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Monetary Reward & Task Performance: A Study of Work Motivation

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The findings from Deci (1971) and Cameron, Pierce, and Sylvia (2004) found that extrinsic motivation has the capability of undermining intrinsic motivation. In the current experiment, 32 participants were asked to solve anagrams on a list given to them. One list contained easy anagrams (3-letters) and the other contained hard anagrams (5-letters). Only half of the participants were told there was a money prize for the participant who solved the most anagrams. It was expected that participants who were told this would perform better; regardless of the difficulty they were given. The results did not support this hypothesis, and found that the no-reward group performed better than the reward group.

If someone enjoys shoveling the driveway during the winter because it's good work, they are intrinsically motivated. What would happen to that someone if they received payment for shoveling? According to Ryan & Deci (2000), when someone is motivated to perform an activity not for any external reward, but for the reward of doing the activity itself, they are said to be intrinsically motivated. Would this payment undermine their intrinsic motivation and become the only factor that motivates them? This is called extrinsic motivation; it is the opposite of intrinsic motivation, where someone is motivated to do something for the chance at getting an external reward (Ryan & Deci, 2000).

Edward Deci (1971) conducted an experiment to test participants' intrinsic motivation through offering them extrinsic rewards for completing puzzles. The subjects worked on a puzzle called Soma created by Parker Brothers; this puzzle was chosen because it was thought that participants would be intrinsically motivated to do it. There were 24

participants in the study and each one was asked to complete three one-hour sessions of puzzle solving. Twelve of the subjects were in a control group and the other 12 were in an experimental group. Both of these groups had to solve four puzzles in every session, but during the second session, participants in the experimental group were paid \$1 for every puzzle they solved. After each session, participants were given some free time to do what they like; it was assumed that since the puzzles were intrinsically motivating, they would continue with solving puzzles. When comparing the results of both groups, it was found that participants in the experimental group experienced a loss of intrinsic motivation in the third session because they were paid during their second session. This study proved that extrinsic motivation could be used to undermine one's intrinsic motivation, though that is not always the case.

In a study conducted by Cameron, Pierce, & Sylvia (2004), the use of incentives in an educational setting for improving performance and motivation in students was tested. According to this article, incentivizing students to motivate them is a controversial thing because some claim that it is harmful and undermines a student's intrinsic motivation. The reason this is brought up is because it is not always clear which motivation is stronger between intrinsic and extrinsic.

Cameron et al (2004) tested 73 undergraduate university students and assigned them to work on three sets of five 'Find the Difference' problems programmed into a computer. What they had to do was to find differences between two cartoons on the computer they were using, and there were six possible differences for them to spot. Participants first had to engage in a learning phase where the low difficulty group of participants had to find two differences in each problem and the high difficulty group had to find four differences.

Participants in the reward conditions were given \$2.00 for every set of five problems they solved; no money was given during this phase for the no reward conditions. The results showed that for the high difficulty groups, the participants who were rewarded performed better than those that were not. In the low difficulty groups, the non-rewarded participants performed better.

The current study is influenced by the experiments done by both Deci (1971) and Cameron et al (2004). Similar to Deci's experiment where participants had to solve puzzles, participants in this study were asked to solve list of anagrams on a page in a fixed amount of time. In his experiment, Deci (1971) found that extrinsic motivation undermined intrinsic motivation in a puzzle-solving task. Participants were given one of two different lists of anagrams; one list contained 'easy' anagrams and the other, 'hard' anagrams. However, only half of the participants were told that there was a chance at winning up to \$20 cash if they could solve the most anagrams out of all participants. The remaining participants were simply told to solve as many anagrams as they could. Based on the findings of both the Deci (1971) and the Cameron et al (2004) study, it is expected that participants who are in the reward group motivated by a chance at winning money will complete more anagrams than the no-reward groups.

Method

Subjects

The subjects that were used for this experiment were 36 people consisting of 32 Huron University College students between the ages of 18-22 years old and five adults were

between the ages of 45 and 59. Out of the sample there were 13 females and 19 males. This entire sample of subjects was made up of family, friends, acquaintances and peers.

Apparatus

Two separate lists of anagrams were created that varied in difficulty. One list was designated as 'easy' and an easy anagram in this test was noted as a 3-letter word that was scrambled; this list can be found in Appendix A. The 'easy' anagram list contained 80 scrambled words while the 'hard' anagram list had 64 scrambled words. The second list was 'hard', which was defined as a 5-letter scrambled word; this list can be found in Appendix B. Each list of anagrams was made using the Microsoft Word program. Both lists of anagrams were printed onto separate 21.59 cm x 27.94 cm of pieces of multiuse eco-responsible paper from Staples. The margins of each page were altered in order to fit more anagrams. The margins set for the page were 2.54 cm on the top, 2.54 cm on the bottom, and 2.54 cm for both the left and right sides of the pages. In order to avoid the anagrams being made too easy or difficult by the experimenter, the anagrams were created by using the website Glass Giant to scramble the letters.

Each scrambled word was typed in capital letters and in size 12 Cambria font. Next to each anagram, there were underscores placed to create lines where the participant's answer would go. An iPhone 4 was used to access the app known as "Clock" was used as a stopwatch to time participants performing the experiment. Participants were offered an assortment of writing utensils for the experiment, which included a Paper Mate HB 2 pencil and a Paper Mate InkJoy blue pen.

Procedure

Testing commenced on March 31, 2014 and was completed on April 11, 2014. The experimenter would give the participant either an easy or a hard list of anagrams face down, as well as place them in a reward or no-reward condition. The experimenter sorted participants into each condition by following a pattern. The experimenter would have the first participant in the hard, no-reward condition, the second participant in the easy, reward condition, the third participant in the hard-reward condition and the fourth participant in the easy, no-reward condition. This pattern was used for the designation of all 32 participants in the experiment.

Once each participant was given their list of anagrams, they were presented with a few choices of writing utensils that they could choose from; the purpose was just to allow the participant to write with whatever utensil they preferred. When the participant was ready, the experimenter explained to them that their goal was to take each anagram of jumbled letters and re-scramble them to create a word. They were told that some of the anagrams could be used to make more than one word, which was acceptable as long as it was an English word. Depending on which list they received, participants would either have three or five minutes to complete as many anagrams as they could. The participants in the easy and hard reward condition were told that there was a prize of \$20 for the participant who completes the most anagrams in each difficulty. Once their time was up, all participants were thanked for their cooperation in the experiment; and the reward condition would be told who would win the prizes in each group once all the data was collected and testing completed.

Results

The criterion for a correctly solved anagram was that it formed a proper English word that had to be a noun, an adjective or a verb. The word was not counted if it had to do with a fictional entity, such as a character; for example, “ABORT” was the correct word, “BORAT” was not. A solved anagram would simply count as one.

A 2 X 2 between-subjects ANOVA, as seen in Appendix C, was conducted with difficulty as an independent variable (easy/hard) and potential for reward being the correlational variable (chance for reward/no chance for reward). The total amount of anagrams on the easy list was 80 and 64 on the hard list.

The results of the experiment are shown in Figure 1. Note that the results showed that there was a main effect for the easy anagram difficulty level, $F(1, 28) = 108.55, p < 0.05$, with those in the easy, no-reward cell ($M = 57.5$) showing more completed anagrams than the easy reward group ($M = 46.25$). Results also showed that there was no main effect for the hard difficulty when comparing the reward and no-reward conditions.

In a planned comparisons test, it was found that there was significance when comparing between the easy and hard difficulty means at the no reward condition; $t(15) = 2.132, p < 0.05$. There was also a statistically significant comparison between the easy and hard difficulty means at the reward condition, $t(15) = 4.38, p < 0.05$.

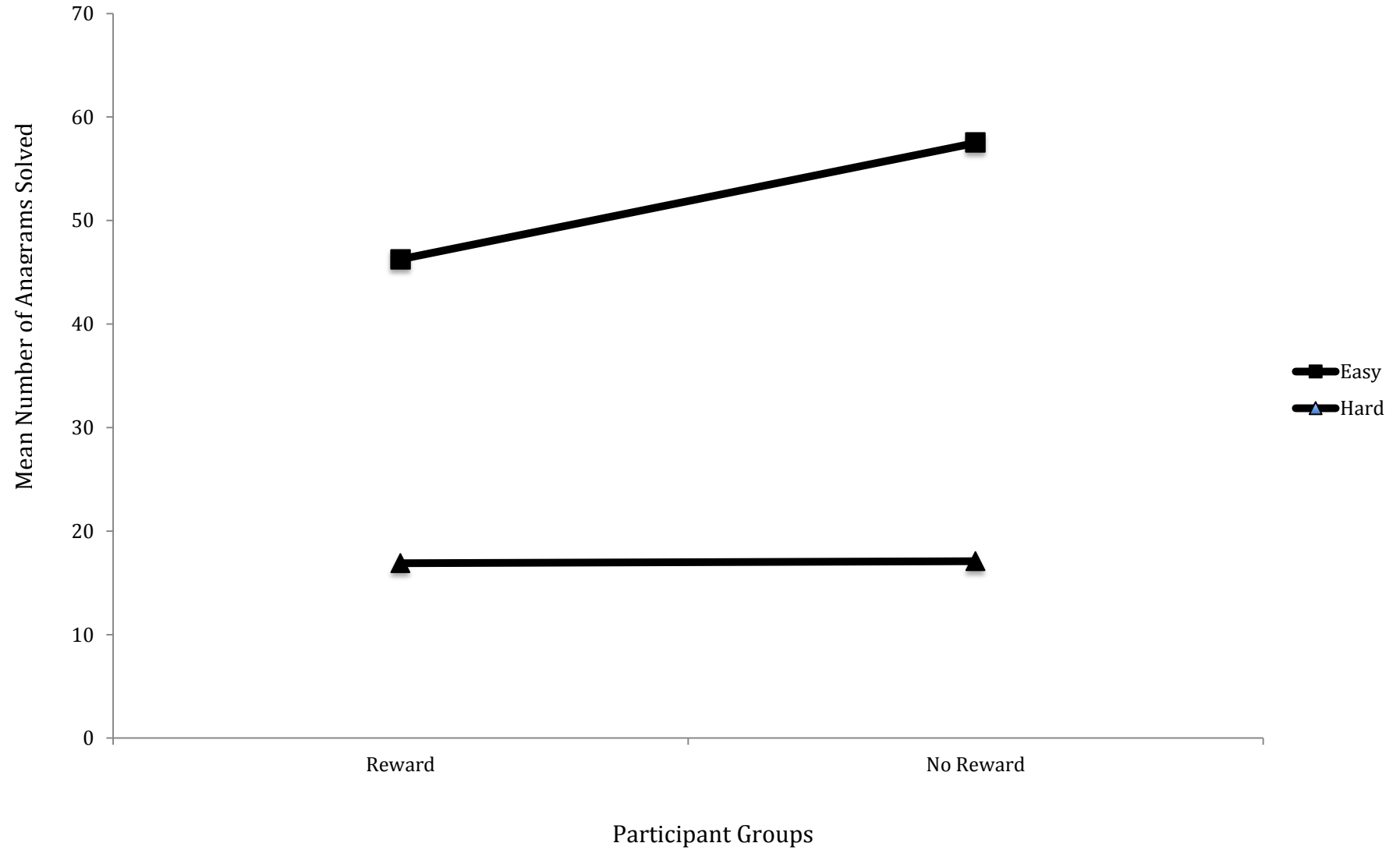


Figure 1. Amount of anagrams solved by participants in difficulty (easy/hard) and incentive groups (reward/no reward)

Discussion

The results that were found were disappointing, but not unexpected; and why that is will be elaborated on. It was hypothesized that participants in the reward condition in both the easy or hard anagram group would solve the most anagrams. The graph on Figure 1 showed that participants in the no-reward group did better than the reward group when they were given the more difficult anagram list, and those who worked on the easy anagrams list performed exactly the same as those in the reward group. It is apparently evident by the experiment that the promise at a chance of winning money did not show any significant improvement for performance for those participants. Seeing as how in both the Deci (1971) and Cameron et al (2004) studies found that extrinsic motivation was able to overpower intrinsic motivation, this may indicate that the current experiment had some methodological issues which showed in the results.

One issue that was overlooked by the experimenter was the lack of two separate consent forms for participants either the reward group or the non-reward group. It should be noted that most participants did not care to go through and read the consent form. However, those that did read it were mildly agitated that they were not assigned to the reward group. All those participants did continue with the experiment, but it could be argued that they did not perform to their best ability because of not being assigned to the reward condition and that they knew they would gain nothing regardless of performance. This certainly could have affected the results of the experiment, and it was a very simple mistake that could have easily been corrected if more attention was paid to it.

Another overlooked issue in this experiment was the fact that the experimenter accidentally duplicated some anagrams in the easy anagrams list; approximately two or three. Participants were the first to notice it, which is slightly embarrassing, and could have affected the score slightly. The experimenter decided to count the words that were duplicated because it wasn't the participants' fault, and technically it still counted.

What could have been done as well was utilize the idea of free time like in Deci (1971) where there is a break between sessions. The experiment could have had participants complete one list of anagrams, then give them the option of other things to do including another set of anagrams. An alteration to the reward condition would be to have participants complete one list of anagrams, and then asked if they would like another list where there was a chance at prize.

The decision for the task of this experiment to be solving anagrams came about impulsively. The anagrams task was a very simple (maybe too simple) idea for a task, and it wasn't a test really put a participant's motivation to the test. There was no noticeable strain or hustle when participants were performing the experiment. It was assumed that most people were familiar with anagrams and enjoyed them, so it was chosen. However, judging from my results there are some people who seem to excel at them more than others. When asked about it, those participants noted that they practiced them a lot in newspapers. A task where everyone is able to perform competently and where experience does not come into effect, such as in the Cameron et al (2004) study with the find the difference problems.

Another direction to take this experiment would be to have participants complete a task that was unpleasant or boring. This deviates from Deci (1971) and Cameron et al

(2004) where their participants had to complete intrinsically motivating or engaging tasks.

By having participants complete a low intrinsically motivating task, one could see how greatly an extrinsic motivator would drive participants to continue with the task.

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Appendix A: Easy Anagrams List

REA _____	XFO _____	TAM _____	WAE _____	DEN _____
SEU _____	RMA _____	GNA _____	UPY _____	TOD _____
OTO _____	PLA _____	PRA _____	WAR _____	BOC _____
TNA _____	GGA _____	PIZ _____	ATR _____	PHI _____
OTB _____	OJY _____	ISH _____	PZI _____	URF _____
DMA _____	SEY _____	CEA _____	ILT _____	NOS _____
ARO _____	INW _____	BRU _____	EKG _____	MEL _____
DAS _____	TPA _____	NAM _____	LOD _____	ONE _____
OZO _____	GEA _____	RAO _____	ELE _____	YDR _____
UHH _____	TOP _____	ASX _____	TFI _____	IOB _____
ERH _____	UYO _____	PAP _____	GBU _____	AOB _____
UGM _____	FER _____	ETL _____	TEA _____	ODU _____
WEA _____	OBL _____	BIN _____	FLE _____	GGE _____
UTB _____	TEG _____	WLO _____	UGY _____	IJB _____
PGA _____	INK _____	DON _____	ESW _____	PAS _____
IKD _____	LYF _____	UOT _____	IBG _____	OHE _____

Appendix B: Hard Anagrams List

TYEVS	_____	OPRED	_____	LASGS	_____	UQTLI	_____
ENEUV	_____	RUCTK	_____	LEENK	_____	QASUT	_____
LAI TR	_____	INWDS	_____	OBLNE	_____	DROAE	_____
UECAS	_____	EIVDS	_____	LISTA	_____	GANSF	_____
LURES	_____	EIRVR	_____	LLYAR	_____	EKECH	_____
TEOUQ	_____	OMELN	_____	OEKHC	_____	OYUGN	_____
KESYP	_____	TROBA	_____	AYLRE	_____	RUTNK	_____
SETAD	_____	ORWMS	_____	DTIHW	_____	WEELJ	_____
DIMTA	_____	PERVI	_____	LESYL	_____	OSHKO	_____
LHOLE	_____	LORYG	_____	SREET	_____	ROKCO	_____
IREFD	_____	WECHY	_____	EVRNE	_____	THIRG	_____
MSUJP	_____	WROTH	_____	NFEKI	_____	TTRUN	_____
GRONA	_____	OTROM	_____	LENUC	_____	RAITN	_____
EVMON	_____	LIXEE	_____	FEIHT	_____	OREFC	_____
ALOKA	_____	SIUES	_____	JANOB	_____	DSHEA	_____
ETRME	_____	BICAN	_____	OISYN	_____	EHATC	_____

Appendix C: ANOVA Summary Table

Source	SS	df	MS	F
Rows	9744.16	1	9744.16	108.55
Columns	257.28	1	257.28	2.87
Interaction	121.08	1	121.08	1.35
Error	2513.64	28	89.77	
Total	12 637.76	31		