Effect of Fatigue and Time Pressure on Self-Control.

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1 Abstract

Individuals often fail to achieve their set personal objectives or make less than optimal choice due to their inability to follow through on their initial plans. This can be explained using the time inconsistency theory where individuals initially choose larger later (LL) but ultimately settles for smaller sooner (SS) when the decision time becomes imminent. In most cases, individuals often make impulsive emotional choices to reach a compromise to settle the urge. This imminent choice is often not optimal and would require some resolve to overcome the urge. We tested the effect of fatigue and time pressure on self-control to understand how these factors affect an individual's ability to reach their goals. We used Hoch & Loewenstein's economic-psychological framework which includes emotional and rational forces to explain the effects of fatigue and time pressure on self-control. In supporting our hypothesis, our experimental results will show that increase in willpower and decrease in desires are required to manage fatigue and time pressure respectively to maintain self-control.

2 Introduction

Consumer behavior is a combination of long-term rational needs and short-term emotional desires (Hoch, 1991). Although either the rational or hedonic perspective can explain the customer experience from its own perspective, neither is sufficient to describe the interaction occurring between both. The rational side has been more quantitatively defined while the emotional side is qualitatively biased. For this paper, we will adopt the decision-theoretic model developed by Hoch and Loewenstein (1991) which attempts to integrate the cognitive and emotional forces influencing consumer behavior. This theory is based on an economic-

psychological framework that uses reference points to represent decision as a combination of two psychological forces of desire and willpower (Hoch, 1991).

Customer decisions and choices are important not only in organizations but also for self-development. Individuals are increasingly demotivated and unhappy as they struggle to meet their personal goals and aspirations. These goals are typically set in good faith either at the beginning of the year or at later times during the year. Such personal goals could range from healthy living to withdrawal from bad habits and sometimes aspirations to include skill acquisition. Unfortunately, most of these goals are not met by the set timeline. Reasons for failure could range from lack of time to inability to adhere to original plan or poor time management. In this study, we will investigate the cause for this disconnection to better understand factors that may impact on consumer behavior, how they impact and what can be done to mitigate the impact.

First, we will explain intertemporal choice, time inconsistency and impulsivity, then we will use Hoch & Loewenstein's framework to explain the concept of self-control. Third, we will look at the impact of one internal factor (fatigue) and one external factor (time pressure) on self-control using decision-theoretic model. Finally, we will describe our experiments, findings and area of further research.

3 Theory

Intertemporal choice is a process by which we decide on future outcomes based on their size and time of delivery. People often pick the larger later outcome at the onset over smaller sooner reward. Most human choices are typically between vices and virtues. While virtues' small costs are experienced early in the consumption process, vices cost are relatively larger, and they come later (Read, 1999). However, it is observed that individuals typically choose the Smaller Sooner

(SS) over the larger later (LL) as the moment of consumption becomes imminent (Frederick, 2002). This behavior is termed as time inconsistency where the choice would not have been made if it was viewed from the rational or logical point of view. The concept of time inconsistency is of great interest as it impacts on general savings culture, addiction, and inability to delay gratification. Often, it brings up the question of whether emotion or passion trumps logic and rational ways of thinking. The common consensus has been that the far-sighted logical thinking is superior as the consumers themselves struggle with this irrational quick switch over to short term gains (Hoch, 1991). One of the explanations for preference for the smaller sooner (SS) choice is because of the value of rewards is delayed over time thereby decreasing the value and attractiveness of the larger later (LL). This concept is termed delay or economic concept of discounting.

Standard discount utility uses exponential discounting which assumes a standard rate of time discounting such that the order of preference is retained now and later. However, real life observations have shown dynamic inconsistency where there is a change in direction of choice towards vices as consumption approaches (Read, 1999). This is because of the immediacy effect (due to hyperbolic discounting) which reflects deep discounting in future rewards and over values immediate rewards. This leaves the unanswered question of why imminent discounting is associated with certain goods (usually hedonic) and not of others. It also does not explain why the proximity of certain goods make them more attractive than the distant ones. Hoch & Loewenstein (1991) however theorizes that such time inconsistent preferences produced by sudden increases in desire are due to a shift in the consumer's reference point (Figure 1 below). This reference point shift can be due to several factors such as physical proximity, temporal proximity, and social comparison causing the consumer to adopt the notion of ownership or

consumption (Hoch, 1991). Thus, after a reference point shift, consumers do not only attach a positive utility to the product, but they also attach a negative utility for failure to own or consume the object. This failure creates an extreme feeling such as deprivation which is like a physiological state of need (Hoch, 1991). This reference point ultimately shows that consumer behavior is not based on objective point of view but rather from a subjective comparison point (like Kahneman and Tversky's prospect theory framework) (Hoch, 1991). This may become apparent by a sudden increase in desire to consume a certain product, and at the same time attempt to control one's behavior- such shifts in time perspective have been named as "myopic" or "time-inconsistent" in economic terms and impulsivity in psychology (Hoch, 1991).

Self-control can be used to manage time-inconsistency and impatience. It reduces the potential of behaving in an inconsistent manner due to myopic or impulsive choices. Self-control is critical in all aspects of human living and particularly more in decision making. It helps to focus on our long-term goals such as healthy health choices, cohesive personal relationships, and investment decisions (Hagger, 2010). According to Hoch & Loewenstein (1991) consumer self-control in choice making is characterized by both long-term rational interests and by short-term emotional influences.

3.1 Self-control, and the Willpower and Desire framework

According to Hoch & Loewenstein (1991)'s theory, desire and willpower are two psychological forces that can explain time-inconsistency in decision making and self-control. These two-factor models have been an integral part of self-control in psychology involving primary (hedonic) and secondary (logical) process thinking. The opposite forces of willpower and desire will determine the ability to retain self-control (Hoch, 1991). To maintain consistency, consumers must

manipulate their reference points by reducing the effect of desire or increasing the impact of willpower (Figure 1). The self-control part is represented by the area above the “Buy” line (Figure 1, area in green), while the time-inconsistency is represented in the area below the line (Figure 1, area in beige). Furthermore, the behavior of shifting from self-control to time-inconsistency (or vice versa) can be explained by moving from above the line to below or the reverse (Figure 1, Situation 1 and 2).

Some of the strategies by which desire can be reduced include avoidance, substitution and postponement or distraction (Figure 1, Situation 1) (Table 1). On the other hand, precommitment, economic cost adjustment, time binding and bundling of costs are some ways to increase willpower (Figure 1, Situation 2) (Table 1).

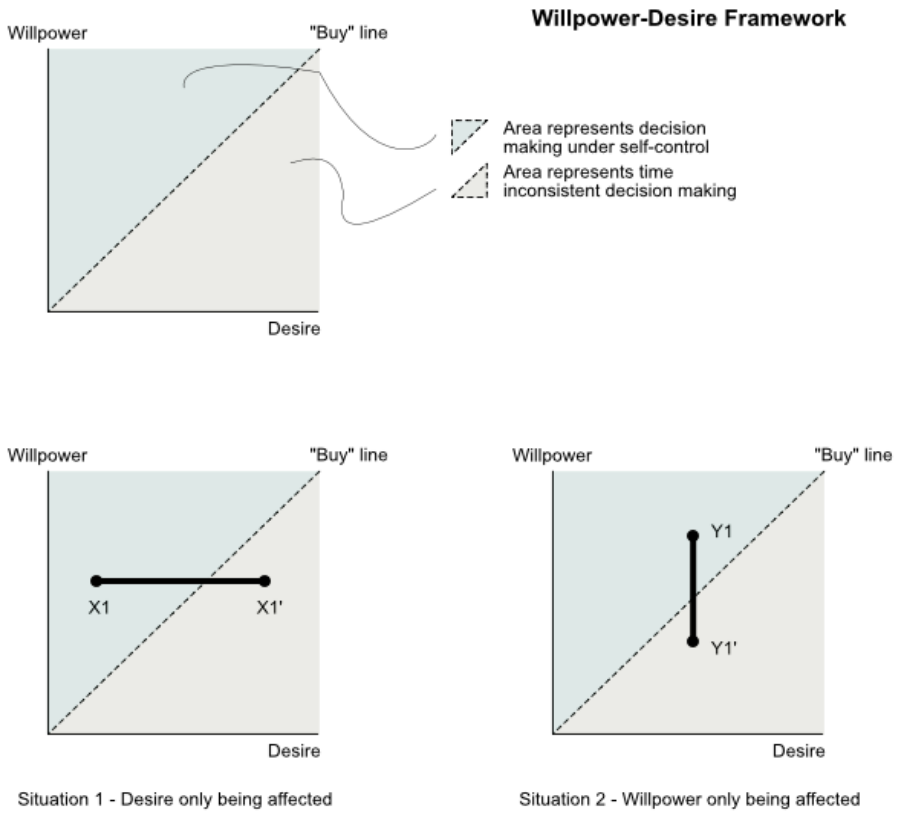

Figure 1- The willpower-desire framework developed by Hoch & Loewenstein (1991). In the paper, the desired-based and willpower-based strategies discussed would be used to achieve self-control, by moving the X1’ and Y1’ back in the green zone (self-control).

Desired-based Strategies	Willpower-based Strategies
Avoidance	Precommitment
Postponement & Distraction	Economic Cost Assessment
Substitution	Time Binding
	Bundling of Costs
	Higher Authority
	Regret & Guilt

Table 1 - Desired-based and willpower-based strategies suggested that can achieve self-control.

Furthermore, they argue that most decisions made based on willpower or desire (and subsequently, self-control itself) can be affected in one way or another by proximity. Proximity is explained as either physical or sensory (i.e., how visual is the desired reward in front of someone, which if made more visual can result in a decrease in willingness to delay reward), or temporal proximity (such as, the time until the desired reward is rewarded, which if moved sooner can lead to an increase in desirability and impatience).

3.2 Time Pressure and self-control

Time pressure is regarded as the limitation or shortage of time required for decision making. It has been regarded as one of the most important situational factors to consider in consumer behavior as one faces increasingly complex options of choice (Park, 1989). The availability of time has become more important to decision making with an increasing amount of information and opportunities. Time Pressure is ultimately regarded as the cost of time scarcity which only manifests when available time to complete a task is perceived as insufficient (Godinho, 2016). Consumer decision making under time pressure has been identified as a complex cognitive task that is difficult to understand in isolation, especially in the forced-choice option where a utility decision must be reached within a specified time (Hagger, 2010). Decisions under time pressure may be marred by cognitive shortcuts and impacted by secondary cues. Ultimately, time pressure is known to result in limited information processing and restriction in ability to attend to task (Monroe, 2003). It has been found that under time pressure consumers would use simple

heuristics such as brand-name or price quality, to reach efficient choices with limited information processing and achieve cognitive closure by using a non-compensatory screening rule (Monroe, 2003). Habitual consumer behavior and everyday fluctuations in self-control resources have also been found to be linked, where consumers act more habitually under time pressure, and when distracted, following depletion of self-control and other everyday situations that reduce the ability to override habitual patterns of decision making (Wood, 2009). For example, shoppers depleted by a long grocery store trip might give in to an unwanted habit of snacking on junk food on their way home (Wood, 2009). Divergent findings on Time pressure have been reported with positive and negative impacts of Time pressure on final quality decision. Preference reversals have also been identified as one of the effects of time pressure which may be due to different information types at different stages of information processing.

In viewing time pressure under the decision theoretic framework, we can build on all previous theory by modeling that time pressure manipulates the desires (Figure 1, Situation 1) and can thus shift decision making from happening under self-control to being time inconsistent. This suggests two things, that when people are taking decisions under time pressure, they tend to a) think of their decision as impulsive, and b) tend to behave similarly to making decisions under ambiguity (Van Dijk, 2003). This would explain the difficulty associated with choice under time pressure (due to the perception of insufficient information to make a rational choice, and thus prefer not to make a choice at all). Furthermore, this would also explain why people tend to prefer repetition or habitual experience instead of experiencing a new one (Wood, 2009).

3.3 Fatigue and self-control

Although several factors may impact an individual's ability to maintain self-control, fatigue is considered a causal factor since it is ubiquitous and can be experienced by everyone. In addition, most people have multiple goals that are being juggled daily beyond individual's personal goals. For instance, in addition to my desire to learn to play basketball, I can either have a full-time job or be engaged as a part-time student. Fatigue can be described as a feeling of exhaustion, tiredness, or lack of energy. In understanding the impact of self-control in decision making, the effect of fatigue will be reviewed using the strength model of self-control developed by Vols & Heatherton (Hagger, 2010). This model theorizes self-control as a reservoir which is depleted once it has been drawn upon reducing the capacity for further self-regulation (Hagger, 2010). It predicts the after effect of self-control regarding the carry over effect in which a poorer self-control results after the initial self-control demand (Muraven, 2019). This was compared with the muscle of the body which becomes fatigued after extensive exertion with reduced capacity to exert further force. Diminished self-control is further termed as ego depletion by Baumeister and colleagues (Hagger, 2010). Ego depletion has however been shown to coincide with fatigue which is experienced when mental resources are taxed (Hagger, 2010). Several experiments show that evoked subjective fatigue results in generalized fatigue resulting in reduced performance on subsequent tasks. Muraven et al (2019) further explained that fatigue may be a mediator and not just an indicator such that exertion of self-control can lead to fatigue which will in turn decrease capacity to exert self-control in future (Hagger, 2010). The level of strength is thus critical to self-control and after exerting self-control, subsequent attempts at self-control may more likely fail (Muraven, 2019). This can be further explained that an increase in fatigue will lead to decrease in self-regulation just as ego depletion will likely lead to loss of self-control

and poor control over decision choice (Muraven, 2019). There are several other consequences of ego depletion ranging from easy persuasion to passivity and poor behavioral consequences. It is also known to affect cognition and lead to focus on lower-level construal (Muraven, 2019). Paper by Danziger et al (2011) suggested that interventions such as short rest and experiencing positive moods can be used to overcome mental fatigue (Danziger, 2011). In summary, Ego depletion theory shows that the ability to maintain self-control expends cognitive resource and leads to loss of energy. Building on previous theories, it can be inferred that since willpower is a limited resource that can be depleted, and the use of willpower on an initial task will reduce the willpower left to be utilized on subsequent tasks. In reviewing this within the decision theoretic framework, fatigue manipulates the willpower axis (Figure 1, Situation 2) and can thus shift decision making from happening under self-control to being time inconsistent. Therefore, strategies for time-inconsistency avoidance would be by manipulating only the willpower, to overcome desire and maintain self-control. Ultimately, fatigue results in depletion in self-control thereby impacting on how decisions are made and thus informs our second hypothesis.

3.4 Hypothesis

Further to the theories above and in alignment with the decision-theoretic framework, our hypotheses are summarized below:

H_1: In decision making, increased fatigue level results in less willpower (self-control) while reduced fatigue levels will lead to more willpower (self-control).

H_2: In decision making, greater time pressure (less time available) results in more desire-based outcome (less self-control) while smaller time pressure (more time available) results in less desire-based outcome (more self-control).

4 Experiments

4.1 Experiment 1 which tests the fatigue/no-fatigue variable:

Experiments were modified from the procedure used by Blain, Hollard, and Pessiglione (2016) in their investigation on Neural mechanisms underlying the impact of daylong cognitive work on economic decisions.

- Participants are to be divided into two groups, corresponding to the two experimental conditions of induced Fatigue and No fatigue.
- Fatigue was operationalized as engagement with executive function tasks for a duration of 60 minutes at a time, after which an inter temporal choice was presented on TV content to watch (lowbrow and highbrow) movies.
- Highbrow movies offer less immediate pleasure but provide long term benefits in the form of educational or cultural enrichment.

Executive function tasks used will be a combination of the following:

a) **Verbal Fluency Tasks**, which require a participant to generate as many words as possible in a specific duration that begin with a given letter and follow certain rules.

b) **The Trail- Making Test (TMT),** which is a test of visual scanning and requires using information processing speed, manual motor speed and sustained attention. Part A involves connecting numbers 1-25 in ascending order; and Part B involves connecting numbers and letters in an alternating and ascending fashion.

- In the No-fatigue condition, participants were not engaged in any executive tasks and were presented with the same inter temporal choice of TV content (low brow and high brow).

We predict that participants engaged in executive tasks would be more likely to choose low-brow choices, as induced fatigue will evoke lower willpower and hence affect-based decisions. Whereas participants not engaged in any executive tasks will be more likely to make high-brow choices as they will be more cognitively oriented in their choice.

4.2 Experiment 2 which tests the Time Pressure/No Time Pressure variable:

We adopted a similar experiment used by Read et al. (Read, 1999) in Mixing Virtue and Vice: Combining the Immediacy Effect and the Diversification Heuristics.

- This is a 2 x 1 between subject experimental study where the independent variable is time pressure (time allotted for the task), and dependent variable is self-control (frequency of lowbrow movies)
- Participants will be divided into two groups, corresponding to the two experimental conditions of Time Pressure (TP) and No Time Pressure (NTP).
- This study involved having the participants rent movies for the weekend. The choice of movie could either be a highbrow film (intense or cognitively stimulating or a lowbrow movie (such as light comedy or the Office show) to unwind from a hard day's work. Highbrow movies will be more of those require more time to choose in comparison to the lowbrows which would be more desire-based since they are fun.
- Highbrow movies offer less immediate pleasure but provide long term benefits in the form of educational or cultural enrichment. Lowbrow movies are more of the superhero or marvel entertainment movies that provide fun reward in the short term but have little impact on the long term.

- Films were selected because people typically enjoy watching movies and will do so voluntarily. It also allows for unbiased choices between emotional and logical since they are not classified that way.
- Subjects will be randomly divided into two groups of time pressure (TP) vs. No Time pressure (NTP) and asked to pick a series of three movies to watch over the weekend from the mix of highbrows and lowbrows presented to them. The time pressure (TP) team will have a limit of 5 minutes while the NTP team will be given a maximum of one hour to pick their three choice moves. Based on our hypothesis, we predict that the average frequency of the lowbrow movies will be higher for the TP subjects in comparison to the NTP participants.

5 Conclusion and Further Research

Impulsivity and self-control continue to remain relevant in research due to their importance in Economics, Psychology, developmental and clinical settings. Individuals will continue to aim for better personal goals to improve lifestyle, reduce addiction and increase long term investment plans. While theories such as random-preference and economic concept of discounting provide rigorous framework to explain this inconsistency, some gaps were identified (Hoch, 1991). Hoch and Lowenstein (1991)'s willpower-desire framework built on this earlier research and expanded them to include when, why and how impulsivity occurs using the reference point concept. It attempts to bridge the gap between emotional and logical factors responsible for consumer behavior. We used this framework to test the impact of one internal (fatigue) and an external factor (time pressure) on self-control. The framework provided us with an opportunity to include the hedonic concept of desire in our explanation. Our findings reveal that desire will be stronger with an increase in time pressure while willpower will be lower for increased fatigue. While the

impact of these factors can be explained using the effects of willpower and desire, either do not exist in isolation. In some cases, strategies to improve on both willpower and desire is required to combat either fatigue or time pressure to maintain self-control.

Furthermore, we can predict that willpower is a feature that can be trained and increased especially when we view fatigue in terms of energy that is expended or muscle that is exerted such that training will strengthen an individual more and improve their utilization. Also, in reviewing the will-power desire framework, the buy-line slope is not constant and as such can be increased or decreased which implies that the surface area of willpower can increase over time beyond the surface area of desire. Perhaps this can explain the difference in the framework for those socially regarded as successful versus non-successful people. For example, successful people may have a bigger willpower area compared to their desire region.

Finally, we question the linearity of the slope or buy-line. Can it be modelled after other slopes, and can there be more precise modelling for different situations? For example, can different situations, emotions or personality affect the slope? Can different mental cognitive permanent conditions, such as depression or ADHD be represented within the framework?

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