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‘Give me a reason to make it my own’: The Further Effects of Confabulation on Self-knowledge

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Abstract

In recent years, research started investigations on the downstream consequences of unconsciously activated behavior. The present study builds on the work on the explanatory vacuum and misattribution of behavior (i.e., confabulation) caused by nonconscious processes and extends the work on confabulation by investigating the further consequences on one's self-knowledge. It was hypothesized that receiving negative false feedback on previously performed behavior would lead, because of the need to explain the behavior, to adopting a confabulated reason for the behavior. Secondly, it was hypothesized that the adopted confabulation reason would be integrated into one's self-concept. Participants had to do a task on the computer and subsequently received false feedback on their performance. Confabulation was measured by the degree in which participants used the confabulation opportunity, given through a scientific article, by completing a *Feedback Questionnaire*. To measure self-knowledge, participants had to fill out the *Cognitive Performance Questionnaire* about sensitivities on their general cognitive performance. Results provided evidence for the first hypothesis, but not for the second hypothesis. The present study used a more stringent test to trigger confabulation than previous studies and thus strengthens the theoretical underpinnings of the influence of unconscious behavior on confabulation. Future studies should focus on the shortcomings of the current study by investigating the further consequences of confabulation to prevent faulty self-knowledge.

Keywords: nonconscious, explanatory vacuum, false feedback, confabulation, self-knowledge

‘Give me a reason to make it my own’: The Further Effects of Confabulation on Self-knowledge

Numerous studies in the past 20 years showed that goals can be activated outside people’s conscious awareness (Bargh, 1990; Bargh, Gollwitzer, Barndollar & Trötschel, 2001; Dijksterhuis, Smith, Baaren, & Wigboldus, 2005; Oettingen, Grant, Smith, Skinner & Gollwitzer, 2006; Parks-Stamm, Oettingen & Gollwitzer, 2010; Bar-Anan, Wilson & Hassin, 2010). An example on how to test this is the study of Bargh and colleagues (2001): participants were primed with high-performance behavior through a word-search puzzle. Participants in the priming condition (e.g., high-performance) scored higher on a later verbal task (e.g., finding the hidden words in a puzzle) than control group participants, without them realizing that this increased performance was related to the word-search task. Crucially, priming does not only happen in experiments, but also in daily life. For example, evidence suggests that the size of dinnerware affects the amount of food consumed. Serving on large plates leads to more food intake than serving on smaller plates, which can ultimately lead to overeating (van Ittersum & Wansink, 2012) without people being aware of the influence of the size of their plates. In recent years, research on nonconscious processes has also started investigations on the downstream consequences of the nonconscious processes. Evidence now suggests that failing on a personally set health goal, without knowing what caused this failing, can lead to adopting erroneous explanations. The present study will build on these novel findings by investigating whether these false explanations can lead to faulty self-knowledge (Oettingen et al., 2006; Bar-Anan et al., 2010; Adriaanse et al., 2014).

As mentioned above, there is a lot of evidence showing that behavior can be activated outside people’s awareness. Recent studies that investigated the consequences of having no explanation for unconsciously activated behavior (i.e., acting in an explanatory vacuum; Oettingen et al., 2006) demonstrated that acting in such an explanatory vacuum can lead to

negative affect, especially when this activated behavior violates consciously held norms or standards (Adriaanse et al., 2014; Parks-Stamm et al., 2010). For example, Oettingen and colleagues (2006) investigated the consequences of acting in an explanatory vacuum on negative affect by comparing people who were engaging in nonconscious versus conscious goal pursuit. All participants were asked to work to together on a joint task. In the unconscious goal pursuit condition participants were unconsciously activated with either a combative goal (norm-violating), a cooperative goal (norm-conform) or no goal. The study showed that participants in the unconscious norm-violating condition experienced more negative affect than the participants in the unconscious norm-conforming condition, or in the conscious norm-violating or norm-conforming condition. Oettingen and colleagues suggested that participants in the norm-violating conscious condition had an excuse for their behavior, because of the consciously assigned goal. Participants in the unconscious norm-violating conditions did not have access to a similar excuse, because their goal to act combative was activated outside of conscious awareness. Thus, when goal directed behavior *needed* an explanation – as was the case in the norm-violating, but not in the norm-conforming condition –, but this explanation was not accessible – as was the case in the nonconscious goal condition – negative affect increased.

Recent research that builds on the study of Oettingen and colleagues (2006) is the study of Adriaanse and colleagues (2014). They suggest that the negative affect that is evoked by nonconsciously activated norm-violating behavior motivates people to confabulate a reason for the behavior. Confabulation can be described as making up a reason without the intention to mislead or being aware of the unfounded reason (Hirstein, 2005, citated in Parks-Stamm et al., 2010). The concept of confabulation originates from the clinical literature. Confabulation is frequently studied among split-brain patients, whose cerebral hemispheres have been separated, which causes a disconnection between brain processes and awareness.

To resolve the action by one hemisphere with the perceptions by the other hemisphere, patients try to produce an explanation to eliminate the conflict between the two. Confabulated reasons are often produced to deny the serious deficit by rationalizing the conflicting information (Roser & Gazzaniga, 2004). The content of the confabulated reasons can vary from plausible to bizarre explanations, but they are always characterized by the absence of the intention to deceive (Borsutzky, Fujiwara, Brand, Markowitsch, 2008). While the research on confabulation originally stems from patient samples, confabulation also occurs among the healthy population. People's explanations for their behavior fit their perceptions in that particular context, and these perceptions are based on assumptions. When these assumptions are inaccurate, it can lead to errors. These errors in people's perception can thus lead to errors in explanations of people's behavior (Hirstein, 2009). Nisbett and Wilson (1977) already proposed that when people report on cognitive processes, they do not do that using true introspection. As a replacement, they report on the extent that a stimulus is a plausible cause of a certain reaction. For example, they conducted an experiment whereby patients with insomnia were given a placebo pill and were told that it produces rapid heart rate and alertness, which are actually some of the symptoms of insomnia. As expected, participants fell asleep earlier, because of the knowledge of taking the pill and thereby could attribute their symptoms to the pill. But when it was asked why they fell asleep earlier, they seem to confabulate a reason (e.g., because their exam was over).

Adriaanse and colleagues (2014) showed the process of confabulation in their study. Participants were primed with an anti-social or neutral goal in a computer game. Then, participants engaged in an ostensibly unrelated voluntary task in which they were asked to complete as much trials as they wanted to. Confirming the effectiveness of the prime, the anti-social group completed fewer trials than the control group. In line with Oettingen and colleagues (2006), quitting sooner on the voluntary task (i.e., completing less trials) without

having an explanation for it, led to increased negative affect. After the task, participants had to answer some questions about the lab facilities (e.g., 'How comfortable is the chair?' or 'Is it too cold in the cube?'). Participants could use these questions about the comfortableness of the lab facilities as a post-hoc confabulated reason explaining why they completed more or less trials. Indeed, the anti-social primed group rated the lab as less comfortable than the control-group, which indicated that they indeed used the given confabulation opportunity (i.e., the comfort of the lab facilities) as a reason for their behavior. These findings can be explained through the mediation-moderation model of Adriaanse and colleagues (2014) which shows a direct effect of unconscious activated behavior on confabulation which is moderated by personal standards, and that negative affect mediates the relationship between unconscious activated behavior and confabulation.

In the present study we build on the theory of Adriaanse and colleagues (2014) by suggesting an additional extension of these consequences. In the present study it is hypothesized that a confabulated reason can influence one's broader self-knowledge. Fazio, Effrein and Falender (1981) already suggested that when a person performs a certain behavior the person undergoes a self-perception process. In this process the person may internalize the disposition suggested by his or her behavior. This can lead to a change in the person's self-concept and may affect his or her behavior in the future situations. So, when behavior is activated outside people's awareness and people thereby misattribute the behavior, the internalization of this misattribution may lead to faulty self-knowledge (Fazio et al. 1981; Freedman & Fraser, 1966; Gorassini & Olsen, 1995). To illustrate, consider the following example of Tina. Tina wants to lose weight and starts a diet. During her lunchbreak, she walks by a billboard on the street with a chocolate bar on it. Later on in the supermarket, Tina buys a chocolate bar in addition to her lunch. After she eats the chocolate bar she feels bad, because she violated her diet without having an accessible reason for it. Then, she remembers an

article she read on the internet about emotional eating and concludes that the fight she had with her boyfriend that morning is probably the reason why she ate that chocolate bar. It seems that Tina is unaware of the billboard and unconsciously uses the fight with her boyfriend as a plausible reason for her norm-violating behavior. These aforementioned steps have been demonstrated in the confabulation model. However, we propose that this confabulated reason may also affect Tina's self-knowledge, for example the extent to which she identifies herself as an emotional eater. For example, it seems plausible that the next day when she talks to her friend about her diet she explains: 'Well I am an emotional eater, I eat everything when I feel bad'.

Initial evidence for the hypothesis that confabulation can lead to faulty self-knowledge, comes from work by Bar-Anan and colleagues (2010). Bar-Anan and colleagues examined if misattribution of behavior, to one or more alternative goals than the real reason, can result in faulty self-knowledge. They investigated the process of misattribution on the basis of a *post-priming misattribution hypothesis*. The post-priming misattribution hypothesized that a) a goal can be activated automatically b) and can influence people's behavior without their awareness, c) this unawareness causes people to misattribute their behavior to an plausible internal state and d) this confabulated internal state can influence people's self-concept and even future behavior. The first three steps of this process (a,b,c) have already been investigated, however not in large numbers (Adriaanse et al., 2014; Parks-Stamm et al., 2010; Oettingen et al., 2006). Bar-Anan and colleagues found, like the previously mentioned studies, evidence for the first three steps in the process related to confabulation.

However they extended current research. Bar-Anan and colleagues (2010, Study 4) expected that the reason to which participants misattribute their behavior, will affect their self-concept. To demonstrate this effect, Bar-Anan and colleagues conducted a study in which

they showed a passage about earning money to the priming group and a passage about returning a CD to the control group. After that, participants had to choose a game to play based on a picture with images of people and symbols relevant to the subject. In one of the pictures (counterbalanced) they inserted dollar bills. The examiners introduced a confabulated reason (e.g., difficulty of the game) after participants made their choice of game, so that it could not have any influence on their choice. As expected, the primed participants were more likely to choose the game with the money in the picture. However, they were unaware of what influenced their behavior. They misattributed their behavior to the level in which they liked challenges (i.e., confabulation). Next, participants had to fill out questionnaires on 'Liking for Challenges' and 'Ratings of Interests' about the topics of the games. The primed participants, to whom the game was presented as difficult, reported that in general they preferred challenges more than the primed participants to whom the game was presented as easy, indicating a change in self-concept. Subsequently, two lists of tips on: 'How to make and save Money' and 'How to successfully pursue challenges' were presented to the participants. Bar-Anan and colleagues showed that primed participants to whom it was presented that they had chosen the difficult game were more likely to choose the tips about pursuing challenges (e.g., future behavior) than the primed participants to whom the game was presented as easy. So, the study showed that misattribution of behavior, used to explain behavior, led to a change in self-concept which influenced behavior later on. In other words, the level of liking challenges was used to explain the choice of game, which led to a change in their perceived general liking for challenges and this then influenced the individual to choose tips on how to pursue challenges.

A more thorough investigation of these further downstream effects of nonconsciously activated behavior on self-knowledge is important because a large part of people's behavior is determined by environmental cues outside people's conscious awareness (Bargh & Chartrand,

1999). The previous studies showed that unconscious processes led to unexplainable behavior and an increased negative affect with the consequence that people misattribute their behavior (Adriaanse et al., 2014; Oettingen et al., 2006). If these erroneous reasons indeed become integrated into people's self-concepts, and even affect behavior further down the road (c.f., Bar-Anan et al., 2010), it may lead to a negative spiral for people like Tina (introduced earlier). For example, Tina observes herself eating a chocolate bar, without having a reason for it. She then feels bad about it and wants to explain her behavior because she violated her diet. As frequently said, the experienced negative affect can lead to misattribution of behavior, in the example of Tina by using an article which describes emotional eating. The need to explain her behavior, and the erroneous reason that is offered, led to the believe that she is an emotional eater. When Tina sees herself as an emotional eater it could influence her subsequent behavior by eating chocolate or other unhealthy snacks every time she feels emotional. Knowing more about how confabulated reasons affect self-knowledge may give direction to unexplainable behavior and insight on how to prevent faulty self-knowledge as a consequence of misattribution of this unexplainable behavior. And maybe then we can prevent that Tina adopts an erroneous self-concept of an emotional eater, which may influence future eating behavior, after just one misstep by eating a chocolate bar.

The present study

A first aim of the present study is to investigate the effect of confabulated reasons (due to acting in an explanatory vacuum) on self-knowledge. In the present study an explanatory vacuum is created through the use of a false feedback paradigm rather than by priming participants. This was done to ensure that participants did not have an accessible explanation for their behavior (as the feedback is false), but are certainly aware of the norm-violating behavior (as explicitly told in the feedback). Previous research from Adriaanse and colleagues

(2014) and Oettingen and colleagues (2010) stated that confabulation is a consequence of unconsciously activated unexplainable behavior which is a violation of a personally set standard. When this is not a violation of a personal standard, people should not feel the need to explain their behavior. They used the method of priming as manipulation in their study design, whereby they assumed that the anti-social prime led to violation of a norm and would lead to increased negative affect due to the explanatory vacuum. However, this method can be criticized because there is no evidence, only the assumption, that participants actually realized that they violated a norm (e.g., acting anti-social) and thus were in an explanatory vacuum. Participants may in fact have been unaware of performing the behavior, or they may not have had clear standards for these unusual situations (e.g., standards on what amount of M&M's is considered the norm when participating in a taste test; Adriaanse, Prinsen, de Witt Huberts, De Ridder & Evers, 2016). The present study overcomes this limitation by using the method of false feedback, whereby participants are made aware of the set norms and their performance in comparison to all other participants. Thus, a second aim of the present study is to provide a more stringent test of the idea that acting in an explanatory vacuum triggers confabulation.

Method

Participants

Thirty-nine participants participated in the study about performance in exchange for 4 euros or course credit. One participant had some missing values on the self-knowledge questionnaire, due to an error in the experiment, and was excluded from the self-knowledge analysis. The participants (28 women and 11 men) were aged between 18 and 28 years old (M= 21.62, SD=2.47).

Design

The study consisted of two conditions (Neutral vs. Negative) of false feedback with a

between subject design. The experimental group received negative false feedback and the control group received neutral false feedback. The dependent variables were confabulation and self-knowledge.

Procedure

The participants were recruited at the Uithof in Utrecht, the Netherlands, verbally and through a poster. The investigator selected the participants above sixteen years, because they are empowered to sign their own consent form. Participants were told that they would be participating in a study that investigated performance. The experiment consisted of different tasks and separate experiments. Participants had to fill out two different baseline questionnaires. First, participants filled out the *Intake Form*, which included items on demographics, and a questionnaire assessing baseline fatigue and filler items. Participants were told that the *Intake Form* belonged to the lab and everybody participating had to fill it out. Then participants were taken to their cubicles were they filled out the *Desirability of Control Scale,* which served as a baseline measurement because former studies showed that the degree of desire to control is related to people's explanatory style (Burger & Cooper, 1979; Adriaanse et al., 2014). Subsequently, all participants had to participate in two tasks. The first task was *Verbal Cognitive Task I*, which served as a boring and cognitive demanding task and was used to reflect on afterwards. The second task was the *Visual Cognitive Task II*, which was included as the task about which participants received false feedback. Then, participants received the *False Feedback.* Participants were randomly assigned to receive neutral or negative feedback. Participants in the neutral condition were led to believe that they scored average on the visual cognitive performance computer task in comparison to all other participants. Participants in the negative condition were led to believe that they scored below average on the same task in comparison to all other participants.

The participants were then told that the first part of the experiment was over. Before

they would move on to the second part of the experiment they were asked to participate in a *Pilot Study* of the supervisor of the investigator, whereby participants had to read a text about the influence of boring highly demanding cognitive tasks on attention and visual perception and had to mark the three core sentences. The purpose of the *Pilot Study* was to expose the participants to a possible reason (i.e., that the *Verbal Cognitive Task I* was highly demanding) for explaining their score on the *Visual Cognitive Task II*. Participants were then asked to fill out a *Feedback Questionnaire* to help improve the experiments in the lab. Participants had to give feedback regarding the degree to which the *Verbal Cognitive Task I* was cognitively demanding to measure the extent to which they used the information in the article of the *Pilot Study* to confabulate. It was expected that the negative feedback condition rated the *Verbal Cognitive Task I* more cognitively demanding than the neutral condition. This would be due to the fact that the participants in the negative condition could not explain their received poor score on the visual performance task. Then, part two of the experiment was introduced. Participants first had to fill out a filler questionnaire and then moved on to the *Cognitive Performance Questionnaire*, which measured the degree to which participants believed that their cognitive performance was generally effected by boring and demanding tasks. This latter questionnaire was used to measure self-knowledge. It was expected that the negative feedback condition scored higher on items about the influence of boring tasks and attention demanding tasks (represented in the *Pilot Study*) on their general cognitive performance than the neutral condition. Finally, the participants were debriefed, received the chosen reward and were thanked.

Materials

Intake Form. The *Intake Form* assessed demographics and included ten items of which nine were filler items and one item which was used as a control variable in the randomization check (‘How tired are you right now?’) measured on a 7- Likert scale (rating

from 1= *not at all* till 7= *very much).*

Desirability of Control Scale. To control for the differences in desirability of control under the participants the Desirability of Control Scale (Burger, 1992) was used as a baseline measurement (cf. Adriaanse et al., 2014). The scale measured the general desire to control events of individuals (Burger & Cooper, 1979). The Desirability of Control Scale was found to have an internal consistency of $\alpha = .69$. The questionnaire consisted of 20 items (e.g. 'I enjoy to make my own decisions'.), whereby participants had to indicate, on a 7-Likert scale (rating from 1= *does not apply to me at all* till 7= *does apply to me very much*) the extent to which they agreed with the statements.

Verbal Cognitive Task I. The first task participants had to do was to score out the vowels in a Dutch historical article about cotton plantations (Drukker, 1984). To make the task a little bit harder, participants were instructed to score out all vowels, except when vowels occurred in succession. The task was meant as a boring and cognitive demanding task and was used to reflect on later in the experiment by the use of a *Feedback Questionnaire*.

Visual Cognitive Task II. The second visual performance task was a computer task which consisted of four squares that were presented with a hole that was oriented upwards, downwards, to the left or to the right. Participants were instructed to indicate the orientation of the arrow by pressing a corresponding key on the keyboard. The squares were randomly presented on the computer screen. Each four squares were presented 50, 100 and 150ms. One trial consisted of twelve squares, so each presented four times with one of the three durations. The experimental trial consisted of four trials, each with twelve squares. So in the experimental trial 48 squares were presented.

False Feedback Manipulation. After the computer task the participants received false feedback on their performance. The false feedback came in two conditions: the neutral false feedback condition indicated that the participant scored average on the performance tasks

(*'86% of the answers you gave were correct. The average score of correct answers of all participants who have participated to date is 87%'*), and a negative false feedback condition, which presented the feedback that the participant scored below average on the performance task (*'63% of the answers you gave were correct. The average score of correct answers of all participants who have participated to date is 87%'*). The amount of actual correct answers and response times in the experimental trials were logged.

Pilot Study. The participants were asked to read a scientific article which was adapted for the present experiment (cf. Adriaanse, Kroese, Weijers, Gollwitzer, & Oettingen, 2016). The article stated that research has shown that highly demanding and boring attention tasks influence one's attention span. The article also stated that performing a highly demanding attention task – in particular a boring task – negatively influences people's visual perception and reaction times. The purpose was to expose the participants to a possible reason (i.e., cognitive exhaustion and visual impairment as a consequence of performing a boring and demanding task) to explain their poor or neutral score on the *Visual Cognitive Task II.* Participants had to read the article and they also had to mark the three core sentences to make sure that they read it all.

Feedback Questionnaire. Confabulation was measured (e.g., the degree to which participants used the content of a scientific article to explain their behavior) by a *Feedback Questionnaire* in which participants had to give feedback on the *Verbal Cognitive Task I*. The *Feedback Questionnaire* consisted of seven items. The items were based on a submitted study from Adriaanse and colleagues (2016). The items were measured on a 7-point Likert Scale (rating from 1= *totally disagree* till 7= *totally agree*). The questionnaire measured two different factors, five items referring to the degree in which the task demanded concentration (e.g., 'The task took too long to keep focused' or 'My concentration did not remain consistent over the task'; $\alpha = .88$) and the remaining two items referred to the subscale degree of

difficulty ('The task was demanding' and 'The task was difficult'; r = .31). In line with Adriaanse et al. (2016), condition was expected to have an influence on confabulation for the concentration subscale and not for the difficulty subscale as the scientific text stated specifically that highly demanding tasks are not difficult tasks per se, but rather tasks that require a constant amount of concentration and tax people's attention span.

Filler Questionnaire. The *Life Style Questionnaire* served as a filler questionnaire and consisted of 30 items (e.g., 'I like to do sports' or 'I like to be alone') that were measured on a 7-point Likert Scale (rating from 1= *does not apply to me at all* till 7= *does apply to me*). This questionnaire was used to conceal any suspicions about the real purpose of the experiment by not directly present the *Cognitive Performance Questionnaire* after the *Pilot Study* and *Feedback Questionnaire.*

Cognitive Performance Questionnaire. Self-knowledge was measured on a scale of six items. Four items were unrelated and used as filler items (e.g., 'When I am hungry, I notice that my cognitive performance decreases rapidly' or 'If I have experienced a lot of negative emotions, I notice that my cognitive performance decreases rapidly'). The other two items measured the degree in which participant's general cognitive performance was effected by boring tasks (e.g. 'When I did a boring task, I notice that my cognitive performance decreases rapidly') and demanding tasks (e.g. 'When I have done a task that required a lot of attention, I notice that my cognitive performance decreases rapidly'). These items were connected to the content of the scientific article (e.g. confabulation opportunity). The items were measured on a 7- Likert Scale (rating from 1= *does not apply to me at all* till 7= *does apply to me*). The two items that measured self-knowledge were unrelated (r = -.04) and were therefore separately conducted in the analyses.

Debriefing

At the end of the experiment the participants were verbally asked (i) if they knew what the purpose of the experiment was and (ii) if they noticed something unusual about the tasks they had to do. The third question that was asked was (iii) if the participants had noticed something about the performance task on the computer. One participant suggested that the pilot study was part of the experiment and two participants suggested that the feedback may have been false. None of the participants guessed the right purpose of the study. Rerunning the main analyses without including these three participants yielded similar results to when they were included. Therefore, all participants were included in the main analyses.

Results

Randomization Check

To make sure that the randomization was successful, separate ANOVA's were conducted with Condition as the independent variable and age, baseline fatigue, desire for control, correct response and response time[i] on the computer task as dependent variables. Chi-square analyses were used to check whether gender and education (i.e., studying psychology or not) were equally divided over the conditions. All effects were non-significant, all *p's* > .50. Only gender with $p = .06$ was marginally significant. However, gender was not a significant covariate in any of the analyses, all *p's* > .33, and was therefore not included as covariate in the analyses reported below.

Main Analyses

Confabulation: Concentration. To determine the effect of Condition on the Concentration subscale an ANOVA with Condition as an independent variable and Confabulation (Concentration) as a dependent variable was conducted [ii]. Condition had a significant effect on Concentration, $F(1, 37) = 5.89$, $p = .02$, $\eta^2 = .14$. As expected,

participants who received the negative false feedback scored significantly higher (M = 4.37, SD = 1.39) on the degree to which they rated the first cognitive task to require concentration than participants in the neutral condition (M = 3.26, SD = 1.46).[iii]

Confabulation: Difficulty. For the difficulty subscale an ANOVA analysis with Condition as an independent variable and Confabulation (Difficulty) as the dependent variable did not have a significant effect with p = .89, as was expected.

Self-knowledge: Boring and Attention. An ANOVA with Condition as independent variable and Self-knowledge *Boring* (degree in which participant's general cognitive performance is influence by boring tasks) as a dependent variable was used to determine whether false feedback has an influence on the self-knowledge ratings. There was no significant effect of Condition on Self-knowledge *Boring*, with p = .10. Another ANOVA was conducted with Condition as the independent variable and Self-knowledge *Attention* (degree in which participant's general cognitive performance is influence by cognitive demanding tasks) as the dependent variable. There was also no significant effect of Condition on Self-knowledge *Attention*, p = .20.

Discussion

The present study was designed to replicate and extend on previous studies on the explanatory vacuum (Oettingen et al., 2006), demonstrating that nonconsciously activated behavior leads to misattribution of this behavior (i.e., confabulation; Bar-Anan et al, 2010; Adriaanse et al., 2014) when there is a need to explain the behavior (e.g., when the behavior is norm-violating, or when people are explicitly requested to explain their behavior). The present study went one step further by investigating the further consequences of confabulation on one's self-concept (c.f. Bar-Anan et al, 2010). A second aim of the present study was to provide a more stringent test of the idea that acting in an explanatory vacuum triggers confabulation. That is, the current study used the methodology of false feedback rather than

priming to create an explanatory vacuum. This ensured that the participants were aware of their behavior, and that they were also aware of the fact that it was norm-violating (i.e., violating the norm to perform well), but did not have an explanation for their behavior. It was expected that the participants who received negative false feedback on their previously performed behavior would use the confabulation opportunity (i.e., the influence of boring and cognitive demanding tasks), given to them through a scientific article, to explain their behavior more than the neutral condition. Secondly, it was hypothesized that the adopted confabulation reason would be integrated into one's self-knowledge. Self-knowledge was measured by the degree in which sensitivities would influence the general cognitive performance of the participants.

Results confirmed the first hypothesis: participants in the negative false feedback (i.e., receiving a poor score) condition rated the first cognitive task (i.e., score out the vowels) as more cognitive exhausting in comparison to the participants in the neutral condition. Unfortunately, no significant effect of condition (i.e., receiving a poor or neutral score) was found on self-knowledge. Participants in both conditions scored equally on the items that measured the degree in which participants' general cognitive performance was influenced by boring tasks and the degree to which participants' general cognitive performance is influenced by cognitive demanding tasks. Results indicated that these nonsignificant effects may be attributable to ceiling effects. That is, we aimed to make the self-knowledge items plausible as it has been found that people are more likely to attribute behavior to plausible causes (Parks-Stamm et al., 2010; Nisbett & Wilson, 1977). However, the non-significant effect on self-knowledge may be due to the fact that the items were actually too plausible. That is, even without the presented scientific article, participants would assume that their cognitive performance in general decreases when they had to do a demanding task. This is illustrated by the fact that 84% of the participants scored 5 or higher on the item that measured the degree to

which participant's general cognitive performance was influenced by cognitive demanding tasks (measured on a 7 point scale). Consequentially, there was little variance to explain and there was no significant effect to find, which was caused by the high scores on the demanding tasks. Therefore, future studies should make the self-knowledge items with more distribution in order to prevent this problem.

Notwithstanding the fact that the second hypothesis regarding self-knowledge was not confirmed, the present findings still provided support for our first hypothesis. The observation that participants in the negative false feedback condition confabulated more than the neutral condition replicates the findings of previous mentioned studies on the effects of unconscious processes on confabulation (Adriaanse et al., 2014; Bar-Anan et al., 2010; Parks-Stamm et al., 2010). Adriaanse and colleagues (2014) stated that people who cannot explain their norm-violating behavior (i.e., being in an explanatory vacuum), because they were unaware of what caused their behavior, will misattribute their unconsciously activated behavior to a plausible reason (i.e. confabulation). The present study found evidence for this effect. Participants in the present study who were in the negative condition could not explain the poor score they received on a visual performance task and used the confabulation opportunity (e.g., that highly demanding and boring attention tasks had an influence on one's attention span, visual perception and reaction times) to explain their behavior more than participants who received a neutral score did.

However, the present study also extended these findings by conducting a more stringent test of the explanatory vacuum. The present study used false feedback to create an explanatory vacuum, which ensured that participants did not had an accessible explanation for their behavior (e.g., having a poor or neutral score on a visual performance task), because the feedback they received was false. At the same time, the participants certainly were aware of the norm-violating behavior – their poor or neutral score was compared to all other

participants - as they were explicitly told about this in the feedback that they received. Previously used manipulations of the explanatory vacuum involved priming paradigms and it could not be ascertained that participants were indeed aware of their behavior and/or the fact that it was norm-violating. This is an important addition as it is illustrated by Adriaanse and colleagues (2014) when nonconsciously activated behavior is expected to trigger confabulation. They triggered the automatic process through priming and stated that participants were aware of the performed behavior but unaware what caused their behavior. This can be criticized, as evidence did not showed whether participants perceived their behavior as norm-violating, or were even aware of their behavior. In the unusual situation of an experiment, participants may not have an clear indication of what the present norm is. For example on the example of Adriaanse and colleagues (2014), participants may not have had a clear norm of the amount of trials they had to complete in order to prevent anti-social behavior. Even more extremely, it is also possible that the primed behavior itself was also executed without being aware of the behavior . The present study overcomes this by making participants explicitly aware of their own behavior by giving a norm through false feedback. The results confirmed this by showing that participants who received the negative false-feedback indeed adopted the proposed reasons to explain their behavior (e.g., rated the verbal task more cognitive exhausting).

Although the present study did not found a significant effect on self-knowledge, Bar-Anan and colleagues (2010) showed in their study that people behave accordingly to how they see themselves. They showed the further consequences of misattribution of behavior on one's self-concept and even on subsequent behavior, what is caused by automatically activated behavior outside people's awareness. The relevance to investigate the effects on self-knowledge more in future studies stems from the fact that people have difficulties adjusting their ideas about the relationship between their behavior and potential causes of this behavior,

when they already adopted a faulty theory about why they performed the behavior. This is especially true when the actual cause of their behavior does not fit with their self-image, which is often the image of a good person as we naturally hold positive self-images (Bar-Anan et al., 2010).

Taken together, the first aim of the present study was to add to the limited number of studies that have looked at the downstream consequences of unconscious processes and extend the recent findings about the further effects of confabulation on self-concept. The relevance to investigate these further consequences are based on the findings that confabulation may lead to a faulty self-knowledge and can even provide a negative spiral by influencing subsequent behavior (Bar-Anan et al., 2010), after frequently adopting the same confabulation reasons. The second aim was to sustain the recent findings about the direct effects of unconsciously activated behavior on misattribution of behavior (Adriaanse et al., 2014) by using a more stringent test of the explanatory vacuum. The present study used the false feedback paradigm to make sure that participants were aware of their norm-violating behavior, but still ensured that participants' did not have an explanation of their behavior. By doing this, the present study overcomes the above mentioned criticism of previous findings (Adriaanse et al., 2014; Oettingen et al., 2010) and thus strengthens the theoretical underpinnings of the influence of unconscious behavior on confabulation.

A few limitations of present study should be noted. Firstly, the power of the present study was low, due to the small sample. Secondly, the selected self-knowledge items were found to be unrelated. Future studies should take this into account and could use, like the current used confabulation measurement (Adriaanse et al., 2016), two subscales consisting of related self-knowledge items to measure separate factors of self-knowledge. Future studies should ensure that there is enough distribution between the items and that they are not too plausible. In addition to addressing these limitations, the present findings call for more

investigation of how these further consequences of confabulation are structured in order to give direction to unexplainable behavior and prevent faulty self-knowledge which may influence subsequent behavior. Take for example Tina (mentioned in the introduction) who misattributed her behavior to emotional eating. As a consequence Tina now sees herself as an emotional eater after one misstep of eating a chocolate bar during her diet. Subsequently, every time Tina feels emotional she will eat an unhealthy snack due to her changed self-concept, which may lead to unhealthy snack behavior in the future.

In conclusion, the present study found evidence for and builds on the literature that states that unconscious processes lead to misattribution of behavior, due to the need to explain the behavior. The present study overcomes limitations of earlier studies (Adriaanse et al., 2014; Oettingen et al., 2006) by creating norm-violating behavior through false feedback, in order to ensure that there really is an explanatory vacuum. This addition ensures that the theory about the consequences of unconscious processes on confabulation is even better substantiated. Future studies should investigate the further consequences, as this long-term effects of confabulation may lead to a faulty self-knowledge, after frequently adopting the same confabulation reasons. Thus, the present study adds to the literature on unconscious processes and helps to understand the consequences of unexplainable behavior.

References

Adriaanse, M. A., Kroese, F. M., Weijers, J., Gollwitzer, P. M., & Oettingen, G. (2016). Explaining unexplainable food choices. Submitted for publication.

Adriaanse, M.A., Prinsen, S., de Witt Huberts, J.C., de Ridder, D., & Evers, C. (2016). 'I Ate too Much So I Must Have Been Sad': Emotions as a Confabulated Reason for Overeating. Submitted for publication.

Adriaanse, M. A., Weijers, J., De Ridder, D. T. D., De Witt Huberts, J., & Evers, C. (2014). Confabulating reasons for behaving bad: The psychological consequences of unconsciously activated behaviour that violates one's standard. *European Journal of Social Psychology, 44,* 255-266.

Bar-Anan, Y., Wilson, T. D., & Hassin, R. R. (2010). Inaccurate self-knowledge formation as a result of automatic behavior. *Journal of Experimental Social Psychology, 46,* 884-894.

Bargh, J. A. (1990). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticy of being. *American Pschologist, 54,* 462-479.

Bargh, J.A., Gollwitzer, P.M., Barndollar,K., & Trötschel, R. (2001). The Automated Will: Nonconscious activation and pursuit of behavior goals. *Journal of Personality and Social Psychology, 81,* 1014-1027.

Borsutzky, S., Fujiwara, E., Brand, M., & Markowitsch, H.J. (2008). Confabulations in alcoholic Korsakoff patients. *Neuropsychologia, 46,* 3133-3143.

Burger, J.M. (1992). *Desire for control: Personality, social, and clinical perspectives.* New York: Plenum Press.

Burger, J.M., & Cooper, H.M. (1979). The desirability of control. *Motivation and Emotion, 3,* 381-393.

Dijksterhuis, A.P., Smith, P.K., Baaren, R.B., Wigboldus, D.H.J. (2005). The unconscious consumer: effects of environment on consumer behavior. *Journal of consumer psychology, 15,* 193-202.

Drukker, J.W. (1984). *Geschiedenis gaat soms niet over mensen.* Taal en Geschiedenis, 89/90. Groningen: Stichting Groniek Groningen.

Fazio, R.H., Effrein, E.A., & Falender, V.J. (1981). Self-perceptions following social interaction. *Journal of Personality and Social Psychology, 41,* 232-242.

Freedman, J.L., & Fraser, S.C. (1966). Compliance without pressure: The foot-in-the-door technique. *Journal of Personality and Social Psychology, 4,*195-202.

Gorassini, D.M., & Olson, J. (1995). Does Self-perception change explain the Foot-in-the door effect? *Journal of Personality and Social Psychology, 69,* 91-105.

Hirstein, W. (2005). *Brain fiction: Self-deception and the riddle of confabulation.* Cambridge, MA: MIT Press.

Hirstein, W. (2009). *False Memories and confabulation*. The Elsevier Encyclopedia of Consciousness. Academic Press.

Ittersum van, K., & Wansink, B. (2011). Plate Size and color suggestibility: the Delboeuf Illusion's Bias on Serving and Eating behavior. *Journal of consumer research, 39,* 215-228.

Nisbett, R.E. & Wilson, T.D. (1977). Telling more than we can know: verbal reports on mental processes. *Psychological Review, 84,* 231-259.

Oettingen, G., Grant, H., Smith, P. K., Skinner, M., & Gollwitzer P. M. (2006). Nonconscious goal pursuit: Acting in an explanatory vacuum. *Journal of Experimental Social Psychology, 42,* 668-675.

Parks-Stamm, E. J., Oettingen, G., & Gollwitzer, P. M. (2010). Making sense of one's actions in an explanatory vacuum: The interpretation of nonconscious goal striving. *Journal of Experimental Social Psychology, 46,* 531-542.

Roser, M., & Gazzaniga, M.S. (2004). Automatic Brains – Interpretive Minds. *Current Directions in Psychological Science, 13,* 56-59.

Footnotes:

[i] Despite the fact that correct responses and reaction times on the computer task were not baseline measurements, both were included in the randomization check to make sure that the level of difficulty of the task was divided equally over the two conditions and could not influence the results.

[ii] Both correct responses and response times on the computer task were included as covariates in the main analysis of Condition on Confabulation *Concentration.* This was done to exclude any unforeseen impact of these two variables on the main effect. Results show that this was not the case, both variables had no significant influence, all p's > .06.

[iii] An ANOVA was also conducted for all confabulation items (e.g. concentration and difficulty subscale) with Condition as an independent variable and Confabulation as a dependent variable. Results also show a significant effect of condition on all the confabulation items, $F(1, 37) = 4.47$, $p = .04$, $\eta^2 = .11$. The present study will only focus on the effect of condition on the confabulation subscale *concentration*, because the effect on this subscale is stronger and corresponds to the present assumptions.