.
 - c. Kristin will never be a front page journalist because she doesn't have the skills necessary to be successful in that position.
 - d. Kristin was injured in a car accident.
20. Mike, a researcher from a cross-town university, has just conducted an experiment for his new job as a physics researcher at a large state university. Overall, the experiment was a failure. Moreover, it seems as if Mike committed many errors throughout the experimental process.

What is the most accurate inference to be made about Mike's performance on his first experiment?

- a. Mike had to sneak into his colleague's lab each night to use his equipment.
 - b. Mike is learning how hard research can be and will continue to persevere and improve.
 - c. Mike used an old lab manual.
 - d. Mike is simply not a very good researcher and will never be successful in his researcher job.
21. Brad is a walk-on college athlete who has just been named the starting place kicker for his school's football team. The football program is considered to be one of the best in the country. He spent an additional hour after practice each day working on his kicking prior to being named starter.

What is the most logical explanation as to why Brad was designated the starting kicker?

- a. Brad worked very hard to impress the coaching staff and increase his ability on the field.
- b. The booster club had enough money to add another scholarship.
- c. Brad is a natural athlete and would have gotten the starting position regardless.
- d. The football program had a tough recruiting year.

Appendix B: Self-report goal orientation items

1. Regarding an individual's intelligence, do you believe that an individual's intelligence is (A) fixed at a certain point and cannot change or (B) malleable and able to be improved on with effort?
 1. Fixed
 2. Malleable

2. How strongly do you agree with this statement: I believe intelligence is fixed and that, no matter how hard you try, you will never be able to improve your intelligence.
 1. Strongly Agree
 2. Agree
 3. Neither Agree nor Disagree
 4. Disagree
 5. Strongly Disagree

3. How strongly do you agree with this statement: I believe intelligence is malleable and that, with some effort, you can improve your level of intelligence.
 1. Strongly Agree
 2. Agree
 3. Neither Agree nor Disagree
 4. Disagree
 5. Strongly Disagree

R10: L10

ACCEGHHIOOPRR	_____
ACIINNOOOPRRT	_____
CEEEFINORRTTU	_____
EEILMNPSSSUV	_____
IINNOOPRRTTUY	_____
EIIIINNSSTTVY	_____
ACFIIINOPRSTU	_____
ADEEGIIMNPRTT	_____
ADGGIIMNNOSS	_____
AEEIMNORRSTTX	_____
BCDDEIILTTUY	_____
CCEEEIIMNRRSS	_____
CEEEFFINSSTU	_____
CDEEINNORRSTT	_____
AAAABCCEELRTU	_____
AABCEILLOORTV	_____
AACCDGIMMNOOT	_____
ACFGIIIINNST	_____
AGHLLMOOPTY	_____
BEIIILOPSSST	_____
CCEIIMNNOOPST	_____
CEIILNNSTTVY	_____
EENNORSSSSTUU	_____
IINOOOPPSSSTT	_____
EEFGIIMNNNRST	_____
BDEEIIRRSSTTU	_____
BEINNOOSSSUX	_____
CEEEFIMNNORRT	_____
DEEFGIINNPRRT	_____
EEFFGLNORSSTU	_____

Appendix D: IRB Form



University and Medical Center Institutional Review Board
 East Carolina University • Brody School of Medicine
 600 Moyer Boulevard • Old Health Sciences Library, Room 1L-09 • Greenville, NC 27834
 Office 252-744-2914 • Fax 252-744-2284 • www.ecu.edu/irb
 Chair and Director of Biomedical IRB: L. Wiley Nifong, MD
 Chair and Director of Behavioral and Social Science IRB: Susan L. McCammon, PhD

TO: Mark Bowler, PhD, Dept of Psychology, ECU—104 Rawl Building
 FROM: UMCIRB *rk*
 DATE: March 23, 2009
 RE: Human Research Activities Determined to Meet Exempt Criteria
 TITLE: “Anagrams and Reasoning”

UMCIRB #09-0298

This research study has undergone IRB review on 3.18.09. It is the determination of the IRB Chairperson (or designee) that these activities meet the criteria set forth in the federal regulations for exemption from 45 CFR 46 Subpart A. These human research activities meet the criteria for an exempt status because it is a research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects and any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

The Chairperson (or designee) deemed this **unfunded** study **no more than minimal risk**. This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any changes must be submitted to the UMCIRB for review prior to implementation to allow determination that proposed changes do not impact the activities eligibility for exempt status. Should it found that a proposed change does require more substantive review, you will be notified in writing within five business days.

The following items were reviewed in determination exempt certification:

- Internal Processing Form—Exempt Application (dated 3.16.09)
- Informed Consent
- Survey
- Reasoning by Inference Test
- Debriefing Form

It was furthermore determined that the reviewer does not have a potential for conflict of interest on this study.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies that fall under the purview of Food and Drug Administration regulations. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.

Table 1. Item Discrimination Indices and Response Frequencies

Item ¹	Discrimination Index	Incremental	Entity	Illogical Response 1	Illogical Response 2
2	-0.117	143 (77.7%)	41 (22.3%)	--	--
3	0.15	157 (85.3%)	27 (14.7%)	--	--
4	0.246	60 (32.6%)	122 (66.3%)	--	1 (0.5%)
5	0.153	78 (42.4%)	105 (57.1%)	1 (0.5%)	--
6	0.18	140 (76.1%)	41 (22.3%)	--	2 (1.1%)
7	0.278	136 (73.9%)	41 (22.3%)	4 (2.2%)	3 (1.6%)
8	0.203	138 (75%)	43 (23.4%)	2 (1.1%)	1 (0.5%)
9	0.186	75 (40.8%)	106 (57.6%)	--	3 (1.6%)
10	0.183	132 (71.7%)	48 (26.1%)	3 (1.6%)	1 (0.5%)
11	0.209	163 (88.6%)	19 (10.3%)	2 (1.1%)	--
12	0.312	82 (44.6%)	100 (54.3%)	1 (0.5%)	1 (0.5%)
13	0.239	168 (91.3%)	14 (7.6%)	--	2 (1.1%)
14	0.061	176 (95.7%)	5 (2.7%)	1 (0.5%)	2 (1.1%)
15	0.231	108 (58.7%)	72 (39.1%)	3 (1.6%)	1 (0.5%)
16	0.141	155 (84.2%)	26 (14.1%)	1 (0.5%)	2 (1.1%)
17	0.077	57 (31.0%)	127 (69.0%)	--	--
18	0.138	150 (81.5%)	31 (16.8%)	2 (1.1%)	1 (0.5%)
19	0.231	177 (96.2%)	6 (3.3%)	1 (0.5%)	--
20	0.199	164 (89.1%)	16 (8.7%)	2 (1.1%)	2 (1.1%)
21	0.279	169 (91.8%)	14 (7.6%)	--	1 (0.5%)

Note. Bolded cells indicate the best performing items, determined by the discrimination indices.

Empty cells indicate that no participants selected that particular response option

¹Item 1 was a true reasoning item.

Table 2. CRT-GO Inter-item Correlations

	CRT-GO 4	CRT-GO 7	CRT-GO 12	CRT-GO 13	CRT-GO 15	CRT-GO 19	CRT-GO 21
CRT-GO 4	1.00						
CRT-GO 7	0.996	1.00					
CRT-GO 12	0.162	0.21	1.00				
CRT-GO 13	0.142	0.12	0.165	1.000			
CRT-GO 15	0.167	0.065	0.187	0.008	1.00		
CRT-GO 19	-0.003	0.150	0.105	0.175	0.101	1.00	
CRT-GO 21	0.103	0.144	0.207	0.156	0.035	0.188	1.00

Table 3. Correlation Matrix of All Variables

	CRT- GO	IQ2	IQ3	GSE ¹	PGO ²	LGO ²	LGO ³	PPGO ³	PAGO ³	LAGO ⁴	LPGO ⁴	PAGO ⁴	PPGO ⁴	Task SE @ round quit	Round Quit (criterion)
CRT-GO	1.00														
IQ2	-0.141	1.00													
IQ3	0.141	0.669**	1.00												
GSE ¹	0.091	-0.288**	0.353**	1.00											
<i>Two-factor GO measure</i>															
PGO ²	0.075	-0.104*	0.101	0.045	1.00										
LGO ²	0.003	-0.437**	0.363**	.447**	0.090	1.00									
<i>Three-factor GO measure</i>															
LGO ³	0.051	-0.336**	0.376**	.485**	0.063	.794**	1.00								
PPGO ³	-0.041	0.014	0.013	.185*	.385**	.171*	.183*	1.00							
PAGO ³	0.007	0.085	-0.106	-0.139	.438**	-.203**	-.214**	.356**	1.00						
<i>Four-factor GO measure</i>															
LAGO ⁴	0.030	-0.205**	0.066	0.011	.299**	0.016	0.030	.302**	.505**	1.00					
LPGO ⁴	0.000	-0.373**	0.387**	.426**	0.052	.707**	.749**	0.098	-.250**	0.063	1.00				
PAGO ⁴	0.142	-0.025	-0.043	0.142	.457**	0.081	0.062	.773**	.403**	.402**	0.045	1.000			
PPGO ⁴	0.106	-0.056	-0.039	-0.033	.454**	-.162*	-.192*	.383**	.708**	.572**	-0.131	.498**	1.000		
Task SE @ round quit	0.028	-0.069	-0.012	-0.090	-0.112	-0.147	-0.129	-0.275**	-0.204*	-0.082	-0.106	-0.262**	-0.095	1.000	
Round Quit (criterion)	-0.111	0.145*	-0.134	0.083	-0.007	0.124	.151 *	0.060	-0.104	0.080	.206 **	0.028	-0.045	0.046	1.000

*Correlation is significant at the .05 level

**Correlation is significant at .01 level

¹Items are from the Chen, Gully, and Eden (2001) general self-efficacy measure.

²Items are from the Button, Matheiu, and Zajac (1996) two-factor goal orientation measure.

³Items are from the VandeWalle (1997) three-factor goal orientation measure.

⁴Items are from the Baranik, Barron, and Finney (2007) four-factor goal orientation measure.