

## ABSTRACT

### PREDICTING OPTIMAL EXPERIENCE: EXAMINING FLOW FROM THE PERSPECTIVE OF MOTIVATIONAL INTENSITY THEORY

By Aaron J. Bagley

The present research explores the relationship between Csikszentmihalyi's theory of optimal experience, or flow, (Csikszentmihalyi, 1990) and Brehm's integrated model of motivational intensity theory (Brehm & Self, 1989; Wright, 1998). Flow is defined as a state of intense focus, enjoyment, and lack of self-awareness that occurs when a person's ability for a given task is able to meet the demands of the task (Csikszentmihalyi, 1990; Jackson & Marsh, 1996). The integrated model of motivational intensity theory (Wright, 1998) posits that energization is a function of difficulty and ability. To date, there has been no empirical test examining the relationship between ability and difficulty in the flow engagement model. Thus, the present study tests the hypothesis that the flow experience is governed by the same energy conservation laws governing energization. Using methodology adopted from Wright and Dill (1993), this study experimentally manipulated perceived ability (poor versus excellent perceived ability) and perceived task difficulty (unknown, easy, versus difficult) in a 2x3 factorial design. It was predicted that participants in the poor-ability easy and unknown task difficulty conditions would report greater flow and would energize more than participants in the difficult condition. It was also predicted that participants in the excellent-ability unknown and difficult conditions would report greater flow and energize more than participants in the easy condition. The manipulation checks suggest that both manipulations of perceived ability and perceived task difficulty were successful. Nevertheless, this study was unable to replicate previous findings that suggest energization is the function of perceived ability and perceived task difficulty. One explanation is that, unlike prior work on intensity theory, nearly all of the measures were assessed during task performance. Consequently, this may have afforded participants the opportunity to reassess the difficulty of the task. Importantly, this study found that perceived ability, one's perception of task competency, accounts for variations in both the flow and energization measures. It was also found that positive affect captures and predicts composite flow and autotelic scale scores. These findings can be useful for flow researchers looking for alternative measures of flow, while also laying the groundwork for future experimental research attempting to predict the flow experience.

Predicting Optimal Experience:

Examining Flow from the Perspective of Motivational Intensity Theory

by

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## Introduction

The current study had two main goals. First, replicate work by previous researchers exploring motivational intensity theory (Wright & Dill, 1993; Kukla, 1974). Second, use intensity theory to predict optimal experience, or flow, (Csikszentmihalyi, 1990). This thesis begins with an introduction to intensity theory and its recent conceptualization as an integrated model (Wright, 1998). This is followed by an examination of optimal experience, its correlates, and how these two experimental paradigms are fused in the current experimental study.

### Brehm's Motivational Intensity Theory

Brehm's motivational intensity theory (Brehm, Wright, Solomon, Silka, & Greenberg, 1983; Brehm & Self, 1989) differentiates between actual and potential motivation. *Potential motivation* represents the total amount of energy an individual would be willing to mobilize were it necessary or useful to do so (Wright & Brehm 1989). A list of internal states determine the degree of potential motivation: need, incentive value, the probability that successful completion of the goal or task will fulfill the need or incentive, etc. (Brehm & Self, 1989, Wright & Brehm, 1989). Several researchers refer to potential motivation, the amalgamation of all possible internal states, as the *importance* of the goal (Silvia, McCord, & Gendolla 2010; Wright, 2016). Potential motivation justifies and sets an upper limit on energization (Brehm & Self, 1989).

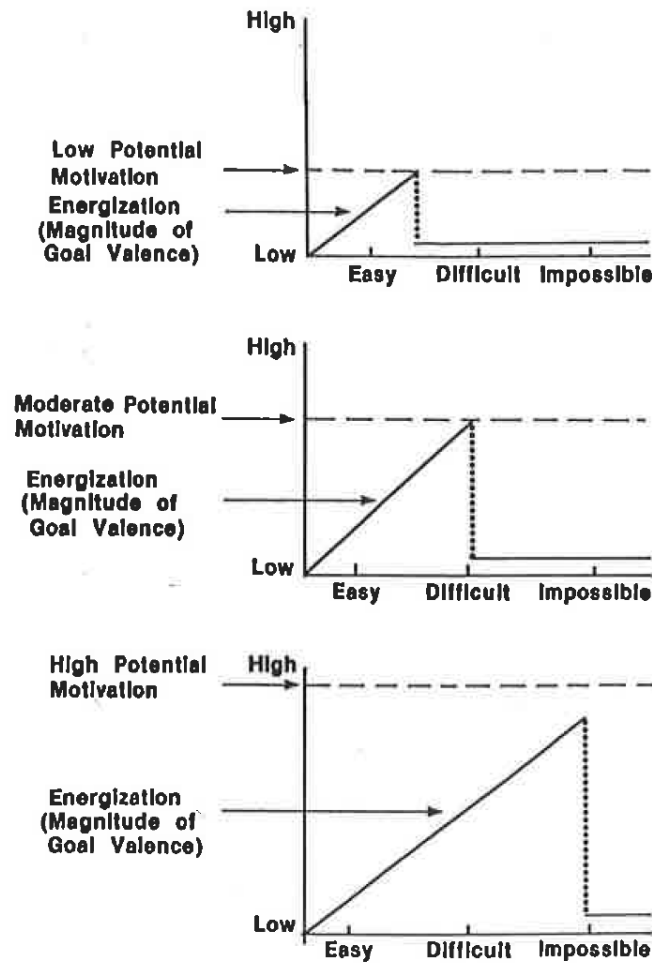
*Actual motivation* (i.e., energization) results from the interaction of the magnitude of potential motivation and the degree of difficulty inherent in the task (Brehm & Self, 1989). Energization is actual effort: it is justified by the magnitude of potential motivation and determined by the degree of difficulty inherent in the instrumental behavior necessary for the successful completion of the goal or task (Silvia, McCord, and Gendolla, 2010). Only outcomes that are “perceived as difficult, possible, and worthwhile” (Wright & Brehm, 1989, p. 169) produce large degrees of energization. A unique aspect of the energization model is that it assumes that energy is a costly bodily resource. Thus, energization only occurs to the extent required by the instrumental behavior necessary to satisfy the motive (Brehm & Self, 1989; Silvia et al., 2010).

To illustrate the difference between potential and actual motivation, an example is presented based on one originally presented by Wright and Brehm (1989). Imagine a famished individual who, late at night, would need to travel 50 miles for food. Despite their hunger, the distance is too far to travel and they resign themselves to wait until morning for a local breakfast establishment to open. Here, potential motivation is high (the individual is hungry), but because the distance is too great, energization (actual motivation) is low.

Imagine the situation again, but this time the individual only needs to travel one mile instead of 50. Here, potential motivation remains high, but now energization is also high because acquiring food is possible and worthwhile.

The engagement graph (Figure 1) illustrates how potential motivation and instrumental task difficulty interact to produce energization. The top and middle graph of

the figure demonstrate that energization increases directly with task difficulty until the goal is completed at the level of potential motivation (Wright & Brehm, 1989). However, in some cases the task is too difficult (bottom graph). Actual motivation increases directly with task difficulty until the task becomes beyond what the individual is capable of performing, or when potential motivation no longer justifies effort.



*Figure 1.* Motivational arousal under three levels of potential motivation. Reprinted from: *Goal Concepts in Personality and Social Psychology* (p. 171), by R. A. Wright, & J. W. Brehm, 1989, Hillsdale, NJ: Erlbaum.

### **Goal Attractiveness and Effort**

Rated attractiveness of an incentive is a classic measure of energization in motivational intensity research. Brehm et al. (1983) first proposed and found that the attractiveness of a goal is a function of the magnitude of energy expenditure necessitated

by the difficulty of instrumental behavior in achieving said goal. Goals perceived as difficult or ambiguous, yet worthwhile, produce higher degrees of energization and higher ratings of goal attractiveness compared to goals perceived as easy, too difficult, impossible, or not worth the effort (Brehm et al., 1983; Wright & Brehm, 1989; Wright & Dill, 1993, Silvia et al., 2010; Wright, 2016).

The Solomon and Silka experiment (reported in Brehm et al., 1983) was one of the first to show the quadratic function of goal attractiveness under varying levels of perceived task difficulty. Participants in the study were informed that their assistance was needed to standardize a new mathematical testing procedure. They were informed that if they successfully completed the math test they would earn a \$1 incentive. Conditions in the experiment varied according to the difficulty of the math problems, and included: high school freshman (easy), second year college (moderately difficult), and PhD level (impossible). After being allowed to preview the questions, participants gave an anticipatory rating of the attractiveness of the \$1 incentive.

Solomon and Silka found that participants' ratings of perceived task difficulty and the degree of effort needed for success increased in a linear function from the easy to the impossible condition (as reported in Brehm et al., 1983). Importantly, participants in the easy and impossible conditions rated the goal as less attractive than did participants in the difficult condition. It was concluded that perceived task difficulty determined *anticipated* energization measured as the attractiveness of the incentive.

Ratings of incentive attractiveness were used because self-report measures of individual effort (i.e., Thayer, 1967; 1978) have been shown to be unreliable (Brehm &

Self, 1989). Several studies failed to find correlations between physiological markers of effort (i.e., systolic blood pressure) and judgments of arousal (Elliot, 1969; Houston, 1972; Manuck, Harvey, Lechleiter, & Neal, 1978). Thus, more recent investigations of intensity theory (see Wright & Dill, 1993) have used physiological markers in combination with ratings of incentive attractiveness.

### **Perceived Task Difficulty**

Task difficulty ultimately determines the intensity of energization (Brehm et al., 1989). People try harder, and exert more energy, when the goal of the task is more challenging (Wright, 2016; Brehm et al., 1983; Wright & Brehm, 1989; Kukla, 1974; Wright & Dill, 1993). For example, it requires less energy to move a pen across a desk than a cement brick. When the difficulty of the task is unknown, participants exert the maximum effort possible as justified by potential motivation (Wright & Brehm, 1989; Brehm & Self, 1989; Sylvia et al., 2010).

Evidence that participants mobilize the maximum amount of energy possible when faced with a task of unknown or ambiguous difficulty was reported in Wright and Brehm (1989). Male college students were invited into the laboratory and falsely informed that they would be competing against a rival male participant for the opportunity to work with a female student. The loser would be assigned to work on a banal card-sorting task. Male participants listened to an ostensibly real audio recording of a conversation between the rival male and the target female student. In the *easy* condition, the rival male presented himself poorly and participants were led to believe

that it would be easy for them to perform minimally better than the rival. In the *difficult* condition, the rival male gave a legitimate presentation. In the *impossible* condition, male participants were informed that groups had been predetermined and there was nothing they could say or do to avoid having to work on the card-sorting task. Finally, in the *unknown difficulty* condition, male participants were not allowed to listen to the recording between the rival male and target female. Wright and Brehm (1989) found the predicted results: participants in the unknown and difficult condition rated the woman more positively, indicated a stronger desire to work with her, and rated the card-sorting task as more adverse than did participants in the easy and impossible conditions.

It should be noted that effort in a difficult task is not due to threat of failure (Kreibig, Gendolla, & Scherer, 2012). Difficult tasks are indeed perceived to be more challenging, but not more threatening. When a task is perceived as impossible, people withhold effort because they are energy-conservative. Also, effort intensity is not the same as achievement (Silvia et al., 2012). Effort refers to the mobilization of energy, whereas achievement is a much broader construct incorporating several factors, including “ability, expertise, effort, and task-specific strategies” (Kreibig et al., 2012, p. 369).

Finally, an alternative explanation for why people exert effort could be an individual’s approach motivation. Essentially, exerting because there is the perception of some worthwhile benefit, other than a tangible incentive. If true, this would suggest a motivational mechanism similar to the antecedents of the flow experience which involves a strong approach motivation.

### **Perceived Ability**

Several contemporary researchers have urged for the incorporation of ability into Brehm's motivational intensity theory (Wright, 1998; Wright & Kirby, 2001; Gendolla & Wright, 2005). This "new" model of motivational intensity theory is known as the *integrative view* (Wright, 1998). The integrative view of intensity theory follows the assumption that, holding difficulty and potential motivation of a task constant, those with high perceived ability should energize to a lesser degree than those with low perceived ability.

For example, imagine two people who only vary in swimming ability were asked to swim across a narrow lake for \$100. Because the only difference between them is their perception of their swimming ability, the low-ability individual should feel less capable, perceive the task as more difficult, and ultimately exert more effort to earn the incentive. To this extent, ability can be conceptualized as a kind of currency and as having a kind of "buying-power". Although the low- and high-ability swimmers have the same number of *ability tokens*, the low-ability swimmer values *ability tokens* less than the high-ability swimmer (Wright, 1998). In Figure 2, the high-ability swimmer is represented by the bottom line, while the low-ability swimmer is represented by the top line.

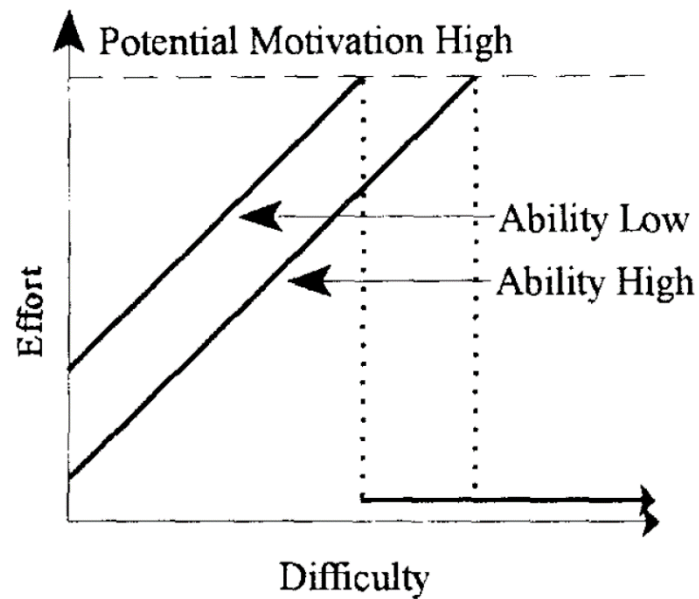


Figure 2. Effort-Difficulty Relation at Two Levels of Potential Motivation for Individuals with Perceived Low- and High-Ability. Reprinted from: *The Psychology of Action: Linking Cognition and Motivation to Behavior* (p. 202), by R. A. Wright, 1998, New York, NY: Guilford

Assuming the integrated model presented in Figure 2 is correct, there follows four implications. First, as long as both low- and high-ability individuals perceive the task as possible and worthwhile, low-ability should energize more (Wright, 1998). Second, compared to individuals with high-ability, individuals with low-ability should disengage at a lower level of objective task difficulty (Wright, 1998). Third, high-ability individuals should eventually disengage if task difficulty increases beyond what they are capable of (Wright, 1998). Finally, because potential motivation determines when task

disengagement occurs, it should *moderate* the relationship between ability and energization (Wright, 1998).

There is no reason why two individuals should differ in their level of potential motivation, unless being capable within a particular domain is related to their self-identity (Wright, 1998). Essentially, it is expected that a professional swimmer would derive greater meaning (i.e., greater intrinsic value) from a 1<sup>st</sup> place finish in a 100-yard sprint than an amateur.

In support of this discussion, Kukla (1974) predicted and found that in a performance-based math task described as either easy or moderately difficult, differences in performance were due to differences in individuals' perceptions of their own ability. The results of his study (Table 1) reveal no statistically significant main effects, however there was a significant interaction between ability and difficulty on performance. In addition, the quadratic pattern of participants' performance scores reflects the integrated model of intensity theory, and reinforces the notion that energy is a costly bodily resource. Individuals mobilize effort only to the extent that the task is perceived as possible and worthwhile (Brehm & Self, 1989).

*Table 1: Mean Number of Correctly Solved Math Problems*

|           | Low-ability | Intermediate-ability | High-ability |
|-----------|-------------|----------------------|--------------|
| Easy      | 125.0       | 117.8                | 98.3         |
| Difficult | 88.2        | 94.0                 | 127.1        |

Note: Table adapted from Kukla (1974), p. 379.

Wright and Dill (1993) tested the effects of perceived ability and perceived task difficulty on cardiovascular reactivity. Cardiovascular measures, specifically systolic blood pressure, are valid indicators of effort (Wright & Dill, 1993; Brehm et al., 1983; Wright & Brehm, 1989). The researchers predicted that low-ability participants, compared to high-ability participants, would mobilize more energy in a task that was perceived to be easy, and less energy in a task that was perceived to be difficult.

Because the current study was based on methods used by Wright and Dill (1993), the procedure is discussed here in greater detail than what is traditional. First, a cover story informed participants that they could win one of two incentives if their performance in an upcoming *performance* task met the objective standard. Then, all participants completed a practice task that allowed the researchers to provide feedback to participants regarding their ability. Both the practice and performance tasks involved circling the letter “E” as many times as it appeared across several sheets of paper.

Participants were given 1 minute to work on the practice task. The task was then scored by the experimenter, and participants were provided false feedback regarding their performance on the practice task. In the *low-ability condition*, participants were told that they had performed poorly, in the bottom 12<sup>th</sup> percentile. Participants in the *high-ability condition* received feedback that they performed excellent, in the upper 87<sup>th</sup> percentile.

Participants were given 1 minute to work on the performance task. Prior to the task, participants in the *easy condition* were informed that in order to win either incentive, they must score at or better than the bottom 15<sup>th</sup> percentile of all other participants. Participants in the *hard condition* were informed that they must score at or

above the upper 85<sup>th</sup> percentile. In addition, an anticipatory cardiovascular measure was taken, and participants were given a questionnaire packet containing several dependent measures. Participants started the performance task after completing the packet. A second cardiovascular measure was taken *during* the performance task.

Table 2: *Participants' Perceived Ability Ratings (Wright & Dill, 1993)*

| Feedback                         | Task Standard |           |
|----------------------------------|---------------|-----------|
|                                  | Easy          | Difficult |
| <b>Poor-ability</b>              |               |           |
| Ability Ratings                  | 5.20          | 4.71      |
| Required Performance             | 8.53          | 12.21     |
| Estimated Attractiveness Ratings | 6.25          | 6.25      |
| <b>Excellent-ability</b>         |               |           |
| Ability Ratings                  | 10.36         | 11.20     |
| Required Performance             | 4.93          | 12.87     |
| Estimated Attractiveness Ratings | 5.60          | 8.90      |

*Note:* Results taken from Wright & Dill, 1993. Attractiveness ratings were not explicitly provided, and were thus interpreted from line-graph.

The results (Table 2) revealed a main effect of perceived ability. Participants in the poor-ability condition rated their ability lower than did participants in the excellent-ability condition across both difficulty standards,  $F(1, 51) = 101.60, p < .001$ . There was also an effect of perceived task difficulty: participants rated their performance required for success significantly higher in the difficult condition than in the easy condition,  $F(1, 54) = 72.76, p < .001$ . Analysis of the ratings of incentive attractiveness revealed a main effect of perceived task difficulty,  $F(1, 54) = 4.63, p < .04$ , qualified by a perceived

ability by perceived task difficulty interaction,  $F(1, 54) = 4.93, p < .03$ . No significant differences were found between groups and their performance on the task ( $ps > .09$ ). A major implication of the study is that it showed that energization occurs both *prior to* and is *sustained throughout* effortful goal pursuit.

### **Optimal Experience**

Flow, or optimal experience, is a state of intense focus, enjoyment, and lack of self-awareness (Csikszentmihalyi, 1990; Jackson & Marsh, 1996). Flow occurs during periods of intense focus, *when a person's ability or skill level meets task demands* (Csikszentmihalyi, 1990; Hoffman & Novak, 1996; Jackson & Marsh, 1996; Ullén et al., 2012). The end result of flow is the *autotelic experience* (Jackson & Marsh, 1996). Csikszentmihalyi originally coined the term, autotelic, to refer to people who habitually engage in tasks for their own intrinsic benefit (Hoffman & Novak, 1996). However, it is better empirically understood as the sense of enjoyment and deep satisfaction that accompanies engagement in an intrinsically rewarding task (Jackson & Marsh, 1996).

Research in the field of consumer psychology (Hoffman & Novak, 1996) has identified two primary antecedents of flow: challenge/skill balance and focused attention. Both antecedents are necessary preconditions that enable the flow experience (Hoffman & Novak, 1996). Perceived challenge/skill balance refers to Csikszentmihalyi's first dimension of flow (1990). Flow occurs only when an individual perceives a balance between task challenge and their ability (Hoffman & Novak, 1996; Csikszentmihalyi,

1990; Jackson & Marsh, 1996). Focused attention refers to the process of attending to a narrow range of stimuli (Hoffman & Novak, 1996).

Flow is positively correlated with several constructs (Jackson, Kimiecik, Ford, & Marsh, 1998; Jackson, Thomas, Marsh, & Smethurst, 2001; Ullén et al., 2012) such as perceived ability, intrinsic goal motivators, self-concept, and the Big Five factor consciousness. Flow is negatively associated with anxiety and neuroticism. No relationships have been found between flow and intelligence or extrinsic motivation. Multivariate regression analysis by Jackson and Marsh (1996) has revealed that perceived sport ability was the variable most substantially correlated with both trait and state flow as the global variable level ( $r^2 = .46, p < .01$ , two-tailed).

The propensity to experience flow is equal for all people (Csikszentmihalyi, 1990). It is not limited to certain nationalities or demographic groups (e.g., socioeconomic status, gender, or age). There are congruencies in what all people report about their flow experience (Csikszentmihalyi, 1990). When people report on their flow experience, they typically describe one of the eight dimensions, or characteristics, of the flow experience (Csikszentmihalyi, 1990; Jackson & Marsh, 1996). The nine dimensions of the flow experience are summarized below, the names of which have been kept congruent with Jackson and Marsh (1996).

#### 1. Challenge/Skill Balance:

A congruency is perceived between situation demands of the task and one's skill in meeting the challenge. A person is working at a high level and is highly

focused. Jackson and Marsh (1996) propose that those higher in perceived ability are more likely to perceive a balance between task challenge and their skill.

2. Action-Awareness Merging:

There is total concentration in the task such that actions become spontaneous or automatic. There is nothing separating the task at hand from the self.

3. Clear Goals:

The task exhibits goals that are clear and explicit. The individual knows what must be done and how to accomplish it.

4. Unambiguous Feedback:

The individual receives feedback from the task or from their actions that they are succeeding.

5. Concentration of Task at Hand:

Total and focused attention is directed at the task.

6. Sense of control

The individual feels or perceives control over his actions and thoughts. Ironically, the individual must not actually have control but rather merely perceive it.

7. Loss of self-consciousness

Awareness of the self dissipates as concentrating moves away from self-identity.

The individual no longer thinks about how they are being perceived by those around them, and they no longer think of themselves in relation to others.

8. Transformation of Time

Time is altered, either by speeding up or slowing down.

## 9. Autotelic Experience

The end result of flow is a self-rewarding experience, characterized best through statements such as, “I enjoyed working on the task.”

## OVERVIEW OF THE PROPOSED STUDY AND HYPOTHESES

The purpose of the present research is to test whether the occurrence of optimal experience can be predicted by the task performer's perceived ability and perceived task difficulty. The integrated model of motivational intensity theory (Wright, 1998) is used as a framework to test the effects of perceived ability and perceived task difficulty on energization.

### **Hypothesis 1**

In line with research by motivational intensity theorists, it was hypothesized that ratings of goal attractiveness would be determined by an interaction between perceived ability and perceived task difficulty (Table 3). A linear relationship was expected at Time 1, such that participants in the poor-ability easy and unknown conditions would report significantly higher ratings of incentive attractiveness compared with participants in the difficult condition. Also at Time 1, a quadratic relationship was expected for participants in the excellent-ability condition. It was predicted that the participants in the excellent-ability easy condition would rate the attractiveness of the incentive significantly lower than participants in the unknown and difficult conditions.

As participants work through Task 2, it was postulated that the intrinsic nature of the task (e.g., a desire to do well or enjoyment of the task) would become more prominent than the desire for material gain. Therefore, it was expected that the linear and quadratic relationship found at Time 1 would dissipate at Time 2.

Table 3:  
*Predictions for Hypotheses 1 and 2*

|                   |           | Perceived Task Difficulty |      |      |
|-------------------|-----------|---------------------------|------|------|
|                   |           | Unknown                   | Easy | Hard |
| Perceived Ability | Poor      | High                      | High | Low  |
|                   | Excellent | High                      | Low  | High |

## Hypothesis 2

In accordance with the flow literature (Csikszentmihalyi, 1990; Jackson & Marsh, 1996), it was hypothesized that flow intensity would vary as a function of perceived task difficulty and perceived ability. Therefore, it was predicted that ratings of state flow would be highest for participants in the poor-ability easy and unknown condition (Table 3). It was also predicted that ratings of state flow would be highest for participants in the excellent-ability unknown and difficult conditions.

## METHOD

### Participants

One hundred and thirty-one college students from the University of Wisconsin Oshkosh were recruited for this experiment. Participants were recruited through the University's online recruitment system, and participated in exchange for course credit in their introductory psychology course. Participants were predominantly Caucasian ( $n = 98$ , 75%), in their early twenties ( $M = 19.56$ ,  $SD = 2.81$ ), and half were women ( $n = 74$ , 56.5%). Participants reported not having much experience with both word searches ( $M = 5.26$ ,  $SD = 1.85$ ) and *Seek-and-Find* puzzles ( $M = 5.15$ ,  $SD = 1.88$ ).

### Experimental Design

Perceived ability and perceived task difficulty were manipulated in a 2 (poor or excellent ability) x 3 (unknown, easy, or difficult task difficulty) factorial design. Potential motivation was held constant with a \$5.00 gift card incentive. The study was comprised of two phases. In phase one participants read a cover story, completed a practice task (Task 1), and were provided false feedback regarding their performance (ability manipulation). In phase two, participants were given false information regarding the difficulty of an upcoming task (difficulty manipulation), worked on the performance task (Task 2), and completed a questionnaire packet containing the dependent measures.

### **Cover Story**

The cover story describes the present investigation as being an examination of the ostensibly real phenomenon “Visual Scanning Ability”. Visual Scanning Ability, or VSA, was presented as a recent scientific finding in which there exists a relationship between the ability to find words in array of letters and the ability to find specific items in a cluster of objects. Participants were told that those who are “good at identifying words” were “also good at identifying hidden objects” and conversely, those who are not good at finding words also do poorly on tasks requiring them to find hidden objects or patterns. Finally, the cover story led participants to believe that they could win the \$5.00 gift card if they succeed in the upcoming performance task (Task 2).

### **Perceived Ability**

In phase one, participants were given positive or negative feedback regarding their performance on Task 1. Participants in the *poor-ability condition* were informed that they have “poor” visual scanning ability and that they scored in the “bottom 12<sup>th</sup> percentile.” Participants in the *excellent-ability condition* were informed that they have “excellent” visual scanning ability and scored in the “upper 87<sup>th</sup> percentile”.

### **Perceived Difficulty**

In phase two, participants were told that the upcoming performance task was either easy or difficult. Participants in the unknown condition were given no information about the difficulty of Task 2, and were simply told to “circle as many objects as [they]

can.” Participants in the easy condition were also told to find as many objects as they can, but also that “85% of all students who participated in this study found enough objects to win the prize.” Participants in the difficult condition were told that only “15%” of all students succeeded.

### **Procedure**

The experimental procedure was adapted from Wright and Dill (1993). Experimental blocks were created ahead of time by someone other than the experimenter. The experimenter remained blind to participant’s experimental condition throughout the study. Participants were individually invited to sit at a desk in a small work room upon which lay an informed consent document (Appendix A) and a flexible desk lamp with its light focused on a Starbucks gift card that served as the incentive. Once consent was obtained, the experimenter provided the participant with a manila folder labeled “STUDY INSTRUCTIONS” which contained the cover story (Appendix B), and then left the room.

Participants communicated having finished reading the instructions by opening the door of the work room. The experimenter then returned and provide the participant with another manila folder labeled “TASK 1 INSTRUCTIONS” (Appendix C) and left the room. Task 1 instructions informed participants that as a “basic” test of their visual scanning ability, they would be working on a practice word search. Participants were informed that they would receive feedback regarding their performance on the practice word search, that this feedback provides an accurate assessment of their VSA, and an

accurate indication as to how well they could expect to do on Task 2. All participants again opened the door when they were ready to continue to Task 1.

Participants were given three minutes to work on Task 1 (Appendix D). Time was manually kept on the experimenter's cell phone after he left the work room. The word search was created using [www.discoveryeducation.com](http://www.discoveryeducation.com), and was both fifteen letters wide and high and contained twenty hidden words. The words were randomly generated using the website [www.randomnumbergenerator.com](http://www.randomnumbergenerator.com). During piloting, it was feared that participants were performing too well on Task 1, and consequently four more randomly generated words were added only to the word bank to increase its objective difficulty.

After three minutes the experimenter returned to the room and collected Task 1, then left again to ostensibly score the document. The experimenter waited 90 seconds then returned to the room and handed the participant another manila envelope containing their feedback, the word search score document (Appendix E). The participant was informed to once again open the door when they were ready to continue.

When the participant was ready to continue, they were given the instructions for Task 2 (Appendices F, G, and H). These instructions informed participants that have twenty minutes to find and circle as many objects in a *Seek-and-Find* (Appendix S) packet as they can. A *Seek-and-Find* is a children's puzzle book similar to a *Where's Waldo* or an *ISpy*. Participants were instructed to work page-by-page through the booklet and to circle every object they found. Although the *Seek-and-Find* packet was the same for each participant, the cover sheet for each packet varied by difficulty condition (Appendices J, K, and L).

Participants worked on Task 2 for fifteen minutes before the experimenter returned and requested that they “pause” their work in order to complete a questionnaire packet related to the study. The questionnaire packet contained the dependent measures (described below), several manipulation checks (Appendix Q), and demographic information (Appendix R).

Once participants completed the questionnaire packet, the experiment was ended. All participants were thoroughly debriefed, and were asked if they would like to participate in a drawing to win a \$50.00 pre-paid Visa gift card in lieu of not being able to actually win the Starbucks gift card.

## **Dependent Measures**

**Ratings of incentive attractiveness.** Two ratings of incentive attractiveness (see Appendix J, K, L, and P) serve as the primary measure of energization for the analysis of Hypothesis 1. Participants rated the attractiveness of a \$5.00 gift card at Time 1 (prior to starting Task 2) and as they completed questionnaire packet (Time 2). Ratings occurred on a scale ranging from 1 (“Not Attractive”) to 15 (“Very Attractive”). These ratings provide the best, non-physiological, indication of the degree of anticipatory energization and actual energization occurring in the individual.

**Actual task performance.** Actual Task 2 performance (i.e., the number of objects found in Task 2) provides an additional indicator of engagement. It is predicted that the number of objects found should follow the same pattern of results as the primary engagement measure, and that the number of objects found should correlate with ratings

of incentive attractiveness. If so, this would provide evidence that the primary energization measure does in fact measure effort.

**Flow.** The 36-item Flow State Scale (Appendix N) developed by Jackson and Marsh (1996) is the primary measure of flow for the analysis of Hypothesis 2. The full scale is comprised of nine factors each corresponding to one of the nine flow dimensions (Csikszentmihalyi, 1990; Jackson & Marsh., 1996). For this study, the number of factors were reduced to four (autotelic, concentration, control, and time), resulting in a sixteen item measure. These items were then reworded to reflect a flow *state* rather than a past experience. For analysis, a composite scale consisting of all sixteen items was created by adding the mean of each item ( $\alpha = .85$ ). Four sub-scales consisted only of items in their respective grouping: autotelic ( $\alpha = .88$ ), concentration ( $\alpha = .84$ ), control ( $\alpha = .88$ ), and time ( $\alpha = .66$ ).

Questions related to the autotelic experience were thought to best characterize the qualitative flow experience, and were presented first: “I really enjoy this experience,” “I loved the feeling of performance associated with this task,” “This experience makes me feel great,” and “I find this experience extremely rewarding”. Participants responded on a 5-point Likert scale ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”).

**Positive affect.** Developed by Miron et al. (2010), a 12-item assessment of positive affect (Appendix M) was used to measure participant’s mood. Participants were asked to rate on a 12-point scale ranging from 1 (“Not at all”) to 9 (“Extremely”), the extent to which they experienced a handful of emotions: active, energetic, happy,

competent, good mood, challenged, threatened, frustrated, relaxed, bored, tired, anxious, interested, and curious.

A composite positive affect scale score was computed by taking the average of eight emotions: happy, competent, good mood, active, energetic, reversed bored, reversed tired, and challenged ( $\alpha = .81$ ). Several sub-scales were also created. The emotions happy, competent, and good mood reflect Csikszentmihalyi's autotelic experience, and were used to create a *flow affect sub-scale* ( $\alpha = .88$ ). An *engagement sub-scale* was created, and comprised of the items active, energetic, bored (reversed scored), tired (reversed scored), and challenged ( $\alpha = .75$ ). Finally, a *threat sub-scale* was computed by using the average of threatened and frustrated ( $\alpha = .60$ ).

It was argued that these scales, particularly the flow affect and engagement affect sub-scales, would capture the qualitative *autotelic* experience as described by Csikszentmihalyi (1990). Consequently, it was predicted that participants' self-reported positive affect scores would follow the same linear and quadratic trends as the flow scores.

**Ratings of task attractiveness.** To assess whether participants valued doing well on Task 2, six questions measured task attractiveness: "How interesting is the current task to you?", "How fun the task is to you?", "To what extent do you want to succeed on the current task?", "To what extent is your performance on the task due to your personality or ability?" and "To what extent is your performance on the task due to the characteristics of the task?" The last two questions assessed whether participants' attention had switched

from a concern about one's own ability to the intrinsic characteristics of the task (Wicklund & Scheuer, 2014).

**Manipulation checks.** Four questions helped to ensure that the manipulations in the study were working as predicted (Appendix Q). First, "How difficult is the current task for you?" and "Keeping in mind that you have 5 minutes remaining, how confident are you that you will earn the prize?" captured participants' perception of the difficulty of Task 2. Responses were made on a 9-point Likert scale, with endpoints labeled "Easy" and "Difficult," and "Not Confident" and "Very Confident" respectively. Prior to starting Task 2, participants were also asked to rate how difficult they *expected* Task 2 to be on a 9-point Likert scale.

To assess buy-in of the ability manipulation, participants were asked to rate their own ability ("How would you rate your own visual scanning ability") on a scale from 1 ("Very Low") to 9 ("Very High"). In addition, participants were also asked to rate the perception of their performance on Task 1 ("How would you rate your own Task 1 performance?") on a scale from 1 ("Poor") to 9 ("Excellent").

**Demographic information.** The questionnaire packet concludes with five demographic information questions. Participants were asked to report their age ("What is your age?"), gender ("What is your gender?"), ethnicity ("What is your ethnicity?"), education ("What is your education level"), and college major ("What is your major"), and two additional questions measuring experience with the tasks used in the study. Specifically, participants were asked to rate on a scale from 1 ("Not at all") to 9 ("A lot of experience") how much experience they have had in completing books similar to a

*Seek-and-Find* and how much experience they have had doing word searches before participating in the study. It is predicted that experience with either task may act as a covariate, and thus confound the results of the study. Manipulation checks and demographic information both concluded the questionnaire packet.

### **Statistical Analysis**

Planned comparisons were conducted on ratings of incentive attractiveness and actual task performance (*Hypothesis 1*), flow and positive affect (*Hypothesis 2*), and task attractiveness (Table 4). The first comparison tested the linear predictions for poor-ability participants. The second comparison tested the quadratic effect for excellent-ability participants. A main effect of perceived ability and perceived task difficulty were also predicted (Table 5). Participants in the excellent-ability condition should indicate higher ability than participants in the poor-ability condition. Participants in the difficult and unknown conditions should rate the task as being more difficult than participants in the easy condition. Finally, analysis of main effects followed each planned contrast.

Table 4  
*Planned Comparison Predictions for the Dependent Variables*

| <b>Dependent Measure</b>        | <b>Condition</b>   |               |                  |                     |               |                  |
|---------------------------------|--------------------|---------------|------------------|---------------------|---------------|------------------|
|                                 | <i>Low-Ability</i> |               |                  | <i>High-Ability</i> |               |                  |
|                                 | <i>Unknown</i>     | <i>Easy</i>   | <i>Difficult</i> | <i>Unknown</i>      | <i>Easy</i>   | <i>Difficult</i> |
| <b>Positive Affect:</b>         | High (1)<br>0      | High (1)<br>0 | Low (-2)<br>0    | 0<br>High (1)       | 0<br>Low (-2) | 0<br>High (1)    |
| <b>Flow:</b>                    | High (1)<br>0      | High (1)<br>0 | Low (-2)<br>0    | 0<br>High (1)       | 0<br>Low (-2) | 0<br>High (1)    |
| <b>Actual Task Performance</b>  | High (1)<br>0      | High (1)<br>0 | Low (-2)<br>0    | 0<br>High (1)       | 0<br>Low (-2) |                  |
| <b>Incentive Attractiveness</b> |                    |               |                  |                     |               |                  |
| Time 1:                         |                    | High (1)<br>0 | Low (-2)<br>0    | 0<br>High (1)       | 0<br>Low (-2) | 0<br>High (1)    |
| Time 2                          |                    | (n/s)         |                  |                     | (n/s)         |                  |
| <b>Task Attractiveness</b>      | High (1)<br>0      | High (1)<br>0 | Low (-2)<br>0    | 0<br>High (1)       | 0<br>Low (-2) | 0<br>High (1)    |

Table 5  
*Panned Comparison Predictions for Mean Ratings of Perceived Ability and Perceived Task Difficulty*

| <b>Dependent Measure</b>   | <b>Condition</b>   |             |                  |                     |             |                  |
|----------------------------|--------------------|-------------|------------------|---------------------|-------------|------------------|
|                            | <i>Low-Ability</i> |             |                  | <i>High-Ability</i> |             |                  |
|                            | <i>Unknown</i>     | <i>Easy</i> | <i>Difficult</i> | <i>Unknown</i>      | <i>Easy</i> | <i>Difficult</i> |
| <b>Ability Ratings:</b>    | Low (-1)           | Low (-1)    | Low (-1)         | High (1)            | High (1)    | High (1)         |
| <b>Difficulty Ratings:</b> | High (1)           | Low (-2)    | High (1)         | High (1)            | Low (-2)    | High (1)         |

## RESULTS

In total, 138 participants were recruited to partake in an hour-long study. A final sample of 131 participants was obtained after excluding data from four participants who were given inconsistent information regarding the difficulty of Task 2 (due to human error when making the experimental blocks, these participants received instructions for Task 2 that had different information about the difficulty manipulation than what was found on the subsequent Task 2 packet). The data from one participant were removed because he/she did not understand the instructions for Task 2 and circled objects randomly. The data from two additional participants were removed due to experimenter error in the execution of the procedure. Thus, all analyses were performed on a final sample of 131 participants.

No participant was missing more than 20% of their data, and no variable was missing more than 5% its data. Three participants skipped three questions that appear on the cover sheet of Task 2. Two questions are manipulation checks. The first check asked participants to restate the feedback they received in regards to their performance on Task 1 (“Based off your score on Task 1, you have \_\_\_\_\_ Visual Scanning Ability”), while the second asked participants to report how difficult they expect Task 2 to be on a scale from 1 (“Easy”) to 9 (“Extremely Difficult”). The third question was the anticipatory energization measure, and missing data for this dependent variable were not estimated in order to retain and examine the most accurate before- and after-effects of this experiment on energization. However, five questions from the Flow State Scale were

each missing one value from five different participants. These missing values were replaced using regression, specifically SPSS's *Linear Trend at Point* function.

### **Review of Hypotheses and Predictions**

Data were analyzed according to the specific hypotheses and predictions (see *Overview of Hypotheses, Dependent Measures*, and Tables 4 and 5 for a review).

Hypothesis 1 predicted that participants' ratings of incentive attractiveness would vary as a function of both perceived task difficulty and perceived ability. A linear relationship was predicted, such that participants in the poor-ability unknown and easy conditions would report significantly higher levels of goal attractiveness than participants in the excellent-ability difficult condition. A quadratic relationship was also predicted such that participants in the excellent-ability unknown and difficult conditions would report significantly greater levels of goal attractiveness than participant in the easy condition.

Hypothesis 2 predicted that flow would vary as a function of ability and difficulty. As before, a linear relationship was predicted for the poor-ability conditions: participants in the unknown and easy condition were expected to report significantly greater levels of flow than participants in the difficult condition. A quadratic relationship was predicted in the excellent ability conditions: participates in the unknown and difficult conditions were expected to report significantly greater levels of flow than participants in the easy condition.

Several additional predictions were made for the additional flow and energization measures. First, it was predicted that the number of objects found on Task 2 (i.e.,

participant's actual performance) would reflect the linear and quadratic pattern described, and correlate with and predict ratings of incentive attractiveness. Second, positive affect scores (composite positive affect, and the sub-scales) were also expected to follow the linear and quadratic patterns described. Finally, it was predicted that composite affect scores would correlate with composite flow scores, and that positive and engagement affect would predict scores on the autotelic subscale. Third, ratings of *task* attractiveness for questions related to interest, fun, and desire for success were expected to follow the linear and quadratic pattern described above.

### **Manipulation Checks**

Prior to examining both Hypothesis 1 and 2, manipulation checks were analyzed to provide context during subsequent analyses (see Table 6 for *M* and *SD*). Beginning with an evaluation of the ability manipulation, a 2 (poor- and excellent-ability) by 3 (unknown, easy, and difficult task difficulty) ANOVA examine differences in participants' ratings of their own Visual Scanning Ability (VSA) and produced a significant model,  $F(5, 125) = 16.58, p < .001, \eta^2 = .40$ . As expected, only ability accounted for a significant proportion of the variance in participants' ratings of their VSA ratings,  $F(1, 125) = 79.15, p < .001, \eta^2 = .39$ . Planned contrast examining participants' ratings of their Visual Scanning Ability (poor-ability versus excellent-ability) indicated that, overall, participants did perceive the feedback as intended: poor-ability participants rated their VSA lower than did participants in the excellent-ability condition,  $t(125) = -8.90, p < .001, d = 0.75$ .

Participants' confidence (in earning the incentive) and Task 1 performance ratings provided an additional indication of the effectiveness of the ability manipulation. A 2 (ability) by 3 (difficulty) ANOVA revealed statistical differences in participants' confidence ratings,  $F(5, 125) = 4.09, p = .002, \eta^2 = .14$ . Perceived ability accounted for a significant proportion of the variance in participants' confidence scores,  $F(1, 125) = 12.38, p = .001, \eta^2 = .09$ . Planned contrasts comparing poor- and excellent-ability participants revealed that participants in the excellent-ability condition rated their confidence in earning the incentive as greater than did participants in the poor-ability condition,  $t(129) = -3.46, p = .001, d = .60$ .

Table 6  
*Manipulation Checks as a Function of Perceived Ability and Perceived Task Difficulty Manipulations*

| Dependent Measure        | Poor                         |                             |                              |                              | Excellent                   |                             |                              |                              |
|--------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|
|                          | Unknown<br>1                 | Easy<br>2                   | Difficult<br>3               | Total                        | Unknown<br>4                | Easy<br>5                   | Difficult<br>6               | Total                        |
| <b>VSA (Ability)</b>     | 4.17 <sub>a</sub><br>(1.87)  | 3.84 <sub>a</sub><br>(1.77) | 4.78 <sub>a</sub><br>(1.44)  | <b>4.26</b><br><b>(1.69)</b> | 6.86 <sub>b</sub><br>(1.39) | 6.83 <sub>b</sub><br>(1.58) | 6.55 <sub>b</sub><br>(1.43)  | <b>6.75</b><br><b>(4.40)</b> |
| <b>Task 2 Difficulty</b> | 5.96<br>(1.58)               | 5.68<br>(1.53)              | 5.96<br>(1.49)               | <b>5.87</b><br><b>(1.53)</b> | 5.45<br>(1.90)              | 5.46<br>(1.56)              | 6.20<br>(1.44)               | <b>5.70</b><br><b>(1.63)</b> |
| <b>Impossible</b>        | 3.65<br>(1.92)               | 3.63<br>(2.11)              | 3.78<br>(1.83)               | <b>3.69</b><br><b>(1.95)</b> | 2.95<br>(2.05)              | 2.83<br>(1.43)              | 3.90<br>(2.00)               | <b>3.23</b><br><b>(1.83)</b> |
| <b>Confident</b>         | 5.48 <sub>ab</sub><br>(1.88) | 4.47 <sub>a</sub><br>(2.06) | 4.48 <sub>ab</sub><br>(2.00) | <b>4.81</b><br><b>(1.98)</b> | 5.41 <sub>b</sub><br>(1.94) | 6.58 <sub>b</sub><br>(2.19) | 6.05 <sub>ab</sub><br>(1.54) | <b>6.01</b><br><b>(1.89)</b> |
| <b>Rate Performance</b>  | 2.74 <sub>a</sub><br>(1.81)  | 1.63 <sub>a</sub><br>(0.83) | 3.00 <sub>a</sub><br>(1.73)  | <b>2.46</b><br><b>(2.15)</b> | 5.27 <sub>b</sub><br>(1.78) | 5.46 <sub>b</sub><br>(2.00) | 5.75 <sub>b</sub><br>(1.62)  | <b>5.49</b><br><b>(1.80)</b> |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

Another 2 (ability) by 3 (difficulty) ANOVA examined differences in participants' ratings of their Task 1 performance, and yielded a significant model,  $F(5, 125) = 21.88, p < .001, \eta^2 = .47$ . Ability accounted for a significant proportion of the variance in ratings of Task 1 performance,  $F(1, 125) = 104.46, p < .001, \eta^2 = .46$ . Planned contrasts revealed that participants in the excellent-ability condition rated their Task 1 performance as significantly greater than participants in the poor-ability condition,  $t(129) = -9.891, p < .001, d = 1.73$ .

To examine the effectiveness of the difficulty manipulation, several additional 2 (ability) by 3 (difficulty) ANOVA's were used. First, analysis of participants' *difficulty expectations* regarding Task 2 (as assessed on the pre-task questionnaire) produced a significant omnibus test and a main effect of difficulty,  $F(2, 125) = 11.19, p < .001, \eta^2 = .16$ , and no interaction,  $F(2, 125) = 1.43, \eta^2 = .02$ . This indicates that prior to starting Task 2, participants did differ in their assessment of the difficulty of Task 2. Simple main effects analysis using the Tukey correction revealed significant differences between the easy ( $M = 4.93, SD = 1.40$ ) and unknown ( $M = 6.07, SD = 1.47, p = .001$ ) conditions, and between the easy and difficult ( $M = 6.38, SD = 1.39$ ) conditions ( $p < .001$ ). A one-way ANOVA examined differences in task difficulty expectations held by participants by condition revealed additional differences (Table 7). It was concluded that the difficulty manipulation was successful as participants in the unknown and difficult task conditions anticipated a more difficult task than those in the easy task condition.

Table 7  
*Perceived Difficulty Expectations by Condition*

| Dependent Measure              | Poor                          |                              |                             |                              | Excellent                    |                             |                              |                              |
|--------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|
|                                | Unknown<br>1                  | Easy<br>2                    | Difficult<br>3              | <i>Total</i>                 | Unknown<br>4                 | Easy<br>5                   | Difficult<br>6               | <i>Total</i>                 |
| <b>Difficulty Expectations</b> | 5.78 <sub>abc</sub><br>(1.48) | 5.11 <sub>ac</sub><br>(1.60) | 6.50 <sub>b</sub><br>(1.50) | <b>5.80</b><br><b>(1.53)</b> | 6.38 <sub>ab</sub><br>(1.43) | 4.78 <sub>c</sub><br>(1.24) | 6.22 <sub>ab</sub><br>(1.26) | <b>6.69</b><br><b>(1.31)</b> |

Note: Row means with different subscripts are statistically significant from each other at  $p < .05$ , across all 6 conditions.

When participants were asked later to report on the difficulty of Task 2, participants' ratings of Task 2 difficulty did not differ across condition,  $F(5, 125) = .786$ ,  $p = .56$ ,  $\eta^2 = .03$ . Difficulty was unable to account for a significant proportion of the variance in participant ratings,  $F(2, 125) = 1.17$ ,  $p > .05$ ,  $\eta^2 = .02$ . Planned contrasts compared Task 2 difficulty ratings between participants in the easy condition and those in the unknown and difficult conditions. Across all six conditions, participants in the easy conditions did not differ from participants in the unknown and difficult task conditions in their ratings of Task 2 difficulty; and this effect remained non-significant even when comparing within ability conditions (all  $ps > .05$ ).

The extent to which participants found Task 2 to be impossible was to serve as another difficulty manipulation check. However, the 2 by 3 ANOVA produced a non-significant model, and planned contrasts revealed that participants did not differ in the extent to which they thought Task 2 was impossible (all  $ps > .05$ ). Altogether, these

results indicate that the manipulation of task perceived difficulty was only successful prior to participants starting Task 2.

### Incentive Attractiveness

A 2 (poor- and excellent-ability) by 3 (unknown, easy, and difficult task difficulty) ANOVAs were used to assess the impact of perceived ability and perceived task difficulty on ratings of incentive attractiveness (see Table 8 for *M* and *SD*). As did become a reoccurring theme, the results of this analysis revealed a significant main effect of perceived ability on rated incentive attractiveness at both Time 1,  $F(1, 122) = 10.68, p < .001, \eta^2 = .08$ , and Time 2,  $F(1, 125) = 6.00, p = .001, \eta^2 = .05$ . Excellent-ability participants rated the incentive as more attractive than poor-ability participants at both Time 1 and Time2. These effects were not qualified by an interaction between perceived ability and task difficulty: Time 1,  $F(5, 125) = .07, p = .93, \eta^2 = .00$ , Time 2,  $F(5, 125) = .36, p = .70, \eta^2 = .01$ .

Table 8  
*Incentive Attractiveness*

| Dependent Measure               | Poor                         |                              |                             |                              | Excellent                    |                              |                              |                               |
|---------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
|                                 | Unknown<br>1                 | Easy<br>2                    | Difficult<br>3              | <i>Total</i>                 | Unknown<br>4                 | Easy<br>5                    | Difficult<br>6               | <i>Total</i>                  |
| <b>Time 1</b><br>(Anticipatory) | 8.85 <sub>ab</sub><br>(3.78) | 8.16 <sub>ab</sub><br>(3.34) | 6.57 <sub>a</sub><br>(4.59) | <b>7.84</b><br><b>(4.03)</b> | 10.77 <sub>b</sub><br>(2.74) | 10.52 <sub>b</sub><br>(4.07) | 9.11 <sub>ab</sub><br>(4.71) | <b>10.21</b><br><b>(3.87)</b> |
| <b>Time 2</b><br>(During)       | 8.78<br>(4.07)               | 7.84<br>(3.40)               | 7.07<br>(4.40)              | <b>7.90</b><br><b>(4.01)</b> | 9.73<br>(3.78)               | 10.08<br>(4.00)              | 9.30<br>(4.76)               | <b>9.72</b><br><b>(4.20)</b>  |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

To assess Hypothesis 1, two one-way Analysis of Variance (ANOVA) planned contrasts examined whether incentive attractiveness varies as a function of perceived task difficulty and perceived ability. Contrast one examined the linear relationship between ratings of incentive attractiveness in the poor-ability condition at Time 1. As predicted for this measure of anticipated energization, participants in the difficult condition rated the incentive less attractive than participants in the unknown and easy conditions, and this difference was significant:  $t(122) = 1.90, p = .03, d = 0.47$ . At Time 2, participants in the difficult condition again rated the incentive as least attractive, however, as predicted, the mean difference was not statistically significant,  $t(125) = 1.60, p = .12, d = 0.31$ .

Contrast two examined the expected quadratic relationship between ratings of incentive attractiveness in the excellent-ability condition. Participants in the unknown and difficult conditions did not differ from those in the easy condition at either Time 1,  $t(122) = -.564, p = .29, d = 0.15$  or Time 2,  $t(125) = -.538, p = .30, d = 0.14$ .

### **Task Performance**

As before, a 2 (poor- and excellent-ability) by 3 (unknown, easy, and difficult task difficulty) ANOVA was used to first assess the impact of perceived ability and perceived task difficulty on ratings of task performance (see Table 9 for *M* and *SD*). The ANOVA yielded a non-significant model,  $F(5, 125) = .685, p = .64, \eta^2 = .03$ , indicating that neither perceived ability nor perceived task difficulty could account for differences in Task 2 performance.

Table 9  
*Task Performance*

| Dependent Measures  | Poor             |                  |                  |                                | Excellent        |                  |                  |                                |
|---------------------|------------------|------------------|------------------|--------------------------------|------------------|------------------|------------------|--------------------------------|
|                     | Unknown<br>1     | Easy<br>2        | Difficult<br>3   | <i>Total</i>                   | Unknown<br>4     | Easy<br>5        | Difficult<br>6   | <i>Total</i>                   |
| # Objects found     | 54.57<br>(12.12) | 50.00<br>(13.99) | 48.13<br>(12.05) | <b>50.95</b><br><b>(12.78)</b> | 52.59<br>(12.24) | 50.92<br>(10.42) | 53.40<br>(16.98) | <b>52.23</b><br><b>(14.10)</b> |
| Cell size, <i>n</i> | 23               | 19               | 23               | <b>65</b>                      | 22               | 24               | 20               | <b>66</b>                      |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

A one-way ANOVA planned contrast tested the linear effect of perceived ability and perceived task difficulty on the number of objects found by participants in the poor-ability condition. As predicted, participants in the difficult condition performed worst, however the contrast was non-significant,  $t(125) = 1.18, p = .12, d = .33$ . Contrast two compared mean differences in the excellent-ability condition. Although the quadratic relationship was found, the contrast yielded no statistical difference,  $t(125) = .60, p = .275, d = .16$ .

A bivariate correlation analysis revealed a positive correlation between the number of objects found ( $M = 51.60, SD = 13.42$ ) and ratings of task attractiveness at Time 1 ( $M = 9.00, SD = 4.12; R = .29, p = .001$ ) and at Time 2 ( $M = 8.82, SD = 4.20; R = .28, p < .001$ ). An additional analysis using simultaneous multivariate regression indicated that ratings of incentive attractiveness (Time 1 and Time 2) did predict actual performance,  $r^2 = .09, F(2, 125) = 5.90, p = .004$ . However, neither Time 1,  $t(127) = .78, p = .44, \beta = .15$  or Time 2,  $t(127) = .79, p = .43, \beta = .15$ , attractiveness ratings uniquely accounted for a significant proportion of the variance in task performance.

## Flow

Two-way 2x3 ANOVAs examined the unique contribution of both ability and difficulty on individuals' Flow State Scale (FSS) scores (see Table 10 for *M* and *SD*). Significant models were produced for the following FSSs: composite,  $F(5, 125) = 6.05, p < .001, \eta^2 = .20$ , autotelic,  $F(5, 125) = 7.17, p < .001, \eta^2 = .23$ , concentration,  $F(5, 125) = 3.34, p = .007, \eta^2 = .12$ , and the control FSS,  $F(5, 125) = 4.48, p = .001, \eta^2 = .15$ . The time FSS-subscale was not significant:  $F(5, 125) = 1.40, p = .23, \eta^2 = .05$ .

Ability accounted for a significant proportion of the variance in FSS scores. Participants in the excellent-ability condition reported significantly higher instances of flow on the composite FSS,  $F(1, 125) = 27.32, p < .001, \eta^2 = .18$ . In addition, flow ratings were higher on the autotelic sub-scale:  $F(1, 125) = 30.96, p < .001, \eta^2 = .20$ , the concentration sub-scale:  $F(1, 125) = 14.83, p < .001, \eta^2 = .11$ , and the control sub-scale:  $F(1, 125) = 20.32, p < .001, \eta^2 = .14$ . These effects were not qualified by an interaction: composite ( $F = .53, p = .59$ ), autotelic ( $F = 1.14, p = .33$ ), concentration ( $F = .72, p = .49$ ), and control ( $F = .31, p = .74$ ).

To assess Hypothesis 2, planned contrasts were used to examine whether flow varied as a function of perceived task difficulty and perceived ability. Contrast one compared the scores of poor-ability participants in the unknown and easy conditions to poor-ability participants in the difficult condition on the five Flow State Scales. No difference was found between the participants in the unknown and easy conditions, and participants in the difficult condition across any measure: composite ( $t = -.47, p = .32$ ),

autotelic ( $t = -.39, p = .35$ ), concentration ( $t = -.70, p = .24$ ), control ( $t = -.95, p = .17$ ), and time ( $t = .74, p = .23$ ). Contrast two compared the scores of participants in the excellent-ability unknown and difficult conditions to excellent-ability participants in the easy condition, and yielded non-significant results: composite ( $t = .61, p = .27$ , concentration ( $t = .02, p = .49$ , control ( $t = 1.21, p = .12$ ), and time ( $t = -1.12, p = .12$ ). However, when rounded, scores on the autotelic subscale were trending toward significance,  $t(125) = 1.61, p = .055, d = .39$ .

Table 10  
*Flow Measures*

| Dependent Measures   | Poor                          |                               |                               |                               | Excellent                     |                               |                              |                               |
|----------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|
|                      | Unknown<br>1                  | Easy<br>2                     | Difficult<br>3                | <i>Total</i>                  | Unknown<br>4                  | Easy<br>5                     | Difficult<br>6               | <i>Total</i>                  |
| <b>Composite FSS</b> | 56.68 <sub>a</sub><br>(6.90)  | 56.64 <sub>a</sub><br>(6.26)  | 57.58 <sub>a</sub><br>(9.00)  | <b>56.97</b><br><b>(7.44)</b> | 62.22 <sub>ab</sub><br>(5.67) | 63.11 <sub>ab</sub><br>(8.92) | 66.35 <sub>b</sub><br>(7.64) | <b>63.80</b><br><b>(7.76)</b> |
| <b>Autotelic</b>     | 12.33 <sub>a</sub><br>(2.66)  | 12.74 <sub>ab</sub><br>(2.23) | 12.83 <sub>ab</sub><br>(3.16) | <b>12.62</b><br><b>(2.70)</b> | 15.10 <sub>bc</sub><br>(2.79) | 14.67 <sub>bc</sub><br>(3.26) | 16.65 <sub>c</sub><br>(3.17) | <b>15.41</b><br><b>(3.14)</b> |
| <b>Concentration</b> | 15.78 <sub>ab</sub><br>(2.43) | 14.53 <sub>b</sub><br>(3.32)  | 15.66 <sub>ab</sub><br>(2.67) | <b>15.37</b><br><b>(2.81)</b> | 17.05 <sub>ab</sub><br>(3.09) | 17.21 <sub>a</sub><br>(2.89)  | 17.40 <sub>a</sub><br>(2.35) | <b>17.21</b><br><b>(2.77)</b> |
| <b>Control</b>       | 14.35 <sub>a</sub><br>(2.71)  | 14.59 <sub>ab</sub><br>(3.18) | 15.13 <sub>ab</sub><br>(2.70) | <b>14.70</b><br><b>(2.83)</b> | 16.91 <sub>ab</sub><br>(1.87) | 16.25 <sub>b</sub><br>(2.94)  | 17.25 <sub>b</sub><br>(2.51) | <b>16.77</b><br><b>(2.49)</b> |
| <b>Time</b>          | 14.22<br>(2.75)               | 14.79<br>(2.15)               | 13.96<br>(2.80)               | <b>14.29</b><br><b>(2.59)</b> | 13.18<br>(3.17)               | 14.99<br>(3.27)               | 15.05<br>(2.74)              | <b>14.40</b><br><b>(3.16)</b> |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

### Positive Affect

Two-way ANOVAs examined the effect of perceived ability and perceived task difficulty on ratings of positive affect (see Table 11, for *Ms* and *SDs*). Significant models were produced for composite affect,  $F(5, 125) = 3.47, p = .006, \eta^2 = .122$ , and positive affect,  $F(5, 125) = 3.70, p = .004, \eta^2 = .20$ . Models for engagement,  $F(5, 125) = 2.03, p = .08, \eta^2 = .08$ , and threat,  $F(5, 125) = 1.91, p = .10, \eta^2 = .07$ , were not significant.

Table 11  
*Positive Affect*

| Dependent Measures      | Poor                         |                             |                              |                              | Excellent                    |                              |                             |                              |
|-------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|
|                         | Unknown<br>1                 | Easy<br>2                   | Difficult<br>3               | <i>Total</i>                 | Unknown<br>4                 | Easy<br>5                    | Difficult<br>6              | <i>Total</i>                 |
| <b>Composite Affect</b> | 5.81 <sub>ab</sub><br>(1.17) | 5.29 <sub>a</sub><br>(1.00) | 5.69 <sub>ab</sub><br>(1.18) | <b>5.60</b><br><b>(1.12)</b> | 5.93 <sub>ab</sub><br>(1.13) | 6.29 <sub>ab</sub><br>(1.22) | 6.64 <sub>b</sub><br>(1.13) | <b>6.29</b><br><b>(1.16)</b> |
| <b>Positive Affect</b>  | 5.90 <sub>ab</sub><br>(1.45) | 5.46 <sub>a</sub><br>(1.24) | 5.88 <sub>ab</sub><br>(1.07) | <b>5.75</b><br><b>(1.25)</b> | 6.26 <sub>ab</sub><br>(1.56) | 6.64 <sub>ab</sub><br>(1.26) | 6.97 <sub>b</sub><br>(1.15) | <b>6.63</b><br><b>(1.32)</b> |
| <b>Engagement</b>       | 5.76<br>(1.36)               | 5.19<br>(1.22)              | 5.57<br>(1.54)               | <b>5.51</b><br><b>(1.37)</b> | 5.74<br>(1.22)               | 6.08<br>(1.49)               | 6.45<br>(1.25)              | <b>6.09</b><br><b>(1.32)</b> |
| <b>Threat</b>           | 3.17<br>(1.59)               | 3.08<br>(1.95)              | 3.11<br>(1.73)               | <b>3.12</b><br><b>(1.76)</b> | 2.05<br>(1.05)               | 2.63<br>(1.36)               | 2.48<br>(1.27)              | <b>2.39</b><br><b>(1.23)</b> |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

Ability accounted for a significant proportion of the variance in composite affect scores,  $F(1, 125) = 11.94, p < .001, \eta^2 = .09$ , and positive affect scores,  $F(1, 125) = 14.71, p < .001, \eta^2 = .11$ . Compared to excellent-ability participants, poor-ability participants' composite and positive affect scores were significantly lower indicating that perceived

competence for a task affects enjoyment of the task. These effects were not qualified by an interaction: composite affect,  $F(5, 125) = 2037, p = .131, \eta^2 = .03$ , and positive affect,  $F(5, 125) = 1.32, p = .272, \eta^2 = .02$ ).

Planned contrasts examining affect scale scores revealed no significant linear or quadratic relationship between groups on any measure. Contrast 1: composite affect ( $t = -.45, p = .33$ ), positive affect ( $t = -.61, p = .27$ ), engagement ( $t = -.26, p = .40$ ), and threat ( $t = .05, p = .48$ ). Contrast 2: composite affect ( $t = -.01, p = .49$ ), positive affect ( $t = -.08, p = .47$ ), engagement ( $t = .03, p = .49$ ), and threat ( $t = -.94, p = .17$ ).

A correlational analysis revealed significant correlations between the flow and positive affect scales (Table 12). Linear regression was used to test if positive affect scores could predict flow scores. The analysis revealed that composite affect scores did in fact predict composite flow scores,  $r^2 = .39, F(1, 129) = 81.45, p < .001, \beta = .62$ . In addition, simultaneous linear regression examined the predictive quality of both positive affect and engagement feelings on ratings of the autotelic experience. The analysis revealed a model in which positive affect scores predicted scores on the autotelic experience sub-scale,  $r^2 = .35, F(2, 128) = 34.38, p < .001$ . Both positive affect,  $t(2) = 2.84, p < .01, \beta = .23$ , and engagement affect,  $t(2) = 5.50, p < .001, \beta = .45$ , uniquely accounted for a significant proportion of the variance in participants' ratings of autotelic experience.

Table 12:  
*Correlations among Affect and Flow Measures*

| <b>Dependent Measure</b>    | 1     | 2     | 3     | 4      | 5     | 6     | 7     | 8   | 9 |
|-----------------------------|-------|-------|-------|--------|-------|-------|-------|-----|---|
| <b>1. Composite Affect</b>  | -     |       |       |        |       |       |       |     |   |
| <b>2. Positive Affect</b>   | .77** | -     |       |        |       |       |       |     |   |
| <b>3. Engagement Affect</b> | .93** | .46** | -     |        |       |       |       |     |   |
| <b>4. Threat Affect</b>     | .05   | -.16  | .17   | -      |       |       |       |     |   |
| <b>5. Composite FSS</b>     | .62** | .53** | .55** | -.10   | -     |       |       |     |   |
| <b>6. Autotelic</b>         | .59** | .44** | .56** | -.13   | .76** | -     |       |     |   |
| <b>7. Concentration</b>     | .45** | .35** | .41** | -.08   | .77** | .37** | -     |     |   |
| <b>8. Control</b>           | .47** | .56** | .31** | -.23** | .73** | .40** | .62** | -   |   |
| <b>9. Time</b>              | .21*  | .13   | .21*  | .16    | .52** | .26** | .26   | .03 | - |

Note: \* $p < .05$ , \*\* $p < .01$ , two-tailed.

### Task Attractiveness

Table 13 displays the means and standard deviations for task attractiveness. Two-way ANOVAs examined the effect of perceived ability and perceived task difficulty on several measures of task attractiveness. Significant models were produced for questions *interesting* (“How interesting do you find Task 2?”;  $F(5, 125) = 2.47, p = .04, \eta^2 = .09$ ), *succeed* (“To what extent do you want to succeed on Task 2?”;  $F(5, 125) = 2.63, p = .03, \eta^2 = .10$ ), *perform* (“How well must you perform on [Task 2] to win the [incentive]?”;

$F(5, 125) = 2.33, p = .05, \eta^2 = .09$ ), and *personality/ability* (“To what extent is your performance [on Task 2] due to your personality or ability?”;  $F(5, 125) = 3.55, p = .005, \eta^2 = .12$ ). Models were not significant for *fun* (“How fun is Task 2”),  $F(5, 125) = 1.64, p = .15, \eta^2 = .06$ , and *task* (“To what extent is your performance on the task due to characteristics of the task?”),  $F(5, 125) = 1.74, p = .13, \eta^2 = .07$ .

Table 13  
*Task Attractiveness*

| Dependent Measures              | Poor                         |                              |                              | Total                        | Excellent                    |                              |                             | Total                        |
|---------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|
|                                 | Unknown<br>1                 | Easy<br>2                    | Difficult<br>3               |                              | Unknown<br>4                 | Easy<br>5                    | Difficult<br>6              |                              |
| <b>Interesting</b>              | 6.17 <sub>a</sub><br>(2.12)  | 6.79 <sub>ab</sub><br>(1.18) | 6.70 <sub>ab</sub><br>(1.66) | <b>6.55</b><br><b>(1.65)</b> | 6.91 <sub>ab</sub><br>(1.19) | 7.00 <sub>ab</sub><br>(1.74) | 7.85 <sub>b</sub><br>(1.35) | <b>7.25</b><br><b>(1.43)</b> |
| <b>Succeed</b>                  | 6.78<br>(1.44)               | 6.47<br>(1.68)               | 7.00<br>(1.93)               | <b>6.75</b><br><b>(1.68)</b> | 7.50<br>(1.26)               | 7.71<br>(1.43)               | 7.85<br>(1.46)              | <b>7.69</b><br><b>(1.38)</b> |
| <b>Perform</b>                  | 6.61<br>(2.19)               | 7.79<br>(1.18)               | 7.87<br>(1.55)               | <b>7.39</b><br><b>(1.64)</b> | 7.36<br>(1.50)               | 7.42<br>(1.18)               | 7.90<br>(1.12)              | <b>7.59</b><br><b>(1.27)</b> |
| <b>Fun</b>                      | 6.17<br>(2.08)               | 6.47<br>(1.47)               | 6.65<br>(2.06)               | <b>6.43</b><br><b>(1.87)</b> | 6.91<br>(1.31)               | 6.88<br>(1.80)               | 7.60<br>(1.39)              | <b>7.13</b><br><b>(1.50)</b> |
| <b>Personality/<br/>Ability</b> | 5.96 <sub>ab</sub><br>(1.43) | 5.79 <sub>a</sub><br>(1.72)  | 5.96 <sub>ab</sub><br>(1.43) | <b>5.90</b><br><b>(1.53)</b> | 7.00 <sub>ab</sub><br>(1.48) | 6.65 <sub>ab</sub><br>(2.05) | 7.40 <sub>b</sub><br>(1.31) | <b>7.02</b><br><b>(1.61)</b> |
| <b>Task</b>                     | 5.87<br>(1.58)               | 5.74<br>(1.58)               | 6.39<br>(0.94)               | <b>6.00</b><br><b>(1.37)</b> | 6.59<br>(1.30)               | 6.63<br>(1.66)               | 6.80<br>(1.85)              | <b>6.67</b><br><b>(1.60)</b> |

Note: Row means with different subscripts are statistically significant from each other at  $p \leq .05$ , across all 6 conditions.

Perceived ability accounted for a significant proportion of the variance on participants ratings of interest,  $F(1, 125) = 6.23, p < .01, \eta^2 = .05$ , desire for success,  $F(2, 125) = 11.87, p = .001, \eta^2 = .09$ , and personality/ability,  $F(1, 125) = 15.87, p < .001, \eta^2 = .11$ . Specifically, excellent ability participants' ratings of these task attractiveness

measures were significantly higher than poor-ability participants (Table 13). The analysis also revealed a main effect of perceived task difficulty on participants' ratings of how well they must perform,  $F(1, 125) = 4.07, p = .02, \eta^2 = .06$ . There was no interaction between ability and task difficulty on any measure of task attractiveness for which a significant model was produced: interesting  $F(1, 125) = .93, p = .40, \eta^2 = .02$ , succeed  $F(1, 125) = .33, p = .72, \eta^2 = .01$ , perform,  $F(1, 125) = 1.57, p = .21, \eta^2 = .02$ , and personality/ability  $F(1, 125) = .38, p = .67, \eta^2 = .01$ .

Linear contrast test revealed that poor-ability participants in the unknown and easy conditions did not find the task more attractive than participants in the poor-ability difficult condition: interest ( $t = -.52, p = .30$ ), fun ( $t = -.73, p = .47$ ), succeed ( $t = -.92, p = .36$ ). However, participants in the poor-ability difficult condition did indicate that they would have to perform significantly better to win the gift card than did the poor-ability participants in the unknown and easy conditions,  $t(125) = -1.71, p = .045, d = .41$ .

There were no significant quadratic differences between groups in the excellent-ability condition: interesting ( $t = .93, p = .18$ ), succeed ( $t = -.08, p = .47$ ), perform ( $t = .56, p = .23$ ), and fun ( $t = .86, p = .20$ ).

## DISCUSSION

This study examined the relationship between the Integrated Model of Motivational Intensity Theory (Wright, 1998; Brehm & Self, 1989) and the Theory of Optimal Experience, or flow (Csikszentmihalyi, 1990). At its core, the goal of this project was to predict the occurrence of flow. It was postulated that by using the energization model and experimentally varying participants' perception of their own ability and their perception of task difficulty, flow could be predicted.

### **The Role of Perceived Ability**

It was found that perceived ability, operationalized in this study as one's perceived competence within the domain of *visual scanning*, was a driving force for many of the statistically significant differences found across dependent variables. Perceived ability accounted for statistical differences in participants' ratings of incentive attractiveness, flow state scale scores, positive affect scores, and ratings of task attractiveness. Not only does this speak to the strength of the ability manipulation used in the present experiment, but also demonstrates the potency of ability perceptions on a range of psychological measures, particularly flow. Prior research examining flow did find a relationship between it and perceived ability (Jackson & Marsh, 1996; Jackson et al., 1998), and thus its role as a significant predictor is perhaps not surprising.

### **The Role of Perceived Difficulty**

What is surprising is the limited role of perceived difficulty on each of the dependent measures. Only once did perceived difficulty account for a significant proportion of the variance in a dependent measure (task attractiveness – how well participants must perform). Also surprising is that never did perceived task difficulty and perceived ability interact. These two *null* findings most starkly separate the findings offered in this thesis from prior research examining intensity theory.

The pre-task manipulation check for the perceived task difficulty manipulation indicated that the manipulation was successful. Prior to starting Task 2, participants in both the poor- and excellent-ability conditions differed in their expectations regarding the difficulty of Task 2. Only after working on the *Seek-and-Find* for fifteen minutes did this difference vanish. The limited role of perceived task difficulty may be due to a change in participants' perception of Task 2 difficulty as they gained exposure and experience with the task. This may have been one unintended consequence of using an objectively “difficult” task for a moderate time duration. Bearing in mind that the participants did not differ in the number of objects found by condition, this explanation is plausible.

Although the difficulty manipulation was initially successful, it is still worth noting that only 40.50% of participants were able to correctly answer the multiple-choice manipulation check that asked participants to report on the difficulty of Task 2. In contrast, 96.20% of participants passed the ability manipulation check. This failure to answer this second manipulation check correctly may be due to confusion regarding *percentile* cutoffs when providing feedback to participants. Using percentiles scores as

part of the feedback to participants aligned methodologically with Wright and Dill (1993)'s manipulation check, but may have ultimately been a flaw of the current study.

### **Poor-Ability Unknown vs. Excellent-Ability Difficult Task Conditions**

On several occasions, a significant difference was found between participants in the poor-ability unknown condition and the excellent-ability difficult condition on some of the dependent measures. When this difference occurred, participants in the excellent-ability difficult condition scored higher than participants in the poor-ability unknown condition. Differences between these two groups were found on the composite, autotelic, and control FSS measures, and on ratings of interest in Task 2. Given the irregularity of this occurrence, it is possible that this effect was due to Type 1 error.

### **Hypothesis 1**

The data are mixed regarding support for hypothesis 1, but in general do not support predictions. However, a significant linear relationship was hypothesized and found at Time 1 for poor-ability participants' ratings of task attractiveness. Participants in the unknown and easy conditions rated the incentive as more attractive than participants in the difficult condition. This finding *does* replicate previous work by motivational theorists (Wright & Dill, 1993; Kulka, 1974). Participants who perceive their ability to be poor within a given domain do energize more on a task they perceive to be possible and worthwhile, in essence, a task perceived as easy. Furthermore, a non-significant linear relationship was found at Time 2 for participants in the poor-ability condition, indicating

that participants may have shifted their desire away from the extrinsic motivator (i.e., the incentive) to an intrinsic feeling of enjoyment.

Incentive attractiveness ratings for the excellent-ability participants do not fit with Hypothesis 1. At Time 1, a *linear* relationship (as opposed to the predicted quadratic) was found in which participants in the difficult task condition rated the incentive least attractive. Consequently, the results for participants in the excellent-ability condition failed to replicate previous work (Wright & Dill, 1993; Kulka, 1974). A non-significant quadratic relationship was found between difficulty conditions at Time 2. However, the relationship was inverse of what was expected (participants in the easy condition rated the incentive as most attractive). Although a non-significant relationship was predicted at Time 2, interpretation of the null finding is complicated by the null finding at Time 1. This failure to replicate might be due to with limitations regarding intensity theory overall. Specifically, ensuring that participants are experiencing the manipulations as intended.

Additional predictions related to hypothesis 1 were also mixed. It was predicted that Task 2 performance would function with perceived ability and perceived task difficulty, as in Kukla (1974). Wright and Dill (1993) failed to find differences in Task 2 performance. Our data support findings by Wright and Dill (1993), that actual performance does not vary with perceived ability and perceived task difficulty. However, despite failing to obtain statistical significance, it is still interesting that the *pattern* of results obtained were as predicted. Poor-ability participants in the unknown and easy conditions outperformed poor-ability participants in the difficult condition – a linear

relationship reminiscent of Kukla (1974). A quadratic relationship was also found for excellent-ability participants such that participants in the unknown and difficult conditions out-performed those in the easy condition. These effects are small to moderate (Tabachnick & Fidell, 2013), indicating that this finding might be meaningful despite failing to reach significance.

The results of a correlational analysis highlight the relationship between ratings of incentive attractiveness and Task 2 performance, and indicate that the two measures are likely related. At both Time 1 and Time 2, participants who rated the incentive as more attractive performed better on the task. Although Time 1 and Time 2 attractiveness ratings together predicted performance, neither alone could account for a significant proportion of the variance in Task 2 performance. Likely, there are other variables yet to be explored that contribute to overall performance.

Overall, this study failed to completely replicate previous work. Despite this, it is still interesting and useful that a pattern of results were obtained were often in support of the *a priori* predictions.

## **Hypothesis 2**

Planned contrasts for the flow measures did not support hypothesis 2. Overall, poor-ability participants' Flow State Scale scores failed to follow the predicted linear pattern. Interestingly, participants in the poor-ability difficult condition reported greater flow than participants in the poor-ability easy task condition on the composite, autotelic, and control sub-scales. This finding is surprising because it was believed that participants

in the difficult task condition would perceive an incongruence between their ability and the demands of the task (i.e., lack challenge/skill balance). This finding may be due to participants' not experiencing the ability and difficulty manipulations as intended.

Bearing in mind that participants in the poor-ability difficult task condition rated the incentive as least attractive at Time 1, valued it more at Time 2, but also performed worse on Task 2, suitable reasons why they experienced more flow are lacking. Without prior literature to draw conclusions from, one possible explanation is that these participants performed not to win, knowing that success was unlikely, but instead to have fun. This explanation makes sense considering these participants did rate Task 2 as more fun than participants in the unknown and easy condition.

There exists greater consistency in the *pattern* of results regarding excellent-ability participants' flow ratings. However, these ratings still failed to conform to the predicted quadratic pattern across each flow measure. Ratings on both the autotelic and control sub-scales did match predictions. Participants in the difficult condition reported more flow on each of the five sub-scales, indicating that these participants may have perceived a challenge/skill balance and experience greater enjoyment during Task 2 than other participants in the excellent-ability condition.

Additional predictions regarding Hypothesis 2 were not supported by the data. Participants' self-reported positive affect failed to conform to the predicted linear and quadratic pattern. Interestingly, a consistent quadratic relationship was found between difficulty levels for participants in the poor-ability condition for each affect measure. Participants in the poor-ability unknown and difficult conditions reported higher indices

of positive affect (and threat) than participants in the poor-ability easy condition. This finding suggests that a challenge/skill balance was perceived not at the level of easy difficulty, but instead at the unknown and difficult standards.

Excellent-ability participants' affect ratings also failed to follow the predicted quadratic pattern. For the affect measures excluding threat (composite, positive, and engagement), a linear relationship was found such that participants in the excellent-ability unknown condition indicated the least amount of positive affect and participants in the difficult condition indicated the greatest. This indicates consistency between excellent-ability participants' flow ratings and their ratings of positive affect.

Many significant correlations were found between ratings of flow and positive affect indicating that the two experiences are related. This not only fits with predictions, but makes theoretical sense as the autotelic experience is operationalized as a feeling of enjoyment. In fact, the most important finding of this study is that positive and engagement affect capture and predict a significant proportion of the variance in the autotelic sub-scale. This finding aligns with previous work (Csikszentmihalyi, 1990; Jackson & Marsh, 1996) that suggest that the autotelic experience refers not to enjoyment alone (positive affect), but also to enjoyment with an intrinsically rewarding task (engagement affect). This is interesting because it reinforces the notion that the autotelic experience refers not to overall enjoyment but also to enjoyment with an intrinsic task (Jackson & Marsh, 1996). Rationalized this way, it makes theoretical sense that engagement affect (active, energetic, and challenged) might account for more of the variance in participant ratings of the autotelic experience.

It was also found that positive affect does capture and predict composite flow and autotelic scale scores. These findings may be useful for flow researchers looking for alternative measures of flow, while also laying the groundwork for future research attempting to predict the flow experience.

Overall, the data do not support hypothesis 2. Participants in any difficulty condition tended to report higher indices of both flow and positive affect. It is postulated that only participants in the excellent-ability condition rated both flow and positive affect measures higher because they perceived a challenge/skill balance, whereas participants in the poor-ability condition did so because they place greater value on the intrinsic nature of the task

### **Task Attractiveness**

Linear and quadratic predictions regarding task attractiveness were not supported. Although no significant differences were found, an interesting and consistent relationship was found regarding the “succeed,” “perform,” and “fun” measures. For each measure, participants in the difficult condition rated the task higher. Moreover, desire for success, required performance, and ratings of fun were highest in the difficult task condition for these participants.

### **Limitations, Implications, and Future Directions**

Despite the inability of this research project to satisfactorily replicate previous findings by intensity theorists and predict optimal experience, it may be useful if used as

a stepping stone when designing future projects. Intensity theory should not be discarded as a means for predicting predict optimal experience. Rather, it is argued that researchers should either modify the methodology described here, or spend greater resources during piloting to establish objective levels of task difficulty. Future researchers might also consider revising the information provided to participants for the difficulty manipulation as percentile cutoffs can be confusing.

Future research could also explore other variables accounting for *effort* in a performance task alongside measures of task attractiveness. This would be useful to help ensure that potential motivation is not varying between participants. In this study, one reward was offered if the objective standard was met. However, Wright and Dill (1993) offered participants a *choice of two* equally attractive prizes. Several participants communicated dissatisfaction with, or ambivalence toward, the Starbucks gift card. Although there is no way to know how many participants actually felt this way, by increasing the number of incentive options future researchers may be able to increase the predictive quality of incentive attractiveness to energization.

The finding that positive and engagement affect captures flow, in particular the autotelic experience, is important. It is a useful and possibly robust finding for researchers looking for alternative means to measure flow. Future researchers may not have to find evidence for each of the nine dimensions of flow in order to conclude that flow is occurring so long as the autotelic experience is present. This is not to say that the other dimensions are not important, indeed challenge/skill balance most certainly is,

however in some applied scenarios (i.e., school or work) enjoyment of the task may be enough to identify whether or not flow is occurring.

The finding that a sense of enjoyment indicates the presence of flow may have implications in schools and workplaces. For example, the number of questions necessary to assess this construct could be severely reduced, thus aiding in the implementation of PLPs (or personalized learning plans) or assessment of workplace enjoyment. Because flow may become easier than ever to assess, the sooner instructors can identify when a student is enjoying their math homework, or not, the sooner they are able to adjust the difficulty of the homework assignment to match the students ability.

Beyond making assessment of flow easier, this finding could also have implications for learning in general. Currently, homework is not given for enjoyment – but what if it were? What if *enjoyment of learning* a new skill and the *challenge involved* became the focus? Such a method could radically change the way in which certain material is presented or even graded. Such a systemic change to our education system is undoubtedly far off, however, future research could examine flow (particularly the autotelic experience) in relation to learning.

In closing, this research presents a few novel findings that should aid the effort of flow researchers to predict and identify the construct. Hindering this research, however, is a stigma held by some who regard flow as unscientific. Bearing in mind that the real-world application of this research could result in myriad beneficial possibilities, researchers should persist in their effort to better understand this optimal experience.

**APPENDIX A**  
**INFORMED CONSENT DOCUMENT**

## INFORMED CONSENT

Dr. Anca Miron and Mr. Aaron Bagley of the Department of Psychology at the University of Wisconsin Oshkosh are conducting a study that examines engagement and performance in two tasks. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

As part of the study, you will be asked to complete two tasks that involve searching for and finding objects in the visual field. It is our hope that participation will provide you with an educational experience, and that the information we collect will be useful in understanding task engagement and performance.

We do not anticipate that the study will present any risk of physical injury or harm to your health. However, there may be some minor discomfort associated with the completion of one or more of the tasks.

Your participation is strictly voluntary. If you wish to withdraw from the study at any time you may do so without penalty. Withdrawal from the study will not negate the credit that is due for your participation. In case of withdrawal, you will be awarded credit based on the amount of time you have committed to the study. In case you wish to file a complaint or have a question regarding your rights as a participant in this study, please contact the Institutional Review Board using the contact information at the bottom of this consent document.

Once the study is completed, we would be glad to give the results to you. Do not hesitate to ask any questions about the study before, during, or after the research is complete. If you would like additional information concerning this study, please feel free to contact either of the researchers below:

Dr. Anca Miron  
UW Oshkosh, Department of Psychology  
Oshkosh, WI 54901  
920-424-2328  
mirona@uwosh.edu

Aaron Bagley  
UW Oshkosh, Department of Psychology  
Oshkosh, WI 54901  
608-359-5275  
baglea45@uwosh.edu

I have received an explanation of the study and agree to participate. I understand that my participation in the study is strictly voluntary.

---

PRINT NAME

SIGNATURE

DATE

This research project has been approved by the University of Wisconsin IRB for Protection of Human Participants for a 1-year period, valid until Fall of 2017. The UW Oshkosh IRB is located in the Office of Grants & Faculty Development at 800 Algoma Boulevard, Dempsey Hall, Suite 214, or at (920) 424-3215.

**APPENDIX B**  
**COVER STORY**

## A CLOSER LOOK AT VISUAL SCANNING ABILITY (VSA)

### STUDY INSTRUCTION DOCUMENT

---

**\*\*Please carefully read the following\*\***

Visual Scanning Ability (VSA) refers to the ability to quickly identify written words or objects in the visual field. Recently, scientific studies have found that the brain processes visual information, written words AND objects, the same way. For example, when we read a word (e.g., “dynamic”) the brain processes it the same way as if we had seen an object (e.g., an actual *chair*). This is a very important because it means that someone with excellent Visual Scanning Ability (VSA) can quickly identify both *written words* and *objects*. As you may have guessed, this study is interested in VSA and the factors that influence written word and object detection.

**Many studies have shown that people with excellent VSA can quickly find hidden words in a matrix of letters and also quickly find hidden objects or patterns. This also means that people with poor VSA are not good at finding words also do poorly on tasks requiring them to find hidden objects or patterns (poor VSA).**

For today’s study you are being asked to complete two tasks that assess your Visual Scanning Ability (VSA). In Task 1 you will complete a **practice word search** that will assess your ability to quickly find written words in the visual field. In Task 2 you will complete a *Seek-and-Find* packet that will assess your ability to quickly find objects in the visual field. **Task 1 (the practice word search) will be used as a basic assessment of your Visual Scanning Ability. The feedback you receive from Task 1 should give you a rough estimate of how well you can expect to do in Task 2 (the *Seek-and-Find*).**

**You can WIN the \$5 gift card in front of you!** We have multiple *Starbucks* gift cards to be used by the UW Oshkosh Psychology Department for research purposes. The Gift Cards were left-overs and considered extra. **To earn this prize you will have to succeed at Task 2.**

**\*\*Open the door to proceed to TASK 1\*\***

---

**APPENDIX C**  
**TASK 1 INSTRUCTION DOCUMENT**

## **TASK 1: Scanning for Words**

### **Practice Word Search Instructions**

---

**\*\*Please carefully read the following\*\***

You will have 5 minutes to complete the practice word search consisting of 24 words. Use the color highlighter provided to draw a line through as many of the words as you can. When the time is up the experimenter will enter the room and ask you to stop. Your word search will be scored by the experimenter, who will then give you a score card. **The score card will provide you with feedback regarding your Visual Scanning Ability.** It should give you good idea of your actual ability to quickly find written words/objects in the visual field.

**NOTE:** TASK 1 has been judged as being **moderately difficult** by students who participated in this study last semester.

**\*\*Open the door when you are ready to begin TASK 1: Scanning for Words\*\***

---

**APPENDIX D**

**TASK 1**

## TASK 1: Scanning for Words

### 5-Minutes | Moderate Difficulty

#### FIND THE WORDS LISTED

ABUNDANT

BARREL

CONTACT

SMILE

HAVE

MANAGEMENT

CATTLE

SENSITIVITY

TASTE

ADVISER

CHIP

DECORATIVE

JOY

ALLOTMENT

OUTER

TILE

ASTONISHING

COMPLETE

SODA

DYNAMIC

KIDNAP

REMAIN

SYMBOL

SUNDAY

Z T N C B E I J F U S A E C R  
 P Y N H O P L T L E U S T I E  
 M A C E C N N I N T F T E M S  
 K V N N M A T S M B B O L A I  
 J S D D D E I A Z S A N P N V  
 Q U G N I T G O C D R I M Y D  
 F E U R I K I A E T R S O D A  
 L B T V O A L C N E E H C Y P  
 A L I S R R O N F A L I N A S  
 T T A E A R F I W L M N Q D I  
 Y S T H A T T A J O Y G S N O  
 U U A T H C R M T I L E A U B  
 O V I P I H C E L X R G S S V  
 E V G C T Z X R W L H C B R H  
 E I C Y U E V B T T V Z M G L

**APPENDIX E**  
**FEEDBACK FORM**

## TASK 1: Scanning for Words

### Practice Word Search Score Sheet

---

Participant # \_\_\_\_\_

Compared to all other students who participated in this study last semester, you scored better than \_\_\_\_\_% of those students. This score puts you in the \_\_\_\_\_ percentile.

Based off your score (the number of words you found) and how you did in comparison to all other students who participated last semester, **you have** \_\_\_\_\_ **Visual Scanning Ability (VSA)**.

**\*\*PUT THE SCORE SHEET BACK BEFORE PROCEEDING\*\***

**\*\*Open the door to proceed to TASK 2\*\***

**APPENDIX F**  
**TASK 2 INSTRUCTIONS: EASY**

## TASK 2: Scanning for Objects

**20-Minutes | EASY**

### Seek-And-Find Instructions

---

The practice word search you just completed was a basic assessment of your visual scanning ability. Specifically, it assessed your ability to quickly find written words in the visual field. **Task 2 will assess your ability to scan for objects in the visual field.**

For Task 2, you will have 20 minutes to find and circle as many objects as you can from a Seek-and-Find workbook. A Seek-and-Find is a fun puzzle book similar to a *Where's Waldo*. Each page has a Key that provides exact copies of the objects that you need to locate on the page. You must find all the objects on each page before moving on to the next page. Make sure you circle every object you find on each page using the color highlighter provided. After 20 minutes, the experimenter will return to the room to collect and score your sheets.

**NOTE:** How to WIN the \$5.00 Gift Card:

**THIS TASK IS EASY. To win the \$5.00 gift card you must find and circle as many objects as you can. Last semester, 85% of all students who participated in this study found enough objects to win the gift card.**

**\*\*Open the door when you are ready to begin TASK 2: Scanning for Objects\*\***

---

**APPENDIX G**  
**TASK 2 INSTRUCTIONS: DIFFICULT**

## TASK 2: Scanning for Objects

### 20-Minutes | DIFFICULT

#### Seek-And-Find Instructions

---

The practice word search you just completed was a basic assessment of your visual scanning ability. Specifically, it assessed your ability to quickly find written words in the visual field. **Task 2 will assess your ability to scan for objects in the visual field.**

For Task 2, you will have 20 minutes to find and circle as many objects as you can from a Seek-and-Find workbook. A Seek-and-Find is a fun puzzle book similar to a *Where's Waldo*. Each page has a Key that provides exact copies of the objects that you need to locate on the page. You must find all the objects on each page before moving on to the next page. Make sure you circle every object you find on each page using the color highlighter provided. After 20 minutes, the experimenter will return to the room to collect and score your sheets.

**NOTE:** How to WIN the \$5.00 Gift Card:

**THIS TASK IS DIFFICULT. To win the \$5.00 gift card you must find and circle as many objects as you can. Last semester, only 15% of all student participants found enough objects to win the gift card.**

**\*\*Open the door when you are ready to begin TASK 2: Scanning for Objects\*\***

---

**APPENDIX H**  
**TASK 2 INSTRUCTIONS: UNKNOWN**

## TASK 2: Scanning for Objects

### **20-Minutes | Find as many objects as possible**

#### **Seek-And-Find Instructions**

---

The practice word search you just completed was a basic assessment of your visual scanning ability. Specifically, it assessed your ability to quickly find written words in the visual field. **Task 2 will assess your ability to scan for objects in the visual field.**

For Task 2, you will have 20 minutes to find and circle as many objects as you can from a Seek-and-Find workbook. A Seek-and-Find is a fun puzzle book similar to a *Where's Waldo*. Each page has a Key that provides exact copies of the objects that you need to locate on the page. You must find all the objects on each page before moving on to the next page. Make sure you circle every object you find on each page using the color highlighter provided. After 20 minutes, the experimenter will return to the room to collect and score your sheets.

**NOTE:** How to WIN the \$5.00 Gift Card:

**To win the gift card you must find and circle as many objects you possibly can.**

**\*\*Open the door when you are ready to begin TASK 2: Scanning for Objects\*\***

---

**APPENDIX I**  
**DEPENDENT MEASURES PACKET COVER SHEET**

---

**DO NOT PUT YOUR NAME ON THIS QUESTIONNAIRE. WHEN YOU HAVE COMPLETED IT, PUT IT BACK IN THE ENVELOPE SO THE RESEARCH ASSISTANT WILL NOT SEE IT. THEN, PLEASE NOTIFY THE RESEARCH ASSISTANT THAT YOU ARE DONE BY OPENING THE DOOR.**

---

**APPENDIX J**  
**TASK 2 COVER SHEET: EASY**

## TASK 2: Scanning for Objects

### 20-Minutes | EASY

#### FIND THE OBJECTS

---

**Before you begin, please take a moment to answer the following questions:**

1. Based off your score in TASK 1 (the number of words you found) and how you did in comparison to all other students who participated last semester, you have \_\_\_\_\_ Visual Scanning Ability (VSA).

A. Excellent  
C. Average

B. Fair  
D. Poor

2. How attractive do you personally find the \$5.00 gift card?

1    2    3    4    5    6    7    8    9    10    11    12    13    14  
15

Not Attractive  
Attractive

Very

3. How difficult do you expect “TASK 2: Finding Objects” to be?

1    2    3    4    5    6    7    8    9

Easy

Moderately Difficult

Extremely Difficult

---

**Remember:** You have 20 minutes. To win the prize you must score in the top 85%.

---

**APPENDIX K**  
**TASK 2 COVER SHEET: DIFFICULT**

## TASK 2: Scanning for Objects

### 20-Minutes | DIFFICULT

#### FIND THE OBJECTS

---

**Before you begin, please take a moment to answer the following questions:**

1. Based off your score in TASK 1 (the number of words you found) and how you did in comparison to all other students who participated last semester, you have \_\_\_\_\_ Visual Scanning Ability (VSA).

A. Excellent  
C. Average

B. Fair  
D. Poor

2. How attractive do you personally find the \$5.00 gift card?

1   2   3   4   5   6   7   8   9   10   11   12   13   14  
15

Not Attractive  
Attractive

Very

3. How difficult do you expect “TASK 2: Finding Objects” to be?

1   2   3   4   5   6   7   8   9

Easy

Moderately Difficult

Extremely Difficult

---

**Remember:** You have 20 minutes. To win the prize you must score in the top 15%.

---

**APPENDIX L**  
**TASK 2 COVER SHEET: UNKNOWN**

## TASK 2: Scanning for Objects

### 20-Minutes | Find as many objects as possible

#### FIND THE OBJECTS

---

**Before you begin, please take a moment to answer the following questions:**

1. Based off your score in TASK 1 (the number of words you found) and how you did in comparison to all other students who participated last semester, you have \_\_\_\_\_ Visual Scanning Ability (VSA).

A. Excellent  
C. Average

B. Fair  
D. Poor

2. How attractive do you personally find the \$5.00 gift card?

1    2    3    4    5    6    7    8    9    10    11    12    13    14  
15

Not Attractive  
Attractive

Very

3. How difficult do you expect “TASK 2: Finding Objects” to be?

1    2    3    4    5    6    7    8    9

Easy

Moderately Difficult

Extremely Difficult

---

**Remember:** You have 20 minutes. Find as many objects as you can.

---

**APPENDIX M**  
**POSITIVE AFFECT**





**APPENDIX N**  
**MODIFIED FLOW STATE SCALE**

## QUESTIONNAIRE B

**Please answer the following questions in relation to your experience with your current task (Task 2: Finding Objects).** These questions relate to thoughts and feelings you may be experiencing. There are no right or wrong answers. Think about how you feel in relation to the task, and answer the questions using the rating scale below. Circle the number that best matches your experience from the options to the right of each questions.

---

*Rating Scale*

|  | Strongly disagree<br>1 | Disagree<br>2 | Neither agree<br>nor disagree<br>3 | Agree<br>4 | Strongly agree<br>5 |
|--|------------------------|---------------|------------------------------------|------------|---------------------|
| 1. I really enjoy this puzzle book task.   | 1                      | 2             | 3                                  | 4          | 5                   |
| 2. I love the feeling of performance associated with this task.                                  | 1                      | 2             | 3                                  | 4          | 5                   |
| 3. This task makes me feel great.  | 1                      | 2             | 3                                  | 4          | 5                   |
| 4. I find this task extremely rewarding.   | 1                      | 2             | 3                                  | 4          | 5                   |
| 5. My attention is focused entirely on the task.   | 1                      | 2             | 3                                  | 4          | 5                   |
| 6. As I scan for objects, I feel in total control of what I am doing.                            | 1                      | 2             | 3                                  | 4          | 5                   |
| 7. Since starting this task, the passage of time has altered (either slowed down or speeded up). | 1                      | 2             | 3                                  | 4          | 5                   |
| 8. It takes little effort to keep my mind engaged on the task.                                   | 1                      | 2             | 3                                  | 4          | 5                   |
| 9. I feel in control of what I am doing during the <i>seek-and-find</i> task.                    | 1                      | 2             | 3                                  | 4          | 5                   |
| 10. The way time is passing seems to be different than normal.                                   | 1                      | 2             | 3                                  | 4          | 5                   |
| 11. I am completely concentrated on the <i>Seek-and-Find</i> task.                               | 1                      | 2             | 3                                  | 4          | 5                   |
| 12. I feeling in absolute control.   | 1                      | 2             | 3                                  | 4          | 5                   |

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 13. Since starting the performance task, I was unaware of the passage of time. | 1 | 2 | 3 | 4 | 5 |
| 14. I am completely focused on the task.                                       | 1 | 2 | 3 | 4 | 5 |
| 15. While working, I feel in total control of my actions.                      | 1 | 2 | 3 | 4 | 5 |
| 16. At times, it almost seemed like things were happening in slow motion.      | 1 | 2 | 3 | 4 | 5 |

**APPENDIX O**  
**TASK ATTRACTIVENESS**



**APPENDIX P**  
**INCENTIVE ATTRACTIVINESS**



**APPENDIX Q**  
**MANIPULATION CHECKS**



**APPENDIX R**  
**DEMOGRAPHIC INFORMATION**

## Questionnaire F

1) What is your age? Please write a number in the space provided \_\_\_\_\_

2) What is your gender?

- Male
- Female
- Other
- Prefer not to say

3) What is your ethnicity?

- African American/Black
- Asian American/Asian
- European American/White
- Hispanic/Latino
- Indian or Pakistani
- Middle East
- American Indian
- Multi-Ethnic
- Other

4) What is your education level?

- Some high school
- High school/GED
- Some college
- Bachelor's Degree
- Master's Degree
- Advanced Graduate Work or Ph.D.
- Not sure

5) What is your major? \_\_\_\_\_

1. How much experience do you have attempting or completing word searches (like the one you completed for TASK 1)?

1      2      3      4      5      6      7      8      9

No Experience

A lot of Experience

2. How much experience do you have attempting or completing object search puzzles (like the one you completed in TASK 2)?

1      2      3      4      5      6      7      8      9

No Experience

A lot of Experience

**APPENDIX S**  
**DEBRIEFING FORM**

Today's Date: \_\_\_\_\_  
\_\_\_\_\_

Participant # \_\_\_\_\_

Participant Name \_\_\_\_\_

Participant email: \_\_\_\_\_

## DEBRIEFING DOCUMENT

---

Thank you for completing these questionnaires. I know you were probably expecting to continue working on the *Seek-and-Find* for another 5 minutes, but that will not be the case. This experiment is now over. If you would please put all materials back in the folder.

*Wait until that is done... then have a seat*

**[1]** Before you leave I would like to spend a few minutes talking to you about today's experiment. **But first, do you have any general questions?**

*Answer with generalizations. Get through the debrief form before any specific answers are given (especially questions regarding the gift card).*

**[2]** What do you think this study is all about?

**[3]** Have you participated in other psychological studies? (Yes/No) **What kind of studies? Can you tell me what some of them were about?**

*Keep it brief here. Basically ascertain if they have/have not participated in a study involving deception OR if they are aware that some studies make use of the technique.*

**[4]** OK, so you [*are OR are not*] aware that sometimes participants are not always told the whole truth about a study until it is over. Do you think that may be true for this study? **In other words, do you think there is more to this study than I have told you so far?**

*Please circle: YES or NO*

If YES, then:

1) What about the study makes you think there is more to it?

**[5]** Early in this study you were informed that recent scientific studies have found that people who have high visual scanning ability (VSA) for written words also have high VSA for objects, and vice-versa (people who have low written word VSA also have low object VSA). When you read this information in the Study Instruction Document, did you believe it? **In other words, did you believe in “VSA” and the relatedness between written words and objects?**

*Please circle:* YES or NO

If NO, then:

Why didn't you believe that?

**[6]** OK, so for TASK 1 (the word search) you were given 5 minutes to find as many words as you could. I then provided you with feedback about your score. **Do you remember what the feedback said regarding your VSA?**

*Please circle:* YES or NO

If YES:

**[5a]** What did the feedback say exactly?

If NO:

**[5b]** What do you think it said? OR, can you provide me any details that you remember about the document and what it might have said?

**[7]** Did you believe that you had [low OR high] scanning ability?

*Please circle:* YES or NO

If NO

**[6a]** At the time you read your feedback, what caused you to not believe what you were told about your VSA?

[8] The instructions for TASK 2 and just prior to actually starting TASK 2 you read a few pieces of information regarding the difficulty of TASK 2. **Do you remember what you read regarding the “objective difficulty of the task”?** *you may need to que response.*

*Please circle:* EASY or DIFFICULT or NO INFORMATION GIVEN

If Easy or Difficult:

[7a] Did you believe that TASK 2 was actually going to be EASY/DIFFICULT?

If NO, then: Why?

If Unknown:

[7b] How difficult did you think TASK 2 was going to be?

[8] **Potential Question:** And finally: are you, or have you been, diagnosed with dyslexia?

*Please circle:* YES or NO

Ok, so as you can probably guess by now there is more to this study than what you were told. Let me tell you what we are studying in this experiment.

First, you read that there was a relationship between the ability to find written words and ability to find hidden objects. We told you this because that allowed us to manipulate your perceived ability to actually perform on TASK 2. Some participants were told they did well on TASK 1, whereas others were told that they did poorly on TASK 1. However, the feedback I gave you about your performance on TASK 1 was NOT based on your actual performance but it was predetermined before you came to the study. Thus the feedback was inaccurate.

Second, you read that the difficulty of TASK 2 was either objectively easy, objectively difficult, or were given no information. This was also predetermined before the study. Some participants were told that the task was easy, others were told that the task was difficult, and others were given no concrete information regarding the difficulty of TASK 2. However, all participants completed the same task.

**\*\*Make aware of Self-Perception Effect\*\***

“There is a phenomenon known as the **perseverance effect**. This is when people continue to believe information even though it has been shown to be untrue.

Please acknowledge this and keep it in mind if you are tempted to believe the fabricated feedback. **Do you understand thus that the feedback was inaccurate –and that you should not believe it? (Wait for answer – feel free to elaborate)"**

This was done because this study is not actually interested in VSA. This study is interested in flow, or optimal experience. Have you heard of flow before?

Flow is a state of intense concentration and enjoyment that occurs when one's ability meets the demands of the task. For example, a professional soccer player might experience flow as she is competing at a high level against a rival team. You might experience flow when you read a book or play a video game. This study attempts to create the flow experience in the laboratory setting by manipulating both ability and difficulty. You were informed, falsely, that you had low/high scanning ability and that the *Seek-and-Find* task was easy/difficult/unknown in order to create flow in the laboratory and study it. Does that make sense? **Do you understand now that the feedback you receive about your visual scanning ability was false and does not reflect your actual level of ability?**

Now, you were promised a \$5.00 gift card if you met the objective standard. Because I do not have enough gift cards to give every participant one, we are instead holding one drawing for a \$50.00 pre-paid visa gift card. If you wish to participate all you have to do is provide me with your name and email address and we will contact you once the study is completed, and if you have won the gift card.

It is my hope that the data we collected today will be useful in the understanding of flow experience. Thank you for your participation.

Before you leave, I have a favor to ask of you. It is important that future students taking part in this study remain unaware of what it is about; else they would not believe the deception. **I ask that you do not tell other students what the study is about, at least until the end of the semester. May I have your verbal conformation that you will not discuss the study? Thank you.**

If you have any questions or concerns, please contact the graduate student Aaron Bagley (bagea45@uwosh.edu), or Dr. Anca Miron ([mirona@uwosh.edu](mailto:mirona@uwosh.edu)). Thanks again for your participation!

**APPENDIX S**  
**SAMPLE FIND THE OBJECTS WORKSHEET**

# FIND the OBJECTS



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