

Are you in for the long run?

The role of depletion and replenishment in the persuasion process

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### Abstract

This two-part study examined the role of self-regulatory resource depletion, heuristic cues and replenishment in the persuasion process. The stability of the influenced attitude and compliance after replenishment was our main interest. The analyses showed that depletion of self-regulatory resources makes it easier to influence attitudes in an upward direction and increase compliance. The presence of a heuristic cue increased the effect of depletion on attitude. The second part of the analyses showed that the strength of the positive effect reduces after resources are replenished. Formerly depleted participants who were exposed to a heuristic cue adjusted their attitude and willingness to comply in a significantly more negative way than participants in all other conditions. The formerly depleted participants remained significantly more positive about the proposition and were still willing to distribute a significantly larger amount of letters than participants who had not been depleted. The results suggest that attitudes and compliance influenced under conditions of mindlessness are less strong and long-lasting than mindfully formed attitudes and compliance.

### *Introduction*

#### *Social influence techniques*

A lot of people and organizations try to influence people's opinion in order to persuade them to show certain behavior like purchasing a product, donating money or doing charity work. Many different influence techniques are used to get consumers to agree with a proposition and get them to show a certain kind of behavior they were not planning to yield to. Examples of these influence techniques are the Foot-in-the-Door technique, in which a small initial request is followed by a more substantial target request (Freedman & Fraser, 1966), and the Door-in-the-Face technique, in which a large initial request is downsized to a smaller target request (Cialdini, Vincent, Lewis, Catalan, Wheeler & Darby, 1975). In these and other techniques, an initial request is presented to heighten the chances of compliance with the actual target request.

Cialdini and others (Cialdini, 1993; Cialdini & Goldstein, 2004) claim that the effectiveness of social influence techniques hinges on the notion that the techniques are able to induce consumer automaticity or "mindless" responses (Langer, 1992). As an effect of this mindlessness, people will fall back on habits and routine behavior and use simple heuristics to make a decision (Chaiken, 1980; Vohs, Baumeister & Ciarocco, 2005).

Social influence techniques are able to induce automatic "mindless" behavior because actively responding to the initial request stage of a social influence technique and making decisions regarding one or more initial requests requires self-control and causes self-regulatory resource depletion (Baumeister, Bratslavsky, Muraven & Tice, 1998; Muraven, Tice & Baumeister, 1998; Vohs and Heatherton, 2000). Recent research of Fennis, Janssen and Vohs (2009) and Janssen, Fennis, Pruyn and Vohs (2008) provided evidence for the assumption that self-regulatory resource depletion seems to be an important underlying factor that accounts for the "mindlessness" and automaticity, and thereby for the impact of many social influence techniques. Janssen et al. (2008) showed that responding to a "continuing question procedure" which is similar to an initial request stage of a social influence technique, depletes self-regulatory resources and induces a state of "mindlessness". Fennis et al. (2009) showed that other elements of social influence techniques, like yielding to the initial request stage of a Foot-in-the-Door script, induced self-regulatory resources.

*Self-regulatory resource depletion*

With self-regulation or self-control we refer to the process by which people initiate, adjust, interrupt, terminate, or otherwise alter actions to promote attainment of personal goals, plans and standards (Baumeister, Heatherton & Tice, 1993; Baumeister, Heatherton & Tice, 1994; Baumeister & Heatherton, 1996). People are exposed to or participate in all kinds of activities that cost a certain amount of self-control on an daily basis. Examples of self-control are dieting or reading a study book instead of watching your favorite show on television.

As previous research has shown, all acts of volition, such as controlled (as opposed to automatic) processing, active (as opposed to passive) choice, initiating behavior, and overriding responses draw on a limited resource, akin to strength or energy, and can easily be depleted (Baumeister et al., 1998; Muraven et al., 1998). This process of self-regulatory resource depletion resembles a muscle that becomes fatigued after exertion and as a result becomes less able to function (Muraven & Baumeister, 2000).

Depletion of self-regulatory resources will eventually lead to self-regulation failure. When the self-regulatory resource is depleted, the self is less able to function effectively and people tend to fall back on habits, routine and automatic processes (Baumeister, Muraven & Tice, 2000). Many studies have shown that self-regulation failure can increase acquiescence. Depleted people tend to ‘give in’ to courses of action that do not cost a lot of effort, for instance agreeing with positions forwarded by others. As an effect of resource depletion, attitudes could be biased in an upward, acquiescent direction (Wheeler, Briñol & Hermann, 2007; Baumeister & Heatherton, 1996).

The experiments of Baumeister et al. (1998), Muraven et al. (1998) and Schmeichel, Baumeister and Vohs (2003) show that when people engage in a situation that requires self-control, performance on a second task that also requires self-control impairs subsequently. For instance, a study of Muraven et al. (1998) showed that people who are told to suppress thoughts about a “white bear” are more likely to give up on unsolvable anagrams. A study of Baumeister et al. (1998) showed that people who forced themselves to eat radishes instead of more tempting chocolates subsequently quit faster on unsolvable puzzles than people who did not have to exert self-control over eating.

*Heuristic cues*

It seems logical that people are less able to critically process through the central-route of the Elaboration Likelihood Model (Petty & Cacioppo, 1986a) when their resources are depleted. Processing through the peripheral-route of the model, in which heuristics play an important role, is much more likely when people do not have access to their full resources (Fennis et al., 2009). It is well established that a state of “mindlessness” affects the employment of heuristics in decision-making in various research areas, such as persuasion (Petty & Wegener, 1999) and compliance (Cialdini, 1993). Recent research also demonstrated that a lower level of self-regulatory resources fosters the use of heuristics (Wheeler et al., 2007; Fennis et al., 2009; Janssen et al., 2008).

Cialdini (1993) described six heuristic principles which will generally increase the likelihood of compliance. The heuristic principle of reciprocity (complying because people feel obliged to return the favor), consistency (complying because people want to behave consistently once they have made a commitment), social proof (complying because people want to do things other people do), liking (complying because one feels sympathy for the influence agent), scarcity (complying because the availability of an offer or request is limited) and authority (complying with an influence agent because he/she is (affiliated with) a high credibility source).

The use of heuristics increases the extent of compliance with a request (Cialdini, 1993; Fennis et al., 2009; Janssen et al., 2008). Research of Janssen et al. (2008) showed that people comply with a request to a larger extent when they have been depleted and a heuristic cue is presented. Janssen et al. (2008) activated the heuristic principle of authority by introducing either a well-known organization, which was described as renowned and experienced, or a relatively unknown organization, described as having starting experience in relief work. Fennis et al. (2009) also found that draining the self of its regulatory resources fosters compliance with charitable requests through reliance on compliance-promoting heuristics, in this case reciprocity and liking.

*Persuasion*

Baumeister and Heatherton (1996) already pointed out that attitudes can be biased in an upward acquiescent direction as an effect of self-regulation failure. Research also showed that the likelihood of compliance increases when heuristic cues are used (Cialdini, 1993; Janssen et al., 2008; Fennis et al., 2009).

Studies have recently begun to explore the link between self-regulation failure and persuasion. It is suggested that a state of self-regulatory resource depletion weakens resistance to temptation and (unwanted) influence attempts (Baumeister, 2002). Research of Wheeler et al. (2007) and Burkley (2008) focuses on ego-depletion and the effects on resistance to persuasion. Wheeler et al. (2007) and Burkley (2008) conclude that resisting to persuasion is another type of task that draws on limited self-regulatory resources, and therefore, resistance processes impair after engaging in a situation that requires self-control. Wheeler et al. (2007) found that depleted participants showed less resistance than non-depleted participants and were less able to generate counterarguments, especially when the arguments in the counter attitudinal persuasive message were weak. Depleted participants could even be persuaded by weak arguments while weak arguments could not persuade non-depleted participants. Burkley (2008) also found a significant interaction between depletion and argument strength. Depleted people who read a strong argument message showed greater agreement with the policy than participants in the control condition. This suggests that people who have access to their full resources are better able to resist strong arguments.

Recently there was evidence found that depletion of self-regulatory resources is an important factor in the success of social influence techniques. Responding to the initial request stage of these techniques depletes self-regulatory resources (Fennis et al., 2009; Janssen et al., 2008). As various research has shown, once people's self-regulatory resources are depleted and a "mindless" state is induced, it gets easier to influence attitude and compliance.

### *Replenishment*

It is not logical to assume that resources stay depleted after an act of self-control/ self-regulation. Similar to the fact that a fatigued muscle needs to regain strength, people need to replenish their diminished energy reserves after an act of self-regulatory depletion (Baumeister, 2002; Tice, Baumeister, Shmueli & Muraven, 2007; Tyler & Burns, 2008). Sleep and rest seem to provide ways to replenish the self. Well-rested people have better self-control and self-control failure is less likely to occur early in the morning after a good night's sleep. As the day wears on, self-control gets weaker and people are easier to influence at the end of the day (Baumeister, et al., 1994). Baumeister et al. (1994) claim that diets are usually broken in the evening as a result of self-regulatory resource depletion.

Although it seems quite obvious that people need to replenish their resources after they have become depleted, the research area of the process of replenishment is still relatively unexplored. Research of Tice et al. (2007) has shown that positive mood or emotion can counteract ego depletion. Tyler and Burns (2008) recently tested the effects of time in the replenishment process of self-regulatory resources.

Vigilance research shows that the introduction of periodic intervals between continual tasks leads to significant improvement in people's performances (Parasuraman, 1984). In general there is a short interval (1 – 3 minutes) in between two self-regulatory acts in depletion studies. Research of Tyler and Burns showed that a longer interval period of 10 minutes is able to counteract the depletion effects. Analysis showed that the usual depletion effect had occurred after the first part of the experiment. Participants in the depleting part of the numerical psychical activity task (Webb and Sheeran, 2003, adapted from Fawcett, Nicolson & Dean, 1996) exhibited a significant reduction in self-regulatory ability (change in handgrip squeezing) compared to the non-depleted participants. The second part of the experiment showed that depleted participants who had been given 10 minutes to replenish their resources (rather than a 1- or 3 minutes interval) performed significantly better on the second handgrip task. In fact, performance increased to the point where it equaled that of non-depleted participants. The 3 minute interval also fostered greater replenishment than the 1 – minute interval (Tyler & Burns, 2008).

#### *The present research*

As an effect of depletion of self-regulatory resources, people tend to fall back on habits, routine and automatic processes (Baumeister et al., 2000). When people do not have access to their full resources it gets easier to influence attitudes in an upward acquiescent way (or reduce resistance) and increase compliance (Baumeister & Heatherton, 1996; Wheeler et al., 2007; Fennis et al., 2009; Janssen et al., 2008; Burkley, 2008). Especially when heuristic cues are used, because a state of depletion/ a state of “mindlessness” fosters people to use simple heuristics to make a decision (Chaiken, 1980; Cialdini, 1993; Vohs et al., 2005; Wheeler et al., 2007; Fennis et al., 2009; Janssen et al., 2008).

We already pointed out that it is likely that central processing reduces as an effect of depletion. In the present research we are therefore interested in the stability of the influenced attitude and willingness to comply after depleted people have been given time to replenish their resources. If depleted people process through the peripheral-route their attitude is not expected to

be very strong and long-lasting (Petty & Cacioppo, 1986a). Besides, recent experiments on the effect of replenishment have showed that a period of rest can counteract the effect of ego depletion. In fact, after a short interval of 10 minutes, performance of formerly depleted participants increased to the point where it equaled that of non-depleted participants (Tyler & Burns, 2008).

The recent findings in the area of resource depletion have inspired us to test a two-stage hypothesis in which the recent developments in the depletion and replenishment field are combined. The study was designed to explore the relation between self-regulatory resource depletion and persuasion and the stability of influenced attitude and compliance after replenishment.

In the first part of the experiment we tested the effects of depletion and heuristic cues on attitude and compliance. This first part of the experiment functioned as a baseline measurement and was crucial to be able to examine the stability of influenced attitude and compliance after replenishment. As already confirmed in other studies (Wheeler et al., 2007; Burkley, 2008), we expect that depletion of self-regulatory resources will lead to a more positive attitude about the counter attitudinal proposal and more willingness to comply to the request of the sender of the letter, especially when a heuristic cue is activated (Wheeler et al., 2007; Fennis et al., 2009; Janssen et al., 2008). We decided to focus on the heuristic cue of authority which has been proven to be effective in research of Janssen et al. (2008).

For the second part of the experiment we manipulated replenishment by either giving participants time to restore their depleted resources, or by not giving them any time to regain strength before the second measurement of the dependent variables attitude and compliance. Although we expect depleted participants (who are exposed to the heuristic cue of authority) to be the most positive about the proposition and most willing to comply at the first measurement, we question the stability of this attitude and willingness to comply. We expect that quite similar to the findings of Tyler and Burns (2008), attitude and compliance are likely to change in a negative direction when formerly depleted participants have been given time to replenish their resources. When they have access to their full resources, the formerly depleted participants should be more critical about the arguments in the persuasive letter and less sensitive to the heuristic cue. As a result the attitude and willingness to comply should be more similar to the pattern of non-depleted participants. We expect that an attitude that is formed with full access to



one's resources changes less over time than an attitude that is formed when self-regulatory resources are depleted.

### *Method*

#### *Overview and participants*

Our hypotheses were tested in a 2 (depletion induction: depletion vs. no-depletion) X 2 (heuristic cue activation: authority vs. no-authority) X 2 (replenishment: replenishment vs. no-replenishment) between subjects design, with depletion-measurement (time = 1 vs. time = 2 ( $t = 1$  vs.  $t = 2$ )), attitude measurement (time 1 vs. time 2 ( $t = 1$  vs.  $t = 2$ )) and compliance-measurement (time 1 vs. time 2 ( $t = 1$  vs.  $t = 2$ )) as within-subject factors. A total of 142 participants (51 men, 91 women) participated in this study in exchange for a course credit or 6 euro. All participants were undergraduate students at Twente University, where this laboratory experiment was carried out. Their mean age was 21.73 years ( $SD = 2.29$ ). Eleven participants were excluded because of extreme scores (all participants deviating more than 2.15 times the standard deviation from the mean).

All participants were previously made aware that they had a fifty percent chance that they would have to come back for the second part of the experiment which would take a maximum of ten minutes. Participants who were assigned to this replenishment condition would only receive the 6 euro or course credit after they also completed this second part.

#### *Procedure and dependent variables*

Due to the complexity of the design we decided to discuss the manipulations and dependent measures in order of appearance. Upon arrival at the laboratory, the experimenter randomly assigned participants to one of the eight conditions. Participants were told they were participating in an experiment about the effect of body posture on numerical processing.

#### *Depletion induction*

A state of resource depletion was induced with a numerical physical activity task which was successfully used by Webb and Sheeran (2003) and Tyler and Burns (2008). Participants in the depletion condition were asked to stand on their weaker leg and count down from 2000, in multiples of seven (2000, 1993, 1986...). To decide which leg was the weakest, the experimenter asked the participants to pretend to kick a soccer ball. The leg that was still standing is needed to keep balance and was therefore considered to be stronger. Participants were told to stand on the leg they would normally use to kick. Participants in the no-depletion condition had to stand on

both legs and were asked to count from 0 to 2000 in multiples of 5 (0, 5, 10...). In both conditions the task lasted for five minutes. Because several students were participating at the same time, it was not possible for the experimenter to check if the participant followed the instructions in a face-to-face setting as used by Webb and Sheeran (2003) and Tyler and Burns (2008). Instead, all participants were told that their answers would be recorded: they wore a headphone with a microphone and were instructed to speak loud and clearly so the numbers were recorded correctly. They were also told that they would be videotaped so that the experimenter could see if they followed the instructions.

### *Depletion*

To measure resource depletion, participants completed the State Ego Depletion Scale (Ciarocco, Twenge, Muraven & Tice, unpublished manuscript) immediately after the depletion manipulation. Participants had to indicate their agreement with 25 items on a seven-point scale (1 = not true, 7 = very true). Examples are “I feel mentally exhausted”, “Right now, it would take me a lot of effort to concentrate on something”, and “I feel motivated” (reversed scored). The average score on the scale was used as an indicator of the level of resource depletion.

### *Mood*

After the State Ego Depletion Scale the participants had to fill out two other questionnaires. Participants were asked to fill out a mood scale (Hermsen, Holland & Van Knippenberg, 2006b) to be able to rule out that the depletion manipulation caused a mood effect which could explain the effects on the dependent measures. Participants had to indicate their agreement on a five-point scale (0 = totally disagree, 5 = totally agree) on the following 6 items: “Right now, I feel; negative/ satisfied/ angry/ happy/ positive/ sad (some of them reversed scored).

### *Stress*

The shortened Dutch translation of the Profile Of Mood States scale (Wald & Mellenbergh, 1990; adapted from McNair, Lorr & Droppleman, 1971) was used to control if effects on the dependent measures could be attributed to differences in stress, caused by the depletion manipulation. Participants were asked to fill out how much they agreed with 6 items on a five-point scale (0 = absolutely not, 4 = very strong). Items were: “Right now, I feel; nervous/ panicky/ tense/ restless/ anxious/ insecure.”

*Activation of the heuristic cue*

After they had filled out the previous mentioned questionnaires, participants got an on screen message they had finished the first part of the body posture and numerical processing experiment. Before they could answer the last questions of this experiment their attention was needed for a completely different matter; reading a letter. To strengthen the idea this concerned a separate part, which had nothing to do with body posture and numerical processing, and to minimize suspicion, the layout of this part was different. The letter contained a personally relevant (to stimulate processing motivation), counter attitudinal (to motivate resistance to the letter) proposition about heightening the minimum grade requirement to get ECTS from 5.5 to 6. A pre-test ( $n= 20$ ) confirmed that the message was perceived as counter attitudinal by the students of Twente University. A mix of strong and weak arguments (adapted from Petty & Cacioppo, 1986b), in favor of the proposition, was used (in attempt) to persuade people. The heuristic principle of authority was (or was not) activated by manipulating the sender of the letter. In the authority condition, it was said that the letter was send by the “Executive Board” of their university. In the no-authority condition “a number of students” were told to be the sender. A pre-test confirmed that the “Executive Board” of the university was perceived as a high authority sender while “a number of students” was perceived to be low in authority.

*Attitude*

The purpose of the letter was not only to manipulate and activate the heuristic cue, the counter attitudinal proposition created the base for the measurement of the dependent variables. After they read the letter, participants were asked to give their opinion about the proposition to heighten the minimum grade to get ECTS from 5.5 to 6. A total of 11 seven-point semantic scales (examples: very bad/very good, totally disagree/totally agree, very ineffective/very effective, in favor/against (reversed scored)) were used to answer the question “What do you think of the proposition to heighten the minimum grade requirement from 5.5 to 6?”

*Compliance*

The second dependent variable, compliance, was measured by asking the participants if and how much letters they would be willing to distribute over the student-mailboxes. A scale from 0 to 100, with multiples of 10 was used.

### *Replenishment*

Replenishment was manipulated by the amount of time between the first and the second measurement of the dependent variables attitude and compliance. Research of Tyler and Burns (2007) showed that an interval period of 10 minutes can counteract the effects of depletion. In the replenishment condition, participants were given a week before the dependent variables were measured for the second time. At the end of the first part of the experiment an on screen message occurred. The participants had to go to the experimenter to make an appointment for the second part of the experiment one week later. When they returned to the lab after one week, participants started with a follow-up questionnaire designed to match the ‘body posture and numerical processing’ cover story. Participants in this condition were asked to fill out the State Ego Depletion Scale for the second time to measure their level of self-regulatory resources depletion. Afterwards the participants got a message that an error had occurred during the first part of the experiment, causing a failure in the saving of the data. They were asked to read the letter with the proposition about heightening the minimum grade requirement to get ECTS from 5.5 to 6 again, and to fill out the attitude- and compliance scales.

In the no-replenishment condition, participants did not get any time to replenish their resources. Participants got an on screen message, which told them to go to the experiment leader, immediately after they had filled out the dependent measures for the first time. The experimenter told them an error had occurred and they had to re-do the last part of the experiment (reading the letter and filling out attitude- and compliance scales) because no data was saved.

### *Results*

The first part of the data was analyzed with a 2 (depletion induction: depletion vs. no-depletion) X 2 (heuristic cue activation: authority vs. no-authority) ANOVA.

### *Depletion*

As expected, an ANOVA revealed a significant effect of the numerical physical activity task on State Ego Depletion Scale scores,  $F(1,129) = 4.40, p < .05$ . Participants who had to count down from 2000, with multiples of seven while standing on their weakest leg scored significantly higher on the State Ego Depletion Scale and thus indicated that they were more depleted ( $M = 3.75, SD = .11$ ) than participants in the control condition ( $M = 3.42, SD = .11$ ). This supports the previous findings of Webb and Sheeran (2003) and Tyler and Burns (2008) that the numerical physical activity task is able to induce depletion.

*Mood*

As expected, participants in the control group were not in a significantly more positive mood than participants in the depletion inducing condition  $F(1,129) = 2.15, p = .15$ . This suggests that differences in attitude and compliance are not due to differential moods engendered by the depletion manipulation.

*Stress*

There were no significant differences in perceived amount of stress between the depletion and no-depletion conditions,  $F(1,129) = 2.33, p = .13$ . It seems that effects on the dependent variables cannot be attributed to stress, caused by the depletion manipulation.

*Attitude*

As expected, there was a significant main effect of depletion on the attitude towards the proposition,  $F(1,127) = 4.85, p < .05$ . Participants who were depleted were significantly more positive about the proposition ( $M = 3.90, SD = .16$ ) than non-depleted participants ( $M = 3.41, SD = .16$ ). This suggests that people who are depleted are more sensitive to persuasive arguments. The attitude towards a counter attitudinal proposition is more likely to change when people are not able to use their full resources. The results are in correspondence with the research of Wheeler et al. (2007) and Burkley (2008).

We found a significant interaction between depletion induction and heuristic-activation,  $F(1,127) = 5.65, p < .05$ . Analysis of the simple main effects however showed that the effect pointed in the opposite direction of what we expected. The effect of resource depletion on attitude was only significant when the no-authority heuristic cue was activated,  $F(1,127) = 10.40, p < .01$  (Figure 1). When the no-authority cue was activated, resource depleted participants were significantly more positive about the proposition ( $M = 4.07, SD = .22$ ) than non-depleted participants ( $M = 3.05, SD = .23$ ). When the authority cue was activated, the attitude did not significantly differ between the participants in the depletion condition and the participants in the non-depletion condition,  $F(1,127) < 1, ns$ . The effects are surprising because, as confirmed in prior research from Janssen et al. (2008), it was expected that resource depleted participants would be more positive when the authority cue was activated. It is possible, that the no-authority sender of the letter “a number of students” activated another heuristic principle, such as the heuristic principle of similarity.

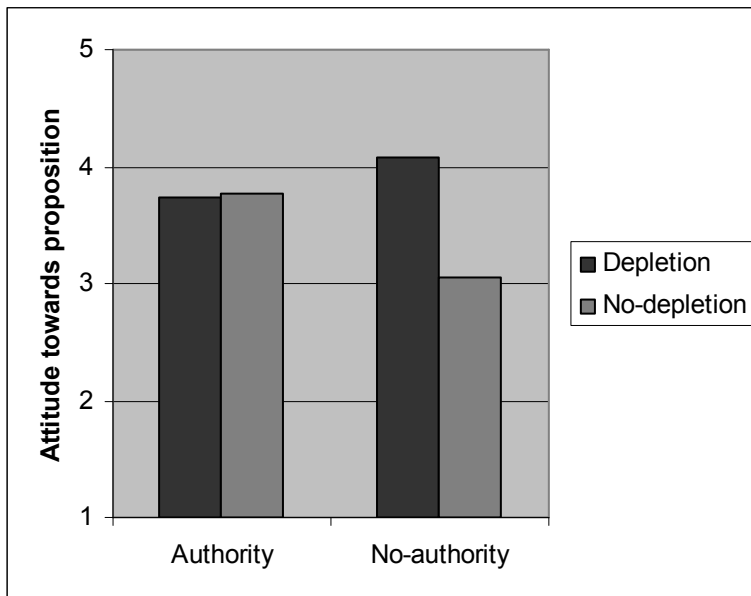


Figure 1. Attitude towards the proposition (1= negative, 7= positive) as a function of resource depletion and exposure to heuristic cue

### Compliance

As predicted, the results showed a significant main effect of depletion on compliance,  $F(1,127) = 6.50, p < .05$ . Depleted participants were willing to distribute a larger amount of letters ( $M = 9.17, SD = 1.32$ ) than the non-depleted participants ( $M = 4.38, SD = 1.34$ ).

The dichotomous version of the compliance variable (1 = not willing to distribute letters, 2 = willing to distribute letters) also confirmed our hypothesis. A chi-square test revealed a significant main effect of depletion ( $\chi^2(1) = 5.11, p < .05$ ). When depleted, 62.7% of the participants agreed to distribute letters (42.5% disagreed). In the non-depletion condition, only 37.3% was willing to comply (57.5% disagreed). Although expected, there was no significant interaction between depletion and heuristic cue activation on compliance.

### The role of replenishment

In order to test the stability of the attitude and willingness to comply and the role of replenishment in the process, the rest of the data was analyzed with a 2 (depletion induction: depletion vs. no-depletion) X 2 (heuristic cue activation: authority vs. no-authority) X 2 (replenishment: replenishment vs. no-replenishment) ANOVA with depletion-measurement ( $t = 1$  vs.  $t = 2$ ), attitude-measurement ( $t = 1$  vs.  $t = 2$ ) and compliance-measurement ( $t = 1$  vs.  $t = 2$ ) as

within-subject factors. Another ten participants were excluded because of extreme scores (all participants deviating more than 2.15 times the standard deviation from the mean).

### *Depletion*

A repeated measures analysis with depletion (depletion  $t = 1$  vs. depletion  $t = 2$ ) added as a within-subject factor, showed that participants were significantly more depleted after they participated in the depletion counting task ( $M = 3.61$ ,  $SD = .11$ ), than when they were asked to fill out the State Ego Depletion Scale for the second time ( $M = 3.02$ ,  $SD = .13$ ),  $F(1,56) = 12.47$ ,  $p < .001$ . Only the participants in the replenishment condition were selected for this analysis. Because it was expected that depleted participants would be able to restore their resources when given the opportunity, only the participants in the replenishment condition were asked to fill out the State Ego Depletion Scale twice. The results show that the resources of the formerly depleted participants were (re)charged at the time of the second part of the experiment.

### *Attitude*

An ANOVA with ‘attitude change’ (attitude  $t = 2$  minus attitude  $t = 1$ ) as dependent variable and the manipulations of depletion, heuristic cue and replenishment as fixed factors showed a significant 3-way interaction between depletion, heuristic cue and replenishment,  $F(1,113) = 3.91$ ,  $p < .05$ . Analysis of the simple main effects showed that the effect of resource depletion on attitude change was only significant when the no-authority cue was activated and participants had had time to replenish their resources,  $F(1,113) = 5.09$ ,  $p < .05$ ). Under these circumstances, participants in the depletion condition (who should no longer be depleted because they had the possibility to replenish their resources) adjusted their opinion in a much more negative way ( $M = -.37$ ,  $SD = .11$ ) than the participants in the no-depletion condition ( $M = -.02$ ,  $SD = .11$ ). Similar to the first part of the analysis, differences we expected to be caused by the activation of the authority cue were actually found when the no-authority cue was activated. The effect of the influenced attitude of depleted participants seems to be less long term than the effect of the attitude of non-depleted participants. As expected, attitudes formed under conditions of mindlessness are more likely to change. Replenishment causes formerly depleted participants to adjust their opinion in a significantly more negative way than participants who formed their attitude while they had access to their full resources.

A repeated measures analysis with attitude (attitude  $t = 1$  vs. attitude  $t = 2$ ) added as a within-subject factor, showed a significant 4-way interaction between the within-subject factor

attitude and the between-subject factors depletion, heuristic cue and replenishment,  $F(1,113) = 3.91, p < .05$ . Although SPSS found a significant interaction on both attitude measurement  $t = 1$  and  $t = 2$  the manipulation of replenishment had not actually been activated at the time of the first measurement. Previous analysis already pointed out that the attitude about the proposition at  $t = 1$  is more positive as a result of depletion and exposure to the no-authority cue. Therefore we only discuss the results of the repeated measure analysis at attitude measurement  $t = 2$ . Analysis of the simple main effects showed that formerly depleted participants in the no-authority condition who had the opportunity to restore their resources were still significantly more positive about the proposition ( $M = 4.03, SD = .33$ ) at  $t = 2$  than non-depleted participants in the same conditions ( $M = 3.07, SD = .32$ ),  $F(1,113) = 4.34, p < .05$ . This was not as expected. The depleted participants in the replenishment condition had the opportunity to replenish their resources before they read the letter again and attitude was measured for the second time. The participants should have processed the information in the persuasive letter the same way as the non-depleted participant and should have been less vulnerable to heuristic cues and more critical about the arguments. As a result, we did not expect to find significant differences between the depleted and the non-depleted participants. It seems as if the process of influencing an attitude in an upward direction as a result of depletion and exposure to a heuristic cue is partially reversible when people had the opportunity to replenish their resources. Formerly depleted people, who were exposed to the no-authority cue, changed their opinion significantly more in a negative way than non-depleted participants, but they remained significantly more positive about the proposition than participants who have not been depleted. It is possible that formerly depleted participants did not adjust their attitude too radically (even though they were able to process the information more critically) because they felt the strong need to show consistent behavior. Possible explanations for the fact that the pattern of the formerly depleted participants did not match the pattern of the non-depleted participant will be further discussed in the discussion section.

We expected that depleted participants who were exposed to the authority cue would be the most positive about the proposition. But because this attitude is formed under “mindless” conditions we expected that participants in the depletion induction X authority cue X replenishment condition would lower their opinion in a significantly more negative way than participants in all other conditions. A contrast analysis did not confirm our expectation,  $F(1,113) = 1.12, ns$ .



### *Compliance*

An ANOVA with ‘compliance change’ (compliance  $t = 2$  minus compliance  $t = 1$ ) was not possible because of extreme outliers. A repeated measures analysis with compliance (compliance  $t = 1$  vs. compliance  $t = 2$ ) added as a within-subject factor, showed a significant 3-way interaction between the within-subject factor compliance and the between subject factors depletion and replenishment,  $F(1,113) = 5.68, p < .05$ . Although SPSS found a significant interaction on both compliance measurement  $t = 1$  and  $t = 2$  the manipulation of replenishment had not actually been activated at the time of the first measurement. Previous analysis had already shown that participants are willing to distribute a significantly larger amount of letters when they are depleted. Therefore we only discuss the results of the repeated measure analysis at compliance measurement  $t = 2$ . Analysis of the simple main effects showed that the effects were only significant in the replenishment condition. At compliance measurement  $t = 2$ , formerly depleted participants were still willing to distribute a significantly larger amount of letters ( $M = 8.82, SD = 1.59$ ) than non-depleted participants ( $M = 2.88, SD = 1.54$ ),  $F(1,113) = 7.19, p < .01$ . We expected that participants would process the information more critically when they were no longer depleted and able to use their full resources. We thought the pattern would be more similar to the pattern of the non-depleted participants and therefore we did not expect to find significant differences between the two groups. Possible explanations for the fact that the pattern of the formerly depleted participants did not match the pattern of the non-depleted participant will be further discussed in the discussion section. It could for instance be that the human need for consistency and the previously made commitment of the formerly depleted participants to distribute a certain amount of letters played an important role in the process.

Similar to the effect we expected to find on the dependent variable ‘attitude’ we expected that participants in the depletion induction X authority cue X replenishment condition would change their willingness to comply in a significantly more negative way than participants in all other conditions. A contrast analysis did not confirm our expectations,  $F(1,113) = 1.19, ns$ .

### *Complementary analysis*

The effects we expected to occur when the authority cue was activated, were actually found when people were exposed to the no-authority cue. A complementary contrast analysis, in line with all other results, showed that participants in the depletion induction X no-authority cue X replenishment condition adjusted their opinion in a significantly more negative way than

participants in all other conditions,  $F(1,113) = 5.19, p < .05$ . Participants who were depleted and exposed to the no-authority cue were the most positive about the proposition when their opinion was measured for the first time. After these participants had been given time to restore their resources, their opinion about the proposition has changed significantly more in a negative direction ( $M = -.37, SD = .11$ ) than in all other conditions.

The same contrast analysis with compliance as dependent variable showed that participants in the depletion induction X no-authority cue X replenishment condition changed their willingness to comply in a significantly more negative way than participants in all other conditions,  $F(1,113) = 9.16, p < .001$ . Participants who were depleted and exposed to the no-authority cue changed the amount of letters they were willing to distribute significantly more in a negative direction ( $M = -5.00, SD = 1.37$ ), than participants in all other conditions after they had had the possibility to restore their resources. These results are in line with the assumption that formerly depleted participant who were exposed to a heuristic cue, want to change their attitude and willingness to comply in a negative direction after they have been given time to replenish their resources and have been able to process the information in the letter more critically.

### *Discussion*

The present study was designed to explore the relation between self-regulatory resource depletion and persuasion and the stability of influenced attitude and compliance after replenishment. The results of the first part of the present study provide supplementary support that resource depletion is an important factor in the influence process. In line with the results of Baumeister and Heatherton (1996), Wheeler et al. (2007), Janssen et al. (2008), Fennis et al. (2009) and Burkley (2008) we found that depleted people are easier to persuade and therefore more positive about a counter attitudinal proposition and willing to distribute a significantly larger amount of letters than non-depleted people.

The activation of a heuristic cue increased the effect of depletion on the attitude against the proposition but not as we expected. Although previous research of Janssen et al. (2008) showed that activation of the heuristic principle of authority increased the effect of depletion, we found that the no-authority condition increased the effect. Our aim was to activate (or not activate) the heuristic principle of authority by manipulating the sender of the letter with the counter attitudinal proposition. In the authority condition, it was said that the letter was sent by the “Executive Board” of the university of the participants. In the no-authority condition “a

number of students” were told to be the sender. A pre-test confirmed that the “Executive Board” of the university was perceived as a high authority sender while “a number of students” was not. It could be that the no-authority sender of the letter “a number of students” activated the heuristic principle of similarity. It seems likely that participants could relate better to “a number of students” than to the “Executive Board”. Although the first reaction to the proposition was negative, perhaps the high similarity “number of students” sender triggered a higher feeling of understanding and sympathy than the high authority “Executive Board” sender, once depleted participants realized the senders made the proposition because they thought it would improve the chances of students on the labour market. It seems as if the heuristic principle of similarity formed a stronger guidance for attitude than the heuristic principle of authority.

Although expected and shown in previous research (Cialdini, 1993; Janssen et al., 2008; Fennis et al., 2009), activation of the heuristic cue did not increase the effect of depletion on compliance. It seems that both the “Executive Board” authority sender and the “number of students” sender (which is expected to have activated the heuristic principle of similarity) were not strong enough to further stimulate depleted participants to become more actively involved and to distribute a larger amount of letters.

The results of the second part of the study provide initial support that the process of influencing attitudes in an upward direction and increasing compliance as a result of depletion and heuristic cues is partially reversible when people have had the opportunity to replenish their resources. Attitudes formed under conditions of mindlessness are more likely to change than attitudes formed when people have access to their full resources. Participants who were depleted and were exposed to the no-authority cue, changed their attitude significantly more in a negative way than participants who had not been depleted. Contrast analysis showed that formerly depleted participants who have been exposed to the no-authority cue changed their willingness to comply (and also their attitude towards the proposition) in a significantly more negative direction than all other participant after they have been given time to replenish their resources. It seems that having access to full resources leads to stronger, longer-lasting attitudes and compliance intentions.

We cannot be certain that formerly depleted participants adjusted their attitude and willingness to comply in a negative way as a result of more critically processing of the information in the letter once their resources were replenished. It cannot be ruled out that

formerly depleted people adjust their attitude and willingness to comply in a negative way when they have access to their full resources again, independent of the possibility to re-process information. The fact that we could not check if people actually re-processed the information in the letter is a limitation of this study.

Research of Tyler and Burns (2008) showed that performance of formerly depleted participants increased to the point where it equaled that of non-depleted participants after they had been given 10 minutes to replenish their resources. We expected to find a similar effect. Because formerly depleted participants were able to process the information in the persuasive letter in the same critical way as the non-depleted participants before the second measurement, we expected that the attitude and compliance pattern would be more similar to the pattern of the non-depleted participants. Repeated measures analysis showed that at measurement 2, formerly depleted participants who had replenished their resources, were still significantly more positive about the proposition and willing to distribute a significantly larger amount of letters than the participants who had not been depleted. It is possible that the human need to show consistent behavior played an important role in this process. Even though formerly depleted participants had time to restore their resources and the opportunity to read the letter more critically, it is likely that participants still remember how they responded to the questions at the first measurement. This memory of the previously made commitment could have formed a strong guideline. It could have activated the heuristic principle of consistency that induced a sort of automatic response when participants were asked to answer the same questions for the second time. Once an opinion is formed it is likely that people fall back on this previously formed opinion without evaluating other possibilities, especially when they are not really challenged to consider the alternatives. Compared to the results of Tyler and Burns (2008), it seems more likely that people show consistent behavior when attitude and compliance are measured in relation to a personal relevant proposition than when they are asked to perform a task like squeezing a handgrip because this is not personally relevant and there is no opinion involved.

In addition to the explanation above as mentioned before; although we instructed all participants to read the persuasive letter with the counter attitudinal proposition again, before they answered the dependent measure questions for the second time, and build in a time-delay to make sure participants could not immediately continue to the questions, we cannot be 100% sure that people followed the instructions and did actually read the message. It is possible, that

formerly depleted participants were not motivated to read the letter for the second time and decided to fill out the questions based on the opinion they formed after reading the letter before the first measurement. If formerly depleted participants decided not to read the letter again after they had replenished their resources, they still did not re-process the information critically. As a result, it seems logical that the attitude and compliance pattern is not the same as that of the non-depleted participants.

The theory of cognitive dissonance (Festinger, 1957) provides another possible explanation why formerly depleted participants are still more positive about the proposition at the second measurement than the non-depleted participants even though they had the opportunity to replenish their resources. After attitude is influenced in an upward direction as a result of depletion and exposure to the heuristic cue, and compliance is increased as a result of depletion, participants could have started to slightly doubt the desirability of the proposition and their response. In order to reduce dissonance and justify their response, participants could have added new cognitions. Once people have added cognitions to strengthen the idea they responded in the right way, it gets less likely their attitude and compliance will equal the pattern of participants who have not been depleted.

#### *Suggestions for future research*

Trying to influence attitude and behavior is something that happens on a daily basis in our modern world. As the present and previous research (Baumeister and Heatherton, 1996; Wheeler et al., 2007; Janssen et al., 2008; Fennis et al., 2009; Burkley, 2008) has shown, attitude can be influenced in an upward direction and compliance can be increased as a result of depletion. The fact that people are exposed to or participate in all kinds of activities which deplete their regulatory resources every single day, makes them vulnerable to influence attempts, especially when heuristic cues are used in order to persuade. It is very important to extend the knowledge we have about influence processes. More insights in the influence process and the role of depletion and heuristic cues is interesting for people who want to influence others, but can also be interesting in order to prevent one from getting influenced. In future research the effect of other heuristic principles and the strength of the different cues to guide behavior should be further tested. Thereby it is important to rule out that the control condition of a heuristic cue activation condition activates another heuristic principle.

Although it seems obvious that resources do not stay depleted after an act that requires self-control, there has not been a lot of research about the replenishment of depleted resources yet. Replenishment is indissolubly connected to depletion and therefore also to attitude and compliance, influenced when people are depleted. It is important to investigate the development of influenced attitude and behavior in the long run, especially because satisfied customers and long-term relationships are very important from a commercial point of view (Day, 2000). Future research should therefore further investigate the effect of replenishment on attitude and behavior, influenced under conditions of mindlessness. The present research is the first to look at the stability of influenced attitudes and compliance, after resources are replenished. The results suggest that attitude and compliance, formed under conditions of mindlessness, are not as strong and long-lasting as mindfully formed attitude and compliance. Formerly depleted people change their attitude and willingness to comply in a significantly more negative way than people who have not been depleted, but remain more positive and willing to distribute letters, after they have been given the possibility to re-evaluate the information when their resources are replenished.

Future research should test why formerly depleted participants adjust their attitude and willingness to comply in a negative direction. It should also test why these formerly depleted participants do remain significantly more positive and willing to comply than participants who have not been depleted. The design of this study did not make it possible to check if people actually read the message, but it is important to know if negative adjustments of attitude and compliance (formed under conditions of mindlessness) are simply the result of replenishment or if these adjustments are the result of more critically processing of the information in the counter attitudinal persuasive letter once resources are replenished. We expect that formerly depleted participants are likely to adjust their attitude in a negative direction once their resources are replenished, but that this effect is stronger when participants actually re-process the previously given information more critically.

To gain better insight in the role of replenishment in the persuasion process, the human need to show consistent behavior and the possibility that people will try to reduce cognitive dissonance should also be taken into consideration in future research. It seems likely that the heuristic principle of consistency plays an important role in the replenishment process because people are fostered to make some sort of a commitment in a social influence context. We further assume that reducing dissonance (for example by sending customers a letter to congratulate them

with their purchase and a summation of all the good qualities of the product) can help to keep the attitude and willingness to comply, formed when someone was depleted, on a more positive level even though people have replenished their resources.

In the present research, a totally new proposition was presented to the participants to make sure they did not already have a pre-established attitude about the subject. To further examine the strength of these newly formed attitudes, it would be interesting to examine if attitudes, influenced or formed under conditions of mindlessness, are easier to influence than mindfully formed attitudes when new arguments are presented. We expect that attitudes formed when people are depleted are more likely to be influenced by new arguments than mindfully formed attitudes because the results of the present study suggest that mindlessly formed attitudes are less strong and long-lasting than mindfully formed attitudes.

### *Conclusion*

Together the results of this study suggest that depletion of self-regulatory resources makes it easier to influence attitudes in an upward direction, especially when a heuristic cue is activated, and that depletion is likely to increase compliance. The strength of the positive effect reduces after resources are replenished. Attitudes and compliance formed under conditions of mindlessness do not seem as strong and long-lasting as attitudes and compliance formed when people have access to their full resources. Formerly depleted participants remain significantly more positive about the proposition and willing to distribute a significantly larger amount of letters than participants who have not been depleted. From a practical perspective this means that sales representatives, fundraisers and all other people who try to influence attitude and compliance, should be careful with depleting people if they are aiming at satisfied customers and a good relationship in the long run.

Present research has shown that research about the role of self-regulatory resource depletion in the process of persuasion should be extended. Replenishment is indissolubly connected to depletion and this makes replenishment an important element in the influence process. The effect of replenishment on the influence process is an interesting and complex area that needs to be further explored.

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## Appendix A

Persuasive letter with counter attitudinal proposition

Heuristic principle of authority version (sender: Executive Board of the University)

**We willen je vragen het volgende bericht, dat afkomstig is van het College van Bestuur, zorgvuldig te lezen**

Als College van Bestuur vinden wij het erg belangrijk om de kwaliteit van de opleidingen te bewaken en ervoor te zorgen dat de kennis van de studenten van voldoende niveau is. Op basis van de rapporten van de visitatiecommissie en naar aanleiding van eigen onderzoek hebben wij moeten concluderen dat het huidige niveau van de UT-studenten niet hoog genoeg is.

Om beter met studenten van andere universiteiten te kunnen concurreren, betere kansen voor studenten van de Universiteit Twente op de arbeidsmarkt te creëren en een snellere doorstroming van banen te bewerkstelligen stellen wij als College van Bestuur voor om de norm voor het behalen van ECTS te veranderen door de minimale cijfer eis te verhogen van 5,5 naar 6. Dit betekent dat een student ECTS krijgt wanneer voor een opdracht of tentamen het cijfer 6 of hoger wordt gehaald.

Het verhogen van de minimum cijfer eis van 5,5 naar 6 is de eenvoudigste manier om het niveau van de studenten te verhogen, zonder de docenten extra te belasten. Een speciale commissie gaat erop toezien dat de tentamens en opdrachten van voldoende academisch niveau blijven. Daarnaast is deze maatregel financieel erg aantrekkelijk omdat het weinig kosten met zich meebrengt.

In Amerika wordt deze maatregel reeds, met gewenst effect, gehanteerd. Uit onderzoek van The Center for Measuring University Performance is gebleken dat het niveau van studenten die moeten voldoen aan de strengere norm hoger is dan dat van studenten van universiteiten die werken met een minimum cijfer eis van 5,5. De cijfers voor de Masterscripties liggen over het algemeen ook hoger. Het blijkt wel dat deze en soortgelijke maatregelen, faalangst versterken. Geredeneerd wordt echter dat mensen hierdoor extra gemotiveerd worden om hard te werken, waardoor de resultaten zullen verbeteren.

Veel studenten krijgen na hun afstuderen een baan bij een bedrijf waar de druk om te presteren heel hoog is. Het verhogen van de minimum cijfereis norm zorgt ervoor dat studenten harder moeten werken om hun ECTS te halen en bereidt studenten daardoor beter voor op het functioneren in deze prestatiegerichte maatschappij.

Wij als College van Bestuur zien het verhogen van de norm als een goede mogelijkheid om studenten van de Universiteit Twente positief te onderscheiden van studenten van andere universiteiten. Een reeds uitgevoerde test laat zien dat het bedrijfsleven ook positief op het voorstel reageert. Verschillende bedrijven geven aan dat ze meer waarde zullen hechten aan een diploma dat behaald is op de Universiteit Twente, wanneer de norm voor het behalen van studiepunten wordt verhoogd.

Bedankt voor je aandacht.

## Appendix B

Persuasive letter with counter attitudinal proposition  
 No-authority version (sender: a number of students)

**We willen je vragen het volgende bericht, dat afkomstig is van een aantal studenten, zorgvuldig te lezen**

Als studenten vinden wij het erg belangrijk om de kwaliteit van de opleidingen te bewaken en ervoor te zorgen dat de kennis van de studenten van voldoende niveau is. Op basis van de rapporten van de visitatiecommissie en naar aanleiding van eigen onderzoek hebben wij moeten concluderen dat het huidige niveau van de UT-studenten niet hoog genoeg is.

Om beter met studenten van andere universiteiten te kunnen concurreren, betere kansen voor studenten van de Universiteit Twente op de arbeidsmarkt te creëren en een snellere doorstroming van banen te bewerkstelligen stellen wij als studenten voor om de norm voor het behalen van ECTS te veranderen door de minimale cijfereis te verhogen van 5,5 naar 6. Dit betekent dat een student ECTS krijgt wanneer voor een opdracht of tentamen het cijfer 6 of hoger wordt gehaald.

Het verhogen van de minimum cijfereis van 5,5 naar 6 is de eenvoudigste manier om het niveau van de studenten te verhogen, zonder de docenten extra te belasten. Een speciale commissie gaat erop toezien dat de tentamens en opdrachten van voldoende academisch niveau blijven. Daarnaast is deze maatregel financieel erg aantrekkelijk omdat het weinig kosten met zich meebrengt.

In Amerika wordt deze maatregel reeds, met gewenst effect, gehanteerd. Uit onderzoek van The Center for Measuring University Performance is gebleken dat het niveau van studenten die moeten voldoen aan de strengere norm hoger is dan dat van studenten van universiteiten die werken met een minimum cijfereis van 5,5. De cijfers voor de Masterscripties liggen over het algemeen ook hoger. Het blijkt wel dat deze en soortgelijke maatregelen, faalangst versterken. Geredeneerd wordt echter dat mensen hierdoor extra gemotiveerd worden om hard te werken, waardoor de resultaten zullen verbeteren.

Veel studenten krijgen na hun afstuderen een baan bij een bedrijf waar de druk om te presteren heel hoog is. Het verhogen van de minimum cijfereis norm zorgt ervoor dat studenten harder moeten werken om hun ECTS te halen en bereidt studenten daardoor beter voor op het functioneren in deze prestatiegerichte maatschappij.

Wij als studenten zien het verhogen van de norm als een goede mogelijkheid om studenten van de Universiteit Twente positief te onderscheiden van studenten van andere universiteiten. Een reeds uitgevoerde test laat zien dat het bedrijfsleven ook positief op het voorstel reageert. Verschillende bedrijven geven aan dat ze meer waarde zullen hechten aan een diploma dat behaald is op de Universiteit Twente, wanneer de norm voor het behalen van studiepunten wordt verhoogd.

Bedankt voor je aandacht.