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The influence of cognitive depletion on punishment behaviour. What about the timing.

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Abstract

People cooperate with others on a daily basis. These collaborations can be disrupted by defection, self-interest or unfair behaviours of others, which is opposing cooperative social norms. People tend to punish these individuals. What exactly underlies this punishment behaviour?

The enforcement of cooperative behaviour is facilitated through emotional mechanisms. Especially anger has been shown to facilitate individuals' tendency to punish. Unfair behaviour induces anger, which in turn is a predictor of punishment behaviour.

Anger thus seems to be the underlying factor. There are, however, boundary conditions under which anger leads to punishment behaviour. One of these conditions is related to the attention given to the emotion. Low mental resources seem to both decrease and increase emotion experience. We investigated whether timing of the depletion of mental resources affect an emotion and subsequently punishment behaviour. More specifically, we hypothesized that high cognitive load during the emotion activation phase leads to less punishment behaviour compared to low cognitive load. In addition, we hypothesized that high cognitive load during the emotion application phase leads to more punishment behaviour.

We investigated our hypotheses in an economic game based on the Dictator Game. In this two-player game, participants were confronted with the decision of another player about the distribution of a sum of money between this player and the participant. We manipulated both timing (activation phase vs. application phase) and occupation of working memory (high load vs. low load).

The results of the study showed that the link between unfairness, anger and punishment behaviour is strongly evident. The impact of the timing of cognitive load is not found to be significant. We can conclude that behaviour of people in joint ventures, in which people are placed against each other, can be influenced by the experience of unfairness of the situation and the amount of attention they have for the task.

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Section 1. Introduction

Cooperation between people happens on a daily basis, in small and large groups, in order to achieve common goals or reputation gain. Yet, cooperation is also frequent among strangers, in non-repeated interactions, including situations where gain of reputation is small or absent. This large-scale cooperation among strangers is typical for human societies, and is mainly based on social norms (Fehr, & Fischbacher, 2004).

Social norms are standards of behaviour that are based on widely shared beliefs how individual group members ought to behave in a given situation (Elster, 1989; Horne, 2001; Ellickson, 2001; Voss, 2001). For example, research suggests that human cooperation is largely based on the social norm of 'conditional' cooperation. This means that people are only willing to cooperate if others cooperate, and defection of others is a legitimate excuse for individual defection (Fehr, & Fischbacher, 2004). Defection, self-interested and unfair behaviour of individuals, are considered to oppose social norms, and can cause a complete breakdown of existing collaborations. In these situations, people often have the tendency to punish non-cooperators, even when this comes to a cost to themselves (Fehr, & Gächter, 2002).

The possibility of punishing the non-cooperator increases cooperation, and cooperation decreases when this option is not available (Fehr, & Gächter, 2002), suggesting that punishment is indeed an effective measure. Third-party punishment experiments have shown that the desire to punish others when norm violations take place, can be strong enough to overcome the third party's self-interest. Thus, people are willing to pay for punishment (e.g., in terms of money or effort), even though there are no direct benefits from punishing the non-cooperative other for the self (Fehr, & Fischbacher, 2004; Kahneman, 1986; Turillo, Folger, Lavelle, Umphress, & Gee, 2002). These third-party punishment experiments clearly show the strength and existence of cooperative norms and costly punishment behaviour. What underlies this punishment behaviour of individuals, that follows the violation of cooperative social norms of others?

The enforcement of cooperative behaviour is facilitated through emotional mechanisms. For example, a recent study endorsed the important role of negative emotions in motivating the punishment of free riders (Fehr, & Gächter, 2002). Results suggests that free riding causes strong negative emotions, and in turn, negative emotions trigger punishment. The more the free rider deviates from the average investment of the other group members, the more he or she will be punished. These negative emotions are found to be the proximate cause of the punishment, because negative emotions became more intense as the free rider deviated

further from the average investement of others (Fehr, & Gächter, 2002). In particular, the emotion anger has been shown to influence punishment behaviour. Unfair behaviour induces anger, and there is a positive correlation between the amount of anger and the change on the use of punishment (Bosman, & van Winden, 2002). Finally, research has shown that individuals indeed experience the emotion anger in response to unfair behaviour of others, and this anger is accompanied by the tendency to retaliate against the defector (Seip, Van Dijk, & Rotteveel, 2014), further supporting the relation between anger and punishment behaviour. The tendency to attack others because of their unfair behaviour is a typical characteristic of the emotion anger (Lazarus, 1991), and can be triggered through unfairness for various reasons. The first reason could be that the punisher tries to correct the unfair outcome. Second, punishment is used as an attempt to correct the behaviour of the defector. The last reason to punish could simply be to harm the defector, as anger induced punishment has shown to give pleasure to the punisher (de Quervain, Fischbacher, Treyer, Schellhammer, Schnyder, Buck, & Fehr, 2004).

1.1 Attention and emotion

The above thus suggests that anger drives punishment, especially in reaction to unfairness. There are, however, boundary conditions under which an emotion leads to certain behavioural responses. Research has shown that this depends on the attention given to the emotion. The subjective experience of emotions requires mental resources, as research suggests that affective states occupies working memory (Erber, & Tesser, 1992; Van Dillen, & Koole, 2007). For example, cognitively demanding tasks, such as solving math problems (Erber, & Tesser, 1992; Van Dillen, & Koole, 2007), reading sentences (Morrow, & Nolen-Hoeksema, 1990), or even thinking about affect (Kron, Schul, Cohen, & Hassin, 2010), can reduce a range of affective experiences, including negative affect (Morrow, & Nolen-Hoeksema, 1990; Van Dillen, Heslenfeld, & Koole, 2009), and anger (Gerin, 2006; Rusting, & Nolen-Hoeksema, 1998), and in turn influences the judgement and decision behaviour of people. Furthermore, incidental anger increases punishment of unfair interactions but only when there is enough attention to process the emotion (Gummerum, Van Dillen, Van Dijk, & López-Perez, 2016). This suggests that anger increases punishment, only when there are enough mental resources. On the other hand, research has shown that low mental resources also increase punishment behaviour of unfair interactions. Individuals who were more impulsive had a stronger tendency to punish proposers who made unfair offers (Crockett, Clark, Lieberman, Tabibnia, & Robbins, 2010). Punishment behaviour is seen as an impulsive act

driven primarily by emotional reactions to perceived unfairness (Koenigs, & Tranel, 2007; Pillutla, & Murnighan, 1996; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003; Tabibnia, Satpute, & Lieberman, 2008). Punishment thus seems to be driven by a lack of self-regulation of negative emotions.

Indeed research has shown that people are more influenced by their emotions when mental recourses are limited. Schmeichel, Volokhov and Demaree (2008) investigated the relation between the experience of emotions and individual differences in working memory capacity. They found that participants with high working memory capacity were better able at suppressing their expressed negative and positive emotions than participants with low working memory capacity. Moreover, participants with high working memory capacity were more capable to appraise emotional stimuli in an unemotional manner and thereby experienced (Studies 3 and 4) and expressed (Study 4) less emotion in response to those stimuli.

1.2 Timing of attention

Low mental resources thus seem to both decrease and increase emotion experience. We suggest that whether low mental resources affect an emotion depends on the timing of the low mental resources. Research on stereotypes has shown that cognitive busyness, which can be considered as an equivalent to working memory load (as the researchers describe it as being simultaneously involved in several cognitive resource-consuming tasks), decreases the likelihood that a particular stereotype will be activated but once the stereotype is activated it increases the likelihood that this stereotype will be applied (Gilbert & Hixon, 1991). Following this line of reasoning, we argue that when depletion of working memory takes place during the emotion-evoking-situation (e.g. activation phase) the emotion will not be elicited and as a result this will not affect punishment behaviour. On the other hand, when depletion of working memory takes place after the emotion-evoking-situation (e.g., application phase) the emotion will already be elicited and as a result will facilitate punishment.

1.3 Research questions

The goal of this master thesis was to determine whether the timing of cognitive load (during or after) an unfair situation leads to different behavioural outcomes. More specifically, we hypothesized that high load during the emotion activation phase leads to less punishment behaviour compared to low load. In addition, we hypothesized that high load during the

emotion application phase leads to more punishment behaviour. To investigate the following research questions, an experimental (lab) study has been conducted:

H1: Cognitive depletion during the emotion activation phase will reduce punishment.

H2: Cognitive depletion during the emotion application phase will increase punishment.

1.4 The current study

In the present research we investigated our hypotheses in an economic game based on the Dictator Game. In this two-player game, participants are confronted with the decision of another player about the distribution of a sum of money between this player and the participant. We experimentally manipulated the unfairness of the other player's behaviour. The distribution of money served as a proximate for different levels of the other player's unfair behaviour. Following the distribution of money, participants decide whether or not to punish the other player. We manipulated both the timing (activation phase vs. application phase) and occupation of working memory (high load vs. low load). We hypothesized that high load during the emotion activation phase will lead to less punishment compared to low load. Conversely, we hypothesized that high load during the emotion application phase will lead to more punishment.

Section 2. Method

2.1 Participants & design

Two hundred students of the University of Leiden participated in exchange for a course credit or a financial reward of three euro. Participants were recruited at several buildings and faculties of the university. Most of the recruitment took place after lectures of first year students, because of the amount of attendees during these lectures. The language used in the study is Dutch; therefore it was a requirement that participants control the Dutch language on a high level. Another requirement of the participants was that they are year one psychology students or students from another study. In this way, an attempt was made to prevent knowledge of participants about this field of research to influence results.

The study had a 3 (unfairness situation: mild/severe/very) within x 2 (load: low/high) between x 2 (phase: activation/application) between - subjects design. Participants were randomly assigned to one of four conditions. The dependent variable is the degree of punishment behaviour. Demographics (nationality, age, gender, and highest completed

education) were measured at the end of the research. All procedures were approved by the ethical committee of Leiden University.

2.2 Procedure

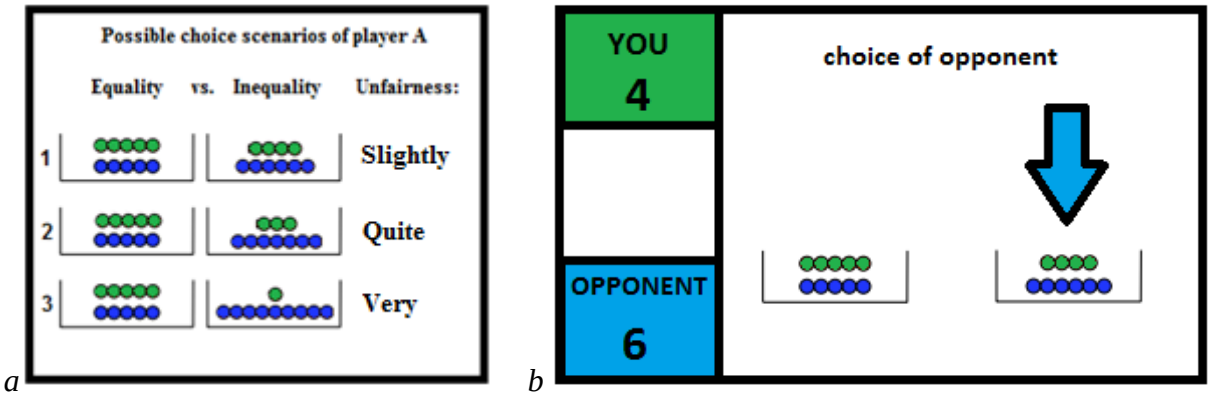
At least four participants had been tested simultaneously in the laboratories of the university in Leiden. This approach was chosen deliberately, so the feeling was created that they actually played against other participants. The participants were seated at separate computer terminals, so that it was not possible to see or interact with each other during the research. The software which was used to conduct this study is programmed by the use of Qualtrics. First, the participants were asked to read and sign the consent. After the consent the participants received instructions for the game they would be participating in. Half of the participants were assigned to the activation phase condition, the other half were assigned to the application phase condition. Subsequently, participants in both conditions played three dictator games with a concurrent high load or a low load task. Participants were told that their opponents were seated in the other terminals and that they would play one game against three of them. In fact, every participant performed the experiment individually. All interactions in the games were computer-mediated and took place anonymously. In addition, the participants were told that they would receive a secondary task, which he/she would perform on his/her own and that this game focused on their capacity to remember digits.

At the end, participants were asked to complete a short questionnaire to indicate their demographics. Also, two questions were included that focus on the task to remember digit(s), to indicate if they experienced the task as difficult and distracting (see below for more information on the manipulation). Then, participants were thanked for their participation and were asked to leave the computer terminal to collect their compensation.

2.2.1 Dictator games

After participants were informed about the structure of the games, they were told that they were assigned to the role of the player B in all games and that in each game they were paired with another player A, who was assigned to the role of dictator. In each game, player A had to choose from two options how to devide €10 between him – or herself and player B. All decisions of player A were pre-programmed, whereas B's decisions were made by participants. Participants were confronted with a slightly unfair, quite unfair and very unfair distribution (see Figure 1a). The order in which these distributions were presented was random.

A slightly unfair division presented the participants with a distribution of 6/4 (i.e., 6 for A and 4 for B), a quite unfair division presented them with a distribution of 7/3 (i.e., 7 for A and 3 for B), and a very unfair division presented them with a distribution of 9/1 (i.e., 9 for A and 1 for B). The unfair distributions were paired with fair distributions (i.e., 5 for A and 5 for B), that were never chosen by A (see Figure 1b). The visual display of the distributions was introduced to contribute to the experience of the participant that the distribution chosen by the opponent was a (slightly/quite/very) unfair act, in comparison to the equal choice option which the opponent did not choose (Will, Crone, & Güroğlu, 2015). Participants thus played three games in total. After participants were presented with a decision of A, they were given the opportunity to punish A.



a *b*

Figure 1a. Possible choice scenarios of player A. *1b.* Example of the visual display of the choice made by player A, in this case a slightly unfair distribution.

2.2.2 Punishment

Following each choice made by A, participants were given the opportunity to punish A by determining the amount of minutes player A had to stay in the laboratory to perform an additional task. This was an annoying task, in which a person was asked to score out the letter 'e' in a text, in case this letter was followed by a consonant. The range of minutes in each game was 0 – 15 minutes, where 0 minutes means no additional task for player A and 15 minutes is the highest possible punishment.

2.2.3 Cognitive load task

In addition to the three games, a secondary task was performed. The participants were told that this task was individual, and that it measured their capability of remembering digits. Each participant was either in a low load- or a high load condition, and this condition then remained unchanged for all the three games.

Low load task. The participants in the low load condition were asked to remember '1' in case of a slightly unfair distribution, '3' in case of a quite unfair distribution, and '8' in case of a severe unfair distribution. The order of the distributions, and therefore the order of the digits presented, was completely random. The participants were asked to type in the digit into the empty response field on the screen.

High load task. The participants in the high load condition were asked to remember the following series of numbers in case of a slightly unfair distribution: '36957281', in case of a quite unfair distribution this series was '82594132', and in case of a severe unfair distribution the series of numbers was '71634928'. The order of the distributions, and therefore the order of the series of digits presented, was completely random. The participants were asked to type in the digit into the empty response field on the screen.

2.2.4 Load manipulation check

In order to measure the experienced load of the tasks, at the end of the study the participants were asked to indicate on a Likert scale (from 1: disagree, to 7: agree) to what extent they agreed with the following two statements: 'I experienced it as difficult to remember the digits', and 'I was not distracted by memorizing the digits during the games'.

2.2.5 Timing conditions

In order to investigate whether the timing of cognitive depletion has an effect on punishment behaviour, the following conditions were also applied in the study: activation phase and appliction phase condition. The names of the conditions refer to the moment on which the cognitive load task is being performed (i.e., during the activation or application of the emotion anger).

Activation phase condition. Following the instructions, in the activation phase condition, participants were asked to remember either one digit (low load) or eight digits (high load). Then, the game started and the distribution-choice made by player A was shown. Immediately after this distribution-choice, participants were asked to type in the digit(s) on the computer screen. Then, the participants were given the opportunity to punish A. This procedure was repeated, so the participant played three games in total.

Application phase condition. In the application phase condition, participants first saw the distribution-choice of player A. After that, they were asked to remember either one digit (low load) or eight digits (high load). Then the participants were given the opportunity to punish A. After they made their punishment decision, participants were asked to type in the

digit(s) on the computer screen. Also for these participants the procedure was repeated, so the participant played three games in total.

2.2.6 Emotion

In order to measure the emotion anger, after each game participants were asked to indicate on a Likert scale (from 1: disagree, to 7: agree) to what extent they agreed with the following statements: 'I think that the distribution of the 10 euros by player A is unfair', 'I am angry with player A', 'I am irritated by the behaviour of player A', and 'I feel satisfaction from punishing player A'.

The four statements were formulated in such a way, that they can be taken together as a mean indication of anger for each distribution. Whether the items actually measured the same construct and can be used as one (mean) variable, will be checked in advance through data analysis.

Section 3. Results

3.1 Participants

A total of two hundred people participated in the study during two weeks in February at the laboratories of the university of Leiden. More women (N = 131, SD = .48) participated in the study than men. Age ranged from 18 to 32 years (M age = 20.18, SD = 2.40).

Because of the language requirements, almost all the participants were Dutch (N = 197), except for someone from China, Germany, and Iceland. These three people were able to read Dutch on a high level, as they stated during the recruitment process of the study. This, and the fact that most of the participants' highest completed education was on secundairy school level (VWO: 72%, HAVO: 9%, and VMBO: 1.5%), can be explained by the second requirement that was imposed on the participants of this research (first year student psychology, or other studies). Other participants already completed an education at the university (11%), HBO (4.5%), MBO (1.5%), and one person did not answer this question.

3.2 Load manipulation check

In the study, two questions were included to verify that the participants experienced the high load task as more difficult and distracting than the low load task. The first question, 'I experienced it as difficult to remember the digits', was reverse coded into a new variable. Subsequently, the correlation was measured between the two items. Because this correlation was only medium-sized, r = .332, p < .01, two separate two-way analyses of variance were

performed to measure if the experienced difficulty and distraction significantly differed between the participants with a low load vs. a high load task.

On average, participants who had been given the low load task, experienced the task as less difficult (M = 6.52, SE = 1.08), than participants who were given the high load task (M = 3.33, SE = 1.56). This difference was significant, F (1, 196) = 281.90, $p < 0.001$, and represented a large effect; Cohen's d = 2.38, r = .77. The proportion of the variance of the experienced difficulty of the task, can be explained for 59% by the load condition. The analysis showed no significant effect for phase (timing of the load) or interaction effect, all *ps* > .45.

The same procedure is performed to verify that participants experienced the distraction of the load task differently, in case of performing the low load vs. the high load task. On average, participants who had been given the low load task, experienced the task as less distracting (M = 4.77, SE = 2.22), than participants who were given the high load task (M = 3.45, SE = 1.74). This difference was significant F (1, 196) = 21.78, $p < 0.001$. This represented a medium effect; Cohen's d = .66, and r = .31. Nevertheless, the proportion in the variance of the reported distraction explained by the load condition was low (9%). The two-way analysis of variance with phase and load condition as factors and reported distraction as dependent variable, showed no significant effect for phase or interaction effect, all *ps* > .07.

3.3 Digit span performance

In addition to the perception of difficulty and distraction, the actual performance on this task was also measured. Participants were asked to enter the digit(s) on the screen, which they had to remember during the games. Through analyzing their accuracy scores, we can verify that the high load task was more difficult than the low load task.

The amount of incorrect digit(s) that the participants entered were calculated for each game. If the answer was correct, the participant received a zero. If one digit was incorrect, the participant received a one, with a maximum sumscore of eight (high load task consisted of a series of eight numbers). Sequences errors were not taken into account, because the calculation of the error scores would be too complicated. The current method seemed to be the most reliable way to calculate the errors for each participant.

A repeated measures ANOVA is performed, with Mistakes variables (three levels: distributions) as within-subjects factors, and load (two levels: low/high) as between-subjects factors. Mauchly's test of Sphericity was significant ($p < .001$), therefore the Greenhouse-Geisser correction is applied. There was a statistically significant main effect of distribution

on the amount of mistakes, $F(1.869, 370.124) = 5.27$, $p < .01$. Thus, the unfairness of the distribution significantly affected the amount of mistakes participants made on the load task. Pairwise comparisons showed that the highest amount of mistakes were made in case of the unfair distribution ($M = 1.29$, $SD = 2.24$), followed by the slightly unfair distribution ($M = .83$, $SD = 1.72$, $p < .01$), and the lowest amount of mistakes were made in case of the quite unfair distribution ($M = .92$, $SD = 1.64$, $p < .05$).

The interaction effect between distribution and load condition on the amount of mistakes was also significant, $F(1.869, 370.124) = 5.03$, $p < .01$. The most mistakes were made in the high load condition in the severe unfair distribution, and distribution had only an effect in the high load conditions.

Phase showed no significant result, $p > .76$. Thus, the timing of the load condition had no significant effect on the amount of mistakes the participants made during the load task.

3.4 Anger in response to distribution unfairness

Four statements were introduced in the study to measure the experienced anger by the participants after each distribution of unfairness (e.g., games). A reliability analysis is performed on the four items per distribution, and as a consequence of the high internal consistences (slightly unfair distribution: $\alpha = .792$, quite unfair distribution: $\alpha = .796$, severe unfair distribution: $\alpha = .789$), the four items were computed into a new variable per distribution: "Mean Anger".

Subsequently, a mixed repeated measures ANOVA was performed, with the "Mean Anger" variables as within-subjects factors, and load (e.g., low / high) and phase (e.g., activation / application) as between-subjects factors. Mauchly's test of Sphericity was significant ($p < .001$), therefore the Greenhouse-Geisser correction is applied.

There was a statistically significant main effect of distribution on anger, $F(1.681, 329.501) = 253.68$, $p < .001$. The results of the pairwise comparisons showed that the mean reported anger after the slightly unfair distribution ($M = 3.27$, $SD = .09$, $p < .001$) was less than the reported anger after the quite unfair distribution ($M = 3.95$, $SD = .10$, $p < .001$), and the mean reported anger was the highest after the severe unfair distribution ($M = 4.59$, $SD = .10$, $p < .001$). Thus, the more the distribution got unfair, the more anger the participants reported.

The interaction between the effects of distribution and load on anger was also siginificant, $F(1.681, 329.501) = 3.27$, $p < .05$. The results of the pairwise comparisons showed that the load conditions only differed in case of the slightly unfair distribution, with

more reported anger in the low load condition (M = 3.40, SD = .13, p < .05), and than in the high load condition (M = 3.13, SD = .13, p < .05).

Phase showed no significant results in the model, *ps* > .17. Therefore, the timing of the load task did not influence the development of anger, evoked by the unfair distributions.

3.4 Punishment behaviour

In order to test whether high compared to low cognitive load during the emotion activation phase reduced punishment, a repeated measures ANOVA was performed, with distribution as within subjects-factor, and load and phase as between-subject factors. The same procedure is performed to test the second hypothesis; high cognitive load during the application phase increases punishment compared to low cognitive load. Mauchly's test of Sphericity was significant (p < .001), therefore the Greenhouse-Geisser correction is applied.

The main effect of distribution on punishment behaviour was significant, F(1.655, 324.362) = 229.68, p < .001. The partial eta-squared (η_p^2 = .54) was of large size. The results of pairwise comparisons showed that in case of the slightly unfair distribution, the punishment was the lowest (M = 2.71, SD = .22, p < .001), followed by the quite unfair distribution (M = 4.80, SD = .29, p < .001), and that punishment was the highest in case of the severe unfair distribution (M = 7.45, SD = .36, p < .001).

The main and interaction effects of load and phase on punishment were not significant, *ps* > .31. Thus, punishment behaviour was influenced by the unfairness of the distribution, but the timing and amount of load did not significantly affect the punishment behaviour of the participants in this study.

Section 4. Discussion

In this section, the results of the study will be presented, along with a discussion of the implications of these results. Next, some limitations of the current study and directions for further research will be discussed. This section is completed by some concluding remarks.

4.1 Summary of the results

In this master thesis, the objective was to demonstrate that the timing of cognitive load influences punishment behaviour, with the emotion anger as an important contributing factor. The punishment behaviour is evoked by unfairness, through the distribution of ten euros between player A and the participant. The distribution of money served as a proximate for different levels of the other player's unfair behaviour. Two hundred participants were

randomly assigned to one of the four research condition. We manipulated both timing (activation phase vs. application phase) and occupation of working memory (high load vs. low load). Following the distribution of money by player A, participants decide whether or not to punish player A. We hypothesized that high load during the emotion activation phase would lead to less punishment compared to low load. In addition, we hypothesized that high load during the emotion application phase would lead to more punishment.

Overview of the results. The results of this study showed that the unfair distributions led to the emotion anger, and subsequently to punishment behaviour. After each game (i.e., distributions) participants were asked to indicate their anger by answering four questions. The punishment that participants could give their opponent after each game, was measured by the amount of minutes (with a maximum of 15) the participant decided to assign to their opponent to perform an additional task. The participants were under the impression that they were playing each game against another participant. In fact, all decisions of the opponents were pre-programmed, whereas the punishment decisions were made by the participants.

The anger was the highest in case of the severe unfair distribution (i.e., distribution of ten euro: 9 for opponent and 1 for the participant), and lowest in case of the slighty unfair distribution (i.e., distribution of ten euro: 6 for opponent and 4 for the participant). After analysing the load conditions, the study revealed that anger only differed significantly between the low and high load condition in case of the slighty unfair distribution. Specifically, participants in the low load conditions experienced more anger, than participants in the high load conditions.

Corresponding to the findings of the relationship between unfairness and anger, punishment behaviour was also the highest in case of the severe unfair distribution, and lowest in case of the slighty unfair distribution. Load did not have a significant effect on punishment behaviour.

Next, the timing of the load did not have a significant effect on either the reported anger or the punishment behaviour of the participants. The results and their implications are described in detail below.

Implications and discussion. Results of this study showed that the more unfair the behaviour of the opponent was, the more anger the participant experienced and the more punishment the participant imposed on this opponer. This is in line with previous research, in which this positive relation between unfair behaviour of opponers and punishment behaviour of participants is found, and was mediated by the experience of the emotion anger (Bosman, &

van Winden, 2002; Fehr, & Gächter, 2002; Seip, E.C., van Dijk, W.W. & Rotteveel, M., 2014, Study 1). Moreover, the study has indeed revealed that the emotion anger has been evoked to a greater extent in case of the most unfair distribution, in comparison to the slightly- and quite unfair distributions. But, only in the case of the slightly unfair distribution, participants reported significantly more anger under low load than under high load. A possible explanation could be that the slightly unfair distribution is perceived as ambiguous. Therefore, the unfairness of this distribution is possibly experienced less strongly for participants for whom their cognitive ability is depleted (high load condition), and stronger for the participants who had their full attention on this distribution (low load condition). It seems that participants need working memory to perceive the slightly unfair situation as an unfair act of their opponent, and ambiguous situations needs more working memory to process, than clearly unfair situations. Research on working memory capacity supports this idea. Barrett, Tugade and Engle (2004) found that individuals with high working memory capacity are better able to evaluate and integrate information in complex situations that require making a decision about how to behave, than individuals with low working memory capacity.

Next, we argued that, because of occupation of working memory during the emotion-evoking-situation (e.g., activation phase), anger would be elicited less, and as a result this would not affect punishment behaviour. In addition, when occupation of working memory took place after the emotion-evoking-situation (e.g., application phase) anger would already have been elicited and as a result would affect punishment behaviour. This line of reasoning was largely based on literature on stereotypes (Gilbert & Hixon, 1991). Nevertheless, the results of this study showed that the timing of the load task had no significant effect on the reported anger and subsequently the punishment behaviour of the participants. This means that there was no difference in anger (as result of the unfair distributions), or punishment behaviour, between the participants who performed the load task during the activation phase (remembering digits while seeing the unfair distribution), or during the application phase (remembering digits while punishing their opponent).

Finally, it is interesting to observe that participants made significantly more mistakes in case of the severe unfair distribution, compared to the slightly and quite unfair distributions. Thus, the severe unfair behaviour of the opponent influenced the participant's own performance on the load task. This result seems to be in contrast to former research, which has shown that anger indeed interferes with task performance, but that this interference was completely eliminated by high perceptual load (Yates, Ashwin & Fox, 2010). On the other hand, research on negative emotional states, has found that emotions reduce task-related

processing resources (Meinhardt, J. & Pekrun, R., 2003). Besides, anger has a strong ability to capture attention. Research has shown that all emotional stimuli have the strength to grab attention more so than do neutral stimuli (Derryberry, & Tucker, 1994; Pratto, & John, 1991). In general, it can be assumed that emotions direct attention toward the object of emotion. Therefore, processing the emotion anger which is evoked by the unfair distribution probably demanded more attention than the performance on the load task.

4.2 Limitations and future research

In this subsection some limitations of the study are discussed. After this section, directions are given for future research on this topic.

The aim of this study was to demonstrate that the timing of cognitive load influences punishment behaviour, with the emotion anger as an important contributing factor. We were unable to show that timing of load had the proposed effect on the punishment behaviour of the participants. This does not mean that such a distinction in the timing of load and subsequently differences in behavioural outcomes does not exist. As discussed before, it is possible that this is due to the attention that is taken away from the load task, because of the emotion component which is highly present during the games. The unfair behaviour of the opponent evoked anger, and it is possible that the participants focused their attention more on this anger than on the load task. A way to prevent this possible issue in future research, is to reward the participants' performance on the load task, which we did not in our study. This could be a way to ensure that attention will be more focused on the load task, instead of the unfair situation that evokes anger.

A second limitation of our study pertains to the sample on which our conclusions are based. First of all, the participants of this study are all highly educated individuals, who share a similar cultural background. This study is largely based on literature on social norms, which vary widely by culture and time (e.g., Bendor, & Swistak, 2001). Although the relationship between unfairness and anger is universal, its impact on punishment behaviour may depend on culture. Future studies should take these cultural differences in social norms into account, in order to make the research results more generalizable.

Finally, although our results support the indirect relationship between anger and punishment behaviour, this relation does not always have to be present. Some situations do not motivate individuals to punish the unfair behaviour of others. As described before, punishment can be used as tool to correct an unfair outcome, to correct the behaviour of others, or to harm individuals to gain pleasure (de Quervain, Fischbacher, Treyer,

Schellhammer, Schnyder, Buck, & Fehr, 2004). If these motivations are not present, or fear of future consequences plays a role, the tendency to punish can be inhibited. Anger can still be the dominating emotion that individuals experience, but the emotion will not lead to punishment behaviour. Moreover, behaviour of individuals is strongly influenced by social norms (Cialdini, Demaine, Sagarin, Barret, Rhoads, et al., 1991). When forgiveness predominates the social standards, unfair behaviour probably does not result in punishment behaviour, even though the emotion anger is experienced. At last, punishing others can also be a common way of reacting to unfair behaviours of others. In this case, people can choose to punish, even though anger is not experienced. Future research could examine the relation further between social norms and its impact on the development of anger and punishment behaviour.

4.3 Conclusion

This study aimed to demonstrate that timing of cognitive load influences punishment behaviour. An attempt was made to make a distinction between the development of the emotion anger and subsequently punishment behaviour, when cognitive load is given during an unfair situation or during the possibility of punishing the opponent. Although this difference did not come forward in this study, the link between unfairness, anger and punishment behaviour is strongly demonstrated once again. We can conclude that behaviour of people in joint ventures, in which people are placed against each other, can be influenced by the experience of unfairness of the situation. The operating underlying mechanism is that unfairness (i.e., behaviour of others that deviates from the social norm) induces anger, and this anger subsequently results in punishment behaviour.

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