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The Effects of Task Difficulty and Reward Opportunity on Motivation

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Abstract

The present study was designed to measure the effects of task difficulty and reward opportunity on motivation. The participants, 20 undergraduate students, were randomly assigned to one of four experimental conditions: reward opportunity-hard proofreading task, reward opportunity-easy proofreading task, no reward opportunity-hard proofreading task, or no reward opportunity-easy proofreading task. It was hypothesized that the participants offered an opportunity for reward would perform better than those not offered an opportunity for reward by indicating and correcting more spelling and grammatical errors. Also, it was hypothesized that participants offered an opportunity for reward would return the completed proofreading task quicker than participants not offered an opportunity for reward. Two, 2 x 2 ANOVAs were carried out with the results showing no main effects of task difficulty or opportunity for reward on number of errors corrected or time of return (in days), indicating no change in motivation. As the original hypothesis was not supported, issues with the study and areas for further research were discussed.

Keywords: Motivation, Opportunity for Reward, Task Difficulty, Procrastination

According to Phares and Chaplin (1997), procrastination is the act of avoiding or postponing a certain task. In addition to this definition, Solomon and Rothblum (1984) suggest that procrastination is really a complex interaction of behavioural, cognitive, and affective components. With most research on procrastination focusing on college/university students, a study conducted by Steel (2007) found that 75% of university students procrastinate. This finding evidently shows that procrastination is a relevant issue in the world of academics and learning, with there being many reasons people procrastinate. As the McGraw Center for Teaching & Learning at Princeton
University suggests, university students’ reasons for procrastination can include, among others, fear of failure, fear of making parents or superiors angry, and the fear of simply looking stupid. As a result, it is clear that reasoning behind procrastination, as well as the act of procrastinating itself, can arise due to a number of different factors.

In a study done by Misztal (2007), the performance of both procrastinators and non-procrastinators under pressure was examined to support previous research suggesting that procrastinators do not work as well under pressure as non-procrastinators. Forty undergraduate students participated in a time-restricted task while their performance was determined by their recorded speed and accuracy. The task required participants to write a cross (+) as accurately as they could inside of squares appearing on various pages, with participants having either five or ten seconds per page to write the crosses in. The results of the study showed that non-procrastinators exhibited superior speed by completing more items than procrastinators, however they exhibited poor accuracy by making more mistakes than procrastinators did. Given these findings, it can be determined that the inclusion of a time-restricted task that effectively increased the difficulty of the task by inducing stress in participants had an effect on participant performance.

Continuing along a similar line of research, Musolino (2007) conducted a study to examine the impact of stress and procrastination on high effort and low effort tasks. Of the 40 total participants, 20 participants who were in the experimental conditions involving a task of high effort, that is, a more difficult task, were asked to complete a 1-2 page essay on a topic of their choosing to be returned to the experimenter within either three or seven days. The results of the study indicated that there was a main effect of
effort required to complete the task, therefore task difficulty, on the procrastination of participants.

A study by Janssen and Carton (1999) examined the effects of task difficulty on procrastination. Forty-two undergraduate students enrolled in an introductory psychology course participated in the study and were randomly assigned to either the difficult or easy experimental condition. The participants were asked to read either a hard or easy psychology article depending on which condition they belonged to, and had to answer a series of questions about the article in writing. With the time of submission of the completed task measured as procrastination, there were no statistically significant results found for the effect of task difficulty.

Above all, the McGraw Center for Teaching & Learning at Princeton University suggests that to avoid procrastinating, it is critical that one stays motivated for productive reasons. Often, a productive reason for completing a task can be the opportunity for reward upon completion. Rewards can come in the form of many things, however in practice in society, the most common reward is receiving payment for work done as part of one’s employment.

Rewards such as money increase motivation as a result of specifically increasing extrinsic motivation, one’s motivation to perform a behaviour or engage in an activity in order to earn a reward (Ryan & Deci, 2000). A study done by Deci (1971) included the participation of 56 undergraduate students and investigated the effects of external rewards on intrinsic motivation to perform an activity. As defined by Ryan & Deci (2000), intrinsic motivation is the motivation to perform a behaviour or engage in an
activity simply because it is inherently interesting or enjoyable. External rewards were given to participants in the form of money upon completion of the required activity. After the conclusion of the study, the results indicated that when money was used as an external reward, intrinsic motivation tended to decrease.

Conversely, the findings of a meta-analysis done by Cameron and Pierce (1994) suggest something different. The meta-analysis included 96 experimental studies comparing the intrinsic motivations of rewarded participants and nonrewarded participants. Overall, the results from the meta-analysis indicated that reward does not decrease intrinsic motivation, conflicting with Deci’s conclusion (1971).

More recently, a study done by Fryer Jr. (2011) looked to better understand the impact of financial incentives on student achievement. The study consisted of a series of school-based experiments in over 200 urban schools across three cities in the United States: Chicago, Dallas, and New York. In Chicago, students were paid for their overall performance, as measured by their classroom grades. In Dallas, students were paid to read books. Finally, in New York, students were paid according to their performance on interim assignments. Surprisingly, the impact of financial incentives on student performance was found to be statistically 0 in all three cities. Furthermore, the financial incentives were found to have “little or no effect” on intrinsic motivation (Fryer Jr., 2011).

Given the past research discussed above, the present study sought to examine the effects of task difficulty and opportunity for reward on motivation. With the idea of reward serving as a productive reason to fuel motivation, an opportunity for a monetary
reward was offered in some experimental conditions to examine its effect on motivation. Keeping the findings of past research in mind, it was hypothesized that subjects offered the opportunity for reward would perform better on proofreading exercises than those not offered an opportunity for reward by identifying and correcting more spelling and grammatical errors. In addition, it was hypothesized that participants offered an opportunity for reward would also return the completed proofreading task before participants not offered an opportunity for reward, effectively procrastinating less as a result of increased motivation.

**Method**

**Participants**

The study involved the participation of 20 participants aged 18-21 ($M = 19.25$, $SD = 0.43$) in the city of London, Ontario, with an equal number of male and female participants. In order to be eligible for the study, participants had to be fluent in English. The participants were friends or acquaintances of the experimenter, and were therefore recruited by being approached in person and asked if they would be willing to participate. The participants were all undergraduate students attending either the University of Western Ontario, Canada (UWO), or Huron University College, a small liberal arts college affiliated with the larger UWO. As university students are often living on tight budgetary constraints, the reward offered was of value. It is also important to note that while all of the participants knew the experimenter, they were randomly selected from a larger population.
Materials

This study involved the use of two different pieces of writing, with one piece serving as the hard proofreading task, and the other being the easy proofreading task. A practice test taken from the website of the Society of Editors and Proofreaders, the hard proofreading task was 291 words long, and contained a total of 24 grammar and spelling errors. It was classified as the hard proofreading task because its spelling mistakes only applied to words that were 3-5 syllables long. Conversely, the easy proofreading task was classified as such because its spelling mistakes only applied to words that were 1-2 syllables long. With a length of 292 words, it was published as a proofreading test by Trevor Horwood, Advanced Member of the Society for Editors and Proofreaders, and contains a total of 27 grammar and spelling mistakes. In addition, an electronic gift card with a value of $10 towards Amazon.com (Amazon) was used as the reward incentive in this study, to be given to the winner of the draw at the conclusion of the study.

Procedure

Participants were divided equally into either the control or experimental group. From the control group of 10 participants, half were given the easy proofreading task to complete while the other half were given the hard proofreading task. They were instructed to identify and correct all grammar and spelling mistakes they could recognize by using basic proofreading markings directly on the proofreading task. They were also told that they had to return the completed proofreading task to the experimenter anytime within the following three days. For the 10 participants that made up the experimental group, the proofreading tasks were distributed the same way as in the control group, with
the exact same set of instructions being given as well. However, participants in the experimental group were also informed that once they had returned their completed proofreading task to the experimenter within the three day limit, their name would be entered into a draw for a $10 Amazon gift card that would take place at the completion of the study. Both the number of mistakes correctly identified by each participant and the number of days it took for their completed proofreading task to be returned to the experimenter were recorded. In the case that a participant failed to return the completed proofreading task to the experimenter within the three day window, it was decided that the days until their completed proofreading task was returned would equal three (the maximum), while the number of mistakes correctly identified would be zero. At the completion of the study, a draw for the reward of the $10 Amazon gift card took place. The gift card was given to the participant whose name was drawn from a hat that held the names of all participants in the experimental group, with the name being drawn by a randomly selected individual with no connection to the study.

Results

The number of errors corrected by participants and the amount of time in days the completed proofreading tasks were returned in were both analyzed to determine the effects of task difficulty and opportunity for reward on motivation. Separate analyses for the experimental conditions produced the following means for the number of errors corrected by participants: reward opportunity-hard proofreading task, 21 (SD = 1.8); reward opportunity-easy proofreading task, 19.6 (SD = 2.7); no reward opportunity-hard proofreading task, 19.4 (SD = 1.4); and no reward opportunity-easy proofreading task, 20.6 (SD = 2.4). In addition, separate analyses for the experimental conditions produced
the following means for the number of days in which the completed proofreading tasks were returned: reward opportunity-hard proofreading task, 1.6 ($SD = 0.5$); reward opportunity-easy proofreading task, 1.6 ($SD = 0.8$); no reward opportunity-hard proofreading task, 1.6 ($SD = 0.8$); and no reward opportunity-easy proofreading task, 2.0 ($SD = 0.6$). To see the number of errors corrected by participants, as well as the time of return for the completed proofreading tasks, refer to Figures 1 and 2, respectively. For a look at the complete data, see Appendix A.

The independent variables in the present study were the opportunity for reward and the difficulty of the proofreading task. When examining the dependent variable of the number of errors, a 2 x 2 between-subjects Analysis of Variance (ANOVA) was used to analyze the data, using an alpha level of 0.05. It was found that there were no significant main effects of reward opportunity, $F(1,16) = 0.080, p > 0.05$, or task difficulty, $F(1,16) = 0.0098, p > 0.05$. There was no significant interaction found between reward opportunity and task difficulty, $F(1,16) = 1.51, p > 0.05$.

When examining the dependent variable of days taken to return the completed task, another 2 x 2 between-subjects ANOVA was used to analyze the data, again using an alpha level of 0.05. It was found that there were no significant main effects of reward opportunity, $F(1,16) = 0.35, p > 0.05$, or task difficulty, $F(1,16) = 0.35, p > 0.05$. Again, no significant interaction was found between reward opportunity and task difficulty, $F(1,16) = 1.16, p > 0.05$. For a continued look at the results of the analyzed data in further detail, a summary table can be seen in Appendix B.
Figure 1. The top graph shows the number of errors corrected by participants given the hard proofreading task, while the bottom graph shows the number of errors corrected by participants given the easy proofreading task. In both graphs, the bars on the left in each pair represent the group offered an opportunity for reward, while the bars on the right of the pairs represent the group not offered an opportunity for reward.
Figure 2. The top graph shows the amount of time (in days) that it took participants to return the completed hard proofreading task, while the bottom graph shows the amount of time (in days) that it took participants to return the completed easy proofreading task. In both graphs, the bars on the left in each pair represent the group offered an opportunity for reward, while the bars on the right of the pairs represent the group not offered an opportunity for reward.
Discussion

The hypothesis of the present study was that participants offered an opportunity for reward for completing the proofreading task would perform better than those not offered an opportunity for reward by identifying and correcting more spelling and grammatical errors. Also, it was hypothesized that participants offered an opportunity for reward would be quicker to return their completed proofreading task than participants not offered an opportunity for reward. As the results indicate, there was no main effect of either task difficulty or opportunity for reward on performance or time of return. As a result, it can be determined that task difficulty and opportunity for reward effectively had no impact on motivation. Therefore, it can be concluded that the findings of the present study were not in support of the initial hypotheses.

When examining the findings of this study, the results can seem somewhat counterintuitive. Naturally, one would be likely to assume that if a task were determined to be harder, then one’s motivation for completing that task would decrease. As well, it would likely be the natural assumption of most that when presented with the opportunity to receive a reward for the completion of a certain task, one’s motivation to complete that task would increase. However, the findings of the present study once again seem to be directly opposite to these natural assumptions. Instead, the results seem to support the findings of Deci (1971) and Fryer Jr. (2011), suggesting that financial incentives do not impact motivation and performance.

With the research done by Janssen and Carton (1999) revealing no significant effect of task difficulty on procrastination, the results of the present study seem to be in
support of their findings. A parallel can be seen between this study and the present study, as Janssen and Carton (1999) manipulated task difficulty by varying the complexity of a psychology article assigned to participants, task difficulty in the present study was manipulated by the types of spelling errors appearing in each proofreading task. Given that both studies manipulated task difficulty and found no significant main effect, it is possible that neither of the pieces of writing in the experimental or control conditions of the studies were substantially challenging to participants, even in the hard conditions. As a result, participants may have dedicated minimal amounts of effort towards completing the task, leaving the results to be potentially skewed.

In addition to the proofreading tasks potentially failing to pose as a challenge to participants, it is a possibility that the offered reward in the present study was simply not an attractive enough reward to have an effect on participant motivation to complete the task. In the case that a participant did not find the proofreading task to be challenging, then receiving a virtually free $10 in online spending money would likely be welcomed and seen as an attractive reward by most. Normally, this would be especially true when an individual is living under the budgetary constraints of being an undergraduate university student. However, some participants may not have seen a value of only $10 as attractive enough to dedicate serious effort towards a task, regardless of difficulty, while some may have simply failed to care for an online gift card because of the online purchasing process. If looking to recreate this study or one of a similar kind in the future with added revisions, it would be beneficial to include a financial incentive so large that it would seem attractive to any individual, regardless of external circumstances. With this
in mind, these factors may have contributed to the results being potentially skewed as well.

Another control issue that must be mentioned the lack of motivation in participants due to a number of external factors. As April marks the end of the university school year, with final exams coming later in the month, students undoubtedly have a lot on their minds. Seeing as how the present study was conducted during the month of April, it is likely a valid assumption that some, if not all, of the participants had things that they personally determined to be more important than completing and returning their proofreading task, such as studying for their upcoming exams. In addition, when participants would complete their proofreading task, their mind could likely be on many different things, affecting their performance in identifying and correcting the mistakes as a result of their divided attention. Seeing as how this could lead to skewed results, it would be beneficial to conduct a study similar to this one at a time when the participants have nothing else to value as more important than taking part in the study in the future.

Reflecting upon this study, there are some issues with sampling that must be mentioned. Firstly, the only specification required to be an eligible participant for the present study was being fluent in English. Therefore, the exact nature of the sample remained to be unknown, with participants coming from a variety of different backgrounds and experiences. While not ideal, this is still reasonably respectable as the sample gave a wide range of participants, and therefore more variability. Secondly, the sample used in this study was quite small with range in age of participants. Therefore, it can be determined that the sample was not the most representative of the larger population, more specifically university students. Taking steps to improve on these
sampling issues by using a larger sample with a larger range of age of participants, the larger population of university students would be better represented while further variability would also be ensured.

When looking for ways to improve the present study for the future, another area to examine would be the measurement of how long it took each participant to return their completed proofreading task. In the present study, this time was measured in days. However, as the present study only gave participants a period of up to three days to return their completed tasks, participants were recorded as returning their tasks only in either one, two, or three days. In order get stronger data that could potentially be more significant, it would be beneficial to record the time of return more accurately. This means that instead of only using days as a measurement, measuring the time of return in number of hours and minutes for each participant would give a better understanding of when exactly the proofreading task was completed. In example, one would be able to differentiate between two participants recorded as both returning the task in two days following the procedure of the present study: one may be recorded as returning the completed task in 26 hours, with the other returning the completed task in 39 hours under different measuring conditions. In turn, this would lead to a better understanding of the level of procrastination displayed by each participant as a result of task difficulty and whether or not they were offered an opportunity for reward.

Examining the results of the present study, one suggestion for future research would be to conduct a similar study, with the previously mentioned control and sampling improvements included, with a sample of students at various stages of their academic careers. The proposed sample would include middle school students, high school
students, undergraduate university students, and graduate school students. As it can be argued that each stage of schooling listed above requires different demands academically, students at different stages of their academic careers would likely have differing rates of procrastination that could be compared. For example, a graduate student who once was a big procrastinator in their past may have learned from it, and now whenever they receive an assignment they decide to tackle it immediately, regardless of difficulty. Conversely, a middle school student may still leave any and every assignment they receive until the last minute. Also, people at different stages of their academic careers would likely be subjected to different effects of opportunity of reward. Continuing with the previous example, a graduate student may not value a small monetary reward for a task, as they have likely earned some significant amount of money through various jobs and work experience in their past. However, the middle school student may become highly motivated to complete a task for a small monetary reward, as they have never had a job or earned any significant amount of money.

The practical implications of researching procrastination, and the effects of task difficulty and opportunity for reward on motivation, are relevant to many aspects of life including learning and human productivity. In terms of learning, as mentioned previously, a high rate of university students admit to being procrastinators (Steel, 2007). This is also undoubtedly true for all students as a whole. As a result of procrastination, students inhibit their ability to learn more material, as their own procrastination forces them to learn at a slower pace. However, procrastination is not exclusive to only students, but the general population as well. If asked to respond honestly, many people would admit to being procrastinators. As a result of their procrastination, people are
forcing themselves to be less productive than they could be if they chose not to procrastinate. As life revolves around meeting commitments and deadlines, it is imperative that people exercise effective time management in order to be successful. Therefore, research such as this is relevant because it helps to expose concepts and results that can affect any individual at some point in their lives. With the effects of procrastination being evident in academic institutions and society as a whole, further research to gain a better understanding of the factors that both positively and negatively contribute to procrastination, such as task difficulty and opportunity for reward, is imperative in order to benefit society and improve productivity.
References


Appendix A

Raw Data: Number of Errors Corrected by Participants

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<thead>
<tr>
<th></th>
<th>Hard Proofreading Task</th>
<th>Easy Proofreading Task</th>
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<tbody>
<tr>
<td>Reward Opportunity</td>
<td>22, 18, 23, 22, 20</td>
<td>20, 23, 19, 21, 15</td>
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<tr>
<td>No Reward Opportunity</td>
<td>17, 20, 20, 19, 21</td>
<td>23, 18, 19, 19, 24</td>
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</table>

Raw Data: Time of Return (in days) of Completed Proofreading Task

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<th>Easy Proofreading Task</th>
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<tr>
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<td>2, 2, 1, 3, 2</td>
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Appendix B

ANOVA: Number of Errors Corrected

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<th>Source</th>
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<th>MS</th>
<th>F</th>
<th>F_{CRITICAL}</th>
</tr>
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<td>0.45</td>
<td>0.080</td>
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<td>0.05</td>
<td>0.0098</td>
<td>4.49</td>
</tr>
<tr>
<td>Reward Opportunity*Task Difficulty</td>
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<td>1</td>
<td>8.45</td>
<td>1.51</td>
<td>4.49</td>
</tr>
<tr>
<td>Within</td>
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<td>16</td>
<td>5.6</td>
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</tr>
<tr>
<td>Total</td>
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<td>19</td>
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*p < 0.05

ANOVA: Time of Return (in days)

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<th>df</th>
<th>MS</th>
<th>F</th>
<th>F_{CRITICAL}</th>
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<td>4.49</td>
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*p < 0.05