

Using the Pavlovian to Instrumental Transfer (PIT)
Paradigm to compare Motivations for earning Money
for an Unknown Purpose with Motivations to earn
Money for Oneself

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Abstract

Motivational differences between earning money for an unknown purpose and earning money for oneself has been examined using the Pavlovian to Instrumental (PIT) paradigm. This paradigm investigates how stimuli influence instrumental actions towards outcomes which are dependent of the motivational state of an individual. Forty-six participants received instrumental training where they learned the associations between two responses and the outcomes 10 cents for a ME account or 10 cents for a STASH account. Followed by Pavlovian Training where they learned the association between stimuli and the two outcomes 10 cents for the ME account and 10 cents for the STASH account. Finally, the participants had the test phase where they performed instrumental actions in the presence and absence of the conditioned stimuli. Results have been analysed using repeated measure ANOVA. Findings indicate that the conditioned stimuli did not affect the instrumental actions meaning that there is no PIT effect, so there is no motivation for earning money for oneself and earning money for an unknown purpose. Limitations of the study are the small sample group as well as the limited financial reward. These should be addressed in future research.

Keywords: Pavlovian to Instrumental Transfer (PIT); Financial rewards; Motivation; Goal-directed behaviour.

Introduction

Charities play a significant role in addressing some of the world's greatest problems such as: poverty, hunger, clean water supply, sanitation, and reducing inequalities (United Nations, 2015). The success of charities is dependent on the number of charitable donations made. A better understanding of what motivates people to donate money to charities could be helpful in designing campaigns to raise money. With regard to earning money, three situations could be recognized: 1. motivation to earn money for oneself, 2. motivation to earn money for an organization, where the purpose of the organization is not known, 3. motivation to earn money for a charity, where the purpose is known. The present research addresses if people have motivation to earn money for an organization where the purpose is not known. A comparison between this motivation and the motivation of earning money for oneself is made. Various studies report different reasons of why individuals are earning money. Some motivations are that people earn money for charity and community activities, to be respected by others. However, there are also studies demonstrating that people earn money merely for oneself (Srivastava, Locke & Bartol, 2001; Landry et al., 2016). The difference between the motivations mentioned above is unknown. The present research aims to contribute to a better understanding of the various motivations.

Pavlovian to Instrumental Transfer paradigm

It is interesting to see if there is a difference in motivation between earning money for an account where the purpose is not clear, naming STASH, compared to earning money for an account for oneself, naming ME. Does the motivation differ between these two accounts, if it is possible to earn the same value for each account? This could be examined with the Pavlovian to Instrumental Transfer (PIT) paradigm (Corbit, Janak & Balleine, 2007). The PIT paradigm is a paradigm that uses Pavlovian training and instrumental training to investigate how cues influence goal-directed behaviors (Talmi, Seymour, Dayan & Dolan, 2008). Cues can trigger goal-directed behavior towards money rewards (Lehner, Balsters, Herger, Hare & Wenderoth, 2017). The logo of the "Holland casino" may remind one of earning money. This thought triggers the action of going to the casino to gamble, even when one was not intended to go. Cues that remind one of money can indirectly trigger the instrumental action towards the reward money. Seeing a sad picture of a poor boy can trigger the action of giving money to charity. These are examples of how cues can trigger behavior towards money rewards (Lehner et al., 2017).

The PIT paradigm consists of three phases: Pavlovian training, instrumental training, and the transfer test. During the Pavlovian training, one or more stimuli are paired with one or more rewards. These stimuli are named a conditioned stimuli (CS). The subjects will learn the association between a stimulus and an outcome (S-O association). During the instrumental training, a relationship is established between one or more actions and the delivery of one or more rewards. In this phase, an association between a response and an outcome is learned (R-O association). Due to the ideomotor principle, representations of motor patterns and contingently following effects are associated bi-directionally (Pfister, Kiesel & Melcher, 2010). So, an association between an outcome and a response is learned (O-R association). The subject has to execute a specific action and he or she will receive a reward for this (Cartoni, Balleine & Baldassarre, 2016; Holmes, Marchand & Coutureau, 2010).

After these two learning phases the last phase can be recognized, during which the participant will again have to perform the instrumental actions, but this time the CS that is trained in the Pavlovian phase is presented during this session. During this phase, it will be checked if the conditioned stimuli had an effect on the instrumental responses. This is tested by comparing the instrumental response during the last phase in periods where no CS is presented, with periods where the CS is presented. It would be expected in the test phase that as a result of the learned association between the conditioned stimuli and an outcome, seeing the conditioned stimulus will trigger the activation of the outcome in the mind of the subject. As during the instrumental phase, the relationship between the outcome and the response is learned, the activation of the outcome in de mind will trigger the response that is associated with the outcome (Cartoni et al., 2016; Holmes et al., 2010). A PIT effect will be found if the reaction time of the instrumental action that is learned is shorter for the conditioned stimuli than the reaction time for the neutral (not conditioned) stimuli. In this last phase no outcomes are delivered during the test, in order to avoid that new learning would occur between stimuli, instrumental actions, and outcomes.

Presentation of a stimulus that is previously paired with an outcome can increase responding because Pavlovian stimuli create a general state that can increase the performance of response, driven by compatible motivational systems (Corbit, Janak & Balleine, 2007). Pavlovian stimuli can create a general state when, during the training, stimuli become associated with the delivery of an outcome. Research has shown that cues can enhance performance more selectively based on the specific outcome that the stimuli predict. For example, if a stimulus previously is paired with earning money for the account for other purposes, and there is an increase in performance of the instrumental action for that stimulus, it could be said that there is more motivation for this outcome. In other words, predictive stimuli can activate a specific priming or retrieval process as an aspect of

the expectancy of a particular reward and that this process selectively elevates the performance of actions associated with that unique reward (Orbit et al., 2007).

Motivation to Earn money for oneself compared to earning money for other purposes

There have been several studies regarding the question of why people want to earn money. Few of these studies conclude that people want to earn money, merely for themselves. Money is for most people a tool to satisfy needs and desires. It can be viewed as a tool for the exchange between individuals and their environment to achieve certain outcomes (Gneezy, Meier & Rey-Biel, 2011). The following studies have examined the reasons why people have a dominant motivation to earn money for themselves.

The study of Landry et al, (2016) signals some main reasons. Firstly, money stimulates happiness. Research on buying motivations and behaviors demonstrate that people buy material goods, not for economic value, but to gain mental benefits. They purchase goods in order to improve their mood. Money is needed in order to achieve this. Secondly, individual success is measured in terms of money and wealth. Most people think that if we do something successfully we should be rewarded financially. We should get compensation for our effort, time and work. If one can buy expensive goods, this will increase the perception of social status and is a sign of personal achievement (Landry et al., 2016). Ditmarr (1992) had documented that the same person was considered more successful, self-reliant and autonomous when he/she was seen with expensive luxurious goods rather than basic ones. As money enables one to buy expensive goods, it contributes to a higher social status. Earning money for oneself is therefore what people prefer to do (Landry et al., 2016).

On the other hand, there are other reasons for individuals to earn money (Srivastava, Locke & Bartol, 2001). These reasons could explain that individuals earn money for another purpose than just for themselves. Individuals want money to gain social status and generate envy and admiration of others. Money is associated with four symbols: status, respect from others, freedom of choice, and luxury of time. Individuals also earn money to make the world a better place. The process of making the world a better place is enjoyable and it fulfills intrinsic relatedness needs (Bekkers, 2010). Investing in the income of other people has a big influence on someone's happiness (Dunn, Aknin, & Norton, 2008). Individuals earn money and use this money to gain respect and sympathy. For example, donating money for charities makes the families of the individuals proud. There is also a societal expectation of what people are supposed to do with

money, such as family support and charitable giving. To earn money for these causes will help individuals avoid feelings of guilt (Baumeister & Leary, 1995).

Srivastava et al., (2001) combined various studies to create a list of motives of why people want to earn money. These motives are: security (including practical need, help for future life planning, freedom from poverty, and security), family support, market worth, pride (including pride and achievement), leisure (including luxury and leisure), freedom, impulse, charity, social comparison (including showing-off, seeking power, and social comparison) and overcoming self-doubt (Srivastava et al, 2001). As one could say motivation to earn money is different and complex, and that the multiple motivations could simultaneously play a role in each situation.

The present study

In the present study, motivation to earn money for other purpose and earn money for oneself is examined using the Pavlovian to Instrumental Transfer paradigm. The following research question is conducted:

“Is there a difference in the motivation between individuals to earn money for other purpose compared to the motivation to earn money for oneself?”

Many studies used PIT to examine the motivation towards drug or food rewards (Garbusow et al., 2014; Talmi et al., 2008). It could be interesting to see if the PIT paradigm could be used to examine the motivation for money rewards. The present study could eventually conclude if individuals have more motivation for earning money for oneself or for earning money for another purpose where the purpose is unknown. The result from this study could be compared with the motivation for earning money in situations where the purpose is known such as earning money for charity. When it is known which reward has the most motivation, PIT could be used to insert different cues and it could be examined how these cues change the behavior (Cartoni et al., 2016). This could be done until the preferred behavior of most motivation to earn money for charities is established. This all explains why it is essential that the difference in motivation is established and that the PIT task is used to examine this. To answer the stated research question the following expectations will be examined.

H1. The PIT task could be used to examine the difference in motivation towards different money rewards.

H2. The motivation to earn money for oneself differs from the motivation to earn money for other purpose.

H3. Individuals have more motivation to earn money for oneself compared to earning money for other purpose.

For further research, the present study is important to eventually achieve an understanding of the motivation to earn money for charity. These findings could eventually be used to improve campaigns for fundraising for charities.

Method

Participants

46 participants ($M = 23.23$, $SD = 1.87$) have taken part in a 2x3 in-between factor design. The participants were young adults and both men (10) and women (36). The selection of participants was made by snowball sampling and through a convenience sample. The sample size consisted of individuals within the social group (35) of the experimenter and of individuals that are retrieved through snowball sampling (11).

Procedure

Test persons were told that the purpose of the study was that they had to react as fast and accurate as possible on specific visual stimuli. They were also told that the experiment would take about half an hour. Before they started the experiment, they had to read an information form about the experiment. This form informed them on the experiment, and that they could earn money based on their performance. This information form also contained information that the participants were always able to quit the experiment even if they were halfway and had no reason for quitting. They were also informed that their data would be used for further research but that it would be anonymous, so that it would not be possible to see which result belongs to which participant. Informed consent was signed to get an approval of the participant that they participated in free will and that they were informed adequately. Participants were exposed to four task conditions: practise phase, instrumental learning, Pavlovian conditioning, and PIT. Participants in the experiment performed all tasks in a silent test room. Before the participants

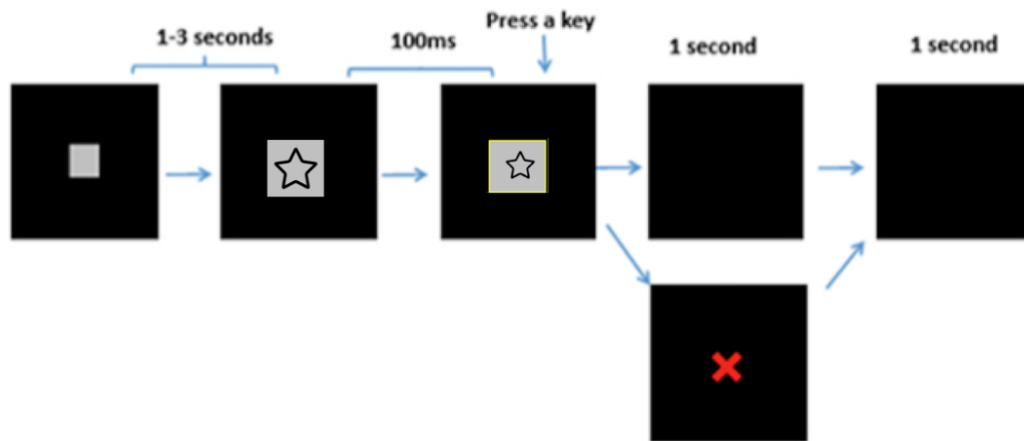
started the experiment, the following background information was noted: age, gender, and if they were left or right-handed. They were also assigned to a particular group, sequence, and trial. Participants were assigned to different conditions in order to avoid order effects. Before the participant started each phase of the PIT task, they received standard instructions.

The instructions before the instrumental phase: *You have finished the first phase! Now you will start the second phase. This is very similar to the previous phase only now you are going to earn real money. Some response will lead to you earning money for an account reserved for you, which will be referred to as the ME account. You will not always be earning money for an account reserved for you. The other account is reserved for other purposes, which will be referred to as the STASH account.*

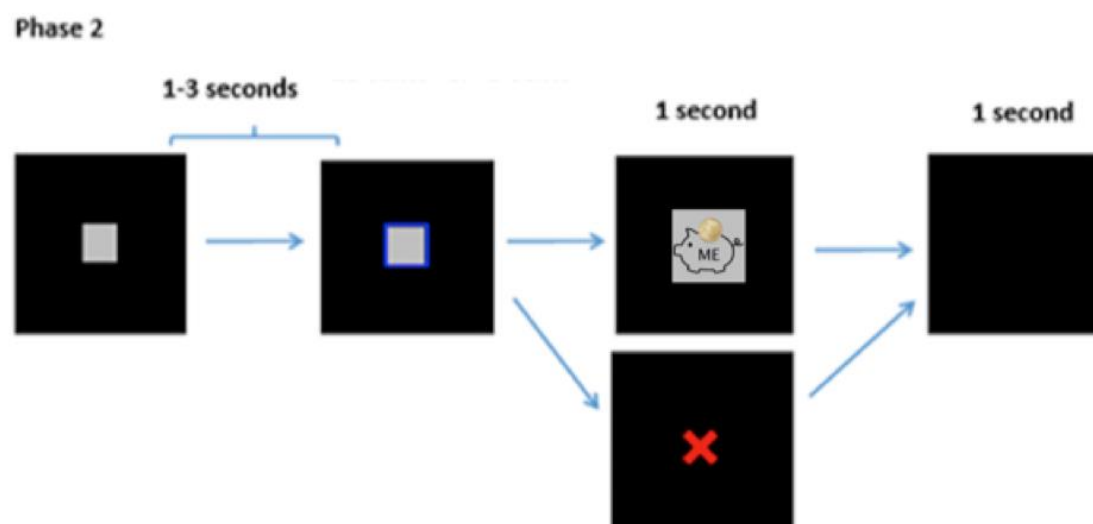
The instructions of the Pavlovian phase: *In this phase, you do not need to press any keys on the keyboard. Your task is to remember the association between the stimuli (star or moon or cloud) and the result (10 cents going either to the account reserved for you or another purpose) and use these stimuli (star or moon or cloud) to predict the potential result (10 cents going either to the account reserved for you or another purpose)*

Pavlovian to instrumental task

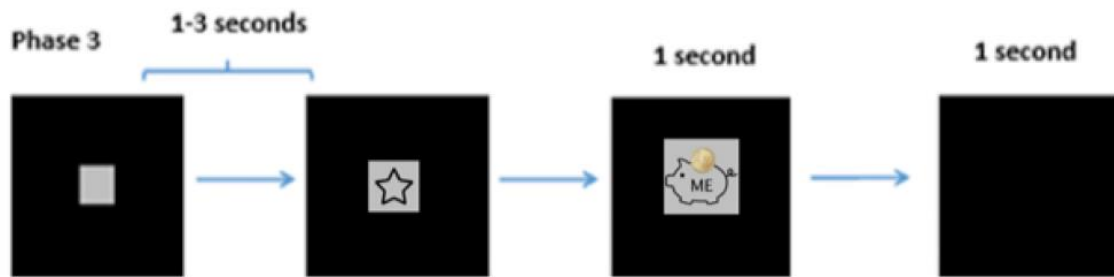
Practice phase. Participants began with the practice phase of the task (figure 1). This phase made them more familiar with the general timing and the set-up of the task. The participants were instructed to press a W-key or an O-key when seeing a blue or yellow line around the grey square. The instructions which key they had to press for which line was different for each participant. Each trial went as follows. They first would see a grey square in the middle of the screen. After 1-3 seconds, they would see one of the neutral cues (star, moon or cloud) appear on the grey screen, followed after 100ms by a blue or yellow line around the grey square. When they saw the line they had to press the key that was associated with the color of the line. When they pressed the accurate key they would see a black screen for 2 seconds before the next trial would begin. When they pressed a wrong key they would see a red cross for 1 second, followed by a black screen for 1 second, before the next trial would begin. The practice phase consisted of 42 trials.



Instrumental phase. The practice phase was followed by the Instrumental phase. Participants learned to press a key to gain 10 cents for the ME account and learned to press a key to gain 10 cents for the STASH account. The task consisted of 20 practice and 20 actual trials. Each trial went as followed: they first saw a grey square for 1-3 seconds, followed by a blue or yellow line around the square. In the instruction they read which key they had to press when seeing a blue or yellow line. They were also instructed which reward was associated with which key. These rewards were 10 cents for ME or 10 cents for STASH. When they saw the yellow or blue line, participants had to press the associate key and speak out the associated reward with that key. They had to say "10 cents for ME" when the reward was for the ME account and "10 cents for STASH" when the reward was for the STASH account. If the participants pressed the correct key, the picture of the reward was shown for 1 second. For the ME account this picture consisted 10 cents going in a piggy bank with ME written on the piggy bank and for the stash account this was the same, only STASH was written on the piggy bank. This was followed by seeing a black screen for 1 second before the next trial started. If participants pressed a wrong key, they saw a red cross for 1 second, followed by a black screen for 1 second before the next trial started. Participants first had practice trials and during these trials no real money could be earned. They were also assured that during the actual task, real money could be earned. At the end of the task, participants were informed of the amount of money they earned for the ME account and the STASH account.



Pavlovian phase. After the instrumental phase the Pavlovian phase started. Participants were instructed not to press any keys during this phase. They were informed to learn the association between a specific cue and a reward. Two neutral cues (star, moon or cloud) were associated with two rewards (ME account or STASH account). Participants were instructed to speak out the reward that was associated with the specific cue that they saw. The trials in the phase went as follows: first, they would see a grey square for 1-3 seconds. After this they saw one of the two learned cues (star, moon or cloud). When they saw one of these cues they had to speak out the reward associated with those cues. They had to speak out: 10 cents for ME or 10 cents for STASH. After seeing the cue for 1 second, they saw the picture of the reward, associated with the cue for 1 second. This was followed with seeing a 1-second screen before beginning the next trial. This phase also consisted of a practice task of 20 trials and the actual task of 20 trials. The participants were instructed that during the practice task, no real money was earned and during the actual task real money could be earned. The experimenter took notes of what they were saying.



PIT phase. Finally, participants did the PIT phase. This phase was identical to the practice phase. This phase existed of 120 trials, which were divided into 4 blocks so that each block consisted of 30 trials. The participants were instructed that no money could be earned during this phase. During this phase the cues were varied by conditioned cues and unconditioned cues. After these phase participants were informed of the amount of money they gained during the total experiment.

Debriefing

Finally, the participants would receive the amount of money they had earned. After they received this, the experimenter asked them if they would donate an amount of money to charity. The experimenter informed the participant with a standard protocol:

This is the end of the experiment! Thank you for taking part. You have earned 5 euros: 2 euro for the STASH account, 2 euro for the ME account and 1 euro for participation. However, you can decide what you want to do with the money. You can donate money to the Against Malaria Foundation, but this is your own choice. The Against Malaria Foundation is a charity that is raising funds and awareness to help people fight against the deadly disease of malaria. About half a million people each year die from malaria and 220 million fall ill. 70% of them are children under 5. Yet, malaria is preventable. The most effective means of preventing malaria is sleeping under a mosquito net, specifically a long-lasting insecticide-treated net. This net costs about 2 euro, it lasts for 3-4 years. 100% of the money collected by the foundation will go to buying nets.

I will leave the room now. You can put the money in the little wallet if you want to donate. This is not part of the experiment.

The experimenter then left the room and the participants could put money in a little wallet. After this the participants were informed about the real meaning of the experiment.

Analyze

To answer the research question, the data of the test phase was analyzed. A repeated measure ANOVA was used because different mean scores of reaction time are compared. Before the repeated measure ANOVA can be used, assumptions of this test have been checked. The repeated measure ANOVA was a 2x3x4 design which consisted of the independent variables: two rewards (ME vs. STASH), three conditioned stimuli (ME vs. STASH vs. Neutral), and 4-time blocks.

Results

Assumption test

Before a repeated measure ANOVA was conducted, assumptions regarding this analyze were tested. Mauchly's test of sphericity indicated that the assumption of sphericity had been violated for the variables Reward ($p=.001$), Blocks ($p=.001$) and the interaction between the variables Cue*Blocks ($p=.001$) and Cue*Reward*Blocks ($p=.003$). This means that the variance for these variables is not equal. For these variables the corrected F-value is used. Also outliers are removed from the data.

Main analysis

A repeated measure ANOVA has been conducted to analyze the interaction between the independent variables on the dependent variable. Statistical analysis revealed that there was no significant main effect of either cues [$F(2,90) = .911, p = .406, \eta^2 = .02$] or reward [$F(1,45) = .601, p = .442, \eta^2 = .013$] or blocks [$F(3, 2.190) = 1.49, p = .229, \eta^2 = .032$]. No significant main effects mean that the reaction time in the presence of the conditioned stimuli (STASH and ME), or the reward (10 cents for ME and 10 cents for STASH) did not differ. No main effect for Blocks means that the Blocks did not have an effect on the reaction time.

Cues and reward did not interact significantly [$F(2,90) = .102, p = .903, \eta^2 = .002$] nor did the interaction between reward and blocks [$F(3,135) = .255, p = .858, \eta^2 = .006$] and the interaction between cues and blocks [$F(4.1,184.5) = .089, p = .987, \eta^2 = .006$].

Finally, the interaction between Cues, Reward and Blocks had no significant interaction effect [$F(4.12, 188) = .377, p = .0833, \eta^2 = .008$]. This means that the interaction of these variables had no effect on the reaction time of the individuals. The interaction between the reward*cue is seen in a plot in Figure 1. The exact means of the reaction times for each variable is shown in Table 1.

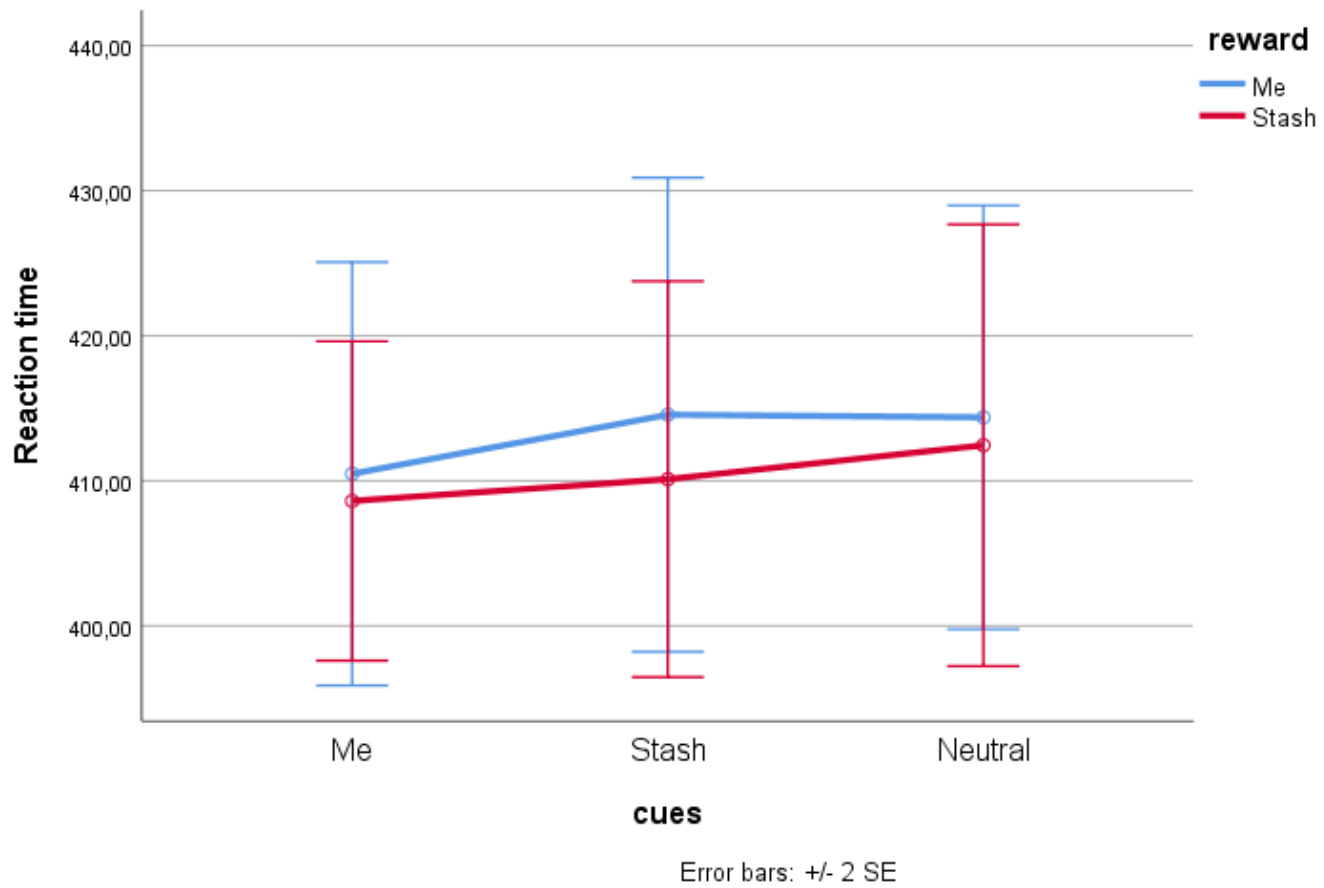


Figure 1. Plot of the reaction times of cues x rewards, with error bars.

Tabel 1.

Exact means of the reaction time and standard deviations for cues x rewards

<i>cues x rewards</i>	Me	Stash
Me	<i>M=410.49 SD=7.29</i>	<i>M=408.6 SD=5.5</i>
Stash	<i>M=414.55 SD=8.17</i>	<i>M=410.1 SD=6.82</i>
Neutral	<i>M=414.37 SD= 7.3</i>	<i>M=412.45 SD=7.61</i>

The total amount of money that participants could earn during the task was 5 euro's (2 euros for Stash account, 2 euros for ME account, 1 euro for participation). The experiment consisted of 49 participants. The total amount of money that these participants could earn together was 245 euros. Afterwards they had the opportunity to give money to charity. The amount of money that has been given to charity was 146 euros. This means 59% of the total amount of money that could be earned has been given to charity.

Discussion

The purpose of the present study is to explore if there is a difference in motivation for earning money for other purpose compared to earning money for oneself. A lot is known about the motivations to earn money for oneself and the motivation to earn money for other purpose (Landry et al., 2016; Lock & Bartol, 2001; Srivastava et al., 2001; Baumeister & Leary, 1995). However, the difference between these situations is unknown

An extensive body of literature on the concept of PIT is available and suggests that it is possible to investigate goal-directed behavior among individuals using conditioned stimuli (Corbit et al., 2007). Based on the existing literature this paper investigates the motivations between the two money rewards by using the PIT task.

Findings

Firstly, in this research no PIT effect has been found for the behavior earning money for oneself and no PIT effect for the behavior earning money for another purpose. This finding is not in line with what has been found by Corbit et al, (2007) and Talmi et al, (2008) who revealed that when using a PIT task, goal-directed behavior could be influenced by conditioned stimuli and instrumental learning. The conditioned stimuli did not enhance performance of the instrumental actions for the outcomes earning money for oneself and earning money for another purpose. Moreover, the present research shows that there is no motivation for earning money for oneself and also no motivation for the other purpose account. With this finding it could be said that the motivation does not differ for the two accounts. This is not in line with what has been reported in research that individuals are motivated to earn money for oneself and for another purpose (Landry et al., 2016; Lock & Bartol, 2001; Srivastava et al., 2001; Baumeister & Leary, 1995).

Implications

In this study, no PIT effect is found for the goal-directed behavior towards earning money for oneself and earning money for other purpose. This finding does not support the hypothesis. This could be explained by the study of Paredes-Olay, Abad & Gamez (2002), where no PIT effect was found, as the outcomes and the monetary incentives used in that experiment were not emotionally engaging enough, so that the cue had little opportunity to enter into associations with the motivational state (Paredes-Olay et al., 2002). In the present study, the monetary incentive that has been used is 10 cents, which could indeed also be not substantive enough. The performance of a participant on goal-directed behavior is mediated by the knowledge of the contingency between the action and the goal or outcome. The motivational state determines the participant's representation of the outcome as a goal. It could be that during this experiment, the amount for each account that could have been earned, is an outcome that is not represented as a goal for them, which has an influence on the learning phases during the PIT task (Paredes-Olay et al., 2002).

This explanation combined with other research could also explain why there was no motivation for earning money for oneself and earning money for other purpose. Literature has shown money earning reasons such as an individual's success and purchasing goods to earn money for oneself (Landry et al., 2016). The reasons to earn money for other purposes are to make the world a better place, societal expectations, and family support (Baumeister & Leary, 1995). It could be that the received amount of 2 euros for each account, would not be of a high enough value to achieve goals as individual success or to make the world a better place.

Another explanation for the finding of no PIT effect could be that because the sample of this experiment consisted of a larger amount of individuals within the social circle of the experimenter (35) than individuals that were unknown (11). It could be that participants took part in the exam in terms of doing a favor instead of taking part because they could earn five euro. This could explain that the participants did not have the motivation to earn money for the two accounts. Also the unknown participants could not have the motivation to earn money for the accounts, because these participants were recruited by snowball sampling. It could be that they participated to please the persons, through which the snowball sampling was conceived.

Limitations

Although the results of the present study are not in line with what was expected, it still supports that research towards the motivation for earning money needs to be examined more accurately, as some limitations of this study are present. A first limitation of the present study is the small number of participants in the analysis. Due to outliers and not probably stored data, three participants were excluded. Before the experiment was done, a power analysis has been conducted to estimate the size of the sample. This resulted in a recommended size of 48 participants. Because of the excluded participant, the study had a sample size of 46, which is a small sample for getting a significant result. Due to time restrictions no more participants could be recruited. A more significant result could likely have been obtained when the sample size would have been larger. In further research, larger samples should be used to increase the possibility of a significant result.

Another limitation is the presence of the experimenter during the PIT task. The presence was necessary because the participants had to speak out words which had to be noted down. The presence of the experimenter could have had an influence on the attention of the participants, or it could be that at least part of their attention could have been affected by distraction on what the experimenter was doing. It is recommended to execute further research in an isolated room communicating by a microphone.

Further research

For further research it is important that the current study would be replicated. Further research needs to take the limitations of the present study into account. The replication of this study needs to have little adjustment, to eventually receive the expected results. Manipulation checks to investigate the motivation of the participants would need to be inserted. These manipulation checks will investigate the motivation for doing the PIT task. Also these manipulation checks will be useful to investigate the reasons why people took part in the experiment.

Also for further research, it would be interesting to see if changing the amount of money that could be earned for the two accounts could influence the PIT task. As seeing a reward as a goal is dependent of the value of this reward, having a higher value of the reward, could enhance more goal-directed behavior.

Conclusions

The aim of this paper was to investigate if there is a difference in motivation between earning money for oneself compared to earning money for another purposes. The PIT task served as a tool to examine the motivation between individuals. Findings revealed that the behavior towards the money rewards earning money for oneself and earning money for other purpose could not be examined using the PIT task, which means that no motivation for the two rewards has been found. Further research is needed to examine this behavior so that eventually motivation for earning money for charity would be better understood.

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Appendix 1: Output

Mauchly's Test of Sphericity^a

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
cues	,931	3,161	2	,206	,935	,974	,500
reward	1,000	,000	0	.	1,000	1,000	1,000
blocks	,555	25,772	5	,000	,730	,769	,333
cues * reward	,939	2,751	2	,253	,943	,983	,500
cues * blocks	,289	53,155	20	,000	,684	,761	,167
reward * blocks	,778	10,990	5	,052	,869	,927	,333
cues * reward * blocks	,378	41,671	20	,003	,697	,777	,167

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: cues + reward + blocks + cues * reward + cues * blocks + reward * blocks + cues * reward * blocks

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
cues	Sphericity Assumed	2927,908	2	1463,954	,911	,406	,020
	Greenhouse- Geisser	2927,908	1,870	1565,430	,911	,400	,020
	Huynh-Feldt	2927,908	1,948	1502,680	,911	,404	,020
	Lower-bound	2927,908	1,000	2927,908	,911	,345	,020
Error(cues)	Sphericity Assumed	144597,045	90	1606,634			
	Greenhouse- Geisser	144597,045	84,166	1718,001			
	Huynh-Feldt	144597,045	87,681	1649,135			
	Lower-bound	144597,045	45,000	3213,268			
reward	Sphericity Assumed	2083,177	1	2083,177	,601	,442	,013
	Greenhouse- Geisser	2083,177	1,000	2083,177	,601	,442	,013
	Huynh-Feldt	2083,177	1,000	2083,177	,601	,442	,013
	Lower-bound	2083,177	1,000	2083,177	,601	,442	,013
Error(reward)	Sphericity Assumed	155878,904	45	3463,976			
	Greenhouse- Geisser	155878,904	45,000	3463,976			
	Huynh-Feldt	155878,904	45,000	3463,976			
	Lower-bound	155878,904	45,000	3463,976			
blocks	Sphericity Assumed	21866,774	3	7288,925	1,492	,220	,032
	Greenhouse- Geisser	21866,774	2,190	9986,044	1,492	,229	,032
	Huynh-Feldt	21866,774	2,306	9481,858	1,492	,228	,032
	Lower-bound	21866,774	1,000	21866,774	1,492	,228	,032

Error(blocks)	Sphericity Assumed	659562,332	135	4885,647			
	Greenhouse-Geisser	659562,332	98,538	6693,482			
	Huynh-Feldt	659562,332	103,778	6355,534			
	Lower-bound	659562,332	45,000	14656,941			
cues * reward	Sphericity Assumed	398,607	2	199,304	,102	,903	,002
	Greenhouse-Geisser	398,607	1,886	211,385	,102	,893	,002
	Huynh-Feldt	398,607	1,966	202,800	,102	,900	,002
	Lower-bound	398,607	1,000	398,607	,102	,751	,002
Error(cues*reward)	Sphericity Assumed	176091,730	90	1956,575			
	Greenhouse-Geisser	176091,730	84,856	2075,176			
	Huynh-Feldt	176091,730	88,448	1990,899			
	Lower-bound	176091,730	45,000	3913,150			
cues * blocks	Sphericity Assumed	916,447	6	152,741	,089	,997	,002
	Greenhouse-Geisser	916,447	4,101	223,453	,089	,987	,002
	Huynh-Feldt	916,447	4,564	200,801	,089	,991	,002
	Lower-bound	916,447	1,000	916,447	,089	,767	,002
Error(cues*blocks)	Sphericity Assumed	462763,683	270	1713,940			
	Greenhouse-Geisser	462763,683	184,559	2507,409			
	Huynh-Feldt	462763,683	205,378	2253,229			
	Lower-bound	462763,683	45,000	10283,637			
reward * blocks	Sphericity Assumed	1657,790	3	552,597	,255	,858	,006
	Greenhouse-Geisser	1657,790	2,606	636,052	,255	,831	,006
	Huynh-Feldt	1657,790	2,781	596,130	,255	,843	,006
	Lower-bound	1657,790	1,000	1657,790	,255	,616	,006
Error(reward*blocks)	Sphericity Assumed	292674,987	135	2167,963			
	Greenhouse-Geisser	292674,987	117,287	2495,377			
	Huynh-Feldt	292674,987	125,141	2338,754			

	Lower-bound	292674,987	45,000	6503,889			
cues * reward * blocks	Sphericity Assumed	3735,402	6	622,567	,377	,893	,008
	Greenhouse-Geisser	3735,402	4,181	893,395	,377	,833	,008
	Huynh-Feldt	3735,402	4,663	801,099	,377	,852	,008
	Lower-bound	3735,402	1,000	3735,402	,377	,542	,008
Error(cues*reward*blocks)	Sphericity Assumed	445417,850	270	1649,696			
	Greenhouse-Geisser	445417,850	188,151	2367,344			
	Huynh-Feldt	445417,850	209,828	2122,776			
	Lower-bound	445417,850	45,000	9898,174			

