Dynamic Self-Regulation: An Examination of how Goals Influence Motivation and Performance Over Time

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This thesis titled
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Abstract

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Dynamic Self-Regulation: An Examination of how Goals Influence Motivation and Performance Over Time

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The zeitgeist of psychology and economics has been that financial incentives lead to increases in effort. When examined empirically under static conditions, research shows that increases in value do lead to increases in motivation. What is not clear is how financial incentives influence motivation dynamically. A number of field studies have investigated individuals work motivation over time and found that individuals work more when their wage rate is lower, not higher. The authors of these studies theorize that individuals are using daily income goals and stop working once they reach their goal. However, these studies have largely been cross-sectional. This study seeks to test experimentally the direct influence of goals on motivation in a dynamic performance context. Results from the current study indicate that the majority of individuals worked longer when their wage rate was high and less when the wage rate was low, even when individuals had a monetary goal for each trial. However, individuals in the monetary goal condition who were loss averse and reported not valuing money highly did work less when their wage rate was higher.

Approved: _____________________________________________________________

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Introduction

Understanding how individuals' motivation changes over time is an important issue for both researchers and management. Yet, psychological theories and research designs are largely static snapshots of dynamic phenomena (Luce, 1995). For example, in psychology, expectancy theory, a prominent theory of work motivation, predicts that when the value attributed to a certain task increases, motivation and effort will increase (Vroom, 1964). Additionally, the model is generally supported empirically. For example, a meta-analytic review of expectancy theory supports the theoretical claims of expectancy theory, showing a positive correlation between value and persistence (Van Eerde & Thierry, 1996). Likewise, in economics, the rational economic model predicts that individuals will choose the option that results in the highest utility for the individual, where utility is a positive function of value (Camerer & Fehr, 2006). These hedonistic theories assume that individuals maximize pleasure and minimize pain (Camerer & Fehr, 2006; Donovan, 2002). Indeed, it appears that psychological and economic theory are in accord in predicting that individuals will persist longer on a task when they are receiving a higher wage than when they are receiving a lower wage.

However, does this relationship hold when applied to a dynamic context? The world outside is not static, but a dynamic, ever changing environment where individuals interact with their environment over time. Therefore, static theories may not explain behavior adequately when applied to more dynamic context (Dalal & Hulin, 2008). The standard economic theory of labor supply, called the intertemporal substitution of labor and leisure, uses standard static expectancy-value assumptions to predict that individuals
will supply more resources on days when their wage rate is high and supply less of their resources (i.e., engage in leisure) when the wage rate is low (Lucas & Rapping, 1969). However, across several field studies, researchers have found that motivation does not increase with increased wages. Instead, individuals allocate more resources (i.e., time) when the wage rate is lower (Camerer et al., 1997; Chou, 2002; Fehr & Goette, 2007; Oettinger, 1999).

Thus, it appears that in a dynamic context, with transitory wage fluctuations, motivation does not adhere to the same patterns found in static settings and theories. The authors of the empirical work on intertemporal substitution suggested that individuals worked in reference to a daily income goal and, once reached, stopped working for the day. On days when their wages were high, they reached their monetary goals in less time, and therefore worked less. It appears that when individuals use daily income goals, they violate standard economic and psychological expectancy-value theories of work motivation (Kanfer, 1990). Instead, goal-based descriptions of work motivation may be needed to explain why individuals persist longer on a task when their wage rate is low and persist less when their wage rate is high.

A goal-based description of human motivation can be found in theories of self-regulation (Vancouver, 2000). Goals are internally represented desired states (Austin & Vancouver, 1996) that determine what is regulated and to what level (Vancouver, 2000). More specifically, goals are believed to focus attention, give a reference to gauge effort and persistence on a task, and influence how to go about accomplishing the task (Locke & Latham, 1990). Most self-regulation theories of motivation describe individuals’
resource allocation policies regarding a task to be a function of the discrepancy between their current state and the goal for that task. Specifically, once the individual reaches the goal, which they will do relatively quickly for monetary goals when wages are higher, they no longer allocate resources to that particular task.

In contrast, expectancy-value theories of motivation state that individuals respond to an increase in wages with an increase in work, only stopping when the increase in value the wage represents no longer has any utility in comparison to the increased amount of effort (Kahneman & Tversky, 1979). That is, they predict that on days when wages are higher, individuals will work more because of the increase in value, and work less on days when the wage rate is low because this smaller reward is not as motivating. Thus, in cases where wages fluctuate temporally and monetary goals exist, expectancy-value and goal theories make distinct and opposite predictions.

Given the centrality of expectancy-value theories in economics and psychology (Heath, Larrick & Wu, 1999; Kanfer, 1990), threats to them need to be evaluated critically. To date, works investigating the role of temporary wage fluctuations on work motivation have only been performed in the field and have largely been cross-sectional, making it impossible to draw causal inferences. Researchers were unable to manipulate individuals' financials goals for these studies and alternative explanations for their findings abound. Therefore, a more controlled examination is necessary both to replicate the effect as well as to test the goal-striving explanation proffered. The purpose of this study is to create a situation in which expectancy-value and self-regulation theories of motivation make opposite predictions and compare the results to each prediction. Below I
review expectancy-value theories. Following is a review of the studies investigating the role of wage rate fluctuations on motivation in a dynamic work context. Next, goal-based theories of motivation are examined. Finally, a proposed study experimentally tests the influence of goals in a dynamic performance context with fluctuating wage rates.
Expectancy-Value Theories of Motivation

Expectancy-value theories of motivation posit that individuals make decisions based on the ultimate notion of maximizing pleasure and minimizing pain. In the rational economic model, this is achieved by choosing options that lead to greater overall utility (Simon, 1955). This conceptualization of individuals has not only been the zeitgeist of economics, but also found in psychological theories of motivation. Expectancy-value theories of motivation such as expectancy theory (Vroom, 1964) embrace this hedonistic conceptualization of individuals (Donovan, 2002). Under both the hedonistic economic conceptualization of man (economic man) and the psychological hedonistic conceptualization of man (expectancy theory), an increase in the value associated with a certain task should result in an increase in motivation. Discussion explicitly of the rational economic model will be provided later when exploring limitations of expectancy theory, but it should be noted that these two theories are not in conflict with one another, but rather the “economic man” is an integral component of expectancy theory (Donovan, 2002). What follows is a review of expectancy theory.

Expectancy Theory

According to expectancy theory, individuals compute a multiplicative mental calculation to reach the optimal choice, often defined heuristically with the equation: \( M = E \times V \) (Van Eerde & Thierry, 1996). M symbolizes motivation or force, E stands for expectancy, which is the belief that an individual’s actions lead to an outcome and V stands for valence or value, which is the subjective value or anticipated satisfaction of the outcome (Donovan, 2002). Vroom (1964) stated that motivation to perform a certain task
is the product of expectancy and the valence individuals place on that task. If, for example, a certain task has a high value and an individual has high expectancy for obtaining that highly valued outcome, the individual will be highly motivated to perform that task. If there is low value or low expectancy, an individual will not be as motivated to perform that task.

Note that V can stand for valence in ExV models (Kanfer, 1990). In ExV models, valence refers to the affective orientation (i.e., pleasure or pain) an individual attributes towards some outcome (Vroom, 1964). Valence is the psychological representation of the “objective” value and generally tracks monotonically to value. For example, an individual would report that $20 has higher positive valence than $10. Meanwhile, the value an individual expects to receive (i.e., valence) from an outcome is the component that influences the individual’s motivation. Just as valence is a psychological equivalent of value, Vroom (1964) defined expectancy as an individual's subjective probability of an action leading to an outcome. Kanfer and Ackerman (1989) refer to expectancy as a "predicted performance" judgment. The higher an individual's expectancy or predicted performance, the higher an individual's motivation. For example, if an individual believes it will be difficult to reach an outcome on a particular day, that individual will have low expectancy and, in turn, low motivation.

The two components, expectancy and valence, are multiplied to obtain an individual's level of motivation. For example, if the individual forecasts lower wages for the day, or believes putting in effort will not lead to rewards, the individual's level of motivation will be low compared to forecasts of higher wages or higher effort-to-reward
contingencies. An individual chooses actions that result in the highest positive force. According to expectancy theory, individuals perform this calculation throughout their day to choose actions in which they will engage (Vroom, 1964).

Donovan (2002), when discussing the empirical support of expectancy theory, concluded, in accordance with previous reviewers of the topic (Campbell & Pritchard, 1976; Pinder, 1998), that the evidence in support for the theory was not strong. One possible explanation for the weak support of the theory could have been a function of inappropriate designs used to test the theory. This issue was specifically examined in a meta-analysis. Van Eerde and Thierry (1996) analyzed the results of 77 studies investigating expectancy theory and its ability to predict performance, effort, intention, preference, and choice. Almost 75% of the studies analyzed used either a between-subjects design and/or used job performance as a dependent variable, which is contrary to the original conceptualization. The original conceptualization was about choosing among or allocating resources to options and should be examined using a within-subjects design. Within-subject designs consider the covariance between the force (or motivation) across options and the likelihood of choosing, or resources (e.g., time) allocated to, the options. Kennedy, Fossum, and White (1983) empirically investigated the predictive power of expectancy theory at the between-subjects level and at the within-subjects level. They found that a within-subjects design resulted in greater predictive power. Likewise, Van Eerde and Thierry found that when effort was the dependent variable and the study used a within-subjects design, the average correlation between value and effort is .52. These
results indicate support for the theoretical claim that increases in value lead to increases in effort when examined across the individual.

Additionally, a meta-analysis by Jenkins et al. (1998) investigated financial incentives and their influence on performance. They found that the relationship between performance quantity and the use of financial incentive systems was .34, but found no relationship with quality. Therefore, this provides evidence that individuals will increase their performance in response to increases in financial incentives. The results of the meta-analyses by both Van Eerde and Thierry (1996) and Jenkins et al. (1998) support the proposition that an increase in value leads to an increase in effort.

Although, these results appear to provide strong support for expectancy-value theories of motivation, they are not without their theoretical criticisms. The theoretical criticisms leveled against expectancy-value theories of motivation are explored next.

**Criticisms of Expectancy-Value Theories**

Under both the economic and psychological conceptualizations of human behavior, an increase in value for a certain task should result in an increase in effort. The previously discussed meta-analyses appear to support this theoretical claim, but a large body of evidence by behavioral economists, particularly in the last thirty years, has shown a rational conceptualization of individuals to be oversimplified and inadequate in many situations (Camerer & Fehr, 2006). Specifically, individuals possess limitations in perception (Miller, 1956), attention (Kahneman, 1973), memory (Baddeley, 1986), and analytical processing (Simon, 1957), and because of these limitation in cognitive capacities, individuals are not able to compute the relative efficacy of every single course
of action. Simon (1957) theorized that individuals often choose a course of action that is good enough for an event under consideration. In addition, expectancy-value theories provide no clear stopping rule for individuals to end one task and move to another. These theories predict that individuals switch to another task when the expected value for another task is greater than the current task being worked on. As previously outlined, because of limitations on cognitive capacity, this creates a challenging problem for individuals. Specifically, it would require that the individual continually assess a current task’s utility or motivational force against all other possible tasks one could be doing. To add even more complexity to the issue, these theories do not outline how value changes as one works on a task. Therefore, it is not clear how task progress would predict changes in behavior.

Part of the problem is that expectancy-value theories of motivation are largely static. Dalal and Hulin (2008) outline that in psychology, the dominant paradigm for investigating behavior and choice is to take static snapshots of the individual. They argue that in contrast, the issue of dynamics is of utmost importance if one is to understand motivation. Indeed, motivational researchers often define motivation in dynamic terms, but then do not appear to take that approach empirically (Dalal & Hulin, 2008). Yet, the disconnect between conceptualization and empirical designs might create misinterpretations of results. Indeed, this was the argument made above regarding the within and between-person designs used to test expectancy theory. Here the argument is that static designs might also lead to interpretation problems. Specifically, it may be that static designs support the predictions of static models like expectancy-value models, but
are may not be able to uncover the processes involved in motivation. For example, it appears that increased financial incentives increases motivation for an individual, or that individuals have higher motivation for a task with a difficult goal, but it is not clear if these relationships would hold if examined dynamically (Dalal & Hulin, 2008).

Individuals over time may feel fatigue from their increased allocation of resources from working on difficult goals, and thus motivation may wane. When increases in value are examined dynamically, the type of a goal an individual has may interact with the increases in value, leading to surprising results, such as the finding of a negative relationship between wages and hours worked (Camerer et al., 1997).

One approach to this challenge is the recognition that rational models of choice and behavior have been supplanted by behavioral and descriptive models of choice and behavior, the most popular being Kahneman and Tversky’s prospect theory (1979; Tversky & Kahneman, 1992). Prospect theory is a model of choice that explains individuals’ choice behavior that violates expected utility theory because of the many limitations in cognitive capacity. Prospect theory accounts for these violations to expected utility by having a value function that is concave for gains, convex for losses, and steeper for loss than gains. Additionally, prospect theory incorporates nonlinear probabilities where there is overweighting of small probabilities and underweighting of high probabilities (Tversky & Kahneman, 1992). The value function incorporates three principles that are important for the current study. First, a reference point divides outcomes into gains and losses, and it is assumed that individuals evaluate outcomes relative to this reference point. Second, outcomes that are determined as a loss are more
painful than equivalent gains are pleasurable. This phenomenon is called loss aversion and after numerous empirical tests, it has been determined that a loss is felt approximately twice as much as an equivalent gain (Tversky & Kahneman, 1991). Third, is the principle that outcomes have smaller marginal impact the further they are from the reference point.

Camerer et al. (1997), Chou (2002), and Fehr and Goette (2007) evoke prospect theory when explaining violations of the intertemporal substitution of labor. However, they also evoke a potentially more important concept, that of goals, to fully account for the phenomena they found. These field studies investigating intertemporal substitution and the explanations proffered are examined next. Then, self-regulation theories of motivation are described. Self-regulation theories provide a more cognitively efficient model of the individual, which is dynamic and incorporates goal striving as an integral part of motivation.
Motivation in a Dynamic Work Context

As previously outlined, in static paradigms, increases in wages often result in increased effort by individuals. The theory of labor supply proposed by Lucas and Rapping (1969) attempts to extrapolate the static positive influence of increased wages on effort into the dynamic context. The authors theorize that on days when wages are low, individuals will supply less labor resources, and on days when their wages are high they will supply more of their labor resources.

Although economic and psychological results support that individuals would work more when their wages were higher and work less when they are lower in a static context, there has been little support for the extrapolation of this theory in a dynamic context in the economic literature (Mankiw, Rotemberg, & Summers, 1985; Altonji 1986). However, Camerer et al. (1997) noted that these null results were not strong tests of intertemporal substitution because wage changes examined were not often transitory. In particular, to have an adequate test of the intertemporal substitution of labor, certain conditions must be satisfied. First, wages must be constant throughout the temporal period, but different between each temporal period. In addition, the effort index (e.g., number of hours an individual works) must be up to the laborer (Camerer et al., 1997). Camerer and colleagues found that New York City cab drivers meet these assumptions. Cab drivers wages fluctuate between days, although they stay relatively constant throughout the day, and they are able to quit whenever they want. Interestingly, when examined under these conditions, Camerer et al. (1997) found that individuals worked fewer hours when they were making money faster, as compared to when they were
making money more slowly (e.g., on nice days when individuals tended to walk rather than take cabs).

To account for this finding, the authors' hypothesized, post hoc, that individuals work in reference to a daily income goal. Performance below this goal, according to Camerer and colleagues (1997), creates a sense of loss, and allowed them to use the concept of loss aversion from prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) to explain their findings. Loss aversion is the propensity for individuals to be more sensitive to a loss than a gain of the same amount. Thaler (1985), with his theory of mental accounting, shows that individuals perceive failure to meet a reference level (goal) as a loss. Thus, the goal serves as a reference point that divides gains and losses and individuals are averse to losses, which motivates individuals to work until they meet their goal. In addition, prospect theory has diminishing marginal utility in the gains curve. Therefore, working beyond one's goal has diminishing return for the individual.

Chou (2002), who in addition to testing the intertemporal substitution of labor and leisure, also investigated Camerer et al.'s post hoc hypothesis that individuals use goals to determine how to allocate their time between work and leisure. Chou (2002) replicated the findings of Camerer et al. (1997) by examining data from taxi drivers in Singapore. Chou finds that wages and hours worked were negatively related, which supports the income targeting hypothesis of Camerer et al., as opposed to the intertemporal substitution of labor hypothesis (Lucas & Rapping, 1969). One difference between the Camerer et al. study and this study is that Chou used a questionnaire for the taxi drivers
and found that individuals who reported using income targets had a significantly stronger negative relationship between wages and hours worked.

Although Camerer et al. (1997) and Chou (2002) found that cab drivers worked fewer hours on high wage days, these studies were cross-sectional and are open to alternative interpretations and methodological criticisms. One criticism is that there may be supply-side shocks, such as cab drivers preferring not to work on a holiday. These holidays have higher wage rates than an average day, but the cab drivers are not working, therefore artificially inflating the results. In addition, one of the requirements to investigating intertemporal substitution is that wages are consistent throughout the day. Farber (2005) claimed that wages within a day vary dramatically and randomly. Lastly, Farber (2005) criticized these studies for measurement reasons, stating that the procedure used was biased towards a negative effect on wage. This means, according to Farber (2005) their data is biased towards not finding optimal intertemporal substitution of labor. Indeed, when Farber (2005) reexamined a new set of data from New York City cab drivers, using a strict income targeting model, he found a weak negative relationship between wages and hours worked. A strict income-targeting model is an extreme version of reference dependent choice, which has extremely high marginal utility of income below the income target and extremely low marginal utility above the income target, therefore individuals stop working once they reach their target (Farber, 2008).

Although, Farber found a weak negative relationship, his data has several limitations, such as missing data on when individuals worked and did not work. For this reason, his analysis is inconclusive as to within day relationships in labor supply, which
he acknowledges. Additionally, his data is collected from only 21 drivers, and six of these drivers worked less than 10 shifts; contrary to Camerer’s et al. (1997) data set, which had over 1400 individuals. Farber (2008) reevaluated his same data again applying a reference dependent model (i.e., prospect theory) to the data and found that drivers generally stopped if they reach their reference level income, but that this reference changes and that many individuals stop before reaching the reference level. These findings are more consistent with the findings of Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007) than Farber’s previous analysis (Farber, 2005).

Fehr and Goette (2007) attempted to overcome these limitations by utilizing a randomized field experiment. Fehr and Goette conducted their field experiment with Swiss bike messengers. Individuals were randomly assigned to one of two groups. The first group (Group A) received an increase of 25 percent in their commission rate for four weeks in September 2000. The other group (Group B) served as the control during this time. Then in November 2000, the groups switched, resulting in a balanced, within-person experimental design. To examine the loss aversion explanation, the authors proposed the idea of an individual difference regarding sensitivity to loss aversion. To measure this sensitivity, participants made lottery choices (Fehr & Goette, 2007).

Specifically, individuals were presented with two lotteries (the money has been converted from Swiss Francs to US dollars):

“Lottery A: Win $6.90 with probability 1⁄2, lose $4.28 with probability 1⁄2. If subjects reject lottery A they receive $0.
Lottery B: This lottery consists of six independent repetitions of lottery A. If subjects reject lottery B they receive $0.”

Participants were able to accept both lotteries, accept only one, or reject both lotteries. Individuals who rejected both lotteries were considered to be the most loss averse. If individuals rejected only lottery A they were coded as moderately loss averse\(^1\). Individuals who accept both lotteries were considered not to be loss averse (Feher & Goette, 2007).

Fehr and Goette (2007) found that bike messengers' degree of loss aversion interacted with the effect of wage changes on effort per shift, operationalized as daily revenue. Specifically, they found that the negative relationship between wages and effort were stronger for those with higher degrees of loss aversion. Indeed, they found no relationship between wages and effort for individuals who were determined not to be loss averse. This means that individuals considered loss averse worked less time when wages were high, and individuals not considered loss averse did not respond with decreased effort to the increase in wages (Fehr & Goette, 2007).

Although the study by Fehr and Goette (2007) provides a stronger test of intertemporal substitution than previous work (Camerer et al., 1997; Chou, 2002), there are still limitations that need to be addressed. The biggest problem is that Fehr and Goette and the previous authors investigating intertemporal substitution did not have a direct test of the goal effect. These authors theorize that the negative influence of higher wages on effort resulted because of goals, but these authors neglected to investigate empirically

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\(^1\) Only one individual accepted lottery A and then rejected lottery B. 19 rejected both, 8 rejected only lottery A and 14 accepted both lotteries.
whether individuals actually used goals. Farber (2008) brings up this criticism specifically with these studies investigating intertemporal substitution. Fehr and Goette indirectly attempted to address this issue by measuring individuals’ loss aversion, which is in line with previous authors (Camerer et al., 1997 and Chou, 2002) who suggested that individuals are loss averse towards their daily target and therefore are motivated to work toward the target. An alternative interpretation is that individuals who are loss averse utilize monetary goals, whereas individuals who are not loss averse do not utilize monetary goals. The individuals who are not loss averse may still be using targeted goals; they may just be of a different nature (e.g. daily time goals). Therefore, it is not necessarily an individual’s level of loss aversion that caused them to violate intertemporal substitution, but rather that these loss averse individuals used daily monetary goals. In addition, because a direct test of the goal was not addressed, it is not possible to examine how powerful the influence of the goal was for individuals. That is, do individuals stop near their goal level, or does the diminishing marginal utility of wages slowly decline?

Lastly, individuals in the treatment condition (i.e. those who received the 25 percent commission increase) worked in total more shifts than the control condition, but their effort per shift was less. The decrease in effort per shift was only found for individuals who were determined to be loss averse. Another possibility involves fatigue effects from working more shifts. Individuals supplied less effort per shift because of the fatigue of working more shifts. These issues therefore warrant a more controlled laboratory experimental test of intertemporal substitution, which includes a direct test of the goal effect.
The central theme throughout these studies is that individuals use daily monetary goals that cause them to violate standard theories of labor supply. Although, Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007) use prospect theory (Kahneman & Tversky, 1979) to account for these findings, they use the goal concept as a central assumption in that explanation. In the next section, I describe how goals are conceptualized in dynamic models of motivation, paying particular attention to Vancouver’s (2008) dynamic theory of self-regulation. In that theory, Vancouver formally incorporates goals into a dynamic theory of motivation. What follows is a description of Vancouver’s goal-based dynamic theory of motivation and then a study is proposed to test the influence of goals on motivation in a dynamic performance context.
Goal-Based Theories of Motivation

In addition to ExV models, goal-based models are very prominent in applied motivational theories (Kanfer, 1990). Presumably, goals focus attention, provide a reference regarding the amount of effort and persistence a task needs to be complete, and influence how individuals go about accomplishing tasks in their daily lives (Locke & Latham, 1990). Goal-based motivational theories are often classified as self-regulation theories (Vancouver, 2000). Vancouver and Day (2005) define self-regulation as the “process involved in attaining and maintaining (i.e., keeping regular) goals, where goals are internally represented (i.e., within the self) desired states” (p.158; emphasis added). Self-regulation theories examine how individuals attain and maintain their goals over time and in different environments (Kanfer, 1990). Self-regulation with goals may also be considered cognitively efficient because goals give the individual information on when to expend effort and when to stop expending effort on the referent task. There are numerous self-regulation theories that incorporate goals. The particular self-regulation theory utilized in this study is a dynamic, goal-based model of self-regulation based on control theory (Vancouver, 2008).

Dynamic Self-Regulation

Vancouver (2008) developed a formal computational model of dynamic self-regulation using a subsystems approach inherent in control theory models of human behavior (Grush, 2004; Jagacinski & Flach, 2003; Powers, 1973). Control theory models of self-regulation are interactional dynamic models of self-regulation, using negative feedback loops that represent interactions between the person and environment over time.
In particular, in a negative feedback loop, the consequences of a person’s action *feedback* to the person, which motivate (or retard) further action, closing a causal loop. The consequences from this interaction create changes in both the system and the environment in which the system is interacting (Vancouver, 2005). Specifically, Figure 1 depicts the negative feedback loop as used in control theory approaches. Above the environment/person border is what Vancouver (2008) calls the self-regulatory agent, which is an information processing subsystem. These subsystems are hypothesized to be hierarchically arranged within persons (Austin & Vancouver, 1996; Carver & Scheier, 1998), and their interactions with other information processing subsystems and the environment gives rise to emergent behavior at the system level (i.e., human behavior) (Vancouver, 2008).

*Figure 1. Negative Feedback Loop*
As an example of the role of self-regulatory agents, consider cab drivers. A potentially key self-regulatory agent includes an input function that transforms perceptions about an environmental variable ($v$), like money earned, into a perception of the state of the variable ($p$). The input function determines what is being regulated (Powers, 1973). The result of the input function feeds into a comparator function that compares it to the desired perception ($p'$), which is often referred to as a goal (Austin & Vancouver, 1996). If there is a discrepancy between the goal ($p'$) and the input function result ($p$), an error signal ($e$) is passed onto the output function. In Vancouver’s theory, error signals ($e$) only result from unrealized goals and are passed to the output function, meaning the comparator is asymmetric (Powers, 1973). The output function weighs error ($e$) by $g$, where $g$ is gain or “error sensitivity” (Hyland, 1988) and determines the level of output ($o$). The output from a self-regulatory agent determines the level of desired perceptions and gains for lower-level self-regulatory agents. At the bottom of the hierarchy, the agents’ outputs determine muscle tensions, transducing information process signals into actions on the environment (Miller, 1978; Powers, 1973). Via the effects of lower-level agents’ actions on the environmental variable, the output function reduces its error (Vancouver, 2008).

One implication of the model, and in particular the asymmetric nature of the comparator function, is that the agent stops sending error signals once the goal is reached. This is contrary to the idea of diminishing marginal utility offered by the reference dependent hypotheses of Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007). Under the dynamic self-regulation conceptualization, individuals stop acting on a
goal once the discrepancy between their current state and their desired state is zero. At that point, resources are allocated towards striving for another goal.

Another element of the dynamic self-regulation theory is that the state of the environmental variable \( v \) is a function of the outputs \( o \) of the agent and disturbances \( d \) from the environment. Both outputs and disturbances can change the state of a variable \( v \). Yet the structure of the negative feedback loop is such that the self-regulatory agent can adjust to these changes in the state of the variable over time, provided it has requisite variety (i.e., the capacity to counteract disturbances) (Ashby, 1952). What results is an agent that interacts with the environment to regulate a perception of a variable, which maintains alignment with the internally represented desired level (i.e. goal) (Vancouver, 2008).

To illustrate these processes, I continue the example using a hypothetical NYC cab driver from the study by Camerer et al. (1997). Assume a particular NYC cab driver is regulating the money made in a day \( v \). For example, suppose the individual has a goal of $300 \( (p') \) for the day. Halfway through the day the individual has made $75 \( (v) \) by carrying passengers through the streets of NYC. The individual compares their goal of $300 \( (p') \) to their current state $75 \( (p) \). Their current state is subtracted from desired state \( (p' - p) \) resulting in an error \( e \) of $225. This error \( e \) is passed onto the output function \( o \), which triggers lower-level self-regulatory agents involved in looking for and picking up fairs. Later in the day, the cab driver has made another $175 from fares, but was given a large tip of $100 (a large positive disturbance), putting his total to $300 (assuming the cab driver's input function includes tips in their monetary goal agent). At this point the
driver’s output no longer motivates the picking up of fares, allowing the driver to attend to other self-regulatory agents with errors (i.e., leisure activities). Using this approach, one can see that the cognitive demands are very simple: is the current state short of desired state? If so, continue working. No calculation of expected utility among alternatives is needed. In the present study, a cognitively simple model (goal-striving) and a cognitively complex model (expectancy-value) will be tested to determine, which model best accounts for individuals behavior in an environment with fluctuating wage rates.
The Present Study

Expectancy-value theories from psychology and economics predict that individuals should respond to financial incentives by increasing effort. There is support for this conceptualization of human behavior (Van Eerde & Thierry 1996; Jenkins et al., 1998). However, these hedonistic models of human behavior have rarely been investigated dynamically. Intertemporal substitution of labor is one dynamic version of hedonistic models. The field studies by Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007) showed results inconsistent with intertemporal substitution of labor. It is proposed that the use of daily income goals by individuals is the key reason the hedonistic theories failed this test. The psychological literature describes individuals as valuing and self-regulating with goals in mind (Austin & Vancouver, 1996). Therefore, it is important to demonstrate experimentally the role goals play in motivation and effort in this type of dynamic context. In addition, the prominence of expectancy-value theories in both psychology and economics warrants a strong test with high internal validity.

Because of the complex nature of this issue, a controlled laboratory investigation is needed to substantiate the results found by Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007).

Further, Camerer et al., (1997), Chou (2002), and Fehr and Goette (2007) interpret the behavior of the individuals under investigation using a modification of prospect theory with goals as reference points (Heath, et al., 1999). This means that they speculated individuals’ loss aversion motivated their work until they meet their goal. However, the authors in these studies never systematically examined whether individuals
had monetary goals or any other types of goals. An important step would be to give individuals in one condition a set daily income goal and individuals in other conditions different goals (e.g., do-your-best). Thus, in the current study, goals are assigned as a means of assessing the effect of goals on behavior. If wage rate correlates negatively with time in trial, for individuals in the monetary goal condition, it would begin to show the influential nature of monetary goals.

*Hypothesis 1:* Individuals in the monetary goal condition will work longer on the task when their wages rates are low relative to when their wage rates are high. That is, rate of pay will be negatively related to time on task.

A stronger test of the role of monetary goals involves comparing a monetary goal condition with a non-monetary goal condition. In the field studies performed, it was suggested that individuals created their own daily monetary goals. Therefore, a condition in which individuals are told to do-your-best is not a true control condition because individuals may self-create monetary goals. However, individuals could be given daily time goals. This condition would serve as a true control condition because it is the only condition that does not deal with profit earned. In addition, Camerer et al. (1997) found that individuals who worked the same number of hours each day would increase their wages by 7.8 percent with no negative effect on the amount of leisure time.

*Hypothesis 2:* Individuals in the time goal condition will work the same amount of time whether their wages are high or low. That is, rate of pay will be unrelated to time on task.
The Influence of Individual Differences on Motivation

Camerer et al. (1997) suggested that the reason why cab drivers worked longer on low wage rate days versus high wage rate days was that the cab drivers were loss averse towards their monetary goal. Fehr and Goette (2007) provided preliminary support to this hypothesis by showing that only individuals who were loss averse exhibited the negative relationship between wage rate and motivation. Therefore, in the current study we sought to understand how not only various types of goals influence motivation, but also how loss aversion influences individuals' motivation.

Fehr and Goette (2007) findings imply that individuals who are most loss averse are the ones most likely to set such monetary goals. Therefore, measuring individuals’ level of loss aversion and inquiring whether individuals in the do-your-best condition self-set goals can lead to a more refined explanation of process.

I also included a do-your-best goal condition. Normative theories of economics and decision making describe the very sophisticated calculations needed to maximize money earned. This type of calculation is consistent with expectancy-value models, in which individuals could work longer on high wage days and then on low wage days in an effort to make the most out of the time available. Some (e.g., most economists) would expect this to be the default process for workers, including NYC cab drivers. Yet, Camerer et al. (1997) calculated that the cab driver could have made 15.6% more money without spending any more time on the road had they adopted such a process. Thus, assigning a maximize goal (e.g., do-your-best) might lead some to do just that, but its vagueness and higher cognitive load requirements might lead others to set monetary goals
for themselves. Findings from Fehr and Goette (2007) indicate that this is more likely to happen if individuals are loss averse. Therefore, I hypothesize this same relationship.

**Hypothesis 3**: Individuals who are loss averse in the do-your-best condition will be more likely to self-set monetary goals than individuals who are determined not to be loss averse.

**Hypothesis 4**: For individuals in the do-your-best condition, the greater one’s loss aversion the stronger will be the negative relationship between rate of pay and time worked.

**Hypothesis 5**: For individuals in the do-your-best condition who self-set a monetary goal, and are loss averse there will be a negative relationship between rate of pay and time worked.

In addition to investigating the influence of loss aversion on those with the sophisticated goal of maximizing efficiency, the influence of loss aversion on individuals in the monetary goal condition was also examined. Consistent with Fehr and Goette (2007) we hypothesize that individuals in the monetary goal condition with higher levels of loss aversion will show a stronger negative relationship between rate of pay and time worked because the failure to reach a financial goal is considered a loss, which motivates individuals to reach their financial goal (Thaler, 1985).

**Hypothesis 6**: For individuals in the monetary goal condition, the greater one’s loss aversion the stronger will be the negative relationship between rate of pay and time worked.
Another important individual difference that may have an influence on how individuals allocate their time between work and leisure is their perceptions of money. Some individuals may be more influenced by money than others. These differences in perceptions of the value of money may add to a more complete account of individual's dynamic motivation as a function of fluctuating wage rates. Tang and Chiu (2003) developed a scale called the love of money scale (LOM) that measures an individual's perception of money. Tang and Chiu state, “The love of money scale reflects the combined notion that money is a motivator, that money represents my success, that money is important, and that I want to be rich” (p.16). Tang and Chiu theorize that individuals who score high on the love of money scale are motivated by money above all else and therefore have low intrinsic motivation, high external locus of control and feel psychological distress with life and pay. Because of the lack of previous research on individuals' perceptions of money, and how it influences their allocation of time between work and leisure, I do not make any hypotheses about how an individual's perception of money may influence their motivation. The influence of perceptions of money on motivation will be examined in exploratory analyses.
Method

Participants

Participants in this study were 119 students enrolled in introductory psychology courses at a large mid-western university. They were recruited from the introductory psychology participant pool and given 1 point of course credit for their participation. Of those participating in the study 44% were female, 56% were freshman students, 92% were Caucasian, the mean age was 19.59 and 62% of the sample had at least one year of work experience.

Design and Manipulations

A 3 (goal) x3 (wage rate) mixed factorial design with goal as a between-subjects factor and wage rate as a within-subjects manipulation was utilized for this study. Participants were randomly assigned to goal condition and a blocked random assignment procedure was used to assign trials to wage rates. The blocked random procedure assured that each participant was assigned to each of the wage rate conditions every three trials, with the order of the assignment varying randomly.

Task

Participants performed a task called the Hurricane Game (Figure 2), adapted from a previous study (Vancouver, More, & Yoder, 2008). Participants were told that they work for the Hurricane Relief Agency and their job is to nail down boards flying across the screen. The participants were able to nail down the boards by clicking on the “boards” as they “flew” across the screen. There was one board on the screen at a time. When an
individual clicked a board, they received one dollar (participants were aware that no real money was involved) for the board clicked.

![Figure 2. Screen Shot of the Hurricane Game](image)

When the participant clicked a board, they received a message that said, “Good job. You nailed a board. You received 1 dollar for nailing the board. If you would like to continue playing, click Ok.” The Hurricane Game consisted of 12 trials and each trial could last up to four minutes. Each trial is representative of a single day. On the side of the screen, the earnings generated for that particular trial was provided. At any time, the participant can click a button on the side of the screen that says, “Call it a day.” When
they “Call it a day,” the work period of the trial ends. The work period ended when either
the individual clicks the "Call it a day" button or time ran out. If there was time left in the
trial when individuals click the "Call it a day" button, the individual is presented with
video clips from *America's Funniest Home Videos* until the 4-minute trial ends. This is
meant to simulate leisure, which is needed to have a realistic test of intertemporal
substitution of labor and leisure. For those in the goal conditions, once individuals click
on enough boards to reach their goal or spend enough time in the trial, they were
informed that they had met their goal and asked if they would still like to keep playing.

**Measures and Manipulations**

**Condition.** Individuals were randomly assigned to one of three conditions.
Individuals in the *no goal* condition were told during the trial to “do-your-best.”
Individuals in the *set time goal* condition were told to “work 2 minutes” during the trial.
Individuals in the *monetary goal* condition were told to “make $30” during the trial. Pilot
work indicated that individuals could make about $30 in 2 minutes given the distribution
of wage rates described below.

**Wage rate.** Wage rate was operationalized by the speed at which the boards flew
around the screen. There were three different speeds creating three wage rates.
Specifically, in the slowest condition, boards could be hit relatively quickly, making the
participant money more quickly (i.e., high wage rate); whereas, in the faster condition
boards are harder to hit, taking more time on average, and thus lowering the wage rate.

**Demographics.** Individuals were asked to provide information on their gender,
race, age, year in college, and previous work experience in years.
Motivation/Performance. Motivation was measured by the amount of time a person spent in the work part of the trial (i.e., the time prior to “calling it a day”). Performance was measured in the hypothetical money made by the participants.

Love of money. Individuals' perceptions of money was measured using a 17-item, 5-point disagreement-agreement scale (1-5) by Tang and Chiu's (2003) 4-factor love of money scale (Appendix A). The four factors are Importance ($\alpha = .75$); Success ($\alpha = .76$); Motivator ($\alpha = .81$); and Rich ($\alpha = .82$).

Loss aversion. Loss aversion was measured using a measure designed by Gachter, Johnson, and Herman (2007). Specifically, to determine an individual’s level of loss aversion, cumulative prospect theory was used (Tversky & Kahneman, 1992; see Appendix B for proof). An individual’s level of loss aversion ($\lambda_{\text{risky}}$) for a lottery with equal probability of winning and losing is simply gain of winning ($G$) divided by loss in a given lottery ($L$). Therefore loss aversion is measured as $\lambda_{\text{risky}} = G/L$ (Gachter et al., 2007). Although loss aversion can be used as a dichotomous variable, to have more information loss aversion is used as a continuous variable and then reversed coded the variable so higher numbers signify higher levels of loss aversion. The lotteries are presented as follows with the gain ($G$) staying constant and the loss ($L$) varying:

Lotteries
#1. If the coin turns up heads, then you lose $2; if the coin turns up tails, you win $6
#2. If the coin turns up heads, then you lose $3; if the coin turns up tails, you win $6.
#3. If the coin turns up heads, then you lose $4; if the coin turns up tails, you win $6.
#4. If the coin turns up heads, then you lose $5; if the coin turns up tails, you win $6.
#5. If the coin turns up heads, then you lose $6; if the coin turns up tails, you win $6.
#6. If the coin turns up heads, then you lose $7; if the coin turns up tails, you win $6.
Monetary goal manipulation check and self-set goal creation measure. All conditions were asked the same questions about goals at the end of the experimental period. Specifically, individuals were asked if they had a monetary goal for each trial (Yes or No) and then asked the level of the goal.

Post experiment questions. Satisfaction with performance was measured using a single question, which asked how satisfied they were with their performance. Additionally, individuals were asked how satisfied they were with their allocation between work and leisure. Both questions used a 5-point (1-5) Likert-type satisfaction response set. Participants were also asked, “Did the speed of the hurricane affect how important it was to work on the trial?” There were four possible responses. For each speed (fast, moderate, slow) the response stated, "Yes, it was more important to work on the (i.e., fast) hurricane." The last response stated, "No, it did not matter how fast the hurricanes were in terms of importance."

Participants were also asked, "Did the speed of the hurricane affect how easy it was to make money on a trial". There were four possible responses: "Yes, it was easier to make money on the fast hurricanes", "Yes, it was easier to make money on the medium speed hurricanes", "Yes, it was easier to make money on the slow hurricanes", and "No, it did not matter how fast the hurricanes were in terms of ease of making money".

Finally, individuals were asked, "Did you find it more intrinsically rewarding to work on the fast hurricanes?" There were three possible responses: "No, I found the slow hurricanes more rewarding", "No, the speed of the hurricane did not matter", and "Yes,
working on the fast hurricanes was more rewarding than working on the slow hurricanes.”

**Analysis**

A repeated-measure mixed model design was used for some hypotheses to investigate the influence of goals on motivation and performance. The repeated measure ANOVA was used because the repeated measures violate the assumption of independence for the standard ANOVA (Stevens, 1996). Additionally, the use of hierarchical linear modeling (Bryk & Raudenbush, 1992) was used to investigate the influence of goals and individual differences on motivation over time. Hierarchical linear modeling (HLM) was used because it correctly models data with correlated errors, such as repeated measures, whereas the general linear model is limited in its ability to account for correlated errors. HLM creates multilevel regression equations for each participant in the sample with the Level-1 equation being the within-person effects and the resulting regression coefficients are regressed on the Level-2 equation, which are the between-person effects. When using HLM it is customary to center the data (Bryk & Raudenbush, 1992) and therefore for all analyses done with HLM the data was grand mean centered improving interpretability because the intercept has a meaning (i.e., it is the in the middle of the data distribution).
Results

Manipulation Check

There were two manipulation checks for the current study. The first manipulation check was a check for the goal condition. As indicated, the majority of individuals (64%) in the monetary goal condition did not report having a monetary goal. Moreover, of the individuals reporting setting a monetary goal, the most common level was $10 per trial, which was endorsed by 10 individuals, although $30 was the assigned goal for individuals in the monetary goal condition. Goals ranged from $1 per trial to $100.

In addition to the survey questions, an ANOVA was performed to determine if the wage rate was significantly higher for the slow speed compared to the fast and moderate speeds. Wage rate was calculated by dividing the amount of money made per trial by the time in trial. Then an ANOVA was used to test for differences in wage rate. Specifically, on average individuals made $0.29/second in the slow speed (high wage rate) condition, $0.16/second in the moderate speed (moderate wage rate) condition, and $0.07/second in the fast speed (low wage rate) condition. These wage rates differed significantly across the three speeds, $F(2, 1396) = 503.72, p < .001$. Bonferroni post-hoc comparisons of the three speeds indicate that the slow speed's wage rate ($M = 0.29, SE = 0.01$) was significantly ($p < .001, d = 2.20$) higher than the fast speed's ($M = 0.07, SE = 0.01, d = 2.20$) and significantly ($p < .001, d = 1.04$) higher than the medium speed's wage rate ($M = 0.16, SE = 0.01$). Comparisons between the fast and the medium speeds indicate that the medium speed's wage rate was significantly ($p < .001, d = 1.00$) higher than the fast speed's.
speed's wage rate. These results indicate that the speed manipulation was effective in creating different wage rates.

**Descriptive Statistics and Correlations**

Table 1 provides descriptive statistics broken down by condition and speed for both time in trial and trial earnings. Table 2 provides descriptive statistics and correlation statistics between the variables.

### Table 1

*Descriptive Statistics for Time in Trial and Trial Earnings*

<table>
<thead>
<tr>
<th>Goal/wage rate</th>
<th>Time in Trial(in sec)</th>
<th>Trial Earnings ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do your best</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast</td>
<td>112.87 (71.85)</td>
<td>$8.00 (7.12)</td>
</tr>
<tr>
<td>Moderate</td>
<td>132.61 (70.84)</td>
<td>23.45 (22.96)</td>
</tr>
<tr>
<td>Slow</td>
<td>163.60 (67.84)</td>
<td>51.55 (33.14)</td>
</tr>
<tr>
<td>Average</td>
<td>136.44 (73.13)</td>
<td>27.74 (29.74)</td>
</tr>
<tr>
<td>Money goal ($30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast</td>
<td>119.42 (83.68)</td>
<td>8.63 (8.46)</td>
</tr>
<tr>
<td>Moderate</td>
<td>144.51 (76.09)</td>
<td>23.44 (19.46)</td>
</tr>
<tr>
<td>Slow</td>
<td>144.44 (71.12)</td>
<td>44.92 (25.56)</td>
</tr>
<tr>
<td>Average</td>
<td>136.13 (77.87)</td>
<td>25.66 (24.27)</td>
</tr>
<tr>
<td>Time goal (120 sec)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast</td>
<td>121.30 (68.58)</td>
<td>6.63 (5.74)</td>
</tr>
<tr>
<td>Moderate</td>
<td>134.64 (65.94)</td>
<td>17.78 (16.06)</td>
</tr>
<tr>
<td>Slow</td>
<td>152.29 (73.84)</td>
<td>39.69 (24.60)</td>
</tr>
<tr>
<td>Average</td>
<td>136.07 (70.47)</td>
<td>21.36 (22.05)</td>
</tr>
</tbody>
</table>

*Note.* Means are presented with standard deviation in parentheses.
Table 2

**Descriptive Statistics and Correlations among Variables**

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Speed</td>
<td>4.00</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Time in Trial</td>
<td>136.25</td>
<td>74.1</td>
<td>.21**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Wage Rate</td>
<td>0.17</td>
<td>0.14</td>
<td>.64**</td>
<td>.19**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Trial Earnings</td>
<td>25.61</td>
<td>26.5</td>
<td>.60**</td>
<td>.56**</td>
<td>.83**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Total Earnings</td>
<td>172.37</td>
<td>129.34</td>
<td>-0.02</td>
<td>0.04</td>
<td>.35**</td>
<td>.32**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Loss Aversion</td>
<td>4.40</td>
<td>1.80</td>
<td></td>
<td>-0.10</td>
<td>0.03</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. LOM Importance</td>
<td>3.92</td>
<td>0.57</td>
<td>-0.18**</td>
<td>0</td>
<td>-0.08**</td>
<td>-0.08**</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>8. LOM Motivation</td>
<td>3.92</td>
<td>0.61</td>
<td>-0.14**</td>
<td>0.01</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.09**</td>
<td></td>
</tr>
<tr>
<td>9. LOM Rich</td>
<td>3.73</td>
<td>0.68</td>
<td>-0.12**</td>
<td>0.05</td>
<td>0</td>
<td>0.02</td>
<td>.06*</td>
<td></td>
</tr>
<tr>
<td>10. LOM Success</td>
<td>3.12</td>
<td>0.79</td>
<td></td>
<td>-0.05</td>
<td>-0.03</td>
<td>-0.04</td>
<td>-0.04</td>
<td>-0.04</td>
</tr>
<tr>
<td>11. LOM Total</td>
<td>3.69</td>
<td>0.52</td>
<td></td>
<td>-0.15**</td>
<td>0</td>
<td>-0.05</td>
<td>-0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>12. Gender</td>
<td>1.74</td>
<td>1.27</td>
<td></td>
<td>-0.07*</td>
<td>0.05</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>13. Education</td>
<td>1.67</td>
<td>0.90</td>
<td></td>
<td>0</td>
<td>-0.03</td>
<td>-0.06*</td>
<td>-0.04</td>
<td>-0.05</td>
</tr>
<tr>
<td>14. Age</td>
<td>19.59</td>
<td>7.43</td>
<td>0.02</td>
<td>-0.02</td>
<td>0</td>
<td>0</td>
<td>-0.10**</td>
<td></td>
</tr>
<tr>
<td>15. Work</td>
<td>3.35</td>
<td>0.96</td>
<td></td>
<td>0.04</td>
<td>0</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Note. N = 119. Gender (1 = Female, 2 = Male). Education (1 = Freshmen to 5 = Graduate Student). Work Experience (1 = None, 2 = Less than six months, 3 = Six months to a year, 4 = > a year).

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).
Table 2 (continued)

Descriptive Statistics and Correlations among Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Time in Trial</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Wage Rate</td>
<td></td>
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<td></td>
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<tr>
<td>4. Trial Earnings</td>
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<td>5. Total Earnings</td>
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<td>6. Loss Aversion</td>
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<td>7. LOM Importance</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>8. LOM Motivation</td>
<td></td>
<td>.57**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9. LOM Rich</td>
<td></td>
<td>.62**</td>
<td>.54**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10. LOM Success</td>
<td></td>
<td>.47**</td>
<td>.40**</td>
<td>.47**</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>11. LOM Total</td>
<td></td>
<td>.84**</td>
<td>.76**</td>
<td>.82**</td>
<td>.76**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12. Gender</td>
<td>-.09**</td>
<td>-.03</td>
<td>-.11**</td>
<td>.02</td>
<td>-.07*</td>
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<tr>
<td>13. Education</td>
<td>-.20**</td>
<td>-.05</td>
<td>-.07**</td>
<td>0.02</td>
<td>-.01</td>
<td>.06*</td>
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<td>14. Age</td>
<td>0.01</td>
<td>0.05</td>
<td>.10**</td>
<td>0.05</td>
<td>.50**</td>
<td>.38**</td>
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<td>15. Work</td>
<td>0.03</td>
<td>-.17**</td>
<td>-.03</td>
<td>.10**</td>
<td>-.01</td>
<td>-.02</td>
<td>.19**</td>
<td>.10**</td>
</tr>
</tbody>
</table>

Note. N = 119. Gender (1 = Female, 2 = Male). Education (1 = Freshmen to 5 = Graduate Student). Work (1 = None, 2 = Less than six months, 3 = Six months to a year, 4 = > a year).
*Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
Post Experiment Questions

Results indicate that individuals were satisfied with both their performance ($M = 3.33$, $SD = .831$) and their allocation of time spent between work and leisure ($M = 3.94$, $SD = 1.291$). A majority of individuals (57%) stated that it was more important to work on the slow speed hurricanes. A majority of individuals (87%) reported that it was easier to make money on the slow speed hurricanes. A majority of individuals (71%) reported that the slow hurricanes were more intrinsically rewarding. These results are in accord with Camerer et al. (1997) who stated that high wage rate days were more pleasurable than low wage rate days. Intrinsic motivation theories (Deci & Ryan, 1985) would predict that individuals would work on the task that is most pleasurable; and economic theories would predict individuals would work on the task with the highest wage rate. This result indicates that both predictions are correct. These questions were asked to gauge individuals’ attitudes about their work performance and their intrinsic motivation for the task.

Hypothesis Tests

All analyses were first run with gender in the model because gender is a potential important individual difference and no significant differences were found. All subsequent analyses were done collapsing across gender. Hypothesis 1 and 2 were both tested using Bonferroni posttests from the same omnibus test. The omnibus test of these hypotheses was a 3 between (monetary goal, time goal, do-your-best condition) x 3 within (high, moderate, and slow wage rate). This was done using the repeated measures ANOVA. Because this test violated the assumption of sphericity, the Huynh-Feldt correction was
used. I found no main effect for goal condition, $F(2,116) = 0.00$, $p = 1.00$, $\eta^2 = 0.00$, a main effect for wage rate, $F(1.94, 224.46) = 25.44$, $p < .001$, $\eta^2 = .18$, and rate X condition interaction, $F(3.87, 224.46) = 2.46$, $p < .05$, $\eta^2 = .04$. Table 3 presents the ANOVA results and Figure 3 plots the results from the analysis for time in trial across the three speeds for all conditions. The significant interaction allowed me to perform post hoc analyses to test the hypotheses.

Table 3

*Repeated Measures Analysis of Variance: The Effects of Goals and Wage Rate on Time in Trial*

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>dfS</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
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<tr>
<td>Goal Condition</td>
<td>1.25</td>
<td>0.623</td>
<td>0</td>
<td>2,116</td>
<td>0</td>
</tr>
<tr>
<td>Error</td>
<td>559916.77</td>
<td>4826.87</td>
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<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage Rate</td>
<td>70705.13</td>
<td>35352.56</td>
<td>25.44**</td>
<td>1.94, 224.46</td>
<td>0.18</td>
</tr>
<tr>
<td>Wage Rate x Condition</td>
<td>13690.27</td>
<td>3537.52</td>
<td>2.46*</td>
<td>3.87,224.46</td>
<td>0.04</td>
</tr>
<tr>
<td>Error</td>
<td>322400.76</td>
<td>1436.33</td>
<td></td>
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</tr>
</tbody>
</table>

Note. N = 116. *$p < 0.05$, **$p < .001$
Hypothesis 1. With regards to the first hypothesis, I was interested in the effect of wage rate on time in trial for individuals in the monetary goal condition. Specifically, when the wage was low it was hypothesized that individuals would work longer because it would take longer to reach their monetary goal and therefore would work longer in the trial. Results showed that in the monetary goal condition, individuals spent significantly ($p < .05$, $d = 0.41$) more time in the moderate wage rate trials ($M = 144.51$, $SE = 9.53$) than in the low wage rate trials ($M = 119.42$, $SE = 10.24$). There was a marginally significant difference ($p = .09$, $d = 0.45$) between the high wage rate trials ($M = 144.44$, $SE = 7.47$) and the low wage rate trials ($M = 119.42$, $SE = 10.24$). These results indicate that individuals in the monetary goal condition spent more time in trial in the high and moderate wage rate trials, which does not support the hypothesis.

Additionally, those in the monetary goal condition who reported having a monetary goal were analyzed separately. This was done to examine whether individuals
who reported having a monetary goal exhibited the negative relationship. There were only six individuals out of a possible 39 individuals in the monetary goal condition who reported having a monetary goal. The above analysis is repeated with only those individuals who reported having a monetary goal in the monetary goal condition.

ANOVA was used to test for differences in time in trial for those who reported that they had a monetary goal. This test violated the assumption of sphericity and therefore the Huynh-Feldt correction was used. The time in trial did not significantly differ across the three wage rates, for those who reported having a monetary goal, \( F(1.5, 7.473) = 0.14, \ p=0.81. \)

The trial earnings for individuals who claimed to have a monetary goal were examined to determine if they were striving for the monetary goal for each trial. ANOVA was used to test for differences in trial earnings for those who reported that they had a monetary goal. This test violated the assumption of sphericity and therefore the Huynh-Feldt correction was used. The trial earnings differed significantly across the three wage rates, for those who reported having a monetary goal, \( F(1.62, 8.1) = 33.22, \ p < .001. \)

Because of the significant omnibus test, post hoc tests were performed using Bonferroni correction. Individuals made significantly \((p < .01, d = 4.56)\) more money in the high wage rate trials \((M = 49.08, SE = 3.52)\) than in the low wage rate trials \((M = 12.13, SE = 3.10)\). Individuals also made significantly \((p < .05, d = 3.33)\) more money in the high wage rate trials than in the moderate wage rate trials \((M = 26.63, SE = 2.18)\). Individuals also made significantly \((p < .01, d = 2.21)\) more money in the moderate wage rate trials than in the low wage rate trials. These results indicate that although individuals reported
setting a monetary goal, they do not appear to follow the monetary goal and rather
respond to differences in wage rates between the trials.

**Hypothesis 2.** With regards to the second hypothesis, I was interested in the
influence of wage rate on time in trial for individuals in the time goal condition.
Specifically, individuals with a time goal should spend the same amount of time in trial
no matter the wage rate of the hurricane. Therefore, a non-significant relationship
between wage rate and time in trial would provide support for this hypothesis. In the time
goal condition individuals spent significantly more time in the high wage rate trials (M =
152.29, SE = 1.43) than in the low wage rate trials (121.30, SE = 9.37), p < .05, d = 0.61.
There was also a significant difference between the high wage rate trials and the
moderate wage rate trials (M = 134.64, SE = 9.10), p < .05, d = 0.45. These results
indicate that individuals in the time goal condition spent more time in trial in the high
wage rate trials and spent less time in the low wage rate trials, which means the second
hypothesis was not supported.

**Hypothesis 3.** With regards to the third hypothesis, I was interested in whether
those in the do-your-best condition would be more likely to self-set monetary goals as a
function of their level of loss aversion. To test this hypothesis a point-biserial correlation
was performed to determine if loss aversion was positively related to self-setting
monetary goals as measured by the goal manipulation check question for individuals in
the do-your-best condition. Consistent with the hypothesis, results indicate that there is a
positively significant relationship between loss aversion and the setting of a monetary
goal for individuals in the do-your-best condition, rpb = .224, p < .001. There were no
significant relationships found between loss aversion and self-setting a monetary goal for either the monetary goal or time goal conditions.

**Hypothesis 4.** With regards to the fourth hypothesis, I was interested in the influence of loss aversion on time in trial for individuals in the do-your-best condition. Specifically, individuals with higher levels of loss aversion should spend more time in trial on low wage rate trials. Therefore, a negative relationship between wage rate and time in trial would provide support for this hypothesis. HLM was used to assess the influence of wage rate on time in trial for individuals in the do-your-best condition. Specifically, when the wage rate was low, it was hypothesized that individuals with higher levels of loss aversion in the do-your-best condition would work longer in the trial. HLM was used to assess the influence of wage rate on time in trial for individuals in the do-your-best condition. Specifically, wage rate was regressed on loss aversion for the do-your-best condition. A negative effect in the intercept for loss aversion ($\beta_{01}$) and a significant effect in the slope for loss aversion ($\beta_{11}$) would indicate that the hypothesis was supported. The resulting HLM equation ($R$, $U_0$, and $U_1$ are error terms) took the following form:

**Level-1 Model (Trial)**

$$\text{Time in Trial} = \pi_0 + \pi_j \cdot (\text{Speed}) + R$$

**Level-2 Model (Individual)**

$$\pi_0 = \beta_{00} + \beta_{01} \cdot (\text{Loss Aversion}) + U_0$$

$$\pi_1 = \beta_{10} + \beta_{11} \cdot (\text{Loss Aversion}) + U_1$$
Contrary to the hypothesis, results indicate that loss aversion did not influence the relationship between time in trial and wage rate. For Equation 1, the intercept ($\beta_{00} = 136.37$) was significantly positive (SE = 4.74, $df = 51$, $p < 0.001$). For Equation 2, the intercept for loss aversion ($\beta_{01} = -2.49$) was not significant (SE = 2.28, $df = 51$, $p = 0.28$). For Equation 3, the slope for loss aversion ($\beta_{11} = 0.76$) was not significant (SE = 1.94, $df = 51$, $p = .70$). The non-significant values for $\beta_{01}$ and $\beta_{11}$ indicates that loss aversion had no influence on time in trial for individuals in the do-your-best condition.

**Hypothesis 5.** With regards to the fifth hypothesis, was interested in the influence of loss aversion on time in trial for individuals who **self-set goals** in the do-your-best condition. Specifically, individuals who self-set goals and have higher levels of loss aversion should spend more time in trial on low wage rate trials. HLM was used to assess the influence of wage rate on time in trial for individuals who self-set goals in the do-your-best condition. A negative effect in the intercept for loss aversion ($\beta_{01}$) and a significant effect in the slope for loss aversion ($\beta_{11}$) would indicate that the hypothesis was supported. The resulting HLM equations took the same form as the previous equations.

Contrary to the hypothesis, results indicate that loss aversion did not influence the relationship between time in trial and wage rate for those who self-set goals in the do-your-best condition. The intercept ($\beta_{00} = 133.94$) was significantly positive (SE = 8.26, $df = 13$, $p < 0.001$). The intercept for loss aversion ($\beta_{01} = 3.25$) was non-significant (SE = 4.76, $df =13$, $p = 0.51$). The slope for loss aversion ($\beta_{11} = 2.05$) was non-significant (SE
\( = 3.90, df = 13, p = 0.61 \). The non-significant values for \( \beta_{01} \) and \( \beta_{11} \) indicates that loss aversion had no influence on time in trial for individuals who self-set goals in the do-your-best condition.

**Hypothesis 6.** The sixth hypothesis examined the influence of loss aversion on individuals in the monetary goal condition. Individuals in the monetary goal condition with higher levels of loss aversion should spend more time in trial on low wage rate trials. Therefore, a negative relationship between wage rate and time in trial would provide support for this hypothesis. HLM was used to assess the influence of wage rate on time in trial for individuals who were loss averse in the monetary goal condition. A negative effect in the intercept for loss aversion (\( \beta_{01} \)) and a significant effect in the slope for loss aversion (\( \beta_{11} \)) would indicate that the hypothesis was supported. The resulting HLM equations took the same form as the previous sets of equations.

Contrary to the hypothesis, results indicate that for individuals in the monetary goal condition, loss aversion did not influence the relationship between time in trial and wage rate. The intercept (\( \beta_{00} = 136.13 \)) was significantly positive (SE = 6.67, \( df = 37, p < 0.001 \)). The intercept for loss aversion (\( \beta_{01} = -9.09 \)) was significantly negative (SE = 3.00, \( df = 37, p = 0.009 \)). The slope for loss aversion (\( \beta_{11} = 5.51 \)) was non-significant (SE = 3.08, \( df = 37, p = 0.81 \)). The non-significant value for \( \beta_{11} \) indicates that the addition of loss aversion into the model for individuals in the monetary goal condition did not create the negative relationship between wage rate and time in trial.
Exploratory Analysis

In addition to the proposed hypotheses, I investigated the influence of the love of money individual difference as well as low aversion on time in trial for each condition. These analyses provide information about how individuals’ level of loss aversion and their value of money influence their persistence on the task. I first correlated loss aversion and the love of money scale. Results indicate that these two individual difference are not significantly related $r = .02$, $p = .423$. For ease of interpretability, analyses are broken down into each condition. HLM was used to assess the influence of wage rate on time in trial as a function of their score on the love of money scale and their level of loss aversion for individuals in each condition. The resulting HLM equation ($R$, $U_0$, and $U_1$ are error terms) is used for each condition and took the following form:

Level-1 Model (Trial)

$$\text{Time in Trial} = \pi_0 + \pi_1 \times (\text{Speed}) + R$$  \hspace{1cm} (4)

Level-2 Model (Individual)

$$\pi_0 = \beta_{00} + \beta_{01} \times (\text{Love of Money}) + \beta_{02} \times (\text{Loss Aversion}) + U_0$$  \hspace{1cm} (5)

$$\pi_1 = \beta_{10} + \beta_{11} \times (\text{Love of Money}) + \beta_{12} \times (\text{Loss Aversion}) + U_1$$  \hspace{1cm} (6)

**Money Goal Condition.** HLM was used to assess the influence of wage rate on time in trial as a function of their score on the love of money scale and their level of loss aversion for individuals in the money goal condition. Negative effects for love of money ($\beta_{01}$) and loss aversion ($\beta_{02}$) on the intercept ($\pi_0$) and significant effects for love of money ($\beta_{11}$) and loss aversion ($\beta_{12}$) on the slope ($\pi_1$) would indicate that individuals
who are high on loss aversion and love of money in the monetary goal condition will have a negative relationship between wage rate and time in trial.

The intercept ($\beta_{00} = 136.13$) was significantly positive ($SE = 6.32, df = 36, p < 0.01$), whereas the intercepts for love of money were both negative. The intercept for love of money ($\beta_{01} = -9.67$) was not significant ($SE = 14.39, df = 36, p = 0.51$), but the intercept for loss aversion ($\beta_{02} = -9.60$) was significantly negative ($SE = 3.39, df = 36, p = 0.008$). The intercept for the speed slope ($\beta_{10} = 12.51$) was significantly positive ($SE = 5.03, df = 36, p = .018$, variance explained = 19%). The effect of love of money ($\beta_{11} = 22.49$) was significantly positive ($SE = 8.95, df = 36, p = .017$), and the effect for loss aversion ($\beta_{12} = 6.69$) was also significantly positive ($SE = 2.77, df = 36, p = .021$). The negative relationships in the intercept and the significant effects in the slopes indicates that individuals who are highly loss averse, but who do not value money highly, worked longer on low wage rate trials and work less on high wage rate trials. Specifically, the addition of loss aversion and love of money explains 19% of the variance in the relationship between time in trial and wage rate. Figure 4 plots the model’s estimated values one standard deviation above and below the mean, indicating the negative relationship between speed and wage rate for individuals who are loss averse and do not value money. Specifically, individuals who are loss averse (one standard deviation above the mean) and who do not value money (one standard deviation below the mean) spend 86 seconds longer in low wage rate trials compared to those who are not loss averse (one standard deviation below the mean) and who value money (one standard deviation above...
the mean). These results indicate that when individual differences (i.e. loss aversion and love of money) are added into the model, a variation of Hypothesis 1 and 6 is supported.

Note. Values are plotted one standard deviation above and below the mean. Importance of money was determined through a self-report measure and individuals engaging in six repeated gambles determined individuals level of loss aversion. Values are significant at p < .05.

Figure 4. Time in Trial as a Function of an Individual's Level of Loss Aversion and Love of Money

Time Goal Condition and Do-Your-Best Condition. HLM was used to assess the influence of wage rate on time in trial as a function of individual's score on the love of money scale and their level of loss aversion for individuals in the time goal and do-your-best condition. Results indicate that that when loss aversion, love of money, or
when both are added to the model there is not a significant negative relationship between time and trial and wage rate.
Discussion

Expectancy-value theories and self-regulation theories can make distinct and opposite predictions about individuals' motivation in a dynamic context with fluctuating wage rates, depending on the goals one might be regulating. Previous investigations attempting to understand individuals' motivation in a dynamic context with fluctuating wage rates have only been done in the field and were largely cross-sectional, limiting the causal inferences that can be made about the influence of goals on motivation. Therefore, a more controlled experiment was performed to test the goal-based account of motivation in a dynamic context with fluctuating wage rates. Because of the controlled nature of the experiment, causal inferences can be made about the influence of goals. Both monetary goals and time goals were examined.

Theoretical Implications

Monetary Goals and Individual Differences. Results from this study provided little support for a goal-based account of motivation in a dynamic context with fluctuating wage rates. These results indicate that expectancy-value theories account for the majority of individuals' behavior in a dynamic task. The current study shows that individuals are able to navigate in a dynamic environment using a more cognitively demanding decision mechanism of expectancy-value rather than a simpler goal mechanism. Specifically, a negative relationship between wage rate and time worked was not found for those who had a monetary goal (Hypothesis 1). Instead, and consistent with hedonistic theories of behavior, a positive relationship was found. These results indicate that monetary goals may not have the impact on motivation hypothesized by Camerer et
al. (1997). Although, the strong monetary goal mechanism was not supported, the addition of individual difference variables did provide support to a monetary goal mechanism for some individuals. Recall that Fehr and Goette (2007) found that only individuals who were loss averse exhibited the negative relationship between wage rate and motivation. In the current study, when the individual’s level of loss aversion and their subjective perception of money were entered into the model, the negative relationship between wage rate and time worked was found for individuals in the monetary goal condition. Specifically, individuals in the monetary goal condition who were loss averse and who did not value money spent more time in trial when their wage rate was low and spent less time in trial when their wage rate was high (Figure 4). These results indicate that for a subset of individuals, the use of monetary goals can lead to behavior inconsistent with expectancy-value theories of motivation. These results indicate that individual differences play a significant role in determining whether individuals violate the theory of intertemporal substitution of labor and leisure.

Camerer et al. (1997) suggested that the reason why cab drivers worked longer on low wage rates days was that the cab drivers were loss averse to a reference level. For the cab drivers this reference level was their daily income goal. Fehr and Goette (2007) provided preliminary support to this hypothesis by showing that individuals who were loss averse exhibited the negative relationship between wage rate and motivation. The results from the current study replicate the Fehr and Goette findings that an individual’s level of loss aversion is an important construct that needs to be taken into account when examining the intertemporal of substitution of labor and leisure.
Fehr and Goette (2007) theorized that individuals who were loss averse set daily monetary goals and that this was the mechanism for creating the negative relationship between wage rate and motivation. In the current study, I wanted to test whether individuals who were not given a goal would adopt a monetary goal if they were high on loss aversion (Hypothesis 3). The results support this hypothesis. A positive relationship was found between setting a monetary goal and loss aversion for individuals in the do-your-best condition. These results indicate that for individuals who are highly loss averse when they are not presented with a monetary goal, are more likely to self-set a monetary goal than those who are not loss averse. Unfortunately, the results from the current study indicate that individuals’ level of loss aversion for those in the do-your-best condition did not influence individual times in trial (Hypothesis 4). In addition, the influence of loss aversion on time in trial was examined for those in the do-your-best condition who self-set a monetary goal and results indicate that loss aversion did influence time in trial for individuals who self-set goals (Hypothesis 5).

Results from the current study indicate that the other important individual difference that needs to be taken into account when examining dynamic motivation with fluctuating wage rates is individual's perceptions of money. In the current study, this was done using Tang and Chiu's (2003) love of money scale. Tang and Chiu state, “The love of money scale reflects the combined notion that money is a motivator, that money represents my success, that money is important, and that I want to be rich.” Tang and Chiu state that individuals who are high on love of money “will be motivated to do whatever it takes to make money” (p. 20). Therefore, individuals who are high on love of
money should work the longest no matter what the condition because they are so motivated to obtain the money. Results from the current study indicate that when individuals are not loss averse and value money highly in the monetary goal condition, they behave in a way more consistent with expectancy-value models of motivation.

**Time as a Goal.** Camerer et al. (1997) predicted that if individuals worked the same amount of time each day they would increase their wages by 7.8% without negatively influencing their leisure time. Following a daily time goal, appears to be just as cognitively simple as following a daily monetary goal and therefore I wanted to examine whether individuals who were given a time goal would spend the same amount of time in trial no matter the difficulty of the trial (Hypothesis 2). The results do not support this hypothesis. Results indicate that individuals spent more time in trial on the easy trials and spent less time on trial on the difficult trials. These results were still found when the individual differences of loss aversion and love of money were added into the model.

When individual differences were added to the model, these individual differences had no influence on striving towards the time goal. Therefore, more research is needed to investigate what individual differences or contextual situations will influence individuals to strive towards a time goal. This is particularly important in the case of intertemporal substitution because as Camerer et al (1997) predicted, individuals could make more money with no negative effect on their leisure time if they adopted time goals.
Limitations

There were a number of improvements in the current study over previous studies investigating intertemporal substitution of labor and leisure. The current study was the only study that attempted to manipulate goals. Previous studies (Camerer et al., 1997; Fehr & Goette, 2008) did not investigate whether individuals’ actually used daily monetary goals. In addition, there has yet to be a controlled experimental investigation of intertemporal substitution of labor and leisure. Despite these improvements, there are clear limitations in the current study.

Although performing the experiment in the lab had many advantages, this limited the ability to use the natural time unit of a day to examine resource allocation between work and leisure. This limitation may be a possible reason for not finding the negative relationship between time in trial and speed of the hurricane in the monetary goal condition for most individuals. The unrealistic nature of a four-minute trial as a nature unit of time, in contrast to a 24-hour day, may be a limitation when investigating intertemporal substitution of labor and leisure. Although I did not replicate the findings of Camerer et al. (1997), I did replicate the findings of Fehr and Goette (2007), which may indicate the lack of a natural time unit is not detrimental to future investigation of intertemporal substitution of labor and leisure in the laboratory.

Another limitation of the current study is that individuals were working for hypothetical money, which is they were not actually paid for their performance. I do not believe this to a be a serious limitation because a number of decision making studies have been done with hypothetical money. In addition a meta-analysis on the influence of
financial incentives on performance in experiments showed that the effect is negligible (Camerer & Hogarth, 1999). I do not believe either of these limitations questions the validity of the current results.

Lastly, the majority of individuals in the monetary goal condition did not report having a goal for each trial. There are various explanations for these responses. One reason could have been confusion about the question. Individuals may have thought it was asking if they had an additional goal above the one that was assigned to them, and therefore responded in the way they did. Another possible explanation is that they did not notice that they were assigned a goal. This explanation is unlikely because during each trial near where their money per trial is being calculated, in large green letters, it informs individuals about what condition they are in.

Another possible explanation is that they did not adopt the goal that was given to them. If this explanation is true, this could be a possible explanation for why I did not replicate Camerer et al.'s (1997) findings. Camerer et al. theorized that individuals used daily monetary goals as a self-control mechanism. They theorized that if a cab driver made too much money one day, they might spend the money irrationally. They also theorized that the reason they work towards a monetary goal even when their wage rate is low is that it provides a self-control mechanism for them to work each day. Another reason Camerer et al. may have found their results is because of social influences. Individuals may have quit work early because they saw other cab drivers quitting work early and followed suit. In addition, if they came home from work with low wages one day this could cause conflict with their spouse and therefore they worked long on low
wage rate days to prevent this conflict. The fact that participants did not perform the task
over a number of days and had the opportunity to make purchases from their earnings
limits the need to use monetary goals as self-control mechanisms. Monetary goals may
only cause individuals to violate intertemporal substitution of labor and leisure when they
are used as self-control mechanisms. In addition, in the current study individuals were not
exposed to social influences from their peers because they could not see other
individuals’ performance on the task. The conflict with a spouse about low wages was
also not manipulated. In future studies these social influences need to be taken into
account because they may have important effects on behavior.

In the current study, there was a strong effect of the experimental environment on
the performance of individuals. There were large significant differences between the
wage rates for the various trials. These large differences in wage rate could have
overridden the goals assigned to individuals because they were easily able to tell the
difference between the trials. However if the differences between trials was smaller,
individuals may have then adopted the assigned goals because it would have been
cognitively simpler to follow the assigned goals then to predict the wage rates for each
trial.

**Future Directions**

Understanding how individuals allocate their time between work and leisure is an
important topic for applied social science researchers. If individuals are not optimally
allocating their time between work and leisure a full understanding of why this occurs is
necessary to develop interventions that influence people to behave in a manner that
would lead to the greater good for themselves. The current study builds on previous work that attempts to understand why this phenomenon occurs. Results indicate that when individuals are highly loss averse and do not value money highly, they exhibit the negative relationship between wage rate and time worked. Camerer et al. (1997) never investigated the level of loss aversion or perceptions of money of the cab drivers in their sample. Therefore, a first step in understanding whether these two individual differences play an important role in their findings is to survey NYC cab drivers on these two individual differences and investigate whether these individual differences influence their work motivation. The findings indicate that a possible reason Camerer et al. obtained the results they did was that the NYC cab drivers in their sample were highly loss averse and did not value money highly. These are unanswered questions that a survey of NYC cab drivers may be able to resolve. Additionally, it needs to be examined whether NYC cab drivers set daily monetary goals and why they do not set other goals such as a time goal, which would earn them more money at no expense to leisure (Camerer et al., 1997).
Conclusion

Results from the current study indicate that the majority of individuals behave in a way consistent with the intertemporal substitution of labor and leisure theory. That is, the majority of individuals spent more time in trial when their wage rate was high and spent less time in trial when their wage rate is low. These results held true even for individuals in the monetary goal condition and for individuals in the do-your-best condition who claimed to self-set a monetary goal. However, when loss aversion and perceptions of money were taken into account, results indicate that individuals in the monetary goal condition who are highly loss averse and who do not value money highly violate the intertemporal substitution of labor and leisure theory. Results indicate that expectancy-value theories of motivation hold true in a dynamic context with fluctuating wage. For over 60 years now, psychologists and behavioral economists have been showing how human behavior violates rational assumptions. These results indicate that this is not always true; and that expectancy-value theories of motivation are an accurate account of human behavior in a dynamic environment with fluctuating wage rates.
References


Appendix A: Love of Money

*Items of the Love of Money Scale (LOMS)*

*1 disagree strongly 3 neutral 5 agree strongly*

**Factor 1: Importance**
1. Money is important.
2. Money is valuable.
3. Money is good.
4. Money is an important factor in the lives of all of us.
5. Money is attractive.

**Factor 2: Success**
6. Money represents my achievement.
7. Money is a symbol of my success.
9. Money is how we compare each other.

**Factor 3: Motivator**
10. I am motivated to work hard for money.
11. Money reinforces me to work harder.
12. I am highly motivated by money.
13. Money is a motivator.

**Factor 4: Rich**
14. Having a lot of money (being rich) is good.
15. It would be nice to be rich.
16. I want to be rich.
17. My life will be more enjoyable, if I am rich and have more money.

Appendix B: Loss Aversion

The individual’s level of loss aversion is determined from cumulative prospect theory (Tversky & Kahneman, 1992). Gachter et al. (2007) state that, “A decision maker will be indifferent between accepting and rejecting the lottery if \( w^+(0.5)v(G) = w^-(0.5)\lambda_{\text{risky}}v(L) \), where \( L \) denotes the loss in a given lottery and \( G \) the gain; \( v(x) \) is the utility of the outcome \( x \in \{G, L\} \), \( \lambda_{\text{risky}} \) denotes the coefficient of loss aversion in the risky choice task; and \( w^+(0.5) \) and \( w^-(0.5) \) denote the probability weights for the 0.5 chance of gaining \( G \) or losing \( L \), respectively. If we assume that \( w^+(0.5) = w^-(0.5) \) (as it is for instance implied by the probability weighting function proposed by Prelec (1998)) only the ratio \( v(G)/v(L) = \lambda_{\text{risky}} \) defines an individual’s implied loss aversion in the lottery choice task. A frequent assumption on \( v(x) \) is linearity \( (v(x) = x) \) for small amounts, which gives us a very simple measure of loss aversion: \( \lambda_{\text{risky}} = G/L \)” (p. 8).