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Need for closure and dealing with uncertainty in decision making context: The role of the behavioral inhibition system and working memory capacity

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ABSTRACT

The aim of the present study was to investigate the moderated mediation model of the relationship between the behavioral inhibition system (BIS), need for closure (NFC) and working memory capacity (WMC) in the decision making process. It was assumed that NFC works as a motivational mechanism that enables individuals high in BIS to deal with uncertainty; therefore, NFC mediates the effect of BIS on behavior in a decision-making situation. Moreover, as uncertainty management requires cognitive resources, we expected WMC to moderate this relationship. In line with our hypothesis, we found that NFC mediated the relationship between BIS and the information search about the job candidates, and this effect occurred only for individuals high in WMC. We discuss these results in the context of effective self-regulation, as well as motivational and cognitive determinants of effort.

1. Introduction

1.1. Individual differences in dealing with uncertainty when making decisions

There are individual differences with regard to the time and effort invested in making decisions. Some individuals consider a few alternatives and gather little information before making a decision, while others persist in analyzing more details and searching for the best option. One important variable related to this dimension of decision making is a need for cognitive closure (NFC), which is defined as a desire for a quick and unambiguous answer to a question and an aversion to uncertainty (Kruglanski, 1989). Previous studies have demonstrated various psychological consequences of NFC, most of which indicated simplistic, one-dimensional and heuristic information processing (see Kruglanski, 2004 for overview). In the context of decision making, high NFC was related to a more limited information search before making a decision (e.g., Choi, Koo, Choi, & Auh, 2008), higher ratings of confidence after making a decision (Webster & Kruglanski, 1994), and a stronger preference for familiar choices instead of new options (Mannetti, Pierro, & Kruglanski, 2007) compared with low NFC.

Another variable that regulates behavior in situations of conflict and novelty and therefore may play a role in the decision making process is the behavioral inhibition system (BIS; Gray & McNaughton, 2003). Specifically, BIS is a neuropsychological system which determines the level of anxiety experienced in such situations. As uncertainty is a common factor for both conflict and novelty, Tritt, Inzlicht, and Harmon-Jones (2012) proposed that BIS is in fact activated by uncertainty. Empirical findings supporting this proposition come from both behavioral and neurobiological studies (e.g., Amodio, Master, Yee, & Taylor, 2008; Shackman, McMenamin, Maxwell, Greischar, & Davidson, 2009).

Given that BIS is activated in situations of uncertainty and regulates reactions to those situations, a positive relationship between BIS and NFC could be expected. High NFC may be adaptive for high BIS individuals because it leads to behavioral strategies that decrease the anxiety experienced in the face of uncertainty. A limited information search, quick judgment formation, and less extensive review of available options may reduce the uncertainty, which is a desired situation for individuals high in BIS. There is some evidence in support of this assumption. In one recent study, Corr and colleagues obtained a strong and positive relation between BIS and NFC (Corr, Hargreaves-Heap, Tsutsui, Russell, & Seger, 2013). In our own study on decision making, both variables

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were also strongly related and NFC mediated the relationship between BIS and amount of information gathered before making a decision (Jaśko, Czernatowicz, Kossowska, & Czarna, submitted for publication). On a physiological level, Roets and van Hiel (2008) demonstrated that NFC is related to indicators of anxiety, such as increased heart rate, systolic blood pressure and electro skin conductance. Other studies that focused on different conceptualizations of anxiety also showed positive relationships between NFC (or similar constructs) and anxiety (Colbert, Peters, & Garety, 2006; Neuberg & Newsom, 1993).

In the present study, we aimed to replicate the relationship between BIS and NFC. We expected that if NFC works as a specific motivational mechanism that helps high BIS individuals regulate their behavior under uncertain conditions, NFC should mediate the effects of BIS in the decision making process. Therefore, BIS through NFC should be related to a limited information search, shorter decision time, and stronger differentiation between available options, as such behaviors decrease the uncertainty experienced while making decisions.

1.2. Working memory capacity in dealing with uncertainty

Several studies have shown that dealing with uncertainty is demanding and requires self-regulatory resources (Alquist, 2010; Milkman, 2012). There are two cognitive processes crucial for effective self-regulation, which are attention control (Kane, Conway, Hambrick, & Engle, 2007) and inhibition (Hasher, Lustig, & Zacks, 2007). They are complementary to each other, as attention control is responsible for effective focusing of attention on task-relevant information, while the other inhibits a potential distraction. According to the multicomponent theory of working memory (Baddeley, 2003), these two functions are assigned to central executive, which is the most important part of WMC. Due to these characteristics, it may be assumed that WMC is essential for self-control. Indeed, several studies have confirmed a positive link between WMC and successful self-regulation with regard to negative emotions (Schmeichel, Volokhov, & Demaree, 2008), intrusive thoughts (Kane et al., 2007), and coping with temptations (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008). In these studies, individuals high in WMC were more effective in the inhibition of automatic, but undesired reactions to successfully achieve preferred goals than individuals low in WMC.

As high WMC is related to more successful goal-directed information processing and behavior, it could be expected that WMC is also important for the successful fulfillment of an epistemic goal, i.e., the reduction of uncertainty. Therefore, if closure is an epistemic goal that is important for individuals high in NFC, WMC should enable the fulfillment of this goal. There are some initial results that confirm the role of WMC in achieving epistemic goals. Kossowska and Jaśko (2013) showed that high NFC individuals behaved in line with their epistemic need only if their WMC is high. Specifically, NFC was negatively related to the amount of gathered information and the decision time, but it was only true for high WMC individuals. Low WMC individuals, despite of their level of NFC, were unable to reach quick closure. Although those results suggest the role of WMC for reaching epistemic goals, they are limited to a single study. Our aim was to address these issues. We expected that satisfying an epistemic goal requires self-control, for which WMC is an important factor. Thus, we predicted that WMC would moderate the relationship between NFC and decision making. Additionally, since we expected an indirect effect of BIS on decision making through NFC, we hypothesized that WMC would moderate this effect as well. Therefore, the goal of our study was to verify the moderated mediation model of relationships between BIS, NFC, WMC and decision making.

2. Method

2.1. Participants

One hundred twenty-four participants, who were recruited through a popular Polish ad portal, took part in the study (83 women, 41 men, $M_{age} = 23.96$, $SD = 4.93$). In exchange for their participation, they received 15PLN (approximately 5USD). The study was conducted in a lab on computers running Inquisit. The study was conducted in groups that consisted of between two and six participants.

2.2. Materials

2.2.1. BIS

The Behavioral inhibition system was measured with Carver and White's 20-item BIS/BAS questionnaire (Carver & White, 1994; Polish translation: Muller & Wytykowska, 2005). In a subsequent analysis, we only used the BIS subscale, which consists of seven items ($\alpha = .75$). The items were reversed such that higher results indicated a higher BIS.

2.2.2. Need for cognitive closure

NFC was measured with the four subscales (27 items) of the Webster and Kruglanski's scale (1994; Polish translation: Kossowska, 2003). The fifth subscale, Decisiveness, was replaced with six items developed by Roets and van Hiel (2007) because the original subscale has been recognized as measuring the ability to achieve cognitive closure instead of motivation. Due to the low reliability of the Closed-mindedness subscale ($\alpha = 0.29$), it was excluded, and the overall index was calculated using only four subscales ($\alpha = .87$).

2.2.3. Working memory capacity

To measure WMC, we used an n-back task (Jaeggi, Buschkuehl, Perrig, & Meier, 2010). During the task, participants monitored a series of letters and indicated whether the current letter matched the one presented n-trials back. Participants completed on average of 75 2-back, 3-back and 4-back trials, which were divided in three blocks for each difficulty level. The results of the n-back test were analyzed using the signal detection approach (Donaldson, 1992). Correct recognitions were counted as hits, and incorrect recognitions were considered false alarms. The *A'* statistic was computed, which indicates the level of discrimination between correct and incorrect stimuli, with higher *A'* scores indicating better recognition.

2.2.4. CV decision task

The task was similar to the one used in previous studies on NFC and decision making (Webster, Richter, & Kruglanski, 1996). Participants were given a job offer, which included a job description and a list of requirements that an employee must meet. They were then asked to evaluate and rank six job candidates on the basis of their CVs. The CVs were pretested in a pilot study, establishing three equally good and three equally bad candidates for the job. The task consisted of three phases: a preparation phase, an evaluation phase, and ranking phase. The order of the two latter phases was counterbalanced. Dependent variables in this task were the number of requested information about the candidates in the preparation phase and the evaluation of the candidates (differentiation between best three and worst three candidates).[1]

[1] Due to a malfunction of the program, we were not able to precisely assess the time spent on various parts of the task (i.e., preparation, evaluation, ranking). Therefore we decided not to include this variable in the analysis as the results would not be reliable.