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# Motivational rigidity enhances multitasking performance: The role of handling interruptions

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A B S T R A C T

In two studies we test the role motivational rigidity, i.e., need for cognitive closure (NFC), plays in handling task irrelevant interruptions and multitasking performance. We assumed that, although related to rigid cognitive style, NFC may enhance multitasking performance thanks to better focalization on the main task goal. We thus predicted that NFC would be related to lower engagement in tasks unrelated to the main task goal and thereby to a better performance on multiple tasks. The results supported our hypotheses as it turned out that NFC was negatively related to the number of responses to task irrelevant interruptions and positively to multitasking performance in Study 1. Study 2 additionally showed that there was a positive indirect effect of NFC on multitasking performance mediated by lower engagement in interruption tasks. This effect was significant for difficult but not easy tasks supporting previous findings that interruptions are more disruptive for complex rather than simple tasks. The results suggest that better focalization on the main task goal and lower engagement in interruptions might be the mechanism responsible for enhanced multitasking performance exhibited at times by highly rigid individuals.



## 1. Introduction

Multitasking pervades our lives (Salvucci & Taatgen, 2011). A large set of everyday activities involves simultaneous combination of several tasks (Adler & Benbunan-Fich, 2013; Bühner, König, Pick, & Krumm, 2006; Hambrick, Oswald, Darowski, Rench, & Brou, 2010) and researchers argue that in today's fast-paced, electronic world multitasking has become the “new normal” (Courage, Bakhtiar, Fitzpatrick, Kenny, & Brandeau, 2015). Multitasking has been commonly defined as carrying out two or more tasks at the same time (e.g., Bühner et al., 2006; Ishizaka, Marshall, & Conte, 2001; Kantrowitz, Grelle, Beaty, & Wolf, 2012; Rubinstein, Meyer, & Evans, 2001) or as a means to accomplish multiple task goals in the same time period by engaging in frequent switches between tasks (Delbridge, 2000). However, some researchers emphasize that one of the aspects of multitasking is handling unscheduled events and treating unplanned interruptions as equal to planned activities (Bluedorn, Kalliath, Strube, & Martin, 1999; Bluedorn, Kaufman, & Lane, 1992; Cotte & Ratneshwar, 1999; Hall & Hall, 1990). In a similar vein, Burgess (2000) states that one of the features of multitasking is adjusting behavior to unexpected interruptions and changes. Thus, handling interruptions is an important (Bluedorn et al., 1992, 1999; Cotte & Ratneshwar, 1999; Hall & Hall, 1990), if not a crucial (Courage et al., 2015), aspect of everyday multitasking.

Many studies have investigated the role cognitive factors play in determining performance on multiple simultaneous tasks (e.g., Bühner et al., 2006; Colom, Martínez-Molina, Shih, & Santacreu, 2010; Hambrick et al., 2010; König, Bühner, & Mürling, 2005) as well as dealing with interruptions (e.g. Conway, Cowan, & Bunting, 2001; Drews & Musters, 2015). Much less, however, is known about the role of motivation in successful multitasking. Several studies have looked into the relationship between motivational factors and multitasking performance (e.g., König et al., 2005; Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013; Szumowska & Kossowska, 2016) but they have not focused on their role in handling interruptions. We however argue that motivation may be associated with handling interruptions and hence with multitasking performance. In this paper we concentrate on motivational rigidity, i.e. need for closure (NFC, Kruglanski, 1990) as an important motive that influences cognition in general, and multitasking in specific.

## 2. Need for closure and multitasking performance

Individual differences related to the need for cognitive closure (NFC) reflect dispositional variability in preference for order, predictability, tolerance of ambiguity, and closed-mindedness (Kruglanski, 2004). People who score low on the NFC scale are open to prolonging uncertainty, engage in more deliberative decision-making and flexibility of thought. In contrast, people who score high on the NFC scale prefer predictability and quick decision-making, exhibit rigidity of thought and a greater preference for conformity (Kruglanski, 2004). Rigid processing style related to need for closure (Kruglanski, 2004) has

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been demonstrated in areas such as decision making (e.g., Jaśko, Czernatowicz-Kukuczka, Kossowska, & Czarna, 2015), social beliefs (e.g., Kossowska & Van Hiel, 2003), creativity (Gocłowska, Baas, Crisp, & De Dreu, 2014), hypothesis generation (Mayseless & Kruglanski, 1987), and group behavior (Kruglanski, Pierro, Mannetti, & De Grada, 2006; see Roets, Kruglanski, Kossowska, Pierro, & Hong, 2015 for overview). There is evidence it also affects the way people handle multiple tasks, as it has been shown that NFC is related to poorer multitasking performance for individuals low on shifting ability. By contrast, when shifting ability is high, it may compensate for deficiencies related to NFC and even lead to better multitasking performance (Szumowska & Kossowska, 2016). Authors suggest that this effect might be explained by increased motivation of highly rigid individuals to comply with the task goal, which, provided sufficient ability level, might lead to advantages in performance.

Previous research in this domain, however, focused only on performance of simultaneous tasks and handling interruptions has been neglected. Therefore, in this paper we address the latter issue. Specifically, we hypothesize that high NFC individuals will be less prone to engage in interruptions, which are external tasks unrelated to the goal of ongoing task(s) (Law et al., 2002; Speier, Valacich, & Vessey, 1999) and "break continuity of cognitive focus on a primary task" (Corragio, 1990, p. 19). It has been shown that NFC is related to a greater selectivity of attention and ability to shut out irrelevant distractions and noise (Kossowska, 2007a; Pica, Pierro, Belanger, & Kruglanski, 2013) and more efficient process of information selection from the environment (Kossowska, 2007b). These differences have been argued to stem from limited pool of cognitive resources individuals high in NFC possess (Kossowska, 2007a, 2007b). There is also neurological evidence for selectivity of attention exhibited by NFC individuals as it has been shown that NFC is related to enhanced electrophysiological responses (an increased N1 component) to stimuli at a very early stage of information processing (Kossowska et al., 2015). Due to these differences in basic cognitive processes, highly rigid (i.e., with high NFC levels) individuals should be less prone to engage in interruptions. Since interruptions require shifts of task focus (Monk, Trafton, & Boehm-Davis, 2008), divided attention (e.g., Adamczyk & Bailey, 2004) and processing of information that is not relevant to the primary task (Drews & Musters, 2015), better attentional selectivity and focalization exhibited by high NFC individuals should reduce, rather than promote, engaging in interruptions. Instead, high NFC individuals should focus more on ongoing primary tasks.

Furthermore, this higher focalization on ongoing tasks exhibited by high NFC individuals should lead to better performance on these tasks. Previous studies robustly demonstrate that task interruptions lead to a decrease in a primary task performance (e.g., Bailey & Konstan, 2006; Czerwinski, Cutrell, & Horvitz, 2000; Rubinstein et al., 2001) and show that interruptions occurring at points of higher mental workload are more disruptive than those occurring at points of lower mental workload (Adamczyk & Bailey, 2004; Bailey & Iqbal, 2008; Cutrell, Czerwinski, & Horvitz, 2000; Iqbal & Bailey, 2005). Speier et al. (1999) and Speier, Vessey, and Valacich (2003) even showed that interruptions improved decision-making performance on simple tasks and lowered performance on complex tasks (the same was found in reference to distractions, Baron, 1986). So, it can be hypothesized that higher focalization on main task goal and a better ability to ignore task irrelevant interruptions exhibited by high NFC individuals should be related to a better performance especially in difficult (rather than easy) tasks.

## 3. Overview of the studies

In two studies we examined the relationship between NFC and handling interruptions in a multitasking context. In Study 1, we used a dual-task paradigm in which participants were required to concurrently perform two equally important tasks. While they were working on these tasks, additional tasks in form of interruptions were presented. In Study 2, participants were presented with a set of difficult and easy tasks to be performed in a multitasking manner. Similar to Study 1, they were interrupted while performing these tasks. In both studies interruptions were external tasks not related to the goal of ongoing tasks.

In both studies, working memory (WM) was controlled for. Previous research has shown that WM is a strong (Bühner et al., 2006), or even the strongest (Colom et al., 2010; König et al., 2005), predictor of multitasking performance. It is also crucial in handling interruptions, as active maintenance of goal-relevant information in the face of distraction or interference is one of the definitional aspects of WM (e.g., Conway et al., 2005; Conway, Kane, & Engle, 2003; Jaeggi, Buschkuehl, Perrig, & Meier, 2010; Kane & Engle, 2002; Redick, Calvo, Gay, & Engle, 2011). We thus decided to include it in our analyses, so that the obtained effects could be interpreted as differences stemming from motivational rather than ability factors.

### 3.1. Study 1

In this study we investigated whether NFC predicts engagement in interrupter tasks. We predicted that NFC would be related to lower engagement in tasks unrelated to the task goal, that is interruptions. Therefore, NFC should be associated with better focalization on the main tasks, and in turn better multitasking performance.

#### 3.1.1. Participants

Seventy-seven students (49 women, 28 men) aged between 18 and 35 ($M = 23.11$, $SD = 3.12$) took part in the study.[1] They were recruited by an announcement and given a monetary compensation of 2.5 EUR in exchange for participation in the study. The study was carried out in accordance with the recommendations of the local Faculty Ethics Committee with written informed consent from all subjects. One case was deleted due to incomplete data. Thus, the final sample comprised 76 subjects (48 women, 28 men) with the mean age of $M = 23.01$ ($SD = 3.10$).

#### 3.1.2. Measures

NFC was measured with the use of the short version of the Need for Cognitive Closure Scale (Webster & Kruglanski, 1994). The scale is divided into five subscales: preference for order and structure in the environment, preference for predictability, ambiguity intolerance, closed-mindedness, and decisiveness. Answers are given on a 6-point Likert scale anchored *definitely disagree* and *definitely agree*. Sample items are: *I think that having clear rules and order at work is essential for success* or *I hate to change my plans at the last minute.* A mean of answers given to all items was calculated (Cronbach's $\alpha = 0.87$). Higher scores indicate higher need for cognitive closure.

To measure handling interruptions in a multitasking context, we asked participants to perform a dual-task which was interrupted by additional external tasks (the paradigm was designed specifically for this study). Two equally important tasks: a searching task and a verification task were presented on a computer screen side by side (see Fig. 1). Participants were instructed to perform two tasks at the same time as best as possible. In the searching task one needed to react to a letter identical with a probe letter (see right panel on Fig. 1). Letters were presented every second and probe letters changed every 20 s. For each probe there were 2 target and 18 non-target letters. Each letter stayed on the screen for 5 s (there were up to five letters presented at the same time, apart from the probe letter). There were 15 probes in total. Responses were given by clicking on the chosen letter with a left button of the computer mouse. In the verification task a person needed to verify whether a mathematical expression presented on the screen was true

[1] We have run an a priori power analysis with the use of *G*Power* 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). We expected a small/medium effect, thus assumed an effect size of $f^2 = 0.10$. The analysis revealed that a sample of at least 64 participants would be needed to obtain statistical power at the recommended level of 0.80 (Cohen, 1988).