The need for closure concept disclosed: Delineating motivation from ability in human decision-making

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Chapter 1

General introduction

The difficulty in life is the choice.

George A. Moore

The Bending of the Bough (act IV)

Making choices, judgments, and decisions is an integral part of human everyday life. Remarkably, although the content and importance of these choices may be extremely diverse, individuals can exhibit considerable stability in how they handle decision-making situations. Some people make firm judgments in a flash, while others feel they are never sure enough and ponder excessively before making a decision. The processes preceding the eventual choice typically require information gathering and knowledge construction. Motivation plays an important part in determining to what extent individuals come to an 'informed decision'. In particular, those who make judgments in a flash often feel intrinsically motivated to obtain answers, judgments, and decisions as swiftly as possible to eliminate the uncertainty and ambiguity which accompany unanswered questions. Conversely, those who ponder excessively often desire to postpone their judgment as long as possible because they fear they will make the wrong decision and they therefore engage in an almost infinite search for every available piece of information.

To obtain a decision or judgment at a given time is one thing, but the flow of information does not necessarily stop when a particular decision has been made. Indeed, newly available information may shed a different light on a previous judgment. Again, motivational considerations may lead people to react differently on post-decisional information; some people flip-flop with each conflicting argument that is presented, while others exhibit extreme rigidity in their decisions even when new arguments clearly prove them wrong.

Not only 'dispositional motivation' leads people to act differently when faced with decision-making situations, but the characteristics of the situation itself also have distinct effects on the motivation to arrive at a decision. For example, time pressure and environmental noise motivate people to make a decision without further delay, whereas situations in which a lot is at stake generally encourage people to avoid premature decisions and elicit an extensive search for the best solution.

Need for closure

Kruglanski (1990b) introduced the Need for Closure concept (NFC) to develop a theoretical framework for the motivational aspects of decision-making, based on his earlier work on lay epistemics (e.g. Kruglanski, 1980; Kruglanski 1989; Kruglanski & Freund, 1983; Kruglanski & Mayseless, 1988). Kruglanski (1990b) defined the NFC as the desire for "*an* answer on a given topic, *any* answer … compared to confusion and ambiguity" (p. 337). Kruglanski and Webster (1996) further argued that the NFC is a motivational tendency which may "prompt activities aimed at the attainment of closure, bias the individuals' choices and preferences toward closure-bound pursuits, and induce negative affect when closure is threatened or undermined and positive affect when it is facilitated or attained" (p. 264).

Kruglanski and Webster (1996) assumed that this motivation towards closure is a continuum with a strong need to attain closure at one end and high need to avoid closure at the other end. High NFC individuals are described as likely to decide "on the basis of inconclusive evidence and exhibit rigidity of thought and reluctance to entertain views different to their own. At the opposite end of the continuum, denoting a high need to avoid closure, people may savor uncertainty and be reluctant to commit to a definite opinion. In those circumstances, individuals may suspend judgment and be quick to engender alternatives to any emergent view" (p. 264).

This motivation towards closure within an individual can differ according to the situation the person encounters. It has been proved that a variety of circumstances such as time pressure (e.g. the presence of a deadline) increases NFC, but since closure eliminates the necessity for further information processes, situations in which information processing is considered to be difficult, laborious, or aversive can also result in a heightened desire for closure. For example, if the task is dull, if performance has been impeded by external conditions such as environmental noise, or if processing is felt to be laborious due to fatigue, people may experience an increased desire to reach closure. On the other hand, in circumstances where the processing is felt to be intrinsically rewarding or when the negative consequences of premature closure are especially salient, people may feel motivated to postpone closure.

According to Webster and Kruglanski (1996), the desire for closure will affect information processing when individuals form or alter their judgments, decisions, and knowledge in two distinct ways, which they refer to as the urgency and the permanence tendency. The first tendency refers to an inclination to *seize* quickly on closure. A strong need for closure makes immediate closure desirable and any further postponement is felt to be bothersome. Individuals then feel they cannot

wait and 'leap to judgment'. The second tendency is about protecting the answer just obtained or, in other words, about holding on to, or *freezing* on the acquired structure. The freezing process thus strengthens the consolidation of the acquired knowledge, and it safeguards the knowledge system against contradictory information. Both tendencies serve to avoid the aversive lack of closure, the first by terminating this state quickly, and the second by keeping it from recurring. Kruglanski and Webster have also postulated a demarcation point (the point of crystallization) separating the 'seizing' phase from the 'freezing' phase. At this point, "a belief crystallized and turned from a hesitant conjecture to a subjectively firm fact" (p. 266).

When people succumb to the urge to make a decision quickly they inevitably base their opinion on information that is most salient and easily accessible. Information processing under high NFC has shown to be less extensive (Mayseless & Kruglanski, 1987, study 2). Moreover, under high NFC, people generate fewer competing hypotheses (Mayseless & Kruglanski, 1987, study 3), and they base their judgments upon the first information available (Webster & Kruglanski, 1994, study 4). Paradoxically, in those situations judgment may even be made with more confidence, although they are less grounded in thorough exploration (e.g. Kruglanski & Webster, 1991).

In addition, once the judgment is made, high NFC individuals are reluctant to reconsider their answer and exhibit relative insensitivity to new contradictory evidence. The lack of openness to new information and evidence is one of the most important implications of need for closure theory. This motivated occlusion has been illustrated by a lowered sensitivity to alternative hypotheses (Kruglanski & Mayseless, 1988) and preference for simplified judgment (Webster & Kruglanski, 1994; Van Hiel & Mervielde, 2003-a), but also by a higher resistance to persuasion (Kruglanski, Webster, & Klem, 1993), and a less extensive search for (additional)

information (Ellis, 1996; Klein & Webster, 2000; Kruglanski, Peri, & Zakai, 1991; Van Hiel & Mervielde, 2002).

NFC has also been shown to initiate a variety of well-illustrated social cognitive effects regarding impressional primacy (Freund, Kruglanski, & Schpitzaijzen, 1985; Heaton & Kruglanski, 1991; Kruglanski & Freund, 1983; Webster & Kruglanski, 1994; Webster, Richter, & Kruglanski, 1996), recency (Richter & Kruglanski, 1998), construct accessibility (Ford & Kruglanski, 1995), and mere exposure (Kruglanski, Freund, & Bar-Tal, 1996), and NFC has been reported to increase the overattribution bias (Webster, 1993) and the use of cognitive heuristics such as numerical anchoring (Kruglanski & Freund, 1983). Moreover, research has demonstrated that NFC has powerful effects on numerous central themes studied in social psychology, such as conformity (De Dreu, 2003), prejudice and racism (e.g., Roets & Van Hiel, 2006), preference for autocratic leadership (Pierro, Mannetti, De Grada, Livi, & Kruglanski, 2003), derogation of opinion deviants (Kruglanski & Webster, 1991), and in-group favoritism (e.g., Kruglanski, Mannetti, Pierro, & De Grada, 2006).

The need for closure scale

NFC may vary as a function of the situation, but as we have mentioned before, individuals also tend to differ in their chronic level of 'dispositional closure' as well. The need for closure scale has been developed as an individual difference measure of these differences by Webster and Kruglanski (1994). They treated the construct as a latent variable that may express itself in various ways. Five major aspects are assumed to broadly represent the construct: *Preference for order* (e.g., "I like to have a place for everything and everything in its place"), *Preference for predictability* (e.g., "I don't like to go into a situation without knowing what I can expect"), *Decisiveness* (e.g., "when faced with a problem I usually see the one best

solution very quickly"), *Discomfort with ambiguity* (e.g., "I don't like situations that are uncertain") *and Closed-mindedness* (e.g., "I do not usually consult many different opinions before forming my own view"). The items for the NFC scale were partially adopted from existing instruments developed by Tompson, Naccarato, Parker &, Moskowitz (1993) such as the Personal Need for Structure scale (e.g., "I enjoy having a clear and structured mode of life" to assess preference for order) and the Personal Fear of Invalidity scale (e.g., "I tend to struggle with most decisions" to asses Decisiveness).

The NFC scale has been successfully used as a measure of cross-validation of situational manipulations of need for closure (e.g., Chiu, Morris, Hong, & Melon, 2000; Ford & Kruglanski, 1995; Shah, Kruglanski, & Thompson, 1998) and has demonstrated high predictive validity for numerous social phenomena. Recent research using the NFC scale has revealed an important role for NFC in, for example, ethnocentrism (Cunningham, Nezlek, & Banji, 2004), political conservatism (e.g. Jost, Glaser, Kruglanski, & Sulloway, 2003; Van Hiel, Pandelaere, & Duriez, 2004), and social judgment (Kruglanski et al., 2005).

The Kruglanski versus Neuberg debate

Although the need for closure scale has proved to be an asset to the broad context of motivated cognition research, it has also been the subject of criticism and its validity and factorial structure have been doubted. The NFC concept was conceived as a one-dimensional construct, incorporating both seizing and freezing tendencies, and the NFC scale was therefore also designed as a one-dimensional tool (see Kruglanski & Webster, 1996; Webster 7 Kruglanski, 1994) with no objective to differentiate between the underlying processes of seizing and freezing.

However, Neuberg, Judice, and West (1997; see also Neuberg, West, et al., 1997) argued that the NFC scale possesses: "low interitem homogeneity ... and ...

confirmatory factor analyses reveal a multifactorial structure, the theoretically based subfacets do not all correlate positively with each other, and the five subfacets display differing relationships with external variables" (p. 1401). The authors concluded that the scale was not one-dimensional as intended by its developers and instead they proposed a two-factor model. The first factor was labeled preference or need for (simple) structure, comprising items tapping preference for order, preference for predictability, discomfort with ambiguity, and closed-mindedness. The second factor loaded the items of the decisiveness facet scale.

Neuberg and colleagues' conclusions were investigated in exhaustive examinations of the structure of NFC scale in four different US samples (Kruglanski, DeGrada, Mannetti, Atash, & Webster, 1997), three European samples (Mannetti, Piero, Kruglanski, Taris, & Bezinovic, 2002) and in European-American and South-Korean samples (Kossowska, Van Hiel, Chun, & Kruglanski, 2002). These studies did not yield conclusive evidence for a one or two factor solution, since both were found to be viable alternatives. However, in each of these studies, four of the five NFCS facet scales (preference for order, predictability, discomfort with ambiguity, and closed-mindedness) loaded on one latent second-order factor, whereas decisiveness emerged as an independent dimension. Moreover, decisiveness repeatedly showed to be negatively correlated with the other facet scales. These results largely corroborate the conclusions of Neuberg and colleagues. Nowadays, the two-factorial interpretation of the NFCS is widely accepted as an alternative for the original one-dimensional perspective.

However, Neuberg and colleagues proposed some important theoretical implications of their two-factor model by introducing the hypothesis that the two primary orthogonal factors of the NFC scale might map respectively the freezing and seizing process. In particular, the authors argued that the seizing process,

characterized by an urgent desire to gain a quick non-specific solution, manifests itself as decisiveness. In turn, the freezing process, characterized by a desire to maintain the specific solution seized upon to some degree, can be regarded as a dispositional analogue of preference for structure. Kruglanski et al. (1997) fiercely opposed these theoretical implications advocated by Neuberg and colleagues which they call "psychometric nay-saying", because they argue that this contention "... is purely speculative at this point and lacks empirical as well as conceptual base" (p.1009).

Present research objectives

The animated debate between Neuberg and Kruglanki has not yet reached closure, and somewhat surprisingly there have been few attempts to clarify this fundamental discussion. Nevertheless, the NFC scale remains a popular research tool in social psychology. Depending on the position to which individual scholars adhere regarding the dimensionality issue, the NFC scale has been used as a one-dimensional as well as a two-factorial instrument.

In the present dissertation we have tried to advance our knowledge on the NFC concept and the scale, clarifying the exact nature and utility of the two competing accounts (one-dimensional versus two-dimensional). We believe that considering these very central but still unresolved issues will prove to be very valuable. In our opinion, progress on this subject is necessary to allow for unambiguous interpretations of the effects obtained with the NFC scale.

The first two chapters straightforwardly address the dimensionality of the need for closure scale and the theoretical consequences of this issue. In Chapter 2 we attended to the request by Neuberg, West, Judice, & Thompson (1997) in which they expressed to "look forward to tests in which researchers use the Need For Closure Scale in a multidimensional manner and clearly articulate measures that cleanly

operationalize the proposed seizing and freezing processes" (p. 1025). In particular, Chapter 2 aims at clarifying the questions whether (1) the scales constituting the first factor underlying the NFCS are related to performance measures on objective, structured tasks that explicitly refer to the freezing process, and whether (2) the second factor which comprises decisiveness, is related to performance specifically referring to seizing processes.

In Chapter 3 we go further into the conceptual base of the decisiveness facet scale. Mannetti, Pierro, Kruglanski, Taris, and Bezinovic (2002) have already reported that "…the specific wording of decisiveness items … described the ability (or lack of ability) to reach a decision quickly, rather than the need to find an answer as soon as possible without too much worry about its validity (i.e. 'seizing' upon the first available answer)" (p. 153). They therefore plead for further operational definitions of the need to decide quickly, as a subdivision of NFC. Moreover, Mannetti et al. (2002) contend that these operational definitions are "very likely to ameliorate the correspondence between the conceptual and the operational definition of this motivational construct" (p. 153).

We consider the possibility that the psychometric problems with the NFCS are largely due to the ill-chosen items of the decisiveness facet scale. Therefore a set of new items as an alternative for the decisiveness facet scale has been constructed, and both the new and the original decisiveness scales are evaluated on a number of criteria. In particular, we test and compare the predictive validity of the new items and the original decisiveness facet items. We also implement an experimental design in which NFC is manipulated to cross-validate the new set of items. Finally the psychometric analyses originally conducted by Neuberg and colleagues (1997) are replicated substituting the original decisiveness facet items by the newly developed items.

In the fourth chapter, we illustrate why fundamental research on NFC and its operationalizations is important for applied research. In particular, based on the insights provided in Chapter 3 we demonstrate how the ambiguity regarding the NFC scale has affected the scientific work on the role of NFC on conservatism, racism, and authoritarianism. Based on an 'enhanced' NFC scale which comprised the new decisiveness items developed in Chapter 3, we reassess some of the findings of previous research, shedding new light on the conclusions provided by previous research regarding the role of NFC on socio-political attitudes.

The fifth chapter goes further into the distinction between motivation (i.e. NFC) and ability (i.e., cognitive capacity). Kruglanski and Webster (1996) and several other authors (e.g. Bar-Tal, Kinshon-Rabin, & Tabak, 1997) have already stated that motivation as well as ability determine the process of decision-making. Both of these variables have been shown to influence the outcomes of decision-making and according to Kruglanski and Webster (1996), "relative capacity and motivation are multiplicatively related" (p. 280), suggesting an interaction between capacity (ability) and need for closure. However, the nature of the combined effect of these variables and their assumed interaction effect in the context of NFC has only been addressed at a theoretical level and empirical contributions are scarce. Therefore, in Chapter 5 we investigate the exact nature of the NFC X cognitive capacity interaction, using the integrative analysis framework developed by Wright and Kirby (2001). In particular, this chapter addresses how task performance and information gathering are affected by the interaction between cognitive capacity and NFC.

In Chapter 6, we aim to advance the understanding of the nature of inter-individual differences in dispositional NFC. In the context of their research on stress and arousal, Folkman, Schaefer and Lazarus (1979) have already argued that

people probably vary in their ability to remain in a state of uncertainty without undue distress. We infer that arousal and stress might be a core determinant in the origin, continuity, and effects of dispositional NFC. In two studies, the relationship between individual differences in need for closure and (negative) arousal experienced during decision-making is investigated. Special interest is devoted to the progression of arousal over time in decision-making situations for high versus low NFC individuals.

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Chapter 2:

The dimensional structure of the Need for Cognitive Closure Scale: Relationships with "seizing" and "freezing" processes[1].

ABSTRACT

Conflicting theoretical accounts portray need for cognitive closure and its measurement tool either as a unidimensional construct or as combining two separate dimensions that independently tap cognitive processes of freezing and seizing. The present research tested structural equation models representing these two perspectives. The results supported a two-factor structure, but the two dimensions, at least as operationalized here, did not map differentially onto seizing and freezing. Further theoretical explication may be necessary to understand the content of the two dimensions of the need for closure scale as well as the precise role of seizing and freezing in the overall need for cognitive closure construct.

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INTRODUCTION

Kruglanski (1989; Kruglanski & Webster, 1996) developed the need for closure theory to explain the individual's desire to come to a relatively quick closure in decisions and judgments. Need for closure is defined as the desire for "*an* answer on a given topic, *any* answer … compared to confusion and ambiguity" (Kruglanski, 1990, p.337). The tendency towards urgency and permanence are two sequential phases that the need for closure may instill in a person. The first phase of this process refers to an inclination to *seize* quickly on closure. High need for closure makes immediate closure desired and any further postponement is experienced to be bothersome. The second phase is about protecting the answer just obtained or, in other words, about holding on to, or freezing on the acquired structure. Both tendencies serve to avoid the aversive lack of closure, the first by terminating this state quickly, and the second by keeping it from recurring. Kruglanski and Webster (1996) postulated that a demarcation point, which separates the "seizing" phase form the "freezing" phase, is a juncture at which "a belief crystallized and turned from a hesitant conjecture to a subjectively firm fact" (p. 266).

The term "need" is used to denote a motivated tendency rather than a deficit, which implies that closure may not be a universal desire (Kruglanski & Webster, 1996). In some circumstances, people may strive to attain it, while in other situations they may try to avoid it. A desire for closure may be activated by situational forces such as time pressure, environmental noise, or dullness of a cognitive task. A high need to avoid closure prompts people to suspend their decisions. That is, fear of invalidity conditions highlight the costs of closure and the consequences of judgmental mistakes. However, Need for closure may also reflect stable individual differences (Kruglanski, De Grada, Mannetti, Atash, & Webster, 1997; Webster & Kruglanski, 1994). An individual with high levels of dispositional need for closure prefers order and predictability, is decisive, feels discomfort with ambiguity, and is closed-minded. According to Kruglanski and

Webster (1996): "Individuals at the need for closure end of the continuum may display considerable cognitive impatience or impulsivity: They may "leap" to judgment on the basis of inconclusive evidence and exhibit rigidity of thought and reluctance to entertain views different from their own. At the opposite end of the continuum, denoting a high need to avoid closure, people may savor uncertainty and be reluctant to commit to a definite opinion. In those circumstances, individuals may suspend judgment and be quick to engender alternatives to any emergent view" (p. 264).

The closedness for new information and evidence is one of the most important implications of need for closure theory, and has been illustrated by a lowered sensitivity to alternative hypotheses (Kruglanski & Mayseless, 1988) and preference for simplified judgment (Webster & Kruglanski, 1994; Van Hiel & Mervielde, 2003-a), but also by a higher resistance to persuasion (Kruglanski, Webster, & Klem, 1993), and a less extensive search for information (Ellis, 1996; Klein & Webster, 2000; Kruglanski, Peri, & Zakai, 1991; Van Hiel & Mervielde, 2002). Moreover, need for closure has also been shown to influence a variety of classic social cognitive phenomena such as the impressional primacy effect (Freund, Kruglanski, & Shpitzajzen, 1985; Heaton & Kruglanski, 1991; Kruglanski & Freund, 1983; Webster & Kruglanski, 1994; Webster, Richter, & Kruglanski, 1996), recency effects (Richter & Kruglanski, 1998), construct accessibility effects (Ford & Kruglanski, 1995), the mere exposure effect (Kruglanski, Freund, & Bar-Tal, 1996), the overattribution bias (Webster, 1993), conformity pressure (De Dreu, 2003), and the use of cognitive heuristics such as numerical anchoring (Kruglanski & Freund, 1983).

In addition the dispositional measure of need for closure has demonstrated high predictive validity (e.g., Ford & Kruglanski, 1995; Webster, 1993; Kruglanski et al., 1993; Chiu, Morris, Hong, & Melon, 2000; Dijksterhuis, van Knippenberg, Kruglanski, & Schaper, 1996) and it has been successfully used as a measure of

cross-validation of situational manipulations of need for closure (e.g., Chiu, Morris, Hong, & Melon, 2000; Ford & Kruglanski, 1995; Shah, Kruglanski, & Thompson, 1998).

Need for closure: Number of dimensions

At present there is a debate between Kruglanski (see Kruglanski et al., 1997) and Neuberg (see Neuberg, West, Judice, & Thompson, 1997; Neuberg, Judice, & West, 1997) about the number of dimensions underlying need for closure. The need for closure concept was conceived by Webster and Kruglanski as a one-dimensional construct, incorporating both seizing and freezing tendencies. According to Webster and Kruglanski (1994): "Our theory predicts that the need for closure is a unitary latent variable which potentially manifests itself in various ways" (p. 1051). The Need for Closure Scale (NFCS), was designed as a one-dimensional tool for measuring this construct through five different ways in which it may express itself, without any intention to differentiate between the underlying processes of seizing and freezing.

Subsequent findings of Neuberg, Judice, and West (1997) have shed a different light on the Need for Closure Scale. According to these researchers, NFCS possesses: "low interitem homogeneity ... and ... confirmatory factor analyses reveal a multifactorial structure, the theoretically based subfacets do not all correlate positively with each other, and the five subfacets display differing relationships with external variables" (p. 1401). Moreover, Neuberg, Judice and West (1997) obtained a two-factor solution in which the first factor, labelled *Need for Simple Structure*, includes items from the Preference for order, Preference for predictability, Discomfort with ambiguity and Closed-mindedness facets. The other factor, *Decisiveness*, is comprised of exactly the same items included in Kruglanski's facet of Decisiveness.

Neuberg and colleagues' conclusions were investigated in exhaustive examinations of the structure of NFCS in four different US samples (Kruglanski, DeGrada, Mannetti, Atash, & Webster, 1997), three European samples (Mannetti, Piero, Kruglanski, Taris, & Bezinovic, 2002) and in European-American and South-Korean samples (Kossowska, Van Hiel, Chun, & Kruglanski, 2002). These studies showed that the one factor as well as the two factor solutions were viable alternatives, thereby lending no decisive support for either the Kruglanski and Neuberg perspective. Anyhow, four of the five NFCS dimensions (preference for order, predictability, discomfort with ambiguity and closed-mindedness) could be explained by one latent second-order factor, whereas Decisiveness emerged as an independent dimension. Hence, the latter result confirms the findings of Neuberg and colleagues.

The relationship between the NFCS dimensions and seizing and freezing processes

Based on their psychometric analyses, Neuberg, Judice, and West (1997) also advanced the hypothesis that the scales loading on the two primary orthogonal factors of the Need for Closure scale might map the seizing and freezing processes underlying the need for closure. The seizing process, characterized by an urgent desire to gain a quick non-specific solution, manifests itself as a preference for decisiveness. The freezing process, in turn, characterized by a desire to maintain with some degree of permanence the specific solution seized upon, has as its dispositional analogue a preference for simple structures. Kruglanski et al. (1997) do not agree with these theoretical implications advocated by Neuberg and colleagues because they have not been based on empirical data, but instead, are based on what Kruglanski et al. (1997) call "psychometric nay-saying". In their reply, Neuberg,

West, Judice, & Thompson (1997, p. 1025) also "look forward to tests in which researchers use the Need For Closure Scale in a multidimensional manner and clearly articulate measures that cleanly operationalize the proposed seizing and freezing processes". This is exactly the aim of the present study.

In particular, the present study aims at clarifying the questions whether (1) the scales constituting the first factor underlying the NFCS are related to freezing processes, and whether (2) the second factor which comprises Decisiveness, is related to seizing processes.

The rationale behind our investigation was quite straightforward. First, we calculated the individual's score on the NFCS facet scales, and then we checked whether these scores showed significant relationships with performance on objective, structured tasks that were constructed to tap the seizing and freezing processes.

According to the Neuberg perspective, one should expect only - or at least much stronger - correlations between the Decisiveness dimension and the seizing indicators, as well as between the Need for simple structure dimension and the freezing indicators. According to the Kruglanski perspective, one should expect correlations of equal strength between the dimensions Decisiveness and Need for simple structure (consisting of the four other facet scales) and the performance on the tasks which measure seizing and freezing tendencies. These two perspectives are depicted in Figure 1.

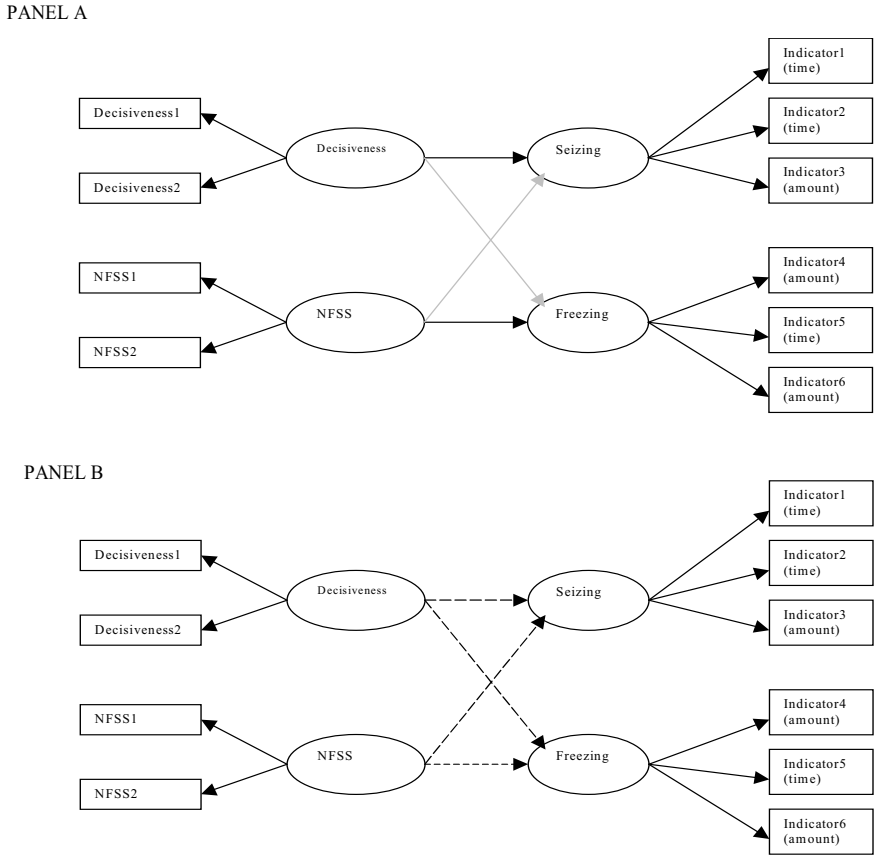

Figure 1. Panel A: Representation of the Neuberg perspective (MODEL 1). Grey arrows are set equal to zero. Panel B: Representation of the Kruglanski perspective (MODEL 2). All pointed arrows are set equal.

METHOD

A total of 164 undergraduate criminology students completed the Dutch version of the NFCS (Cratylus, 1995) a first time in a classroom session (T1) and again one month later in small group session (T2). The questionnaire was rated on

six-point scales anchored by '*Certainly disagree*' (1) and '*Certainly agree*' (6). The Need For Simple Structure (NFSS) was calculated by taking the mean of the items pertaining to the four relevant facet scores (preference for order, preference for predictability, discomfort for ambiguity and closed-mindedness) while a mean Decisiveness score was calculated from the decisiveness subscale items. Cronbach's alphas for NFSS and Decisiveness were .85 and .70 respectively at T1 and .90 and .79 respectively at T2. Test-retest reliability of the subscales as well as the composite NFSS scale was acceptable (ranging from r = .67 to r = .77). Closed-mindedness showed somewhat weaker psychometric coherence resulting in a more modest test-retest reliability (r = .60). Participants also completed the objective, structured tasks at T2. These tasks were used as indicators for the seizing and freezing processes.

Structured tasks

After reviewing the literature for suitable indicators for seizing and freezing processes we chose and adapted a diversity of objective and structured problems that had already been used in previous studies on need for closure.

Seizing indicators

The first task was originally designed to measure the anchoring effect, referring to the tendency to use an initial numerical estimate as a reference point for further estimations without sufficient adjustment in the light of subsequent calculations. This tendency is considered an instance of epistemic freezing (Kruglanski & Freund, 1983). In the present study however, while we used the format of this estimation task, the original two subtasks were combined to construct a task that measures how fast people make a decision, which is closely tied to the definition of the seizing process. In this computerized task, participants were asked

to estimate (since calculation using mental arithmetic was impossible) the probability of picking a red sock out of a drawer filled with red and white socks, given both the proportion of red socks in the closet and the number of times they could randomly draw a sock. After a series of exercise trials, the subjects completed twelve experimental trials. In half of these trials, they were asked to estimate the probability to draw a red sock at least once given a specified number of attempts, whereas in the remainder of the trials they had to estimate the probability of ending up with a red sock on every draw[2]. Rather than having participants estimate the probabilities themselves, they had to choose on each trial between two alternative answers (either below or above a given probability that was close to the real probability). No feedback on the correctness of their answers was provided. Since participants did not have the cognitive resources to actually solve the presented problems, they had no other choice than to decide by guessing. Participants who quickly reverted to such a guessing strategy thus expressed a clear desire to have quick, rapid answers, as opposed to those who engaged in excessive pondering, expressing a willingness to occupy themselves with potentially non-conclusive reasoning. Hence, high scorers on seizing are assumed to give fast answers, whereas low scorers on seizing are assumed to give much slower answers. The time needed to make these estimation-based decisions was registered and used as an indicator for individual differences in seizing[3].

[2] With q the proportion of red socks in the closet, a disjunctive event (y) would be drawing a red sock at least once on n draws; $p(y)= 1-(1-q)^n$. A conjunctive event (x) would be drawing a red sock on every single draw; $p(x)= q^n$.

[3] One could suspect that subjects may show anchoring effects on this task which would influence the outcome on the seizing measure. Although we did not expect such interference to occur, we did consider this possibility by calculating the correlation between anchoring effects (freezing) and response speed (r= -.13, n.s). We believe this indicates that freezing effects did not substantially contaminate our seizing measure.

For the second seizing measure we used a task format described by Mayseless and Kruglanski (1987). Participants had to identify a single digit (between 1 and 6) on a computer monitor. The length of exposure was set on 30 ms. The digit was masked by an array of '&' before and after its exposure, effectively making it impossible to consciously view and identify the digit. Participants could get additional exposures each time they pressed a button. They were allowed to operate this button an unlimited number of times until they felt able to reach a decision regarding the digit's identity. After they confirmed their decision by pressing another 'identification' button (1 to 6), a new digit was displayed. Two exercise and six experimental trials were presented. Since the digits could never be identified with complete certainty, the time participants needed to 'feel comfortable enough' making a decision concerning the digit's identity reflects the seizing process. The aggregated time for all six trials was used as a second seizing indicator.

The third seizing indicator was a computerized analogy-test, which was a variation of a procedure described by Keinan (1987). The test consisted of a series of six, rather difficult analogies, adapted from the Dutch Verbal Analogy Test (Drenth & Van Wieringen, 1969). The analogies had the format "X is related to Y as Z is related to …". Participants chose which of the five alternatives presented would correctly complete the blanks. Each analogy problem was presented one at a time on a computer monitor. By pressing one of the keys from 1 to 5 on the computer keyboard, participants could choose which of the alternative answer would be displayed on the screen, and they were able to view these alternatives as many times as they wished. Only a single alternative answer could be displayed at any given time. The participant's final decision on the correct answer was signalled by displaying that alternative on screen and then pressing an assigned "confirmation" key. A new analogy problem was then displayed. However, unlike the original Keinan (1987) experiment, we presented participants with some analogy problems

that contained only incorrect alternatives, forcing the participants to choose an inherently incorrect answer for these unsolvable problems. Participants high in seizing are expected to examine and consider the alternatives less extensively before reaching a(n) (incorrect) decision. The total number of presentations of the alternatives that the subjects displayed before reaching a decision on the unsolvable analogies was used as a third indicator of the seizing process.

Freezing indicators

The freezing indicators were based on a task used by Van Hiel and Mervielde (2002) in which subjects had to judge to what degree they liked a person described by one or more personality traits. The ratings of the target were achieved on a scale anchored by 1 ("*Dislike very much*") and 7 ("*Like very much*"). After making a first rating based on one personality trait, participants were presented with a second trait that is supposedly characteristic for the same target. Then participants were asked to rate a second time the likeability of the target, now based on these two traits. Two exercise trials and twelve experimental trials had to be completed. High scorers on freezing are expected to base their second evaluation largely on the first one they made. Thus, because high scorers on freezing are assumed to be less influenced by the second trait, a smaller overall deviation between the first and the second rating should occur (freezing indicator 1), which indicates an underlying urge similar to the anchoring freezing effect. They are also expected to need less evaluation time to arrive at a second decision regardless of the time they needed to reach a first judgement (freezing indicator 2), which indicates reduced attention to additional information after a judgement is made. Note that we controlled for the

general tendency to respond quickly (denoting seizing) in this measure[4]. Finally, they are assumed to show a higher incidence of equal first and second ratings (freezing indicator 3), which denotes a preference for consistency.

RESULTS

In anticipation of our main analyses, we examined the structure of the NFCS. In these analyses we used the average score over T1 and T2 for each item. Significant and positive correlations between all facets were obtained, except for Decisiveness. The latter facet scale correlated significantly and negatively with Discomfort with ambiguity (r = -.32, p < .01), whereas negative but insignificant correlations were obtained with Preference for predictability (r = -.06) and Closed-mindedness (r = -.10). A positive but non-significant correlation was found with Preference for order (r = .13). An exploratory Principal Component Analysis (PCA) on the NFCS items yielded two primary components, corroborating the findings of Neuberg, Judice, and West (1997). The first component could be labelled NFSS (eigenvalue 8.82, explaining 25.93% of the variance) and the second one referred to Decisiveness (eigenvalue 4.40, explaining 12.94% of the variance). The correlation between the OBLIMIN rotated components was -.03 (*n.s.*).

We conducted an exploratory PCA on the six objective structured tasks. Two components were extracted showing a clear distinction between tasks constructed to measure seizing and those tasks constructed to tap on the freezing process. The freezing indicators loaded highly and exclusively on the first factor (eigenvalue 1.74, explaining 28.98% of the variance) while the seizing indicators had primary loadings on the second factor (eigenvalue 1.37, explaining 22.68% of

[4] To rule out the possibility that seizing characteristics caused a faster response on our measure, we used the standardized residuals of the regression analysis in which the decision time on the second judgement was explained by the decision time on the first judgement.

the variance). The correlation between the OBLIMIN rotated components was -.03 (*n.s.*).

Model testing

A structural equation modelling approach with latent variables was applied to assess the relationship between Decisiveness and Need for Simple Structure (NFSS) as exogenous variables on the one hand and the performance on the tasks that measure seizing and freezing tendencies as dependent variables on the other. In a preliminary model (Model 0) we estimated all paths without restrictions. Subsequently we contrasted the fit of two distinct models, a first model (Model 1) representing Neuberg's theory, and a second model (Model 2) which incorporates Kruglanski's perspective. In Model 1, the relationship between Decisiveness and freezing tendencies on the one hand, and between NFSS and seizing tendencies on the other hand, were set equal to zero. In Model 2 the relationships between the exogenous variables (Decisiveness and NFSS) and the seizing and freezing tendencies were all restricted to be equal.

Data were analysed using Lisrel 8.54 (Jöreskog & Sörbom, 1996a, 1996b) with maximum likelihood estimates from the sample covariance matrix. Following recommendations by Hu and Bentler (1998) and MacCallum and Austin (2000), we examined the Root Mean Squared Error of Approximation (RMSEA, Steiger & Lind, 1980), the Standardized Root Mean Squared Residual (SRMR, Bentler, 1995) and Comparative Fit Index (CFI, Bentler, 1990) to evaluate the goodness of fit of the measurement and structural models. These indicators have been shown to be the most sensitive to models with misspecified factor loadings and factor (co)-variances. Especially SRMR performs well when sample size is small ($N < 250$; Hu & Bentler, 1998). According to Hu and Bentler (1999), the combined cut-off values of .09 for SRMR, .06 for RMSEA and .95 or more for CFI indicate good fit.

The effective sample size for the present analyses was $N = 149$. The scores at time 1 and time 2 on the Decisiveness and NFSS subscales served as the indicators for the latent variables Decisiveness and NFSS. The latent variables seizing and freezing were each related to the three performance indicators derived from the structured tasks.

The baseline measurement model (Model 0) without a-priori restrictions fits the data very well (see Table 1). The paths from decisiveness to both seizing and freezing were significant ($\beta = .38$ and $\beta = .21$ respectively) as well as the paths from NFSS to seizing and freezing ($\beta = .21$ and $\beta = .15$ respectively). Neuberg and colleagues asserted that Decisiveness and NFSS constitute two separate components. A formal test of the unidimensionality of the NFCS revealed that a model in which the correlation between these two components was set equal to 1 had an abysmal fit (χ^2 (31) = 6883.61, RMSEA = 1.23, CFI = 0.0, SRMR = 0.37), evidently worse than the measurement model ($p < .001$). Even a less stringent test of the unidimensionality hypothesis (e.g. $r = .60$) yielded a significantly worse fit than the measurement model ($\Delta\chi^2$ (1) = 57.8, $p < .001$). Hence, these analyses support Neuberg and collegues' assertion that the NFCS is multidimensional.

Table 1
Fit indices from SEM analyses (N= 149)

		χ^2	df	RMSEA	CFI	SRMR
Model 0	Measurement model (unconstrained)	32.56, ns	30	.024	.98	.06
Model 1	Neuberg model	43.57, ns	32	.050	.95	.08
Model 1'	Neuberg model*	49.35, ($p<.05$)	33	.058	.93	.07
Model 2	Kruglanski model	33.35, ns	33	.008	.99	.06

Note. * Neuberg orthogonality model with additional zero correlation restriction between Decisiveness and NFSS.

Next we tested Neuberg, Judice, and West's (1997) position (Model 1) that Decisiveness is the dispositional analogue of the seizing process, and NFSS is the dispositional analogue for freezing. The model fits the data well (see Table 1), but significantly worse than the baseline model in terms of the difference in χ^2 ($\Delta\chi^2(2) = 11.01$, $p < .01$). In this model with two paths set equal to zero, the path from Decisiveness to seizing ($\beta = .38$) was significant, and the path from NFSS to freezing ($\beta = .15$) just exceeded the .05 threshold. In order to represent Neuberg et al.'s claim of orthogonality between the two NFCS dimensions we fit the model again, imposing an additional zero correlation between Decisiveness and NFSS. In terms of the difference in χ^2, this new model (Model 1', see Table 1) fits the data significantly worse than both the baseline model ($\Delta\chi^2(3) = 16.79$, $p < .01$) and the original Neuberg model ($\Delta\chi^2(1) = 5.78$, $p < .025$).

Less stringent tests of the Neuberg perspective includes fitting two subsidiary models. That is, one can distinguish between two assumptions underlying this perspective, which can be tested separately. First, if one is able to show that NFSS has a *stronger* path to freezing than to seizing (instead of loading exclusively

on freezing as it has been the case in the stringent model, Model 1), at least part of the Neuberg perspective may prove applicable. Second, if one is able to show that the path from Decisiveness is *stronger* for seizing than for freezing (instead of loading exclusively on seizing), again the Neuberg model might prove to be partially valid. These alternative models can be tested by constraining the paths from NFSS to seizing and freezing to be equal (subsidiary Model 1), and constraining the paths from Decisiveness to seizing and freezing to be equal (subsidiary Model 2). If these subsidiary models do not yield a significantly decreased fit, we can conclude that NFSS does not load more strongly on freezing than on seizing, and that Decisiveness does not load more strongly on seizing than on freezing. Analysis of both these models showed that there was no significant change in fit for both models compared to the measurement model ($\Delta\chi^2(1) = .00$, n.s. for subsidiary Model 1 and $\Delta\chi^2(1) = .15$, n.s. for subsidiary Model 2). It can thus be concluded that less stringent tests of the Neuberg perspective does not yield affirmative evidence for its validity.

Model 2 implemented the Kruglanski perspective. All facets from the NFCS are equally indicative of both seizing and freezing processes and one should therefore not expect differential relationships between Decisiveness and NFSS and the seizing and freezing processes. This perspective was tested by constraining all paths from Decisiveness and NFSS to seizing and freezing to be equal[5]. All relevant

[5] Note that the Kruglanski perspective actually does not necessarily require all four paths to be equal. Although paths from NFSS need to be equal and paths from Decisiveness need to be equal, the pair of paths from NFSS do not need to be equal to the pair paths from Decisiveness, since Kruglanski's perspective states that both components are both equally related to the processes but one component might be more predictive for both processes than the other. We therefore tested a model 2' that constrains both paths from decisiveness to be equal to each other and both paths of NFSS to be equal to each other without restraining these pairs of paths to be equal to each other. Note that this is actually a combination of less stringent tests (a and b) of the Neuberg Model. This model fits the data very well ($\chi^2(32) = 32.14$, *ns*; RMSEA = .001; CFI = .99; SRMR = .06) and not significantly different from the measurement model ($\Delta\chi^2(2) = .52$, *ns*).

paths were set equal on the basis of the unstandardized coefficient (β = .86) and without any constraints involving orthogonality. As a result the two paths to seizing had a standardized coefficient of .28, and the two paths to freezing had a β of .20. The model fits the data very well (see Table 1), the model fit for Model 2 was significantly better than for Model 1 ($\Delta\chi^2$ (1) = 10.22, $p < .01$) and not significantly different from the unconstrained baseline model ($\Delta\chi^2(3) = .79$, *ns*). The contrasted models are depicted in Figure 2.

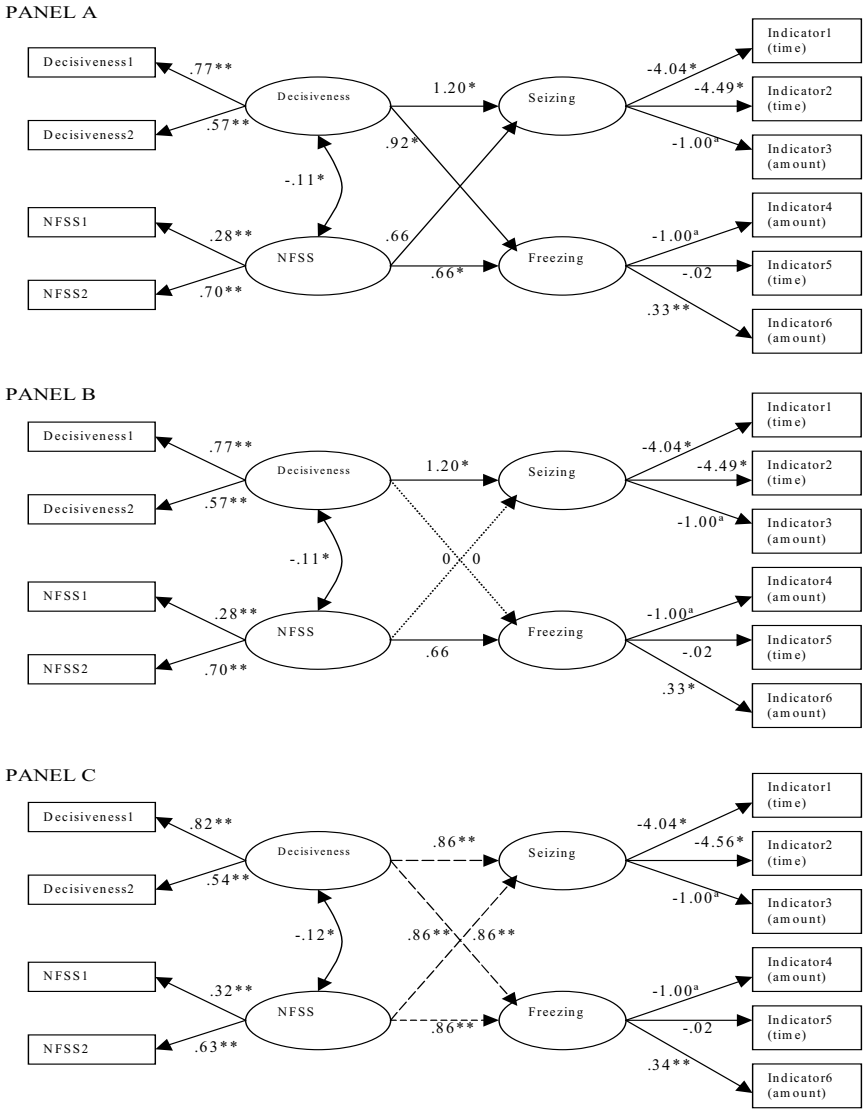

Figure 2. Structural equation models with unstandardized estimates. Panel A: Unrestricted model. Panel B: The Neuberg perspective (MODEL 1). Panel C: The Kruglanski perspective (MODEL 2).

Note. **: p<.01; *: p<.05; [a]: fixed coefficient.

In concluding, we found that although both the Kruglanski and the Neuberg models fit the data, the Kruglanski model clearly provided a much better fit, with all crucial paths being significant. Therefore we refute the hypothesis by Neuberg and colleagues that NFSS is only related to freezing and Decisiveness is only related to seizing.

Regression analyses

Following these SEM analyses, we conducted regression analyses in order to assess whether Decisiveness and NFSS independently and additively explain the seizing and freezing processes, and/or whether there is evidence for an (additional) interaction effect. We used latent scores from the baseline model for these purposes and the interaction terms were calculated by taking the product of the centred latent scores for Decisiveness and NFSS.

Hierarchical regression analyses with the independent variables Decisiveness and NFSS entered in the first step and the interaction term entered in the second step and the seizing and freezing processes as the dependent variables were performed. Evidence for additional interactive effects would be confirmed if the cross-product entered in the second step significantly increases the percentage of the variance explained (see, Aiken & West, 1991). In the first step, both Decisiveness and NFSS showed a significant relationship with the target variable seizing ($\beta = .358$, $t = 4.61$, $p < .001$ and $\beta = .20$, $t = 2.54$, $p < .05$; $\Delta R^2 = .151$, ΔF (2,146) = 12.714, $p < .001$). Similarly, we found a significant relationship between both predictors and freezing ($\beta = .19$, $t = 2.34$, $p < .05$ and $\beta = .24$, $t = 2.93$, $p < .01$ respectively, $\Delta R^2 = .082$, ΔF (2,146) = 6.35, $p < .01$). However, our analyses did not reveal a significant moderator effect for either the latent seizing variable ($\Delta R^2 = .001$, ΔF (1,145) = .17, *n.s.*) or the latent freezing variable ($\Delta R^2 = .003$, ΔF (1,142) = .47, *n.s.*).

DISCUSSION

In the present study we evaluated the two principal positions regarding the underlying structure of the Need for Closure Scale. According to Neuberg and colleagues (Neuberg, Judice, & West, 1997; Neuberg, West, et al., 1997) there should be strong correlations between the Decisiveness dimension and the seizing indicators, as well as between the Need for Structure dimension (NFSS, consisting of the Preference for order, Preference for predictability, Intolerance of ambiguity and Closed-mindedness facet scales) and the freezing indicators. Moreover, the correlations between Decisiveness and freezing and between NFSS and seizing should approach zero. Conversely, according to Kruglanski and colleagues (1997), one should expect correlations of approximately equal strength between the Need for closure dimensions and the seizing and freezing processes.

The present results corroborate Kruglanski's perspective. In particular, we obtained a significant better fit of the model in which there are direct (and equal) paths from Decisiveness and NFSS to both the seizing and freezing processes (Model 2) than for the model in which Decisiveness and NFSS had an unique path to seizing and freezing respectively (Model 1). Moreover, all a-priori requested paths in Model 2 were highly significant, whereas the essential path from NFSS to freezing just reached the conventional significance level in Model 1. If Neuberg's position about the two primary orthogonal factors of the Need for Closure scale mapping the seizing and freezing processes is valid, highly significant paths between these factors and the processes they are presumed to map, would be more compelling.

However, unlike Webster and Kruglanski's (1994) claim that the NFCS is a one-dimensional instrument with five correlating facet scales, the present results clearly indicate a two-dimensional structure. In line with Neuberg et al. (Neuberg, Judice, & West, 1997; Neuberg, West, et al., 1997) these dimensions could be

identified as Decisiveness and NFSS. In conclusion, the present results corroborate the Neuberg position that the NFCS consists of two dimensions, but did not confirm these authors' views that these dimensions emerge as separate dispositional analogues for the seizing and freezing processes.

In the remainder of the discussion, we will first address the theoretical implications of these findings, with special reference to the additive effect of Decisiveness and NFSS on the seizing and freezing processes. Subsequently, we will critically assess the validity of seizing measures used in some previous studies and discuss the seizing and freezing measures in this paper. Finally, we elaborate on the use of objective structured tasks in fundamental research on need for closure.

Need for closure effects in the seizing and freezing phases

In accordance with Neuberg and colleagues' critical assessment of the NFCS, Decisiveness was not related to NFSS and clearly measured a distinctive aspect of closure. Neuberg and colleagues argued that the underlying, two-dimensional structure of the NFCS leads to interpretational problems. In fact, the use of one global scale score for an essentially two-dimensional model could lead to three possible interpretations. A first possibility is that the previously found effects of the total NFCS can be entirely accounted for by only one of the two components (e.g. NFSS), while the other component (e.g. Decisiveness) has no effect. A second possibility is that the NFCS effect is provoked by the additive effect of its two components, NFSS and Decisiveness, while a third possibility is that the interaction effect between NFSS and Decisiveness produces the global NFCS effect.

The present results clearly corroborate the second thesis. This would imply, according to Neuberg, Judice, and West (1997), that "both components may alone encourage … simplification and, thus, when added together – as they are in a

unidimensional use of the scale – lead to large effects of this sort" (p. 1406). In other words, the present results concur with the view that NFSS explains part of the variance in typical phenomena that are predicted by NFCS, such as primacy effects, the use of heuristics, and stereotyping, and that Decisiveness explains an additional proportion of the variance.

The present results thus show that Decisiveness is poorly correlated with NFSS on the one hand, but also that both these variables soundly predict seizing and freezing processes on the other hand. This apparent paradox demands a theoretical explanation. It is possible that Decisiveness does not really measure a need, but instead, refers to some type of ability. Indeed, according to Manetti, Piero, Kruglanski, Taris, and Bezinovic (2002) "…the specific wording of Decisiveness items … described the ability (or lack of ability) to reach a decision quickly, rather than the need to find an answer as soon as possible without too much worry about its validity (i.e. 'seizing' upon the first available answer)" (p. 153). In accordance with the suggestion made by Mannetti et al. (2002), Roets and Van Hiel (2007) have reported that newly written items that explicitly probe the *need* component of Decisiveness showed positive correlations with the other NFCS facet scales, whereas the traditional Decisiveness items did not. Roets and Van Hiel therefore concluded that the Decisiveness subscale of the NFCS is probably contaminated by its ability-related content. If Decisiveness is indeed a measure of ability rather than of need, the present results can be easily explained. First, it is not unsurprising that, due to its emphasis on ability, Decisiveness is only marginally related to the other items that clearly represent a need. Second, both the scale which encompasses a need component and the scale with a stronger focus on ability predict scores on seizing and freezing indicators. Seizing and freezing thus seem to result from the additive effect of the need and ability components of the propensity to achieve closure.

Although the distinctiveness of Decisiveness did not result in the emergence of a distinctive pattern of correlations with the seizing and freezing processes, such differential correlations could emerge with other dependent variables. It is possible that certain phenomena that are mainly the result of closure *needs* are poorly related to Decisiveness because these outcomes do not necessarily require much in terms of ability to achieve closure. For example, Kossowska and Van Hiel (2003) and Van Hiel, Pandelaere, and Duriez (2004) reported that only NFSS was related to conservative beliefs, whereas no such relationship was found for Decisiveness. According to Kossowska & Van Hiel (2003), conservatism captures people's "frozen" ideologies and beliefs, which they seized upon long ago, and they further argued that adherence to specific ideologies reflects freezing processes. In other words, only NFSS was related to a variable believed to tap freezing processes, whereas contrary to the present results, Decisiveness was not. A possible explanation for these contrasting findings may be that adhering to particular belief systems is not related to ability, but that these beliefs instead reflect epistemic *needs* (see Jost, Glaser, Kruglanski, &, Sulloway, 2003).

The present results thus indicate that Decisiveness is not strongly related to the other NFCS dimensions, and that Decisiveness cannot be considered a specific measure of seizing processes (instead, it predicts both seizing and freezing). Hence, the question arises to what extent it is advisable to use the Decisiveness subscale in future studies. For example, future research could develop a theory outlining which phenomena are expected to be influenced mainly by NFSS and/or Decisiveness – or, alternatively stated - need and/or ability. However, we have some doubts on the fruitfulness of engaging in this line of research. First, previous studies have already developed scales that specifically aim at measuring the ability component (e.g., Bar-Tal, Kishon-Rabin, & Tabak, 1997). Second, even with social psychological phenomena that are well explained by a need for closure, there is always the

possibility that some unique characteristics may mask or eliminate possible relations with Decisiveness (for example in the case of conservatism).

The measurement of the seizing process

Most studies on the need for closure have focused on the freezing process of need for closure. For example, the impressional primacy effect (e.g. Freund, Kruglanski, & Shpitzajzen, 1985; Webster & Kruglanski, 1994), construct accessibility effects (Ford & Kruglanski, 1995), the overattribution bias (Webster, 1993), and the use of cognitive heuristics such as numerical anchoring (Kruglanski & Freund, 1983) all seem to involve typical freezing processes. However, only a limited number of studies have been concerned with investigating the seizing processes, and often this process was not operationalized very convincingly. Van Hiel and Mervielde (2002) already pointed at several problems in the experiments presumably intended to manipulate the need for closure during the seizing process. Some experiments (e.g., Kruglanski, Webster, & Klem, 1993; Kruglanski, Peri & Zakai, 1991) that have been explicitly identified as referring to the seizing process (see Kruglanski & Webster, 1996, p. 276-277) do not seem to use tasks that tap need for closure effects in the precrystallization phase of knowledge construction. That is, in these experiments participants had to state an interim judgment before the need for closure effect was measured, and therefore these measures might be inflated with freezing processes.

The construction of objective seizing measures and the assessment of the role of Decisiveness and NFSS in the seizing process are issues that are clearly in need of more attention in future research. Seizing indicators should be as “pure” and straightforward as possible by allowing participants to engage in a task without current hypotheses, structure, or stereotype in mind. In other words, seizing measures should be selected on minimal contagion by freezing processes. Hence, the

seizing tasks we used in the present study clearly involved processes executed before any initial judgment was reached and crystallised. In addition, for each of these tasks, participants could never really be certain of their answers or solutions, which means that rapid responses on these tasks indicate a preference for obtaining any uncertain answer (often resulting from a mere guessing strategy) rather than having no answer or delaying their decision.

We believe that the seizing and freezing measures we used in this paper tap distinctively into respectively the seizing and freezing processes. However, we are aware that our test of the conflicting views on the NFCS is only as valid as the measures of seizing and freezing we used. The use of other objective measures might yield different results or may improve the robustness of the model. Especially the modest loading of our time-related freezing indicator on the latent freezing construct suggests that, at least for this indicator, alternative measures might prove to be an improvement to this model. Therefore we would like to encourage further research on this issue to apply different seizing and freezing indicators which might provide further support or might potentially yield counter-evidence for our results. In this regard, finding and implementing appropriate objective structured tasks will be the main challenge in this line of research.

The use of objective, structured tasks to measure cognitive processes

To a certain degree, many existing studies on need for closure can be qualified as the investigation of the consequences of rapid or presumably heuristic information processing. Although these previous research projects have contributed considerably to our understanding of the impact of closure on various biases and cognitive shortcuts, and its applied value for predicting social cognitive phenomena, more fundamental research on the nature of the seizing and freezing processes has been neglected.

In the present study, we tried to address this concern by constructing stable dimensions of seizing and freezing processes based on the performance on specified objective structured tasks. The present approach is also consistent with the argument that our understanding of cognitive style would be advanced through the use of factor-analysis (e.g. Klein, Barr, & Wolitzky, 1967; Van Hiel & Mervielde, 2003-b; Wardell & Royce, 1978). On the basis of the peculiarities and the characteristics of these tasks loading on a factor-analytic dimension, one can gain more fundamental insight in the process of the need for closure.

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Chapter 3:

Separating Ability From Need: Clarifying the Dimensional Structure of the Need for Closure Scale[6]

ABSTRACT

The validity of the Need for Closure Scale (NFCS) has recently been debated in the research literature. In the present study, it is argued that the traditional Decisiveness scale primarily taps ability content, instead of the hypothesized motivational need; therefore, new items that explicitly probe the need for quick and unambiguous answers were developed. It was shown that these need items form a reliable scale (Study 1); were predictive of the seizing process over and beyond ability, whereas the old Decisiveness scale was not (Study 2); and that they were sensitive to experimentally manipulated levels of task motivation (Study 3). Finally, a reassembled NFCS with the new items replacing the traditional Decisiveness items showed superior fit as a unidimensional model. In the Discussion, it is argued that the specific position of Decisiveness is due to its particular operationalization, and not to its theoretical status.

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INTRODUCTION

During the last few years, the Need for Closure Scale (NFCS) often has been included in a diverse range of social psychological studies, as evidenced by the frequent citations of the original article that introduced this scale (Webster & Kruganski, 1994). At the same time, however, substantial critiques and skepticism concerning this scale surfaced. The Decisiveness facet scale has been particularly criticized because it measures a distinct dimension (see Neuberg, Judice, & West, 1997; Neuberg, West, Judice, & Thompson, 1997; but for another opinion, see Kruglanski, De Grada, Mannetti, Atash, & Webster, 1997) and because its construct validity is doubtful (see Mannetti, Pierro, Kruglanski, Taris, & Bezinovic, 2002; Roets, Van Hiel, & Cornelis, 2006). Hence, it is not entirely clear to what extent Decisiveness played its role as one of the five subscales contributing to the global NFC score or whether it is related to a different underlying process and refers to a distinctive need for closure factor. The present study attempts to provide some answers regarding this vital issue and highlights the need to re-evaluate previously reported findings from the need for closure literature.

In particular, we argue that the traditional Decisiveness scale taps a mixture of the hypothesized "need" construct as well as unintended ability content. In the present studies, we develop items that clearly refer to a craving for quick and unambiguous decisions, instead of habitually making this kind of rushed decisions. This set of new items will be compared to Webster and Kruglanski's (1994) original Decisiveness scale in terms of its predictive power on motivational effects that are assumed to be instigated by the need for closure.

Need for Closure

Need for closure (Kruglanski, 1989; Kruglanski & Webster, 1996) has been defined as the need to settle for any answer, as opposed to further sustaining ambiguity. Two sequential phases are assumed to underlie this need: the tendency

towards urgency and the tendency towards permanence. The first phase refers to the inclination to seize on closure quickly, especially under heightened need for closure conditions. According to Kruglanski and Webster (1996), “Any further postponement of closure is experienced as bothersome, and the individual’s overriding sense is that he or she simply cannot wait” (p. 265). The second phase focuses on protecting the answer just obtained or, in other words, holding on to the obtained structure. This freezing process thus strengthens the consolidation of the acquired knowledge, and safeguards the knowledge system against new, contradictory information. Kruglanski and Webster (1996) postulated that a demarcation point which separated the seizing or precrystallization phase from the freezing or postcrystallization phase is the juncture at which "a belief crystallized and turned from a hesitant conjecture to a subjectively firm fact" (p. 266).

The relative disregard for new information after rendering a judgment has been illustrated by a lowered sensitivity to alternative hypotheses (e.g. Kruglanski & Mayseless, 1988), greater resistance to persuasion (Kruglanski, Webster, & Klem, 1993) and a lowered motivation to search for information (Kruglanski, Peri, & Zakai, 1991; Van Hiel & Mervielde, 2002), as well as increased opinion uniformity, resistance to change, and conservatism (Kruglanski, Pierro, Mannetti, & De Grada, 2006).

Situational forces such as time pressure, environmental noise, or dullness of the task may cause a temporal heightening of an individual’s need for closure. But according to Kruglanski et al. (1997) and Webster and Kruglanski (1994), need for closure also refers to stable individual differences measured by the Need for Closure Scale (NFCS). Hence, the need for closure is assumed to be a situationally induced form of motivation as well as a dimension of stable individual differences.

Dimensionality of the Need for Closure Scale

Webster and Kruglanski (1994) suggested that need for closure is a unitary latent variable, which potentially manifests itself in various ways such as a preference for order, a preference for predictability, decisiveness, discomfort with ambiguity and closed-mindedness. According to the authors, these five different manifestations of need for closure reflect a single underlying mechanism, and hence, the NFCS has been presented as a unidimensional measure. However, based on psychometric analyses, Neuberg, Judice, and West (1997; see also Neuberg, West, et al., 1997) proposed a two factor model for the NFCS, with a first factor denoting a preference for structure, comprising items tapping preference for order, preference for predictability, discomfort with ambiguity and closed-mindedness, and a second factor containing the decisiveness items.

More recently, exhaustive examinations of the structure of the scale in several American, European, European American and East Asian samples (Kossowska, Van Hiel, Chun, & Kruglanski, 2002; Kruglanski et al., 1997; Mannetti et al., 2002;) have shown that the one-factor as well as the two-factor (second-order) solution may be viable alternatives. The virtually equal model fit of the one- and two-factor models initially seemed to corroborate Kruglanski and colleagues' perspective. However, these studies also have generated evidence in favor of the interpretation advanced by Neuberg and colleagues. First, Decisiveness was not significantly related to the other NFCS facet scales, although positive correlations are expected because each of the scales is assumed to measure need for closure. Not surprisingly, then, confirmatory factor analysis targeting a one-factor solution revealed that Decisiveness had no significant loadings on this general NFC factor (Kossowska et al., 2002; Mannetti et al., 2002). Moreover, the items pertaining to

Decisiveness displayed significant loadings on the second factor when a two-factor solution was tested (Kossowska et al., 2002).

In conclusion, the results of the large-scale investigations of the structure of NFCS are more in line with Neuberg and colleagues' findings, suggesting that NFCS is multidimensional and that Decisiveness constitutes an independent and distinctive dimension. If we assume that two primary orthogonal factors underlie the NFCS, what do these two distinctive dimensions exactly represent? According to one interpretation (Neuberg, Judice, & West, 1997), the dimensions reflect seizing and freezing processes, whereas other authors (Mannetti et al., 2002) have described the dimensions as tapping the distinction between ability and motivation.

As we will discuss further, the unclear nature of the underlying dimensionality and the lack of a generally accepted understanding of the scale have caused researchers to apply and interpret the NFCS at their own discretion, including one-dimensional and multidimensional reports as well as applications in which the Decisiveness scale was simply omitted. Disagreement on how the NFCS should be used even discouraged researchers to employ the scale, with some authors citing exactly this reason as an argument to refrain from including the scale in their research (e.g., Chaiken, Duckworth, & Darke, 1999).

Neuberg and colleagues' interpretation of the dimensions underlying the NFCS

Neuberg et al. (1997) hypothesized that the two factors of the NFCS tap the seizing and freezing process. In particular, the seizing process, characterized by an urgent desire to gain a quick nonspecific solution, manifests itself as decisiveness. In turn, the freezing process, characterized by a desire to maintain to some degree the

specific solution seized on, can be conceived as a dispositional analogue of a preference for structure.

Yet, the interpretation of these factors in terms of seizing and freezing processes is solely based on content analysis of the items constituting these factors, and only few studies explicitly addressed the issue of factor interpretation in a more sophisticated way. In their earlier work, preceding the controversy on the two-dimensionality of the NFCS, Kruglanski, et al. (1993) obtained significant effects of the aggregated NFCS score on motivated resistance to persuasion, which reflects - under the appropriate circumstances - seizing as well as freezing processes (Kruglanski et al., 1997; Kruglanski & Webster, 1996). Hence, because these results indicate that the NFCS is similarly related to seizing and to freezing processes, the perspective proposed by Neuberg and colleagues is not really corroborated. However, because the full NFCS was used it is possible that the decisiveness and the need for simple structure components caused these correlations in the seizing and freezing conditions respectively.

Roets, et al. (2006) studied this issue in a more direct manner as they constructed objective, structured tasks that were specifically designed to separately tap seizing and freezing processes. The results supported Neuberg and colleagues' two-factor structure underlying NFCS, but the two dimensions did not map differentially onto seizing and freezing processes. In other words, significant relationships of equal strength emerged between the dimensions underlying the NFCS on the one hand, and the seizing and freezing indicators on the other hand. Hence, Neuberg and colleagues' conjecture that Decisiveness and NFSS are dispositional analogues of seizing and freezing, does not seem to provide the most appropriate interpretation for the apparent two-dimensionality of NFCS.

Mannetti and colleagues' interpretation of the dimensions underlying the Need for Closure Scale

Some questions have also been raised regarding the *construct validity* of the Decisiveness facet scale. Mannetti et al. (2002) argued the items of the Decisiveness scale indicate ability instead of the assumed motivational component, whereas the other facet scales reflect the intended epistemic closure motivation. Indeed, although Webster and Kruglanski (1994) originally described this facet scale as the "urgency of striving for closure in judgments and decision-making" (p. 1050), close inspection of the scale reveals that many items tap, to some extent, ability related characteristics. For example, the items "When faced with a problem I usually see the one best solution very quickly" and "When I go shopping I have difficulty deciding exactly what it is that I want" (reversed item) do not seem to measure solely the sheer wish to make quick decisions but also the perceived ability to make these decisions. Items for a need scale should refer only to motivation and preferences rather than probing habitual behaviors that represent a mix of ability and need. Manetti et al. (2002) conclude "…the specific wording of Decisiveness items … described the ability (or lack of ability) to reach a decision quickly, rather than the need to find an answer as soon as possible without too much worry about its validity (i.e. 'seizing' upon the first available answer)" (p. 153).

If Decisiveness indicates the ability to reach cognitive closure, then this scale should be considered as an important predictor - in addition to the need component - of cognitive closure outcomes. Indeed, previous research has demonstrated that the ability and need components may have differential effects on cognitive performance. In particular, the studies of Pelham and Neter (1995) and Bar-Tal, Kishon-Rabin, and Tabak (1997) suggest a possible interaction effect between need for closure and ability, indicating that the need for closure effect noted

by Kruglanski and colleagues only emerges in conjunction with sufficient levels of ability to reach closure. Conversely, high need for closure combined with low levels of ability could have opposite and counterintuitive effects. Although these results indicate a potential interaction between need for closure and ability, it is important to note that these studies did not explicitly target the need for closure construct. That is, there are some crucial conceptual differences regarding the need variables studied, and some specific characteristics of the experimental designs in these studies prevents us to draw any definite conclusions regarding the need for closure.

To date, research on need for closure did not investigate the interpretation of Decisiveness in terms of ability, which is a prerequisite to investigate and interpret potential interactions between Decisiveness and NFSS. Given the possible interaction between need and ability, a clear distinction between these two components is of primordial importance for gaining a better understanding of cognitive closure behavior.

The present studies

Mannetti et al. (2002) have pleaded for alternative and more specific operational definitions of the need to decide quickly as a subdivision of the need for closure concept. According to these authors, these operational definitions are "very likely to ameliorate the correspondence between the conceptual and the operational definition of this motivational construct" (p. 153). This is exactly the goal of the present studies. We want to show why the original Decisiveness facet scale represents a separate dimension in the NFCS, and incorporate an alternative Decisiveness scale in the NFCS to ameliorate the measurement of the need for closure construct.

The rationale behind the present studies is quite straightforward. We will develop new Decisiveness items measuring the *need* or motivation to obtain a quick answer. In particular, these items refer to the desire to acquire quick, rapid answers, as opposed to eagerness to engage in nonconclusive reasoning. The new items will then be compared to the classic Decisiveness items. Although we do not explicitly intend to construct a seizing measure, it should be mentioned (as illustrated by the work of Neuberg and colleagues) that the content of the original Decisiveness scale mainly refers to the seizing process. Hence, since we only attempt to filter the ability content, the new Decisiveness scale may also resemble content that is typical for the seizing process. Arguably, some facet scales in the reassembled NFCS are likely to be better indicators for one process, but since both processes are considered to be intertwined and sequential, we do not intend to explicitly differentiate between them.

Hence, we assume that (1) the NFCS is contaminated by a facet scale that does not probe need, resulting in a failure to obtain a unidimensional scale, (2) the contamination by this facet scale is due to its ability content, and (3) the replacement of this scale by an appropriate item set should improve the validity of NFCS.

In Study 1, we investigate the structure of the new Decisiveness items and check whether they load on a single dimension. In Study 2, we assess the predictive validity of the new items. We compare the power of the new and the original Decisiveness items to predict various indicators of the seizing process while statistically controlling for individual differences in *ability*. Study 3 experimentally tests whether low versus high scorers on the new Decisiveness scale react differently to need for closure, manipulated by inducing different levels of motivation (attention for primary versus secondary task). Finally, in Study 4, the psychometric analyses originally conducted by Neuberg and colleagues (1997) are replicated with the original NFCS as well as with the new version of the NFCS, substituting the original Decisiveness facet items by the new items.

STUDY 1

Webster and Kruglanski (1994) defined the Decisiveness as one of five facet scales constituting the NFCS: "A (third) subset of items tapped the urgency of striving for closure in judgments and decision making" (p. 1050, parenthesis added). The authors "assumed that persons with high need for closure would experience an urgent desire to reach closure, reflected in decisiveness of their judgments and choices" (p. 1050).

In the present study we constructed a set of items to measure this urgent desire for quick, unambiguous answers, defined as "the desire to obtain swift answers, as opposed to an eagerness to engage in non-conclusive reasoning." The current authors, who both have substantial experience with the Need for Closure construct and scale, constructed independently thirty new Decisiveness items that fit this definition. After thorough discussion and consideration of this set of statements by the authors, six items (see Appendix) were retained as an operationalization of the desire to reach a conclusive answer as fast as possible.

Method

The psychometric properties of the six-item scale were examined in a sample of undergraduate criminology students (N = 137; 37% men and 63% women; average age = 20.1) who completed the questionnaire and later received feedback on their scores during small group class sessions. A private key generated by participants for feedback purposes ensured confidentiality.

Results and Discussion

Reliability analyses indicated a mean intercorrelation for the six items of r = .32, and a Cronbach's alpha of .73. Principal component analysis indicated only one component with an eigenvalue greater than 1 explaining 45% of the total variance. Items had factor loadings between .49 and .83, with a mean of .66. Confirmatory factor analysis was then conducted using Lisrel 8.54 (Jöreskog & Sörbom, 1996), with maximum likelihood estimates derived from the sample covariance matrix. These analyses showed an excellent fit for the measurement model postulating a unidimensional structure, $\chi^2(9) = 3.71$, *n.s.*. Factor loadings varied from .42 to .85 with an average of .61.

In conclusion, the set of new Decisiveness items forms a unidimensional scale with good psychometric properties.

STUDY 2

In Study 2, we compare the power of the newly developed and the original Decisiveness items to predict various indicators of the seizing process. To include an independent indicator of the ability component, we also administered the Ability to Achieve Cognitive Structure Scale (AACS; Bar-Tal, 1994), an instrument developed as a distinctive measure for ability rather than need (e.g. Bar-Tal, Kishon-Rabin, & Tabak, 1997).

According to Kruglanski and colleagues, Decisiveness is a dispositional analogue of both the seizing and freezing process since these processes are inexorably entwined, whereas in the Neuberg perspective, Decisiveness is considered to indicate only the seizing process. Because both perspectives share the assumption that Decisiveness is a predictor of the seizing process, only this process

was chosen as the main dependent variable. Indeed, according to the Neuberg perspective, using Decisiveness as a predictor for freezing processes is theoretically pointless, and therefore, freezing processes are not included in the present study.

To obtain a solid indicator of seizing processes, we administered objective tasks that focus on the first stage of the information acquisition process; before any judgment or decision is made. Hence, Study 2 is explicitly designed to examine to what extent the new items and the original Decisiveness items predict the outcomes on seizing tasks when the ability component is statistically controlled.

Method

A total of 164 undergraduate criminology students (64% women 36% men, average age = 19.7) completed the 6 new items and Dutch versions of the NFCS (Cratylus, 1995) and the AACS (Bar-Tal, 1994) during a class session. The internal consistency of the original Decisiveness facet scale (7 items), the new Decisiveness scale (6 items), and AACS (24 items) was .70, .67, and .76. Scale scores were calculated by averaging the item scores.

After reviewing the literature for suitable indicators for seizing process, we chose and adapted a diversity of objective and structured problems that have been administered in previous studies on need for closure (for a more detailed overview, see Roets et al., 2006). These tasks were considered to be indicators for the seizing process and were completed by all participants. Three indicators were assessed: (1) the time needed to make estimation-based decisions about a series of probability problems (unsolvable by using mental arithmetic), (2) the quantity of subliminal exposures subjects needed to feel comfortable making a decision about a digit's identity, and (3) the total number of presentations subjects requested to reach a decision on unsolvable analogies.

In the first computerized task, participants were asked to estimate (since calculation using mental arithmetic was impossible) the probability of picking a red sock out of a drawer filled with red and white socks, given both the proportion of red socks in the closet and the number of times they could randomly draw a sock. Participants had to choose on each trial between two alternative answers (either below or above a given probability that was close to the real probability). Because participants did not have the cognitive resources to actually solve the problems, they had to decide by guessing. Participants who quickly reverted to guessing thus expressed a clear desire to have quick, rapid answers, as opposed to those engaging in excessive pondering, lingering on with potentially nonconclusive reasoning.

For the second seizing measure participants repeatedly pressed a button to identify a single digit (between 1 and 6) that was exposed for 30 ms on a computer screen until they felt able to identify the digit. Since the digits could never be identified with complete certainty, the time participants needed to feel comfortable enough making a decision concerning the digit's identity reflects the seizing process.

The third seizing indicator consisted of a task with six difficult analogies. Participants had to choose which one of the five alternatives was correct. Analogies were presented one at a time on a computer monitor. Participants were able to view these alternatives as many times as they wished. Only one alternative answer was displayed at any given time. However, some analogy problems included only incorrect alternatives, forcing the participants to choose an incorrect answer for these unsolvable problems. Participants high in seizing are expected to examine and to ponder the alternatives on these analogies less extensively before reaching a(n) (incorrect) decision. These tasks are described in greater detail in Roets et al. (2006).

Results and Discussion

We first calculated the correlation between the new Decisiveness scale and the original Decisiveness scale (r = .21, p < .05), revealing that the two scales are related but distinct measures of swift responding. Correlations with AACS were, r = .56, p < .001 for the old Decisiveness scale and r = .11, *n.s*. for the new Decisiveness scale.

Next a principal component was extracted from the intercorrelations of the scores on the three seizing tasks, accounting for 46.12% of the variance. One participant was identified as an outlier scoring more than three *SD*s below the mean on the seizing component. Data provided by this participant were omitted from further analyses. In three regression analyses, AACS, Decisiveness, and the new set of items were entered as predictors of the seizing component. Each predictor explained a significant proportion of the variance when entered as the sole predictor, $F(1, 145)$ = 8.45, 9.86, and 13.11, all ps < .01, respectively for Decisiveness, the new items and AACS.

We then conducted hierarchical regression analyses, entering AACS in the first block. Including the original Decisiveness scale in the second block yielded no significant increase in the explained variance, ΔR^2 =.01, $\Delta F(1, 144)$ = 1.17, *n.s.;* standardized β's for AACS and Decisiveness were .29 and .11 respectively. These results indicate that Decisiveness has no incremental predictive validity for seizing processes over and beyond the ability component. Conversely, inclusion of the new Decisiveness scale in the second step resulted in a significant increase in the explained variance, ΔR^2 =.051, $\Delta F(1, 144)$ = 8.40, p < .01. Standardized β's for AACS and the new Decisiveness scale were .29 and .23 respectively. Furthermore, the new Decisiveness scale turned out to have incremental validity over and beyond the old scale when both were inserted in the regression, with standardized β = .05

(*n.s.*) for the old scale and $\beta = .22$ ($p < .01$) for the new scale. We therefore argue that unlike the original Decisiveness scale, the newly developed items predict variance in seizing processes that cannot be entirely accounted for by ability.

In conclusion, the present results show that the new Decisiveness items significantly predict seizing processes, and have incremental validity over and beyond ability, confirming its assumed motivational nature. Conversely, although the old Decisiveness scale is significantly related to the seizing component, it does not explain additional variance when AACS is entered in the first block of the regression equation. Hence, this result suggests that the relation between the old Decisiveness scale and the seizing process primarily reflects its ability component.

STUDY 3

The third study further tests the validity of the new items. Although these items were explicitly constructed and intended to measure need rather than behavior or ability, and although their content reveals that they probe a need (i.e., the items have face validity), the third study seeks to extend this evidence by demonstrating that outcomes predicted by the items are sensitive to an experimentally induced manipulation of need. We therefore developed an experimental manipulation contrasting high and low induced need. We expect that high scorers on the new items will respond more quickly than low scorers in a typical situation that does not in itself calls for swift responding but that these differences shrink or disappear when the situation in itself induces a propensity for quick answers.

The motivation to respond quickly is manipulated in this experiment by requesting subjects to devote their attention to a primary task while paying less attention to a secondary, less important task. We therefore contrasted conditions with a decision task as the primary and cognitive load as the secondary task and

vice-versa (swapping the primary and secondary task). A stronger need to make a fast decision is induced when the decision task is introduced as the secondary, relatively less important task. Because the decision task always comes first in the two-task sequence it delays and almost certainly hampers performance on the more important primary cognitive load task. Therefore, participants will be eager to decide quickly on the less important task and get on with the primary task as fast as possible. Conversely, if the decision task is described as important, participants can spend as much time as they want on judging the target.

In this experiment, we expect to find an interaction effect between dispositional and situational induced motivations to fast decision-making. The fact that the cognitive resources of highly motivated participants (due to their personality or because of situational variables) are depleted because they pay more attention to the cognitive load constitutes an alternative interpretation of such an interaction effect. To cope with this alternative interpretation, we included a moderately and highly burdening cognitive load condition. We reasoned that the interaction effect between the motivational status induced by the task instructions and the scores on the quick decision items can be interpreted as truly motivational in nature when it is not further qualified by the extent of the cognitive load.

Method

Participants

A total of 39 second-year political science students at Ghent University (19 men, 20 women; M age = 19.85) participated in partial fulfilment of course requirements for the introductory social psychology course.

Stimuli, Materials and Procedure

The experimental task used in the present study is based on Van Hiel and Mervielde (2002), in which participants had to judge how much they liked a person described by a personality trait. Targets were rated on a scale anchored by 1 (*Dislike very much*) and 7 (*Like very much*). Time needed to judge the target person was used as the dependent variable. Seven practice trials and 20 randomly presented experimental trials had to be completed.

In the low-load condition, four letters had to be memorized, whereas eight letters had to be memorized in the high-load conditions. The letters were displayed for five seconds on the computer screen before a trait adjective describing the target person appeared on the screen. After the target person was rated, participants wrote down the letter combination on a separate sheet of paper.

Participants were told on some trials that we were particularly interested in their judgments, whereas for other trials, the memory task was designated as more important. The primary task was announced on each trial just before presenting the memory load. In the primary task condition, participants read the message "We are primarily interested in your judgment of the target person. The performance on the memory task is less important." In the secondary task condition, participants received the opposite message, "We are primarily interested in your performance on the memory task. The judgment of the target person is less important."

Design

Motivational status of task (primary versus secondary task) and cognitive load (4 versus 8 digits) were manipulated in a 2 x 2 factorial within-subjects design. The score on the new Decisiveness scale was entered in the analysis as a covariate.

The main dependent variable was the time needed to decide how much they liked the target person.

Results

One participant was identified as an outlier with scores more than three *SD*s above the mean. Data provided by this participant were omitted from further analyses. A 2 X 2 repeated measures MANOVA revealed a main effect for motivational status of the task, $F(1, 36) = 14.38$, $p < .001$, indicating slower responding when the decision task was the primary task ($M = 5.10$ seconds, $SD = .23$) than when the decision task was the secondary task ($M = 3.71$ seconds, $SD = .25$). We also obtained a significant main effect for cognitive load, $F(1, 36) = 7.21$, $p < .05$, with higher latencies for eight digits ($M = 4.91$ seconds, $SD = .31$) than for four digits ($M = 3.89$ seconds, $SD = .21$).

In line with the predictions, a significant interaction effect emerged between motivational status of the task and the scores on the new Decisiveness scale, $F(1, 36) = 5.69$, $p < .05$. As expected, lower response latencies were obtained for high scorers as compared to low scorers with the decision task as the primary task, whereas these differences disappeared when the decision task was the secondary task. This effect is visualized in Figure 1 by grouping low and high scorers based on the median split of the new Decisiveness scale scores. Additional analysis of contrasts (based on this median split) revealed that high scorers showed significantly lower response latencies than low scorers when the decision task was the primary task, $F(1, 36) = 13.81$, $p < .01$, whereas this difference was not significant when the decision was the secondary task, $F(1, 36) = 1.53$, *n.s*. Moreover, this interaction effect was not further qualified by cognitive load, $F(1, 36) = .64$, *n.s.*, supporting the motivational nature of the crucial effect. Including the original Decisiveness scale as a covariate did not undermine the interaction effect, $F(1, 35) = 4.52$, $p < .05$. Hence these results revealed that the new Decisiveness items affect the presumed motivational

component of the task, but that the original Decisiveness scale does not account for these effects.

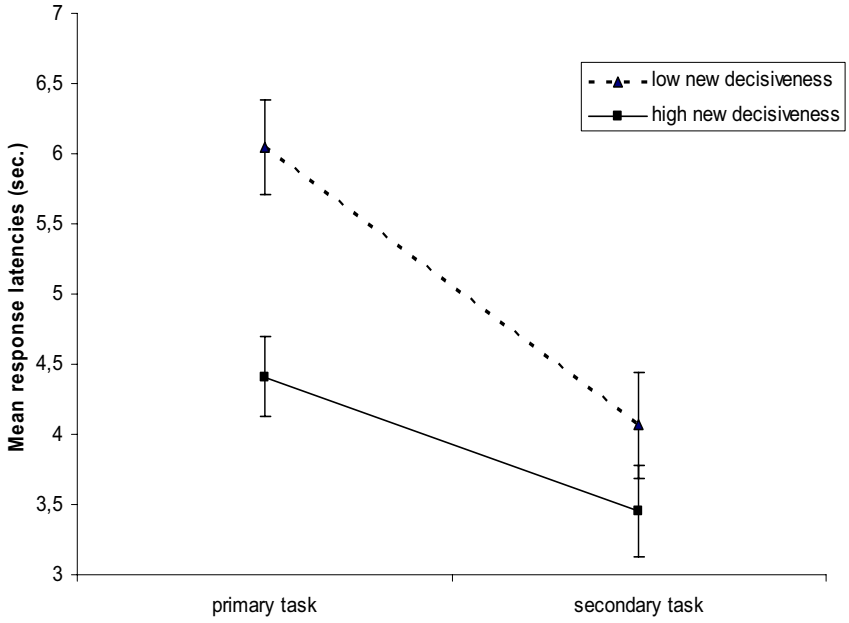

Figure 1. Response latencies on primary (low induced NFC) and secondary (high induced NFC) judgment task for high versus low scorers on new Decisiveness scale with standardized errors.

Next, we conducted similar analyses for the original Decisiveness scale. In contrast with the analyses based on the new scale, the interaction effect between motivational status of the task and original Decisiveness was not significant, $F(1, 36) = .11$, *n.s.*, and the interaction effect between load and Decisiveness also did not approach significance, $F(1, 35) = 1.02$, *n.s*.

Discussion

The expected interaction effect between motivational status of the decision-making task (primary task versus secondary task) and the scores on the new Decisiveness scale was borne out by the present data. In particular, when the decision task was the primary task, lower response latencies for high scorers on the new items emerged. Similar differences, however, did not emerge when the decision task was the secondary task, presumably because both low and high scorers on the new Decisiveness scale felt the situationally induced urge to decide quickly to get on with the more important cognitive load task. This moderator effect of experimental and dispositional need on the response latencies provides further evidence of the validity of the newly developed items.

It is also important to point out that this interaction effect was not further qualified by experimentally induced variations in cognitive load, extending the findings of Study 2 in which ability measured by the AACS questionnaire also failed to undermine the need effect. Together these findings thus not only attest to the motivational nature of the effects associated with the new Decisiveness scale but they also reveal that ability – irrespective of the fact that ability is measured by a questionnaire or induced by a situation - does not account for these motivational effects.

STUDY 4

Given that the newly developed items adequately measure the need for quick decisions and that this scale, unlike the original Decisiveness scale, taps motivational need for closure instead of the corresponding ability, the psychometric properties of the NFCS should be reassessed. Because the original Decisiveness items of the NFCS do not seem to adequately measure a need - probably accounting for the psychometric problems reported by Neuberg et al. (1997) - we will replace

the items of this facet scale by the new items. Hence, in the present investigation, the analyses performed on the original NFCS by Neuberg, Judice, and West (1997) will be replicated and compared with the reassembled NFCS, substituting the original Decisiveness items with the new items.

Method

To test various theoretical models, data from two different samples were collected and analysed. The first sample (N = 400) consisted of second year undergraduate psychology students who volunteered for this study. The second sample (N = 434) consisted of second year undergraduate social sciences students who received partial course credit for participation. All participants anonymously completed the six new items as well as the Dutch translation of the NFCS (Cratylus, 1995) during a class session.

Results

First we examined whether replacing the original Decisiveness items by the new items improves internal consistency and increases interitem homogeneity, as well as raises the correlations among the five NFCS facets. Next we conduct exploratory and confirmatory factor analyses.

Internal consistency, interitem correlations, and correlations among the facet scales

Replacing the items from the original Decisiveness facet scale with the new items raises the Cronbach's alpha of the total NFCS from .85 to .87 in Sample 1 and from .82 to .86 in Sample 2. Although this is a modest increase, one should take into account the already high target values, the large number of items, and the fact that about 80% of the original item set was preserved. Replacement of the Decisiveness

items raised the median interitem correlation from .14 to .16 in Sample 1 and from .12 to .16 in Sample 2.

In accordance with the findings reported by Neuberg and colleagues, analysis of interitem correlations for the original NFCS produced 27.5% and 25.5% negative correlations in Sample 1 and 2, respectively. After replacement of the old Decisiveness items with the new items, the proportion of negative interitem correlations dropped to 16.0% and 11.8% in Sample 1 and 2, respectively. Neuberg, Judice, and West (1997) argued that it "…seems unlikely that Closed-Mindedness by itself will add much of use…" (p. 1405), and because of its low internal consistency, this facet scale should be excluded from the NFCS. Omitting the items of this facet scale from our analyses further raised the Cronbach's alpha to .88 and .87 for sample 1 and 2, respectively, as well as increased the median interitem correlation to .20 and .19 respectively, including only 9.1% and 4.6% negative correlations, respectively.

Table 1
Intercorrelations between the Need for Closure facet scales and the new Decisiveness scale

Scale	(1)	(2)	(3)	(4)	(5)
(1) Need for Order	__				
(2) Need for Predictability	.62**	__			
	.56**				
(3) Intolerance of Ambiguity	.33**	.40**	__		
	.29**	.48**			
(4) Closed-mindedness	.12*	.21**	.05	__	
	.15**	.27**	.07		
(5) Decisiveness	.08	-.09	-.27**	.20**	__
	.14**	-.08	-.20**	.06	
(6) New Decisiveness	.21**	.14**	.26**	.17**	.25**
	.29**	.30**	.31**	.22**	.05

Note. Upper correlations for sample 1, lower correlations for sample 2.
* p< .05. ** p<.01.

Finally, as can be seen in Table 1, the five original facet scales of the NFCS showed a similar pattern of correlations as reported by Neuberg and colleagues. The old Decisiveness scale is uncorrelated or negatively correlated with almost all other subscales in the original NFCS, which is incompatible with the basic rationale of the scale that requires simple aggregation of all items. That is, if negatively related with other facet scales, inclusion of the Decisiveness items in the aggregated score tends to reduce its validity because those high in NFC generally will generally obtain lower overall scores because of their low Decisiveness scores and those low in NFC will obtain higher scores because of their higher Decisiveness scores.

As can be seen in Table 1, the new Decisiveness scale is moderately correlated with Decisiveness in Sample 1 and unrelated to Decisiveness in Sample 2, indicating that these scales in fact measure different content although they are based on the very same concept of swift responding. More important, the new scale shows high, positive correlations with all other facet scales of the NFCS. Hence, replacing the old Decisiveness scale with the new items yields findings that are much more in tune with the theoretical underpinnings of the NFCS.

Next, we investigated the underlying structure of NFCS with exploratory and confirmatory factor analyses. In order to achieve a sample size (N = 834) that guarantees sufficient power to test models with a relatively high number of degrees of freedom, both samples drawn from virtually the same student population were merged.

Exploratory factor Analyses

To guarantee comparability between the exploratory and confirmatory factor analyses, the exploratory factor analysis was also performed on the aggregated data file. Analysis of the original NFCS, extracting one component, revealed the smallest loadings (all < |.11|) for the old Decisiveness items, with four out of seven items yielding negative loadings. Exploratory factor analysis after replacement of the old Decisiveness items by the new items resulted in positive loadings for all items, ranging from .16 to .53, with a median of .34.

Confirmatory Factor Analyses: indicators of fit and measurement models

Confirmatory factor analysis was conducted using Lisrel 8.54 (Jöreskog & Sörbom, 1996) with maximum likelihood estimates derived from the sample covariance matrix. Following recommendations by Hu and Bentler (1998) and MacCallum and Austin (2000), we examined the Root Mean Squared Error of

Approximation (RMSEA, Steiger & Lind, 1980), the Standardized Root Mean Squared Residual (SRMR, Bentler, 1995) and Comparative Fit Index (CFI, Bentler, 1990) to evaluate the goodness of fit of the measurement model and structural models further in the analysis. These indicators have been shown to be most sensitive to models with misspecified factor loadings and factor (co)-variances. According to Hu and Bentler (1999), the combined cut-off values of .09 for SRMR, .06 for RMSEA and .95 or more for CFI indicate good fit.

Table 2
Fit indices for the confirmatory factor-analysis of five models representing the Need for Closure

	χ^2	df	χ^2/df	RMSEA	CFI	SRMR	AIC
Model 1[a]	2.589.27	522	4.96	0.073	0.91	0.096	2735.27
	1827.40	373	4.90	0.072	0.93	0.080	1951.40
Model 1b[a]	2628.80	523	5.03	0.073	0.90	0.095	2772.80
	1853.23	374	4.96	0.073	0.93	0.084	1975.23
Model 2[a]	1969.90	490	4.02	0.063	0.92	0.078	2111.85
	1340.72	346	3.87	0.062	0.95	0.057	1460.72
Model 3[b]	2611.59	523	4.99	0.073	0.90	0.092	2755.59
	1835.59	374	4.91	0.072	0.93	0.081	1957.59
Model 4[b]	2018.48	491	4.11	0.064	0.92	0.088	2158.48
	1372.09	347	3.95	0.063	0.94	0.073	1490.09

Note. Upper lines for each model represent fit indices for a model with Closed-mindedness; lower lines for each model represent fit indices for a model without Closed-mindedness.

a In Models 1, 1b and 2, each facet scale is represented by a first-order latent variable. In Model 1 and 1b the original Decisiveness items were included; in Model 2, the 6 newly written items replaced the Decisiveness items.

b Fit indices refer to models with two orthogonal latent variables: Need For Simple Structure (NFSS, second-order) and Decisiveness (Model 3) or NFSS and the 6-item scale (Model 4).

Although the original NFCS was composed of five facet scales, and Neuberg and colleagues (1997) tested the unidimensionality proposed by Kruglanski and colleagues by including all five facet scales, they suggested dropping the closed-mindedness subscale - because of its low internal consistency- for the test of their two-dimensional model. In the present study, a measurement model of the original NFCS without the closed-mindedness facet scale indicated better fit ($\chi^2(371) = 1666.22$, RMSEA = .068, CFI = .93, SRMR = .070) than a model with closed-mindedness included ($\chi^2(517) = 2346.56$, RMSEA = .069, CFI = .91, SRMR = .083). Furthermore, the latent variable representing the closed-mindedness scale was significantly related to only one facet scale from the NFSS component (with Predictability, $p < .05$) while all other facet scales of NFSS were highly intercorrelated (all ps $< .001$). Subsequent analyses therefore test all relevant models once with and once without the closed-mindedness facet scale.

Confirmatory Factor Analysis of the model hypothesized by Kruglanski and colleagues

In the model that comes closest to the theoretical representation of the NFCS advocated by Kruglanski and colleagues, the items constitute five first-order latent variables – each of them representing the facet scales of the NFCS- that in turn load a second-order latent variable. Neuberg, Judice, and West (1997) state that "…this second-order model appears to be the most consistent with Webster and Kruglanski's five-facet conception of the NFCS…" (p. 1398). This model will be referred to as the unidimensional model. However, one should keep in mind that this second-order unidimensional model attests to the item variety underlying the distinctive facet scales. That is, the items are sorted in subscales that, in turn, all refer to the same single construct rather than treating the item set as an undifferentiated pool of equivalent items all loading directly on the same construct.

In addition, we required positive and preferably significant paths from the general second-order latent variable to all subscale latent variables. Because the NFCS is considered to be unidimensional and the total score on the NFCS is the mean of all subscale items (reversed if necessary), positive paths from the second-order latent variable to the subscales are required.

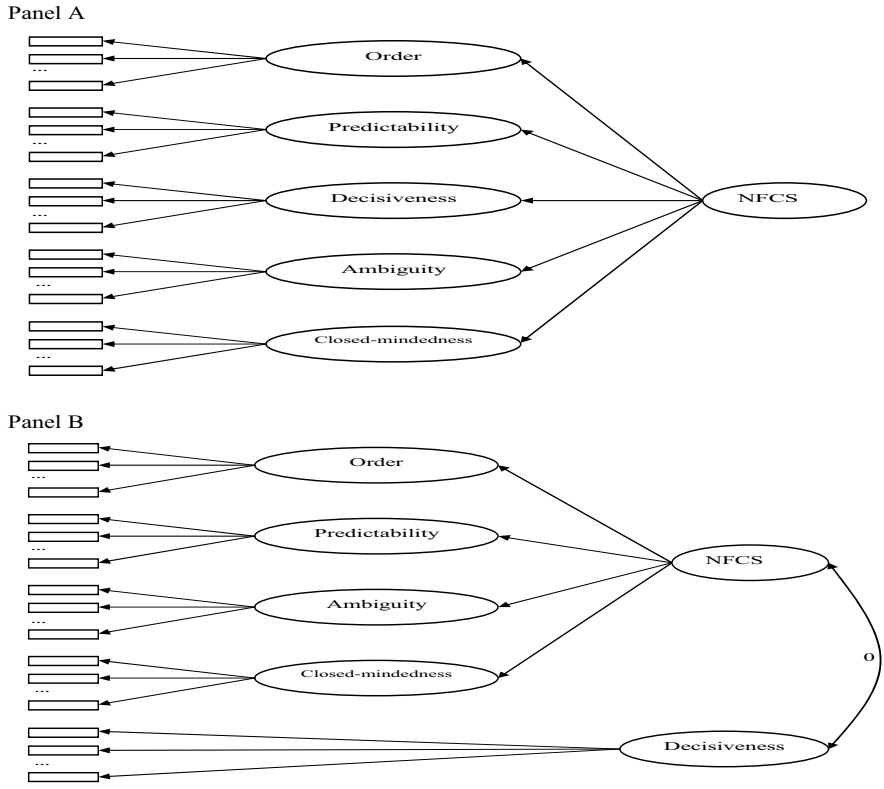

Figure 2 Panel A: Structural representation of Model 1;
Panel B: Structural representation of Model 3.

Note. In Panel A, for Model 1b, the path from the Need for Closure Scale (NFCS) to Decisiveness is fixed to the minimal positive significant path. For Model 2 the Decisiveness subscale has been replaced by the scale consisting our 6 newly developed items. For Model 4 the Decisiveness subscale has been replaced by the scale consisting of our 6 newly developed items.

We first tested the fit of a model representing the NFCS with its original facet scales. In this model (Model 1, see Table 2 and Figure 2) the path from NFCS to Decisiveness turned out to be negative and significant, standardized βs= -.16 and -.17 (for the model with and without Closed-mindedness, respectively). Therefore, this model fails to meet the theoretical constraint requiring solely positive paths from NFCS to every subscale. To adapt the model to this vital requirement, we ran the model again after introducing an additional restriction by fixing the value of this negative path to the minimum positive value required to render this path significant (Model 1b). As can be seen in Table 2, although Model 1b meets the theoretical requirements, it yields a significantly worse fit than the original model, with $\Delta\chi^2(1) = 30.78$, $p < .001$, and $\Delta\chi^2(1) = 25.83$, $p < .001$, for the model with and without Closed-mindedness, respectively.

Next, we tested Model 2, representing the very same structure but with substitution of the original Decisiveness items by the new items, validated in the previous studies. Because nonnested models are compared here, the Akaike Information Criterion (AIC, Akaike, 1987) was examined. Lower AIC indicates a better fit. Model 2 was in tune with the theoretical restrictions and showed a better fit than Model 1b (AIC = 2231.81 for Model 2 and AIC = 2782.11 for Model 1b with Closed-mindedness and AIC =1564.65 for Model 2 and AIC = 1975.23 for Model 1b without the closed-mindedness facet scale;see also Table 2).

Finally, it is important to note that complex and comprehensive models tested with confirmatory factor analysis typically produce fit indices that are rather modest. Although some of the fit indices for the unidimensional model are slightly off the rule-of-thumb recommendations for good fit provided in the literature, the overall results suggests an acceptable fit for the proposed structure.

Confirmatory Factor Analysis of the Neuberg and colleagues model

The previous models were all based on the Kruglanski perspective contending that NFCS manifests one latent variable indicated or expressed in five different ways. However, it is also possible that Neuberg's two-dimensional approach yields a better fit than a unidimensional model. To test Neuberg's perspective we specified a model with first-order latent variables for all facet scales in which the facet scales, except Decisiveness, constitute a second-order latent variable NFSS, which is orthogonal to the decisiveness latent variable. Moreover, it is also feasible that replacing Decisiveness items with the new items within this two-factor model yields an even better fit. Model 3 with two orthogonal components differentiating the latent variables NFSS and decisiveness, showed a slightly better fit than the corrected unidimensional model (Model 1b) with five correlated facet scales (based on a comparison of χ^2, RMSEA, SRMR and AIC; see Table 2) confirming that Decisiveness is distinct from the other facet scales. However, an analogous Model 4 with the new Decisiveness items instead of the old items revealed a worse fit for this two-dimensional model compared to the unidimensional model (Model 2) ($\Delta\chi^2(1) = 48.58$, $p < .001$ and $\Delta\chi^2(1) = 31.37$, $p < .001$ for the model with and without Closed-mindedness respectively). This difference in model fit may be considered modest given the overall number of items and the high power for detecting differences. Nonetheless, the improvement is highly significant and indicates that the new Decisiveness scale is in fact better conceived as an integral part of the NFCS (see also Table 2).

Discussion

The present study yields three noteworthy results. First, replicating and extending the psychometric analyses performed by Neuberg, Judice, and West (1997), it was revealed that a two-dimensional structure underlies the original

NFCS. Indeed, the two-dimensional model had a slightly better fit than the unidimensional model, at least when the unidimensional model met all theoretical requirements. Because Neuberg and colleagues proposed this model but did not test the hypothesized two-dimensional structure themselves, this paper is the first to confirm with item level confirmatory factor analysis the structure of the original NFCS.

Second, and even more importantly, tests performed on a modified version of the NFCS including the set of new Decisiveness items revealed that the best-fitting model is the one in which Need for Closure is conceptualised as a unidimensional construct, indicated by five facets. These analyses of the modified NFCS with the new Decisiveness items thus confirm the unidimensional model championed by Kruglanski and colleagues.

Third, the model with the new Decisiveness items revealed a superior fit compared to the model with the old Decisiveness items. Moreover, it has been convincingly shown that the new Decisiveness scale reflects motivation rather than ability. In other words, the present studies demonstrate that the replacement of the old Decisiveness scale by a more appropriate item set upgrades the NFCS to an instrument that it is theoretically coherent with need for closure theory, as intended by its original developers. In sum, we can conclude that this upgraded version of the NFCS is a less ambiguous measure of need for closure. Finally, we note that dropping Closed-mindedness items further improved the psychometric quality of NFCS.

GENERAL DISCUSSION

The present series of studies demonstrated that the set of new Decisiveness items provides a viable alternative for the old Decisiveness subscale of the NFCS, which was poorly related to the other NFCS facet scales (e.g., Neuberg, Judice, &

West, 1997) and had questionable validity (see Mannetti et al., 2002; Roets et al., 2006). We believe that these psychometric problems of the original Decisiveness facet scale are caused by the fact that this scale is contaminated by ability-related content, while the NFCS intended to solely measure the need component of closure. The inclusion of ability related content, then, is responsible for the often-cited psychometric problems of the NFCS, primarily reflected by its multidimensionality. Therefore the new items were developed with explicit reference to decisiveness, but formulated in such a way that they relate to the *need* rather than to the *ability* to decide.

Four main findings surface from the present studies. First, the newly developed items correlate substantially, resulting in a scale with adequate internal consistency. Second, the new Decisiveness scale showed incremental validity above and beyond a measure of ability in predicting seizing processes, whereas the traditional Decisiveness scale only accounted for the variance in seizing that could be attributed to ability. Third, the scores on the new Decisiveness scale moderated the effect of an experimental manipulation of motivation on the processing of predecisional information, whereas the traditional Decisiveness scale did not moderate this effect. Moreover, it was shown that the effect of the new Decisiveness scale was not altered by experimentally induced variation of cognitive ability. Finally, replacing the old Decisiveness facet scale by the new items substantially improved the unidimensionality of the NFCS, increasing its internal consistency and interitem homogeneity as well as yielding a factor structure in accordance with need for closure theory. In line with the theorizing of Kruglanski et al. (1997) and Webster and Kruglanski (1994), a model with the five facet scales as separate first-order factors and one general second-order factor turned out to be the best fitting model for this re-assembled NFCS.

In sum, the present results indicate – in accordance with Neuberg and colleagues (1997) – that the old Decisiveness scale is marginally related to the other NFCS facet scales and therefore should be considered as a separate dimension. However, the present results also clearly show that the new items - probing a *need* to decide - do not load on a distinct dimension but instead constitute an integral part of the full fledged need for closure scale. From this perspective it seems reasonable to presume that the diverging findings of Neuberg and colleagues are due to a less than optimal operationalization of "making quick decisions" as conceived by the old Decisiveness facet scale.

Nevertheless, Neuberg and colleagues criticism about the poor psychometric qualities of the Closed-mindedness scale were supported by the present data. This facet scale evinced poor internal consistency, substantially impedes the coherence of the NFCS in terms of interitem correlations, is not related to most of the other facet scales, and dropping it from the original NFCS improves model fit.

A straightforward implication of the present results is that if researchers choose to administer the original NFCS, they are recommended to conceive it as a two-dimensional instrument, not only measuring need but also ability to reach closure. However, we recommend the reassembled unidimensional NFCS as the most adequate measure of need for closure if the research focuses primarily on the motivational component of closure. In addition, future users of NFCS may consider dropping the Closed-mindedness facet scale. Finally, we want to point out that not only the consideration of the global NFCS but also the separate analysis of the different facet scales should be recommended to gain further insight in the exact structure of the NFC concept and its operationalization.

Our contribution to clarify the debate between Kruglanski and Neuberg has also raised two critical issues that still need to be addressed. First, the relationships between NFCS and the seizing and freezing processes should be discussed. Second,

the present results attest to the need for a theoretical framework that integrates the need and ability components that inevitably accompany each instance of decision-making.

The relationships between NFCS and seizing and freezing processes

Based on the results of psychometric analyses, Neuberg and colleagues inferred that Decisiveness might be a dispositional analogue of the propensity to seize and that the other facet scales denoting Need for Simple Structure represent the tendency to engage in freezing. However, the present results do not corroborate this line of reasoning as they suggest that the Decisiveness scale is not particularly efficient to probe for the hypothesized need component reflected in seizing.

Moreover, Roets et al. (2006) compared the impact of the various NFCS facet scales on prototypical indicators of seizing and freezing processes and report equally strong relationships with both seizing and freezing processes. In other words, Decisiveness and the Need for Simple Structure are *not* specific indicators of seizing and freezing processes and therefore lack specificity to corroborate Neuberg and colleagues' perspective. In sum, the present results as well as those reported by Roets et al. (2006) do not support the hypothesis that Decisiveness is a dispositional analogue of the propensity to seize, because (1) a *need* to obtain quick decisions is closely related to, and yields results convergent with, the other need for closure facets, and (2) the (old) Decisiveness scale did not emerge as a unique or specific indicator of seizing processes.

It is important to note that the authors of the original NFCS did not intend to distinguish between seizing and freezing processes. They argued instead that both processes underlying the need for closure are interconnected. Constructing a measure that distinguishes between seizing and freezing processes represents a justifiable goal, but the present results as well as those obtained by Roets et al.

(2006) suggest that the NFCS items are not really appropriate to address this question. Nevertheless, research that focuses on this issue may remain important to substantiate Neuberg and colleagues' claims.

A Need X Ability framework of judgments and decision-making

Although the present study did not provide an extensive account of the relationship between need and ability, the seemingly unattended mix of need and ability items in the Decisiveness facet scale undoubtedly attests to the entanglement of both concepts. This is surely not a new insight (e.g. Hess, 2001; Kuhn, 2001) because previous accounts of need for closure (see Kruglanski & Webster, 1996; Webster, Richter, & Kruglanski, 1996) acknowledge that situational demand manipulations -implemented to induce need for closure- not only affect the individual's information-processing motivation but also tend to decrease his/her cognitive capacity in relation to task requirements (see Kruglanski & Webster, 1996). This 'double effect' of need for closure manipulations raises questions about the relationship between ability and motivation as well as about their joint effects on judgment and task performance.

According to Kruglanski and Webster (1996), "relative capacity and motivation are multiplicatively related" (p. 280). In other words, one should expect an interaction between ability and motivation. However, although some studies have shown that need and ability predict task performance (e.g., Hess, 2001; Hess, Waters, & Bolstad, 2000; Kuhn, 2001), there is little empirical evidence for an interaction between need and ability, predicting judgments and outcomes of decision tasks. Unfortunately, in the present studies (Studies 2 and 3), such an interaction effect between Decisiveness and need for closure did not emerge. A possible explanation for this lack of empirical support might be that although Decisiveness

includes items measuring ability, it is not particularly useful as an unambiguous measure of cognitive capacity.

Some previous studies however generated confirming evidence for the hypothesized Need X Ability interaction. Pelham and Neter (1995) and Bar-Tal et al. (1997) already suggested that high levels of motivation increase performance when the task is easy or when the situation implies high ability. Conversely, a decrease in performance occurs when the task is difficult or when the situation induces low ability. Although these studies do not manipulate or measure need for closure, these findings suggest a potential interaction effect between ability and need for closure.

In sum, there is some evidence for an interaction effect between need for closure and ability, although the exact nature of this effect still has to be revealed. Bar-Tal and colleagues, for example, suggest that low levels of ability combined with high levels of motivation lead to hypervigilant processing, resulting in low levels of task performance, whereas Kruglanski and Webster (1996) suggest intermediate levels of task performance given the high levels of at least one of the crucial instigators of good task performance and precise judgment.

The theoretical implications of this specific type of interaction between need and ability are still open to debate. Kruglanski and Webster (1996) and Websteret al. (1993) presented two theoretical models that might underlie this multiplicative function between need and ability. In their first account – the independence assumption - it is asserted that capacity and motivation are independent. Hence, reductions in capacity do not affect motivation, and fluctuations in motivation do not affect capacity. In their second account – the causality assumption – depletion of cognitive resources induces a motivation to expend less effort on the requisite judgment, which translates in heightened levels of need for closure. Kruglanski and colleagues expressed greater preference for the latter account, which seems to have

better empirical support. For example, Hess (2001; Hess et al., 2000) argued that the age-related decline in cognitive ability causes higher Need for Structure and lower Need for Cognition, influencing task performance and everyday judgments.

Implications for former and future applied research

In their 'advice for the potential user', Neuberg and colleagues (1997) argued: "…additional work will be necessary for these scales to reach their maximum potential as measures of the intended constructs. … If proper studies of convergent, discriminant, and construct validity establish the intended and unique interpretations of the resulting subscales, the 'NFCS-revised' would offer considerable promise of being an excellent measure of individual differences …" (p. 1407). Mannetti et al. (2002) have also pleaded for an improved operational definition, particularly of the Decisiveness facet scale. To date, however, no attempt was made to ameliorate the NFCS, although the contributions of Neuberg and colleagues have focused attention of the scientific community on the psychometric tribulations regarding the NFCS and theoretical implications of these problems.

The mere absence of closure in the debate caused some researchers to wonder whether they did not miss out on interesting effects by using the 'wrong' perspective on the scale or to refrain from using the NFCS even though they consider the scale to be a potentially useful research instrument. For example, Klein and Webster (2000) argued: "Perhaps, we may have observed stronger moderational effects had we differentiated between the two motives (*Decisiveness and NFSS*)" (p. 128, italics added), whereas Chaikenet al. (1999) acknowledged the potential benefit of introducing need for closure in their dual-process theory on the motivational treatment of persuasion but refrained from employing the scale because "its utility in advancing theory and research awaits the resolution of debates regarding the validity

of current manipulations and measures of the need for closure" (p. 122). In sum, the ambiguities surrounding the NFCS impede the application of need for closure theory, and efforts to solve these problems would increase its impact.

Furthermore, as long as the theoretical status of Decisiveness remains unclear, conflicting and incorrect interpretations of the relationships between NFCS and third variables are likely to occur. In fact, three creative strategies for using the NFCS evolved over time. First, some researchers bypass the problem by simply omitting the troublesome Decisiveness scale from their analysis (e.g., Chirumbolo, Areni, & Sensales, 2004; Pierro, Mannetti, De Grada, Livi, & Kruglanski, 2003). Second, others use the scale as a unidimensional construct, applying the original NFCS in the same way it was used before the psychometric debate (e.g. Chiu, Morris, Hong, & Menon, 2000; Jost, Glaser, Kruglanski, & Sullaway, 2003), ignoring the psychometric problems and the apparent multidimensionality of the scale. Third, some scholars differentiate between the Decisiveness and NFSS component when analyzing NFCS data, invariably interpreting results in terms of seizing and freezing processes (e.g., Hirt, Kardes, & Markman, 2004; Van Hiel, Pandelaere, & Duriez, 2004), disregarding the lack of empirical support for this position.

Although all three strategies are more or less problematic, depending on the exact question under study, the present results and those obtained by Roets et al. (2006) suggest that the second and especially the third strategy may lead to erroneous conclusions. Research connecting Decisiveness and seizing processes is very likely to misinterpret the effects of seizing processes on third variables.

Finally, we wish to emphasize that amelioration of the NFCS not only resolves confusions about the scale but also is needed to realize its full potential. The inclusion of a facet scale that unwittingly measures a different concept obviously diminishes the practical value of the scale. Moreover, addressing this problem and

raising the scale's internal consistency will boost correlations with other variables that are genuinely related to NFC and simultaneously reduce chances to obtain spurious correlations.

Conclusion

The present studies addressed some of the conceptual and psychometric issues that have been debated in the literature on the NFCS (see Kruglanski et al., 1997; Neuberg, Judice, & West, 1997: Neuberg, West et al., 1997). In our opinion, many of the critiques that Neuberg and colleagues formulated on the NFCS are justifiable, and the present results confirm that Decisiveness is poorly related to the other NFCS facet scales. However, the present study also shows that these flaws can be fixed with new Decisiveness items that explicitly measure the *need* for having a quick answer. Hence, we conclude that the deviant status of Decisiveness is due to its original operationalization, rather than to its theoretical status as suggested by Neuberg and colleagues.

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APPENDIX CHAPTER 3: ALTERNATIVE DECISIVENESS ITEMS

The six item scale as an alternative for the Decisiveness facet scale.

1) When I have made a decision, I feel relieved.
2) When I am confronted with a problem, I ‘m dying to reach a solution very quickly.
3) I would quickly become impatient and irritated if I would not find a solution to a problem immediately.
4) I would rather make a decision quickly than sleep over it.
5) Even if I get a lot of time to make a decision, I still feel compelled to decide quickly.
6) I almost always feel hurried to reach a decision, even when there is no reason to do so.

Chapter 4:

Need for Closure relations with authoritarianism, conservative beliefs and racism: The impact of Urgency and Permanence tendencies[7]

ABSTRACT

Previous research has shown that Right-Wing Authoritarianism and Social Dominance Orientation mediate the relationship between need for closure (NFC) and conservative beliefs and racism. These results did not apply to the NFC facet scale Decisiveness. However, the Decisiveness scale has been reported to have a questionable validity, and the recent development of a new scale inspired a reassessment of these previous studies. The present results obtained in two Flemish undergraduate samples (N = 164 and 162) show that both the new Decisiveness scale and the other NFC facet scales correlate with conservatism and racism, and that both these relationships are mediated by social attitudes (i.e. RWA and SDO). In the discussion it is argued that not only permanence needs, but also the urgency need reflected in Decisiveness, are important in order to understand right-wing ideology.

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INTRODUCTION

Since the publication of Adorno, Frenkel-Brunswik, Levinson, & Stanford's (1950) *The Authoritarian Personality*, numerous studies have shown that authoritarianism is strongly related to political and ideological attitudes in general, and conservatism and racism in particular (for an overview, see Duckitt, 2001). Modern approaches of authoritarianism (e.g., Right-Wing Authoritarianism, RWA, Altemeyer, 1981; 1996) define the concept as the covariation of pro-attitudes toward conventionalism, submission to ingroup leaders and authorities, and aggression toward outgroup members. High correlations were found between RWA and, for example, ethnic prejudice, nationalism, political and economic conservatism, and right-wing political party preferences (for an overview, see Altemeyer, 1981; 1988; 1996). Also, from the early days on, the hypothesis that authoritarianism is reflected in dysfunctional cognitive performance has attracted a lot of research attention. Classic studies that followed these lines reported that authoritarianism is related to cognitive rigidity (Rokeach, 1948), intolerance of ambiguity (Frenkel-Brunswik, 1949), and low levels of integrative complexity (for an overview, Van Hiel & Mervielde, 2003).

More recently, we witnessed the innovative introduction of Social Dominance Orientation (SDO) which has been defined as "a general attitudinal orientation toward intergroup relations, reflecting whether one generally prefers such relations to be equal, versus hierarchical" (Pratto, Sidanius, Stallworth, & Malle, 1994, p. 742). Many studies also showed that SDO is related to conservative beliefs, right-wing political preferences, and positive opinions about punitive policies and military programs (for an overview, see Pratto, 1999). Because these variables are related to authoritarianism as well, researchers have started to examine the predictive utility of both social attitudes (i.e., RWA and SDO) in explaining right-wing political attitudes and values (Duriez, & Van Hiel, 2002; McFarland, 1998) and prejudice (e.g. Altemeyer, 1998; Van Hiel & Mervielde, 2002).

The relationship between social attitudes and cognitive functioning

Scholars recently showed a renewed interest in the motivational aspects of cognitive functioning, eliciting a vast amount of research on constructs like, for instance, the need for closure (Kruglanski & Webster, 1996), need for cognition (Cacioppo & Petty, 1982) and regulatory focus (Higgins, 1998). Especially the need for closure (NFC) has been intensively studied and will be the focus of the present manuscript. NFC has been introduced as an important concept within a theoretical framework of motivational aspects in decision-making (Kruglanski & Webster, 1996) and comprises two sequential strivings. First, strivings for urgency (i.e., the need for quick, unambiguous answers), promote behaviour in which people *seize* on an early available solution. Second, strivings for permanence (i.e., the need to consolidate previously acquired knowledge), may lead to behavior in which people *freeze* on the answer just obtained. The seizing and freezing phenomena are as such manifestations of the underlying urgency and permanence strivings.

Webster and Kruglanski (1994) also developed a Need for closure scale to assess individual differences in NFC. This instrument was conceived as a general measure of NFC comprising five facet scales which represent the various ways the concept manifests itself.

The aforementioned advancements in our understanding of social attitudes and motivational-cognitive styles have instigated research on the relationship between these two types of variables (e.g., Chirumbolo, 2002; Cornelis & Van Hiel, 2006; Crowson, Thoma, & Hestevold, 2005; Jost, Glaser, Kruglanski, & Sulloway, 2003; Jost, Kruglanski, & Simon 1999; Kemmelmeier, 1997; Kossowska &Van Hiel, 2003; Van Hiel, Pandelaere, & Duriez, 2004). While the aforementioned studies provided direct evidence for the link between social attitudes and NFC, other studies provided additional, indirect evidence for this relation by showing that high need for closure individuals are more likely to prefer autocratic leadership (Pierro,

Mannetti, De Grada, Livi, & Kruglanski, 2003) and to derogate deviants (Kruglanski & Webster, 1991). Moreover, other research also revealed significant relationships between NFC and prejudice, showing that high (vs. low) NFC scorers tend to favour ingroups and derogate outgroups (Golec, Federico, Cislak, & Dial, 2005; Kruglanski, Mannetti, Pierro, & De Grada, 2006).

An integrative model of social attitudes and cognitive style explaining right-wing ideology and prejudice

Some studies (Chirumbolo, 2002; Cornelis & Van Hiel, 2006; Crowson et al., 2005; Van Hiel et al., 2004) tried to construct integrative models in which the effects of NFC on target variables, such as right-wing beliefs and prejudice, are transmitted through social attitudes. Van Hiel et al. (2004) have indeed shown that the NFC effects on conservatism and prejudice were fully mediated by RWA, as well as partially mediated by SDO. Moreover, separate analyses for the five NFC facet scales yielded striking differences. The relations between the conglomerate of four NFC facets scales – need for order, need for predictability, intolerance of ambiguity, and closed-mindedness - and conservatism and racism were mediated by RWA and SDO. Interestingly, exactly these four scales have been identified as the Need for Simple Structure (NFSS), which according to Neuberg, Judice, and West (1997) probe permanence strivings. However, no such a mediation effect was obtained for Decisiveness, and this facet scale was not significantly correlated with social attitudes, nor with conservatism or racism (see also, Kossowska & Van Hiel, 2003). According to Neuberg et al. (1997), Decisiveness is the one facet scale that captures urgency strivings.

Is Decisiveness a measure of urgency strivings?

There has been some criticism on the Decisiveness scale focussing on what this facet scale exactly measures (see, Neuberg et al., 1997). This issue has been fiercely debated (see, Kruglanski et al., 1997) but until recently, no conclusive answer on the nature of the Decisiveness scale was reached. In the meanwhile, some authors have argued that because of the non-significant relationship between Decisiveness and social attitudes, urgency strivings are not related to ideological variables (see, Kossowska & Van Hiel, 2003; Van Hiel et al., 2004). Other authors who studied the relationship between NFC and social attitudes simply omitted the Decisiveness facet scale from their analyses (e.g., Pierro, Mannetti, Livi, & Kruglanski, 2003; Chirumbolo 2002).

Recent developments however have advanced our understanding of Decisiveness, and therefore these new findings alter the interpretation of the previously reported non-significant relationship between Decisiveness and social attitudes. Roets, Van Hiel, and Cornelis (2006) found that Decisiveness and the Need for simple structure (NFSS) are not specific indicators of quick decision-making (seizing behavior) and the preservation of previously made decisions (freezing behavior) respectively, as has been assumed in the two-dimensional approach of Neuberg and colleagues (1997). In particular, both NFSS and Decisiveness had (equally) strong relations with tasks that measure seizing behaviour as well as with tasks that measure freezing behavior. Since urgency tendencies are assumed to lead to seizing behaviour, these results seem to demonstrate that the Decisiveness scale is an adequate (although not exclusive) indicator of urgency tendencies. Therefore the lack of relationship between Decisiveness and right-wing beliefs may suggest the absence of true relationship between these variables.

However, a recent study by Roets and Van Hiel (in press) demonstrated that this latter assumption is not tenable, disclosing the poor validity of the Decisiveness scale as a measure of urgency strivings. In particular, the authors revealed that the actual behaviour of reaching a conclusion quickly is not only affected by the *need* to make quick decisions (i.e. urgency strivings) but also by the *ability* to make such decisions. Moreover, they demonstrated that, although the original Decisiveness scale does affect the swiftness of decision-making, as was demonstrated by Roets et al. (2006), it only represents the ability aspect and *not* the motivational aspect (i.e. the urgency needs) of seizing behavior. This finding provided empirical evidence for the idea of Mannetti, Pierro, Kruglanski, Taris, & Bezinovic (2002) that many of the Decisiveness items refer to ability. To resolve the validity problem, Roets and Van Hiel developed a new Decisiveness scale that indeed proved to be related to urgency strivings. Put otherwise, their new Decisiveness scale reflects the intended need component, whereas the old scale did not. Moreover, this new scale was reported to be positively related to the other need for closure facet scales.

Hence, the absence of a relationship between Decisiveness and social attitudes reported in previous studies may only demonstrate that the *ability* to decide is unrelated to such attitudes. However, if a scale that measures the motivational need to seize (urgency strivings) had been used – like the new Decisiveness scale developed by Roets and Van Hiel – a significant correlation could have emerged. Hence, the main research question here is whether the new Decisiveness items are related to socio-political attitudes.

The present study

In the present study we included the original NFCS facet scales as well as the six new Decisiveness items (Roets & Van Hiel, in press) probing urgency strivings. We tested the relationship between NFC, social attitudes, conservatism

and racism, as well as a mediation model in which the relationship between NFC and conservatism and racism is mediated by these social attitudes. In particular, we expected to find a significant relationship between the new Decisiveness scale on the one hand and conservatism and racism on the other hand, mediated by social attitudes, whereas no such relationship or mediation was expected for the original Decisiveness scale.

METHOD

Participants

Data were collected in two samples of undergraduate social sciences students who completed the questionnaires in classroom sessions. The first sample (Sample 1) consisted of 164 participants (64% females) with an average age of 19.7 years (SD = .94). The second sample (Sample 2) consisted of 162 participants (82% females), having an average age of 19.8 years (SD = 3.0).

Measures

Sample 1 participants completed the 34-item NFCS (Webster & Kruglanski, 1994, translated by Cratylus, 1995). This scale includes items like: "I think that having clear rules and order at work is essential for success" and "I dislike unpredictable situations". Additionally, the 6 new Decisiveness items were administered probing the need for quick decisions (Roets & Van Hiel, 2007). These questionnaires were rated on six-point scales anchored by '*Certainly disagree*' (1) and '*Certainly agree*' (6). An 11-item RWA scale (Altemeyer, 1981, translated by Meloen, 1991) and a 14-item SDO scale (Pratto et al., 1994, translated by Van Hiel and Duriez, 2002) were also administered and rated on five-point scales anchored by '*Certainly disagree*' (1) and '*Certainly agree*' (5). Representative items from the RWA scale are: "Obedience and respect are the most important virtues children

should learn" and "Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down". The SDO scale contains items like: "Some groups of people are simply not the equals of others" and " To get ahead in life, it's sometimes necessary to step on others."

Sample 2 participants completed the 34-item Dutch version of the NFCS, the 6-item new Decisiveness scale, a 24-item RWA scale (Altemeyer, 1988, translated by Meloen, 1991) and a 14-item SDO scale. Additionally, the Middendorp cultural and economic conservatism scales (Dewitte, 1990) were administered in this sample. The 12-item cultural conservatism scale addresses beliefs and values about education, work ethic, position of women in society, abortion and euthanasia. Representative items of this scale are: "A woman is more suited to raise small children than a man" and "Working hard makes you a better person". The 12-item economic conservatism scale addresses issues such as the impact of trade unions, level of state intervention in regulating the economy, and income differences. Representative items of this scale are:"Differences between high and low incomes should remain as they are" and "Economic growth can only be realized when the government allows unrestricted private enterprise". Participants in Sample 2 also completed a 12-item (subtle) racism scale (see Pettigrew & Meertens, 1995; adapted by Van Hiel & Mervielde, 2005) which includes items like: "There are huge differences between immigrants and Belgian people with respect to their religious beliefs and practices" and "It is just a matter of some people not trying hard enough. If immigrants would only try harder they could be as well of as the Belgian people".

Cronbach's alphas and mean scores for all measures in both samples are reported in Table 1. The Need for Simple Structure (NFSS) was calculated by taking the mean of the items pertaining to the four relevant facet scores (preference for order, preference for predictability, discomfort with ambiguity and closed-

mindedness) while a mean Decisiveness score was calculated from the Decisiveness subscale items.

Table 1
Summary of Cronbach's alphas and test-retest reliabilities in Sample 1 and 2.

	Sample 1		Sample 2	
	α	MEAN (SD)	α	MEAN (SD)
RWA	.81	3.43 (.87)	.84	2.28 (.43)
SDO	.84	2.38 (.57)	.85	2.18 (.57)
NFSS	.86	3.60 (.78)	.86	3.60 (.54)
Original Decisiveness	.70	3.61 (.49)	.83	3.74 (.91)
New Decisiveness	.67	3.25 (.60)	.79	3.48 (.80)
Cultural Conservatism			.69	2.22 (.43)
Economic Conservatism			.78	2.62 (.48)
Racism			.79	3.05 (.52)

Note. α = Chronbach's alpha. RWA in Sample 1: 11 items version (Altemeyer, 1981), RWA in Sample 2: 24 items version (Altemeyer, 1988).

RESULTS

Table 2 clearly shows that whereas NFSS was significantly related to RWA and SDO in Sample 1, no relationship between the original Decisiveness scale and these variables was found. These findings corroborate previous results obtained by Kossowska and Van Hiel (2003) and Van Hiel et al. (2004). Conversely, the 6-item new Decisiveness scale, developed as an alternative for the old Decisiveness scale,

shows a correlation pattern very similar to that of NFSS, and in line with Roets and Van Hiel (in press), both these NFC scales are strongly correlated.

In Sample 2, the pattern of correlations largely replicated the results obtained in Sample 1 (see also Table 2). NFSS and the new Decisiveness scale bore out significant correlations with RWA, but in this sample, the new Decisiveness scale was not correlated with SDO. Importantly, analogous to the first sample, the original Decisiveness scale was not significantly related to RWA and SDO.

RWA as well as SDO showed strong relationships with racism and cultural conservatism, whereas only SDO was significantly related to economic conservatism. NFSS showed significant correlations with all mediator and target variables, with the exception of economic conservatism. The new Decisiveness scale was related to all mediator and target variables, apart from the non-significant correlation with economic conservatism and SDO and a borderline correlation with racism.

Table 2
Correlations between need for closure and socio-political attitudes

	NFSS	Original Decisiveness	New Decisiveness	RWA	SDO
Sample 1					
Original Decisiveness	.-.09				
New Decisiveness	.31**	.21*			
RWA	.32**	-.09	.27**		
SDO	.19*	-.03	.18**	.40**	
Sample 2					
Original Decisiveness	-.04				
New Decisiveness	.50**	.08			
RWA	.47**	-.01	.27**		
SDO	.22**	-.04	.11	.44**	
Economic conservatism	-.00	.11	.00	-.01	.29**
Cultural conservatism	.47**	.02	.27**	.63**	.32**
Racism	.37**	-.13	.15 ($p < .06$)	.46**	.47**

Note. * p< .05. ** p<.01.

In line with the model proposed by Van Hiel et al. (2004), we tested whether the effects of the original and new Decisiveness scale on the target variables were mediated by RWA and SDO, and whether this pattern of mediations was similar to the pattern obtained for NFSS. This model was only tested on Sample 2 data given that not all variables were administered in Sample 1.

Structural equation modeling with latent variables was performed using Lisrel 8.54 (Jöreskog & Sörbom, 1996a, b). We tested models with RWA and SDO as mediator variables, and racism and both cultural and economic conservatism as dependent variables for each of the three independent variables in parallel (see

Figure 1). Instead of using separate items as indicators for the latent variables, we created three parcels of random items. Parceling is not without critique when carelessly or inappropriately applied (e.g. in examining the dimensional structure of an item set), but its usefulness is generally agreed on when investigating the nature of a set of constructs and their relationships (e.g. Little, Cunningham, Shashar, & Widaman, 2002), which was exactly the aim of the present study. When used to examine the relationships between constructs, parceling has the advantage of resulting in a smaller number of indicators per latent factor, often yielding stronger relationships between individual parcels and the latent factor. Moreover, through the use of parceling, the results are less likely to be influenced by method effects, and are more likely to meet the assumptions of normality (Marsh, Hau, Balla, and Grayson, 1998). To obtain a latent variable for NFSS, the four constituting facet scales were used as indicators.

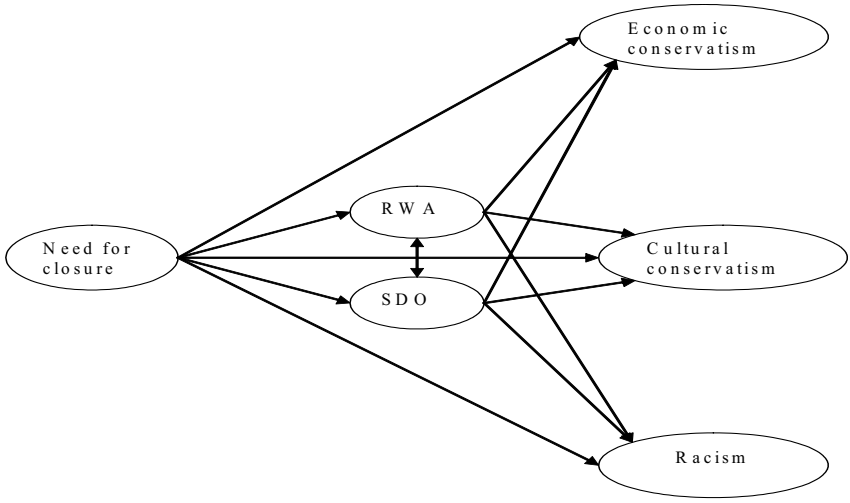

Figure 1. Model with RWA and SDO as mediator variables for effects of need for closure measures on racism and cultural and economic conservatism.
Note. The model was tested separately with NFSS, the original Decisiveness scale and the new Decisiveness scale as independent measures of need for closure.

Following recommendations by Hu and Bentler (1998) and MacCallum and Austin (2000), we examined the Root Mean Squared Error of Approximation (RMSEA, Steiger & Lind, 1980), the Standardized Root Mean Squared Residual (SRMR, Bentler, 1995) and Comparative Fit Index (CFI, Bentler, 1990) to evaluate the goodness of fit of the structural models. These indicators have been shown to be most sensitive to models with misspecified factor loadings and factor (co)-variances. According to Hu and Bentler (1999), the combined cut-off values of .09 for SRMR, .06 for RMSEA and .95 or more for CFI indicate good fit.

All models showed to have acceptable model fit; $\chi^2(140) = 264.37$, RMSEA = .075, CFI = .95, SRMR = .078 for the model with NFSS; $\chi^2(123) = 209.30$, RMSEA = .066, CFI = .96, SRMR = .073 for the model with the new Decisiveness scale; and $\chi^2(123) = 200.38$, RMSEA = .063, CFI = .96, SRMR = .069 for the model with the original Decisiveness scale.

Total, direct and indirect effects were assessed using the Lisrel program, and in order to calculate the indirect effects via SDO and RWA, Sobel (1982) tests were computed on the path coefficients of the models.

As can be seen in Table 3, NFSS and the new Decisiveness scale showed largely similar mediation effects. While both variables had no total effect on economic conservatism, strong overall effects on cultural conservatism and racism were obtained. The effects of both NFSS and the new Decisiveness scale on cultural conservatism were fully mediated by RWA. NFSS had an additional significant direct effect on racism as well as an indirect effect through both RWA and SDO, whereas the effect of new Decisiveness was fully mediated by RWA only.

In spite of some minor differences between the patterns of NFSS and the new Decisiveness scale, the present results yield an overall consistent pattern of relationships for these two independent variables. However, this overall pattern is totally dissimilar from the one obtained for the original Decisiveness scale. SEM

analyses revealed no effects of Decisiveness on cultural or economic conservatism, and a negative total effect on racism that was not mediated by RWA or SDO.

Table 3

Total, indirect, and direct effects of NFSS, the original Decisiveness scale and the new Decisiveness scale via RWA and SDO on cultural conservatism, economic conservatism and racism

Independent variable	Dependent variable	Direct effect	Total indirect effect	Indirect effect via RWA	Indirect effect via SDO	Total effect
NFSS	Cultural conservatism	.21 *t* = 1.88	.42** *t* = 4.39	.41** Sobel *z* =3.89	.01 Sobel *z* =.41	.63** *t* = 5.29
	Economic conservatism	-.02 *t* =-.17	.01 *t* =.10	-.15* Sobel *z* = 1.99	.16* Sobel *z* = 2.53	.03 *t* = .28
	Racism	.28** *t* = 2.65	.30** *t* = 3.92	.19** Sobel *z* =2.63	.10* Sobel *z* =2.35	.56** *t* = 5.79

Independent variable	Dependent variable	Direct effect	Total indirect effect	Indirect effect via RWA	Indirect effect via SDO	Total effect
Original Decisiveness	Cultural conservatism	.07 *t* = .81	-.02 *t* = -.30	-.03 Sobel *z* =.29	-.00 Sobel *z* =.31	.04 *t* = .41
	Economic conservatism	.11 *t* = 1.22	-.02 *t* = -.39	.01 Sobel *z* =.29	-.03 Sobel *z* =.50	.09 *t* = .95
	Racism	-.18* *t* = -2.24	-.03 *t* = -.43	-.02 Sobel *z* =.29	-.02 Sobel *z* =.50	-.21* *t* = -2.08

Independent variable	Dependent variable	Direct effect	Total indirect effect	Indirect effect via RWA	Indirect effect via SDO	Total effect
New Decisiveness	Cultural conservatism	.09 *t* = 1.03	.26** *t* = 3.03	.25** Sobel *z* = 2.89	.01 Sobel *z* =.39	.36** *t* = 3.13
	Economic conservatism	.03 *t* = .30	-.01 *t* = -.11	-.09* Sobel *z* =1.97	.08 Sobel *z* =1.49	.02 *t* = .23
	Racism	.00 *t* = .03	.21** *t* = 2.84	.16** Sobel *z* =2.70	.05 Sobel *z* = 1.45	.21* *t* = 2.06

Note. * p< .05. ** p<.01.

DISCUSSION

The present study yields two major findings. First, with respect to the NFSS and the original Decisiveness scale, we can conclude that NFSS is highly related to social attitudes (especially RWA) and cultural conservatism and racism. Furthermore, these relationships are largely mediated by Right-Wing Authoritarianism. The present results thus corroborate previous studies on the relationship between the need for closure and authoritarianism (e.g., Jost et al., 2003; Kemmelmeier, 1997; Kossowska & Van Hiel, 2003) as well as on the mediating role of RWA in the relationship between NFSS and right-wing attitudes (e.g., Chirumbolo, 2002; Cornelis & Van Hiel, 2006; Crowson et al., 2005; Van Hiel et al., 2004). The theoretical rationale that explains these well-replicated results has been summarized by Jost and colleagues (2003) who argued that "contents that promise or support epistemic stability, clarity, order, and uniformity should be preferred by high-need-for-closure persons over contents that promise their epistemic opposites (i.e., instability, ambiguity, chaos, and diversity)' (p. 348). However, also in line with previous research, the original Decisiveness is generally unrelated to social attitudes, racism and conservatism.

Importantly, the second finding of the present study meaningfully extends the previous results by showing significant relations between the new Decisiveness scale and the target variables (social attitudes and racism and conservatism). Moreover, analogous to NFSS, the effects of the new Decisiveness scale on the target variables were transmitted through social attitudes, and the results therefore show that the mediation model proposed by Chirumbolo (2002), Cornelis and Van Hiel (2006), Crowson et al. (2005), and Van Hiel et al. (2004) is applicable to the present data. In sum, the new Decisiveness scale has much more in common with NFSS than the original Decisiveness scale.

We discuss the implications of these results in the remainder and we also address some potential limitations of the present study.

The relationship between urgency tendencies and ideology

Previous studies (e.g., Kossowska & Van Hiel, 2003; Van Hiel et al., 2004) argued that the lack of a significant relationship between Decisiveness and right-wing ideology may reflect the absence of a true relationship between urgency needs and ideology. This explanation has been based on Neuberg and colleagues (1997) who asserted that Decisiveness captures individual differences in the urgency strivings and non-specific closure. That is, Decisiveness does not refer to specific contents, but would instead involve seizing on *any* possible solution. Kossowska and Van Hiel (2003) argued that making swift decisions does not account for the fact that information is permanently stored in memory and used in further evaluations. According to the authors, this may exactly be the reason why urgency strivings and the swift decision-making that is promoted by these strivings, are not the basis for political beliefs.

However, the present results cast serious doubts on the latter interpretation. Indeed, the interpretation of the results of previous studies may have been flawed because the old Decisiveness scale is not a measure probing into the intended motivation. The new Decisiveness scale on the other hand contains items referring to the *need* or motivation to obtain a quick answer, generating results dissimilar from those obtained with the original Decisiveness scale. If we accept that this new scale is a better measure of the *desire* to reach closure swiftly, as has been argued by Roets and Van Hiel (in press), the present research clearly shows that previous findings have been biased by a less-than-optimal operationalization. Instead, the present research clearly shows that urgency tendencies are related to right-wing ideology.

Then, what does the relationship between urgency strivings and right-wing ideology exactly mean? While people with higher urgency needs strongly prefer ‘any’ answer over no answer at all, another critical aspect of this striving is that the particular answer acquired should be conclusive and unambiguous and it should reduce uncertainty. The need for 'any' answer motivates people to seek for ‘a quick and definite solution’, not only in experimental tasks, but also in everyday life. NFC theory states that people high in urgency needs make decisions based on early, immediately available information and disregard additional information. Therefore, people high in the desire for urgency are more likely to consider the most salient and readily available information when they have to make a decision or judgment. Hence, their heightened need for immediate closure leads them to turn to those sources that can instantly provide an easily accessible set of clear-cut answers on the nature of society and social relationships. Obviously, ingrained conservative views on social issues supported by authorities, society and common cultural heritage are more readily available and salient compared to an innovative, alternative approach that is off the beaten track.

People high in urgency needs, craving to make up their mind as fast as possible are less likely to go beyond these most readily available, clear-cut answers, because what is already known will always be available before what has yet to be explored. Hence, they are most likely to decide or judge according to well-known schemes, because that is the easiest, fastest and most clear-cut way to satisfy their urgency needs.

Conservative ideologies thus do not only seem to satisfy epistemic, existential and ideological needs to preserve what is familiar (permanency), but also successfully satisfy the need to instantly resolve uncertainty (urgency). The present results therefore suggest that specific (directional) needs for closure and non-specific (non-directional) needs for closure, which are both assumed to influence belief

formation by affecting information gathering and processing, are intertwined in a politically conservative direction.

Potential limitations of the present study

The samples used in this study consist of (mostly female) students which may raise questions regarding the robustness of the effects in the general population. Therefore, it can be argued that a more heterogeneous sample may be desirable to confirm these results in further research. However, the effects of NFSS and the original Decisiveness scale in the present study are very similar to the findings obtained in previous studies that also used heterogeneous adult samples (e.g., Van Hiel et al., 2004). Furthermore, in a test of an almost identical model as the one presented in the current study, Van Hiel et al. (2004) did not find differences between the adult and student samples. It is therefore very likely that the present findings, obtained in student samples, will largely apply to the general population.

Concluding remarks

As a general remark for future research on need for closure we want to stress the importance of making clear distinctions between the motivation to reach a decision quickly, the ability to do so, and the resulting behavior of swift decision-making. The present studies demonstrated that the *desire* to decide swiftly affects ideological and political beliefs, whereas on the basis of previous studies it is suggested that the *ability* to make these quick decisions is unrelated to such attitudes and beliefs. We therefore argue that making a distinction between the desire to perform in a certain way (e.g. to decide quickly) and the ability to do so, is primordial for a better understanding of the effect of motivated cognitive functioning on third variables, including political attitudes and ideologies.

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Chapter 5:

Determinants of task performance and invested effort: A need for closure X relative cognitive capacity interaction analysis[8]

ABSTRACT

This study examines the simultaneous effects of need for closure (NFC) and relative cognitive capacity on invested effort and task performance within the integrative analysis framework (Wright & Kirby, 2001). Two main results were obtained. First, we revealed a significant interaction effect between relative cognitive capacity (manipulated through task difficulty) and NFC (manipulated through time pressure, noise, and fear of invalidity, as well as assessed by an individual differences measure) on effort investment. Second, contrary to dispositional NFC, our manipulations yielded a 'double effect' because they negatively affected task performance as well as invested effort. The latter result was interpreted as an indication that NFC manipulations also tax cognitive resources. The two main findings are discussed and we conclude that the integrative analysis framework, which has been developed to account for cardiovascular data, can be applied to the study of behavioral data as well.

[8] This chapter has been accepted as an article in Personality and Social Psychology Bulletin in a slightly more condensed version:
Roets, A., Van Hiel, A., Cornelis, I., & Soetens, B. (in press). Determinants of task performance and invested effort: A need for closure by relative cognitive capacity interaction analysis. *Personality and Social Psychology Bulletin.*

INTRODUCTION

Human decision-making and judgement has attracted scholars' attention for many decades, with a host of studies demonstrating that both motivation and relative cognitive capacity alter human decision-making processes (see Kruglanski, 2004; Staal, 2004). However, although a comprehensive picture of the interplay between these two important variables may enlarge our understanding of the underlying processes of human decision-making, the assessment of the simultaneous effects of motivation and relative cognitive capacity in a single study has been somewhat neglected in previous social psychology research.

One of the most frequently studied motivational variables is the need for closure (NFC). Over the past decade, the need for closure theory developed by Kruglanski and colleagues (Kruglanski, 1989, 2004; Kruglanski & Webster, 1996) has proven to be very useful for the study of motivational aspects of decision-making. Although studies on NFC have only occasionally and partially addressed the potential interplay between motivation and cognitive capacity, Kruglanski and Webster (1996) assumed an interaction effect between NFC and relative cognitive capacity, and that as a consequence, the effects of motivation depend on cognitive capacity (and visa versa). The main goal of the present study is to disclose the exact nature of this potential interaction effect on information gathering effort and task performance. To address this research goal we applied the integrative analysis framework of Wright & Kirby (2001).

NFC theory assumes that manipulations such as time pressure and noise have an impact on motivation. However, these same manipulations have also been demonstrated to affect relative cognitive capacity and therefore, a subsidiary goal of the present study is to disclose the differential effects of these manipulations on motivation and relative cognitive capacity.

The need for closure

Kruglanski and colleagues (Kruglanski, 1989, 2004; Kruglanski & Webster, 1996) developed the need for cognitive closure theory in order to account for the observation that in some contexts individuals wish to achieve relatively quick closure in decisions and judgments. NFC has been defined as the desire for "*an* answer on a given topic, *any* answer … compared to confusion and ambiguity" (Kruglanski, 1990, p. 337, italics in original), and a large number of studies has demonstrated that NFC has powerful effects on information processing (e.g., Kruglanski, Peri, & Zakai, 1991; Van Hiel & Mervielde, 2002).

Situational forces such as time pressure, environmental noise, and dullness of a cognitive task activate the need for closure. Conversely, situations that instill a fear of invalidity, highlighting the costs of closure and the consequences of judgmental mistakes, result in a high need to avoid closure prompting people to suspend their decisions. Apart from situational inductions of NFC, people also differ in dispositional NFC, tapped by the Need for Closure Scale (Webster & Kruglanski, 1994; see also Kruglanski, De Grada, Mannetti, Atash, & Webster, 1997; Roets & Van Hiel, 2007). This scale comprises five facet scales: Preference for order (e.g., I like to have a place for everything and everything in its place), Preference for predictability (e.g., I don't like to go into a situation without knowing what I can expect), Decisiveness (e.g., when faced with a problem I usually see the one best solution very quickly), Discomfort with ambiguity (e.g., I don't like situations that are uncertain) and Closed-mindedness (e.g., I do not usually consult many different opinions before forming my own view).

Previous research amply demonstrated that NFC has powerful effects on numerous variables studied in social psychology, such as prejudice and racism (e.g., Roets & Van Hiel, 2006), preference for autocratic leadership (Pierro, Mannetti, De

Grada, Livi, & Kruglanski, 2003), derogation of opinion deviants (Kruglanski & Webster, 1991) and in-group favoritism (Kruglanski, Mannetti, Pierro, & De Grada, 2006). Enhanced understanding of the NFC concept and how it operates and interacts with relative cognitive capacity can therefore advance our knowledge of the cognitive-motivational underpinnings of these varied social phenomena.

Relative cognitive capacity: the capacity/demands ratio

The notion of relative cognitive capacity was introduced by Kruglanski and Webster (1996) to denote the degree to which individuals' capabilities match the task demands. Relative capacity can be affected in two ways: by changing the amount of available cognitive resources, or by changing the task demands (i.e. increasing difficulty). The importance of relative cognitive capacity for human performance and decision-making has been demonstrated in a wide variety of research including studies on motivated cognition (e.g., Kruglanski & Webster, 1996; Bar-Tal, Kishon-Rabin, & Tabak, 1997), as well as in research on the effects of stress on cognition (for an overview, see Staal, 2004).

The interaction between need for closure and relative cognitive capacity

According to Kruglanski and Webster (1996), "relative capacity and motivation are multiplicatively related" (p. 280), suggesting an interaction between relative capacity and need for closure. To date, however, research on this topic is scarce and the findings of the few relevant studies cannot be straightforwardly extrapolated to the need for closure concept.

One line of inquiry relevant for the hypothesized NFC X relative cognitive capacity interaction on decision-making was provided by Pelham and Neter (1995). These authors reported a significant interaction effect between participants' accuracy

motivation and their relative cognitive capacity (manipulated by varying task difficulty) on decision task performance (e.g., mathematical problem-solving and recall decisions). Although these results may be considered indicative for an interaction between NFC and relative cognitive capacity as well, a cautionary note is in place here. First, these results can only be extrapolated to NFC if one assumes a straightforward opposition between the accuracy motivation of Pelham and Neter (1995) and the closure motivation, i.e., if both concepts are opposite poles on a single dimension. Second, Pelham and Neter manipulated task difficulty through time pressure variations in one of their experiments, whereas time pressure is assumed to have its primary effect on motivation in NFC theory. Finally, these studies were restricted by the use of heuristics and the interaction should be demonstrated for other relevant decision-making variables as well, such as sampling of alternative hypotheses and information.

In another interesting series of studies Bar-Tal et al. (1997) investigated the relationships between the Ability to achieve cognitive structure and the Need to achieve cognitive structure on the one hand and cognitive structuring behavior on the other hand. These authors reported significant interaction effects between these dispositional measures of motivation and ability. In particular, the highest level of cognitive structuring occurred when both motivation and ability were either at a low or at a high level. However, whether these results can be unambiguously applied to the NFC concept is again unclear for several reasons. First, it is unclear whether a need for cognitive structuring is similar to a need for closure. Second, related to the first issue, it is doubtful whether cognitive structuring behavior maps onto closure behavior. For example, cognitive structuring is regularly the most effective way to process information, whereas information processing based on closure needs is often ineffective or even deficient. Finally, Bar-Tal and colleagues did not demonstrate

that their ability measure is related to individual differences in relative cognitive capacity such as intelligence or working memory capacity, nor did they use a manipulation of task difficulty to cross-validate the effects of the Ability to achieve structure scale. Hence, the direct application of the results obtained by Bar-Tal and colleagues to the NFC concept is also problematic.

Another line of research providing indirect evidence for the assumed NFC X relative cognitive capacity interaction pertains to the study of Schultz and Searleman (1998). These authors investigated whether Personal Need for Structure (a scale closely resembling the first two facet scales of the NFC measure) predicted performance on Luchins' (1942) Einstellung water-jar task under high- or low-stress conditions. Their results clearly demonstrated that the motivational variable was associated with the tendency to develop a mental set, but only under high-stress conditions. Assuming that stress induction taxes cognitive resources, these results may indicate an interaction effect between closure needs and relative cognitive capacity. Unfortunately, in the Schultz and Searleman study, stress was induced through time pressure, which is considered a manipulation of motivation in the NFC literature.

Overall, it is unclear from the studies of Pelham and Neter (1995), Bar-Tal et al. (1997) and Schulz and Searleman (1998) whether the results obtained are caused by (the interaction between) two *distinct* determinants, i.e., the motivational component and the relative cognitive capacity. The interpretation of the interaction effect in Schulz and Searleman best exemplifies this ambiguity: Is the effect caused by the assumed interaction effect between motivation and relative cognitive capacity, or alternatively, does it reflect 'a double' motivational effect (i.e., dispositional and situational)?

Despite the interpretation problems regarding the manipulations in these studies (altering motivation or ability) and the specificity of the dependent variables, these previous research findings generally suggest an interaction effect of NFC and relative cognitive capacity on relevant decision-making process variables such as information sampling. Nevertheless, the exact nature and specificity of this interaction effect, as well its theoretical implications remain uncertain.

The integrative analysis framework: on the interplay between motivation and relative cognitive capacity

Unlike previous research, our own approach to the issue of the NFC X cognitive capacity interaction has been developed within a well-documented and widely researched theoretical framework. The integrative analysis framework developed by Wright & Kirby (2001, based on Brehm & Self, 1989; Obirst, 1976) asserts that the effort a person spends on a cognitive task is determined by the joint operation of relative cognitive capacity and motivation. In the integrative analysis framework, effort investment has traditionally been operationalized using cardiovascular responses. This approach is based on Obrist (1976, 1998) who proposed that the influence of the sympathetic nervous system on the cardio-vascular system is proportional to effort or task engagement. Obirst states that with (effortful) active coping, the heart is under greater sympathetic control, and cardiac influences on blood pressure become more dominant. Conversely, with passive coping the heart is predominantly under vagal control and blood pressure is mostly determined by vascular processes. Wright and colleagues (see Wright & Kirby, 2001) later combined Obirst's theory with Brehm's (Brehm & Self, 1989) motivational intensity theory to specify the extent to which people manifest effort-related cardio-vascular responses. The most commonly used parameters to capture

effort in this approach are heart rate, diastolic blood pressure and systolic blood pressure, the latter presumably being the most sensitive to the proposed sympathetic nervous system influence (for an overview of this research, see Wright & Kirby, 2001).

Relative cognitive capacity and motivation are considered to be the two determinants of effort investment. Relative cognitive capacity refers to the individual's capability or the amount of available cognitive resources relative to the task demands. In the integrative analysis framework this variable is generally referred to and manipulated by task difficulty. According to Wright and Kirby, the amount of effort necessary to perform effectively on a certain task is defined by task difficulty (i.e., the relative cognitive capacity). Therefore, in order to perform at a given level, high task difficulty (low relative capacity) requires more effort compared to low task difficulty (high relative capacity). Evidently, we can also assume that the individual differences in relative cognitive capacity also have a substantial impact on his/her task performance.

Motivation - the second determinant of effort - primarily acts regardless of task difficulty and its effects depend on intrinsic or situationally induced motivation. This motivation defines the upper limit of effort a person is willing to invest.

As stated above, the effort needed to perform adequately is defined by task difficulty and generally, as task difficulty increases, so will effort investment. However, effort will not increase endlessly; once people reach their motivational upper limit, effort will not increase any further, no matter how much the task difficulty further rises. Hence, according to the integrative analysis framework, a person's level of motivation limits the maximum effort a person is willing to invest in an increasingly difficult task. Put otherwise, differences in the maximum effort people are willing to invest reflect differences in the motivational input. Importantly,

the theory also states that, when the task is perceived as impossible, effort will be low due to the task characteristics, regardless of the initial upper limit of motivation.

In the most general terms, as shown in Figure 1 (adopted from Wright & Kirby, 2001, p. 261), the amount of effort a person invests rises with increasing task difficulty up to the point where the required effort is greater than is justified by the initial motive. That is, when potential motivation is low, people will only invest little effort in solving the task (panel A). When motivation is moderate, people are willing to spend greater effort, allowing adequate investment over a broader difficulty range (panel B). Finally, when motivation is very high but the task demands exceed the individual's resources (i.e., once success is viewed as impossible or excessively difficult), he/she may bring to bear great effort at the very beginning of the task due to the initial, very high upper limit of motivation. However, success is soon perceived as impossible and the willingness to invest is reduced, resulting in low effort (panel C). In other words, as long as success is viewed as attainable and worthwhile, effort will correspond to the difficulty of the task. Finally, inducing a reduction in level of cognitive ability (e.g., by fatigue) shifts the entire figure to the left on the X axis, attesting to the fact that relative capacity can also be affected by changes in the absolute amount of cognitive resources.

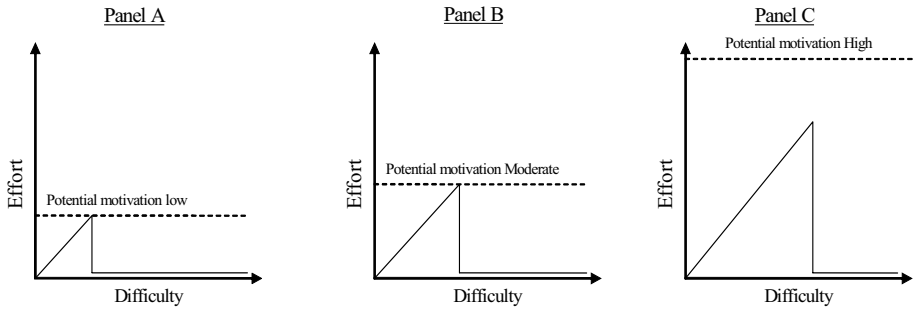

Figure 1. Effort-difficulty relation where potential motivation is low, moderate, and high. Adopted from Wright and Kirby (2001, page 261).

Need for closure in the integrative analysis framework

From its conception, NFC has been demonstrated to be one of the most powerful motivational variables in decision-making and judgments. It is therefore interesting to consider NFC as a specific example of the general motivation concept included in the integrative framework analysis. We assume that situational manipulations of NFC (e.g., noise and time pressure) as well as dispositional NFC act as the motivational input in terms of the integrative framework analysis, decreasing people's effort investment in decision tasks. In particular, NFC has been demonstrated to decrease the amount of information gathered before making a decision (see Kruglanski & Webster, 1996; Van Hiel & Mervielde, 2002) which, in terms of the integrative analysis framework, reflects a lower initial motivation to invest effort in information gathering.

However, in addition to their effects on motivation, situational manipulations of NFC have also been acknowledged to decrease cognitive capacity (e.g., Kruglanski & Webster, 1996; Webster, Richter, & Kruglanski, 1996; Bacon, 1974; Easterbrook, 1959; Gonzalez, 2005). This assumption has been labeled 'the

dual effect' of NFC manipulations (Kruglanski and Webster, 1996). Unfortunately, to date, empirical evidence clearly demonstrating the assumed dual effect is curiously lacking. Because the integrative framework analysis allows a simultaneous investigation of the effects of motivation and relative cognitive capacity (as argued below), this framework seems promising to discern the hitherto ambiguous 'dual effect' of NFC manipulations.

Most importantly, however, because we consider NFC to be a motivational input variable, we expect an effort expenditure pattern that follows the integrative framework predictions. In particular, we expect manipulations that induce NFC (time pressure and noise) to result in an investment pattern similar to the one depicted in Panel A of Figure 1, whereby increasing difficulty does not lead to additional investment. In contrast, in control and fear of invalidity conditions (no NFC induced), we expect an investment pattern similar to the one depicted in Panel C of Figure 1, whereby increasing task difficulty results in additional investment.

In sum, based on the incorporation of NFC in the integrative analysis framework, we can formulate three hypotheses:

Hypothesis 1: High task difficulty increases information gathering effort as long as the task is not perceived as impossible (= main effect of relative cognitive capacity on effort investment).

Hypothesis 2: High NFC reduces information gathering effort, (= main effect of motivation on effort investment).

Hypothesis 3: Effort investment increases with higher task difficulty only when NFC is low (Figure 1, panel C), but not when NFC is high (Figure 1, panel A) (= interaction effect of motivation and relative cognitive capacity on information gathering investment).

Although the integrative analysis framework only makes specific predictions about effort investment, and the proposed patterns in Figure 1 are not directly applicable to performance, the assessment of performance measures can also be informative. We propose two additional hypotheses related to performance.

Hypothesis 4: High task difficulty reduces task performance (= main effect of relative cognitive capacity on performance), as has been proposed by, among others, Maynard and Hakel (1997).

Hypothesis 5: High NFC reduces task performance (= main effect of NFC on performance). Importantly, because of the 'double effect' of manipulations such as time pressure and noise, one may assume that not only the individual's motivation is decreased, but also his/her relative cognitive capacity. We expect task performance to be taxed as a result of these two processes. However, unlike NFC manipulations, we would not expect dispositional NFC to alter relative cognitive capacity, because its effects have been considered to reflect pure motivational tendencies (see, Kruglanski & Webster, 1996). We therefore assume that the effects of situational NFC manipulations on performance are more pronounced (because of the decrease in both motivation and relative cognitive capacity) than the effects of the dispositional measure (because solely motivation is decreased). Moreover, if only NFC manipulations but not dispositional NFC affect performance, this would indicate that the effect is caused by cognitive capacity depletion alone.

The present research

In the present studies we tested whether the need for closure X relative cognitive capacity interaction effect on invested effort (indexed by information gathering effort) can be framed within the integrative analysis framework. Instead of

assessing the cardiovascular measures typically used in this type of research, we directly probed participants' information processing behavior. Such behavioral outcomes are direct indicators of participants' investment in information gathering. Because cardiovascular measures only *imply* general motivational intensity and effort, and hence serve as an indirect measure of task effort, the use of behavioral data as the dependent variable is a defendable option.

In the first experiment we aimed to establish the applicability of the integrative analysis framework to behavioral data in a decision task. Therefore, we tried to replicate the effort pattern depicted in Figure 1 with a behavioral measure of effort investment as well as with self-reports. Because no manipulations were induced to lower the motivational limit, we expected to find an effort pattern consistent with the theoretical pattern for high motivation (see Figure 1, panel C). Moreover, in addition to the variables included in the integrative analysis framework, we also assessed task performance as a variable of interest.

After the validity of the use of behavioral measures in the integrative model is established, the second experiment further explored NFC effects on effort investment in information gathering and performance. The design of the experiment referred to as Study 2a allowed us to test our hypotheses on the main and interaction effects of NFC and relative capacity on effort investment and task performance. Three commonly used manipulations of NFC (i.e., time pressure, noise, and fear of invalidity) were investigated within the framework.

In the second part of Study 2 (referred to as Study 2b) we investigated whether the effects of dispositional NFC are comparable to the effects found with situational NFC manipulations. This cross-validation study was essential to probe into the assumed 'double effect' of NFC manipulations. In particular, we expected

that the dispositional measure of NFC would have a weaker impact (or none) on task performance compared to the time pressure and noise conditions.

Figure 2 gives a schematic overview of the variables and concepts in the present research.

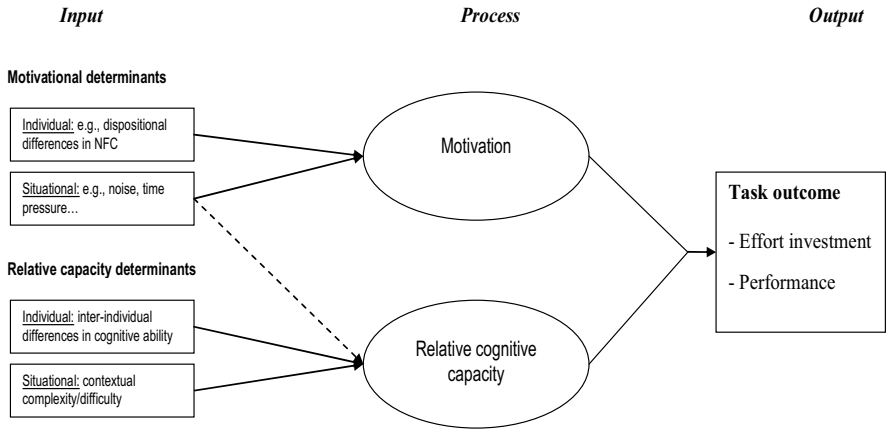

Figure 2. Schematic overview of the variables investigated in the present study.

STUDY 1

Method

Participants

Seventy-five undergraduate students (77 % female, mean age = 19.7) participated in the present study in partial fulfillment of course requirements.

Stimuli and Materials

Participants completed a decision-making task from Mayseless and Kruglanski (1987) adapted by Roets, Van Hiel and Cornelis (2006), in which they

had to identify a single digit (ranging between 1 and 6) which was presented very briefly on a computer monitor. The digit was masked by an array of '&' symbols before and after exposure. Participants could get additional exposures each time they pressed a button (i.e., the key '7'). They were allowed to operate this button an unlimited number of times until they felt able to reach a decision regarding the digit's identity. After they confirmed their decision by pressing another 'identification' button (1 to 6), a new digit was displayed.

Procedure and Design

Upon arrival at the laboratory, participants were told that they would be taking part in an experiment "that aimed to explore the ease with which particular digits are identified". They first completed an exercise block after which they were randomly assigned to one of four experimental blocks with varying levels of difficulty. They were presented trials for 210 seconds, with a maximum of 120 trials, for both blocks. In the exercise block, length of exposure of the stimulus was set to 50 ms. In the experimental block, length of exposure was set to 50, 40, 30 or 20 ms for the low, moderate, high and impossible levels of difficulty respectively (low level of difficulty = level 0, moderate level = level 1, high level = level 2, impossible level = level 3). Test runs of the program revealed that only when the length of exposure was set to 20 ms, participants reported that they believed identification of the stimulus was impossible.

Measures

Effort investment. The mean number of digit exposures requested by the participant in the experimental block was calculated as a measure of information gathering effort (the behavioral measure). A self-report measure of effort investment was administered as well. In particular, after the experimental block, participants

were asked to retrospectively compare the effort they made in the experimental block compared to the effort made in the exercise block, the latter being fixed at five on an 11-point Likert scale (0 = no effort; 10 = maximum effort). In line with the integrative analysis model, a pattern of increasing scores on these dependent variables thus indicated that the upper limit of task motivation was yet to be attained. The self-report and behavioral measures were strongly related, $r = .45$.

Performance. Mean proportions of correct identifications in the experimental block were calculated as a measure of performance.

Results

The effects of the various difficulty levels were probed in two series of analyses. First we analyzed the pattern of results for the measures of effort investment. Next, task performance was examined. Data from one participant who failed to comply with the task instructions were omitted from further analyses.

Patterns in effort investment

An univariate ANOVA revealed a significant main effect of difficulty level on the measure of behavioral effort, $F(3, 70) = 8.35$, $p < .001$ (see Figure 3). Planned comparisons with Step-down Bonferroni corrections[9] showed a non-significant increase in the number of requested presentations when difficulty of task was moderate compared to low ($M = 1.67$ versus 1.60 for level 1 and 0 respectively), $F(1, 70) = .04$, *ns*. However, participants required significantly more presentations in the high difficulty compared to the moderate difficulty condition ($M = 3.13$ versus

[9] This procedure provides a universally applicable solution to control the family-wise (experiment-wise) type 1 error rate (Ludbrook, 2000). The *p*-values reported are significant after step-down corrections, unless otherwise stated.

1.67 for level 2 and 1 respectively), $F(1, 70) = 17.88$, $p < .001$. Finally, when the task became impossible, participants requested less presentations than when the task was hard but within their ability range ($M = 2.17$ versus 3.13 for level 3 and 2 respectively), $F(1, 70) = 8.08$, $p < .01$. In sum, the results with the measure of behavioral effort supported previous studies showing increased effort with increased task difficulty up to a point where successful task performance is perceived as impossible. These results corroborated Hypothesis 1.

A second ANOVA on the self-report measure of effort investment (also depicted in Figure 3) largely corroborated the results of the behavioral measure, cross-validating the previous analyses (note that only 63 out of 74 participants completed the self-report measure, thereby decreasing the degrees of freedom in these analyses). The overall effect of task difficulty on the measure of self- reported effort was significant, $F(3, 59) = 17.96$, $p < .001$, indicating that participants provided higher ratings of effort with increasing task difficulty ($M = 4.21$, 7.06 and 8.50 for level 0, 1, and 2 respectively), but self-reported effort declined at the impossible level ($M = 4.33$; level = 3). The difference between level 1 and 0 was significant, $F(1, 59) = 16.28$, $p < .001$, as well as the difference in self-reported effort between level 2 and 1, $F(1, 59) = 4.15$, $p < .05$. Significantly less invested effort was also reported in the impossible condition compared to the hard but possible condition, $F(1, 59) = 36.77$, $p < .001$. These results also corroborated Hypothesis 1.

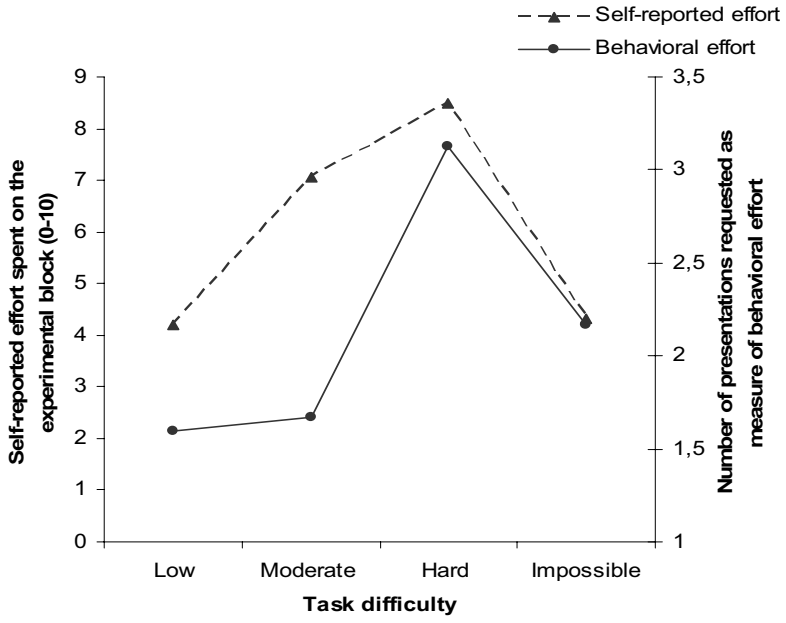

Figure 3. Mean number of exposures requested before attaining judgement and self-reported effort on easy, moderate, hard and impossible trials of the decision task.

Performance patterns

Next, we analyzed task performance. Univariate ANOVA revealed that task difficulty had a significant main effect $F(3, 70) = 30.88$, $p < .001$. With the exception of a slight but non-significant decrease in performance between level 0 (M = 91% correct) and level 1 (M = 79% correct), $F(3, 70) = 3.41$, $p = .07$, all other comparisons between the difficulty levels were significant. The performance on level 2 (M = 61% correct) was significantly worse than the performance on the previous level, $F(3, 70) = 7.67$, $p < .01$, and the performance on level 3 (M = 36 % correct), in turn, was significantly lower than the performance on level 2, $F(3, 70) =$

18.19, $p < .001$. These comparisons thus revealed that performance diminished with increasing difficulty corroborating Hypothesis 4.

Relationship between effort investment and task performance

Since we implemented task performance as a subsidiary dependent variable in our model, a relevant question here is whether this variable is related to effort investment, our other dependent variable. Our results generally revealed that in the present task invested effort and task performance are essentially unrelated for several reasons. First, these dependent variables were not significantly correlated (*r*s = -.13 and .15, *ns* for the relationships between performance and behavioral effort and between performance and self-reported effort respectively). Second, the comparison of the pattern of results for invested effort and task performance demonstrates that although effort increased, a decrease in performance occurred when task difficulty was heightened. This shows that task difficulty has a differential effect on effort investment and performance, underlining the distinctiveness of these two dependent variables. Third, the effect of task difficulty on performance was neither mediated nor moderated by invested effort. With respect to the potential mediation effect, no changes in the predictive value of difficulty level on performance were found when invested effort was controlled for (introducing this variable as a covariate), $F(3, 69) = 29.94$, $p < .001$ and $F(3, 58) = 28.17$, $p < .001$, for the behavioral and subjective measure of task motivation respectively compared to the predictive value without covariates; $F(3, 70) = 30.88$, $p < .001$. Pertaining to the potential moderator effect, we did not find a significant interaction effect of difficulty level X effort investment on task performance, $F(3, 66) = 2.58$, *ns* and $F(3, 55) = .55$, *ns*, for the behavioral and self-report measure respectively.

In conclusion, these results suggest that invested effort and task performance do not affect each other and can therefore be considered separate outcome variables in the present design.

Discussion

The present results showed that with increased difficulty, participants invest augmented effort to gather information with a remarkable decline in effort when the task became impossible. This general pattern was obtained with behavioral as well as self-report effort data, notwithstanding some slight differences between the two dependent variables. That is, participants only invested slightly more effort in the moderately difficult condition compared to the low difficulty condition according to the behavioral effort measure, but their self-reports indicated higher effort. These results suggest that there was only a slight difference between the latter two conditions, both being relatively easy, but that in the participants' mind the conditions did differ and that the more difficult condition required more effort.

More importantly, participants requested significantly more presentations in the high difficulty condition than in the moderate difficulty condition. This difference in invested effort based on behavioral data was corroborated by the self-report data. Finally, in line with integrative analysis theory, a significant decrease of both behavioral and self-reported investment emerged in the impossible condition. The pattern of invested effort is therefore very similar to the pattern suggested by the integrative analysis framework for high motivation, depicted in Figure 1, panel C. Hence, the present experiment corroborates the applicability of the integrative analysis theory not only to cardiovascular responses (as illustrated in previous studies), but also to behavioral and self-report data. Given the present replication of this typical pattern of results usually obtained with cardio-vascular measures, we

believe that the behavioral and self-report measures are valid indicators of effort investment.

The results also indicated that with increasing task difficulty the proportion of correct answers declined. In other words, this finding demonstrated that increasing task difficulty weighs down on task performance regardless of effort investment. In particular, decreased performance that accompanies higher task difficulty is not affected (i.e. compensated) by the increased effort that also occurs with higher difficulty levels.

In contrast to Study 1, in which only one of the two main variables of the integrative framework (i.e. relative cognitive capacity) was manipulated, in Study 2 we also introduced variations in motivation - the second core variable included in the framework. In particular, in Study 2a we investigated the effects of different NFC manipulations while Study 2b examined the effect of dispositional NFC.

STUDY 2A

Study 1 established the validity of the integrative framework for behavioral outcomes. In Study 2 we investigated the interaction between motivation and capacity in terms of Wright and Kirby's (2001) integrative analysis framework, introducing need for closure as the specific motivational variable of interest. That is, the application of this framework enabled us to empirically test specific hypotheses on NFC effects on effort investment. In particular, the effects of time pressure and noise (as well as those of fear of invalidity) were compared with a control condition in terms of differences in the upper limit of invested effort. Brehm and Self (1989) stated that: "As long as one is able to perform the required instrumental behavior, the upper limit is determined by whether or not potential motivation justifies the

amount of effort required" (p. 111). Thus, effort investment should parallel increasing difficulty, but with low levels of input motivation the limit of maximum effort investment is quickly reached. Compared to standard situations, high NFC levels should reduce the limit of potential effort investment resulting in a decreased upper boundary of information gathering effort one is willing to invest compared to standard situations (see Figure 1, panel A). Conversely, when the individual experiences a need to *avoid* closure due to fear of invalidity, we expect the upper limit of effort investment to be higher (see Figure 1, panel C).

Additionally, we tested the potential effects of NFC manipulations as well as their interaction with relative cognitive capacity on performance. Previous need for closure research (e.g., Kruglanski & Webster, 1996; Webster, Richter, & Kruglanski, 1996) acknowledged that situational manipulations implemented to induce NFC (e.g., time pressure, noise) not only affect individuals' information-processing motivation, but also tend to decrease their relative cognitive capacity (e.g., Bacon, 1974; Easterbrook, 1959; Gonzalez, 2005; Kruglanski & Webster, 1996). One should therefore expect that these manipulations would seriously hinder task performance. We return to this issue in Study 2b.

Method

Participants

A total of eighty-four social sciences students took part in the study (68% females, mean age = 19.6) and they were paid € 7 for their participation.

Procedure and Design

Participants were presented the same task as in Study 1, with the exception that they completed four consecutive experimental blocks with increasing difficulty

(low level of difficulty = level 0, moderate level = level 1, high level = level 2, impossible level = level 3, respectively); length of exposure was set to 50, 40, 30, 20 ms for the respective conditions.

Similar to the study of Eubanks, Wright and Williams (2002), difficulty was varied across time in a fixed rather than a random order. Eubanks and colleagues argued that this procedure "… allowed participants to gain gradually a sense of what would be required for each block and, thus maximized the chance that participants would withhold effort once they were presented with a challenge that called for more than they could or would provide" (p. 144). Also, in several test runs of the decision task, participants reported that it was unnatural to receive the difficult blocks before being presented with the easy blocks. Using a fixed order procedure therefore seemed to be the most adequate procedure for this study.

Participants were randomly assigned to one of four experimental conditions: a control condition, a time pressure condition, a noise condition, or a fear of invalidity (evaluation) condition. The second and third of these conditions were assumed to induce heightened levels of need for closure, whereas the fourth condition induced a need to avoid closure. In the *control condition*, instructions were similar to those of Study 1, without any particular instructions on performance or speed. In the *time pressure condition*, participants were asked to reach a judgment on the digit's identity as fast as possible. Additionally, when response latencies exceeded five seconds, they were presented with the phrase 'please respond faster' after they reached a judgment on the trial (for a similar manipulation of time pressure, see Van Hiel & Mervielde, 2002, Exp. 1). In the *noise condition*, participants heard a dull beep tone (1000 Hz) during the experimental series (for a similar manipulation of noise, see Van Hiel & Mervielde, in press). Participants in the *fear for invalidity condition* received instructions to avoid incorrect identifications. They were told that false responses were recorded and that after the

experiment they would receive feedback on how well they had done compared to other participants. They were also informed that they would be assigned to a 'skilled group' or to a 'weak and unskilled group' based on the correctness of their judgments (see Kruglanski & Freund, 1983, for a similar manipulation of fear of invalidity).

Measures

Two dependent variables were included in the present experiment. Analogous to Study 1, information gathering effort was assessed with the behavioral measure (i.e., the mean number of digit exposures needed for all trials within each block) and mean proportions of correct identifications were calculated to measure performance.

Results

In a first series of analyses we examined the pattern of invested effort across the various difficulty levels, similar to the analyses performed in Study 1. In the present study however, we examined the distinct effects of the different NFC manipulations on this pattern. A second series of analyses pertained to the effect of the NFC conditions on the task performance across difficulty levels.

Effort investment patterns in the need for closure conditions

In a first series of analyses we investigated whether NFC leads to a reduced motivational upper limit reflected in an impaired willingness to invest effort. A first ANOVA with repeated measures[10] of effort investment measured by the mean number of requested exposures for each trial, revealed significant main effects for

[10] For the ANOVA with repeated measures, all reported values were based on Wilk's Lambda.

difficulty level, $F(3, 77) = 10.75$, $p < .001$ (corroborating Hypothesis 1), and NFC, $F(3, 79) = 3.26$, $p < .05$ (corroborating Hypothesis 2), as well as a significant interaction effect between difficulty and NFC; $F(9, 187.55) = 2.09$, $p < .05$ (corroborating Hypothesis 3). Given the significant interaction effect, the effect of difficulty level was further analyzed within each of the four NFC conditions (for control, fear of invalidity, time pressure and noise conditions, respectively).

Figure 4 depicts the relevant means of invested effort. Planned comparisons with Bonferroni Step-down corrections were conducted to further analyze the effects of increasing difficulty (task difficulty: easy level of difficulty = level 0, moderate level = level 1, high level = level 2, impossible level = level 3) within the different NFC conditions[11].

[11] Note that in the first block the invested effort did not differ from the control condition for any of the manipulations; $F(1, 79) = .50$, *ns*, $F(1, 79) = 1.64$, *ns* and $F(1, 79) = 1.25$, *ns* for time pressure, noise and fear of invalidity, respectively. These additional analyses have been accounted for in determining the Step-down Bonferonni corrections for all comparisons of invested effort.

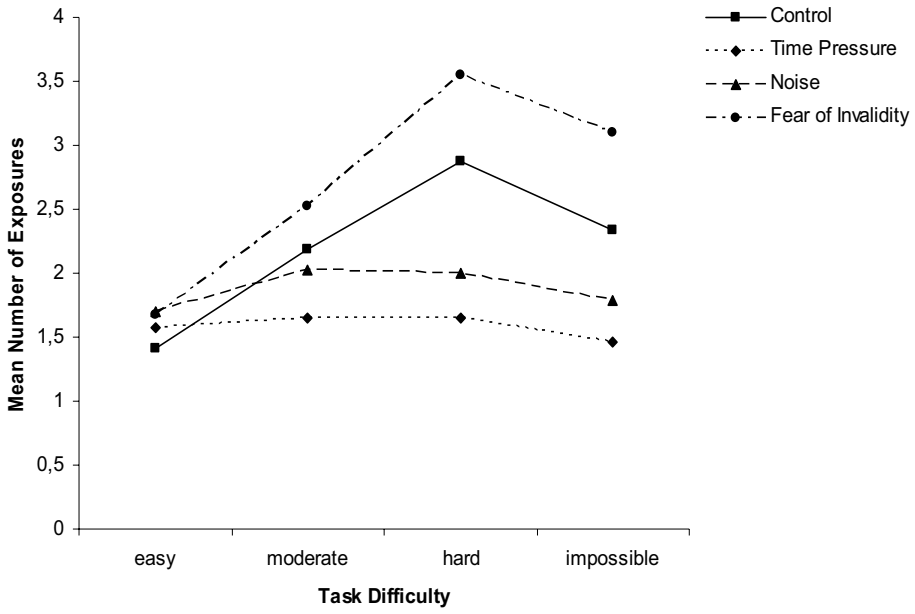

Figure 4. Mean number of exposures requested before attaining judgement on easy, moderate, hard and impossible trials of the decision task for control, time pressure, noise and fear for invalidity conditions.

In the control condition, the number of requested exposures increased significantly for each difficulty level compared to the previous level (from level 0 to level 1, $F(1, 79) = 33.85$, $p < .001$, and from level 1 to level 2, $F(1, 79) = 19.81$, $p < .001$) with a significant decrease between the hard condition and the impossible condition (from level 2 to level 3, $F(1, 79) = 16.34$, $p < .001$). These results replicate the findings obtained in Study 1 and corroborated the pattern of effort depicted in Figure 1, panel C.

A similar pattern across difficulty levels was observed for the need to avoid closure condition (level 0 - level 1, $F(1, 79) = 15.59$, $p < .001$; level 1 - level 2: $F(1,$

79) = 16.40, $p < .001$; level 2 - level 3: $F(1, 79) = 4.15$, $p < .05$, *ns*, after Step-down Bonferroni corrections). In sum, in the control and the fear of invalidity conditions we obtained a pattern of results indicating a high level of task motivation as depicted in Figure 1, panel C.

However, when NFC was induced (through time pressure or noise) no effect of difficulty on task investment was found. In the time pressure condition, the number of requested exposures proved to be comparable across the various difficulty levels (level 0 to level 1: $F(1, 79) = .13$, *ns*, level 1 to level 2: $F(1, 79) = .002$, *ns*; and level 2 to level 3: $F(1, 79) = .86$, *ns*). Similarly, no differences were found for the noise condition across the difficulty levels (level 0 to level 1: $F(1, 79) = 2.75$, *ns*, level 1 - level 2: $F(1, 79) = .02$, *ns* and level 2 to level 3: $F(1, 79) = .99$, *ns*). These results parallel the theoretical pattern depicted in Figure 1, panel A.

In conclusion, in the control and fear of invalidity conditions, these analyses revealed heightened levels of effort investment with increasing task difficulty (i.e., with decreasing relative capacity) up to an optimum, followed by a dramatic drop in effort for the impossible task condition (i.e., when capacity is clearly exceeded by task demands). Conversely, in the time pressure and noise conditions, assumed to implement heightened levels of NFC, invested effort remained low irrespective of task difficulty. This result confirms Hypothesis 3 and suggests that – in terms of the integrative framework - the motivational upper limit in the high NFC conditions is very low and does not allow for any additional effort investment.

Performance patterns in the need for closure conditions

In a second series of analyses, we investigated whether performance is impaired under NFC manipulations. An ANOVA with repeated measures with proportion of correct identifications as the dependent variable yielded a significant

main effect for difficulty level[12], $F(3, 77) = 525.89$, $p < .001$ (corroborating Hypothesis 4), and a marginal significant main effect of NFC condition, $F(3,79) = 2.42$, $p = .07$ (tentatively supportive of Hypothesis 5). Additionally an interaction effect between level of difficulty and NFC condition emerged, $F(9, 187.55) = 2.96$, $p = .002$. Given the significant interaction effect, the effect of NFC was further analyzed for each of the task difficulty conditions.

Because the high difficulty of task levels 2 and 3 (hard and impossible, respectively) had a detrimental effect on performance (see Study 1), the effects of the NFC manipulations at these difficulty levels were expected to be nugatory. Indeed, ANOVA with repeated measures of performance including only the hard and impossible conditions revealed no main effect for NFC, $F(1, 79) = 1.61$, *ns,* nor did we find an interaction effect between task difficulty and NFC, $F(1, 79) = .49$, *ns*. The main effect of difficulty level was significant, $F(1, 79) = 150.17$, $p < .001$, showing that the already poor performance in the high difficulty condition ($M = 47\%$ correct) further decreased in the impossible difficulty level ($M = 21\%$ correct). Given the lack of effect of NFC in these difficulty conditions, the comparison of different manipulations in these difficulty levels is pointless.

However, at the easy and moderate difficulty levels we expected specific NFC effects. A detailed analysis using planned comparisons between the conditions was therefore conducted. In particular, we wanted to test the hypothesis that time pressure as well as noise reduce performance, compared to the control condition. In line with our expectations, we found that both NFC conditions resulted in impaired

[12] The robust main effect of difficulty level suggests that performance significantly diminishes with increasing difficulty level in all conditions, which was corroborated when planned comparisons within conditions across difficulty levels were conducted. However, since these analyses are not vital to our study and inclusion of these comparisons would only lead to an unnecessary and exorbitant rise in the number of Bonferroni corrections, these analyses are not reported.

performance compared to the control condition at the easy level, $F(1, 79) = 10.61$, $p = .002$, and $F(1, 79) = 5.65$, $p = .020$ (marginally significant after Step-down Bonferroni corrections) for noise and time pressure respectively. A similar decrease in performance was obtained, $F(1, 79) = 8.42$, $p = .005$ and $F(1, 79) = 6.43$, $p = .013$ (marginally significant after Step-down Bonferroni corrections), at the moderate level. Finally, no such difference was found for the fear of invalidity condition, $F(1, 79) = .29$, *ns* and $F(1, 79) = 1.93$, *ns,* for the easy and moderate level respectively. Mean proportion of correct responses and the accompanying standard deviations are reported in Table 1 for all conditions and difficulty levels.

In conclusion, the analyses of the proportion of correct identifications demonstrated that performance at the easy and moderate difficulty levels was worse when NFC was experimentally induced. When task requirements were very high (i.e., at the hard and impossible difficulty levels) performance was always deficient and largely unaffected by NFC.

Table 1
Mean percentage correct answers and standard deviations for control, time pressure, noise and fear of invalidity manipulations in four difficulty levels

	Low	Moderate	Hard	Impossible
Control	.93 (.09)	.81 (.14)	.48 (.16)	.22 (.10)
Time Pressure	.84 (.16)	.67 (.22)	.41 (.18)	.17 (.05)
Noise	.80 (.20)	.65 (.25)	.48 (.21)	.25 (.11)
Fear of Invalidity	.91 (.10)	.72 (.19)	.51 (.25)	.21 (.12)

Discussion

The present findings clearly showed that participants' effort invested in the decision task is indeed affected by relative cognitive capacity (corroborating Hypothesis 1) and NFC (corroborating Hypothesis 2). Most importantly, these two main effects on invested effort were further qualified by their significant interaction effect. In particular, in accordance with Hypothesis 3, only low levels of NFC resulted in adjustment of invested effort according to the level of relative cognitive capacity. More specifically, participants tried to compensate decreases in relative cognitive capacity through increased effort. Conversely, high induced NFC prohibited such a compensation to occur.

In line with Hypothesis 4, decreased relative cognitive capacity was accompanied by decreased performance. The interaction effect between relative cognitive capacity and NFC on task performance attained the conventional significance levels, indicating that with high levels of relative cognitive capacity, NFC decreased task performance (partially corroborating Hypothesis 5). In other words, this suggests, in line with the 'double effect' hypothesis, that NFC manipulations not only affect motivation, but also tax relative capacity. Because the effect of adding high levels of NFC to high levels of relative cognitive capacity parallels the effect of low relative capacity, it is suggested that NFC is burdening the individual's cognitive resources.

In order to test the 'double effect' hypothesis more explicitly, the effects of dispositional NFC were probed in Study 2b. In particular, we investigated whether the effects of NFC manipulations in Study 2a can be replicated with the dispositional NFC measure.

STUDY 2B

A host of studies have successfully applied the dispositional NFC measure to cross-validate the motivational effects obtained with manipulated NFC, and the motivational impact of dispositional NFC has been abundantly shown. Moreover, unlike the ambiguous effects of NFC manipulations, dispositional NFC is generally assumed not to alter relative cognitive capacity but to reflect pure motivational tendencies. Kruglanski and Webster (1996), for example, concluded: "It is highly unlikely that scores on this measure [NFC] are readily susceptible to an alternative interpretation in terms of capacity restrictions" (p. 281).

We expected to find a similar pattern of invested effort as in Study 2a. However, we reasoned that if no effect of dispositional NFC on task performance would emerge, the previously obtained significant effect of manipulated NFC on performance should be ascribed to a decrease in relative cognitive capacity rather than to changes in motivation.

Method

Participants in the control condition of Study 2a (N = 37) also completed a version of the need for closure scale (NFCS, Webster & Kruglanski, 1994; translated by Cratylus, 1995; adapted by Roets & Van Hiel, 2007) with new items replacing the original Decisiveness items. These new Decisiveness items have proven to better tap the intended motivational aspects and improve the one-dimensional structure of the NFC scale (Roets & Van Hiel, 2007).

Identical to Study 2a, two dependent measures - mean number of digit exposures needed for each trial and mean proportions of correct identifications - were assessed.

Results

Effects of dispositional NFC on effort investment

First, we tested whether dispositional NFC has an effect on effort investment. To analyze this effect, participants were assigned to a low and a high NFC group based on a median split. This procedure inevitably involves some loss of information compared to treating NFC as a continuous variable. However, a continuous variable does not allow us to test the hypothesized pattern of effort investment in as much detail as we did with the NFC manipulations. In particular, it is not possible to test the specific motivational patterns depicted in Figure 1 when NFC is treated as a continuous variable.

Between-subjects ANOVAs with repeated measures within the various difficulty levels of the control condition were conducted. The results cross-validated the findings obtained with the NFC manipulations. A significant main effect on the number of presentations emerged for difficulty level as well as for NFC, $F(3, 33) = 8.70$, $p < .001$, and $F(1, 35) = 4.99$, $p < .05$ respectively. An interaction effect between difficulty and dispositional NFC was also obtained, $F(3, 33) = 4.17$, $p < .05$.

Planned comparisons with Step-down Bonferroni correction revealed that for low NFC participants the number of requested exposures increased significantly for each difficulty level compared to the previous level; level 0 ($M = 2.43$) - level 1 ($M = 3.54$), $F(1, 35) = 28.64$, $p < .001$, and level 1 - level 2 ($M = 4.46$), $F(1, 35) = 12.95$, $p < .001$, with a significant decrease between the hard condition and the impossible condition; level 2 to level 3 ($M = 3.93$), $F(1, 35) = 7.61$, $p < .01$. This pattern of results depicted in Figure 1, panel C, is similar to the control and fear of invalidity conditions reported in Study 2.

No such differences were found for high NFC participants, $F(1, 35) = 3.75$, *ns*, and $F(1,35) = 2.85$, *ns*, for the comparisons between easy ($M = 2.41$) and

moderate (M = 2.82) and moderate and hard (M = 3.27) tasks difficulty levels, respectively. However, the decrease in requested presentations between the hard and the impossible difficulty level (M = 2.70) was significant, $F(1, 35) = 8.52$, $p < .01$. Overall, this pattern of results is similar to noise and time pressure conditions reported in Study 2a., and corroborated the theoretical pattern depicted in Figure 1, panel A.

Effects of dispositional NFC on task performance

ANOVA with repeated measures in the control condition revealed a significant main effect of difficulty level, $F(3, 33) = 487.25$, $p < .001$, but not of dispositional NFC, $F(1, 35) = .61$, *ns,* nor did we record a significant interaction effect between difficulty and NFC, $F(3, 33) = 1.18$, *ns*. We can therefore conclude that, contrary to the NFC manipulations, scores on the dispositional measure of NFC were *not* associated with decreased performance.

Discussion

The invested effort pattern obtained for the dispositional measure of need for closure paralleled the findings with the NFC manipulations. In particular, a positive correlation between effort and difficulty level was obtained only for low scoring NFC individuals, up to the point when the task became impossible. In other words, these participants tend to increase effort in order to compensate for reduced relative capacity through higher task difficulty. Moreover, similar to the effect of the situational induction of NFC, no significant rise in effort was found among the high NFC scorers, indicating that the low motivation to gather information prohibits any additional effort investment. Hence, the results found with the dispositional NFC (present study) as well as these obtained with situational manipulations of NFC

(study 2a) show that, in line with our expectations, NFC places an upper limit on the effort people are prepared to invest when gathering information.

However, whereas performance at the easy and moderate difficulty levels was worse when NFC was experimentally induced, these effects were not present with the dispositional measure of NFC. Taking the findings of Study 2a and 2b into account, it is suggested that manipulations of NFC indeed produce a 'dual effect', influencing both motivation and relative cognitive capacity. Moreover, the effect of NFC manipulations on performance is due to these changes in relative cognitive capacity rather than to changes in information gathering motivation.

GENERAL DISCUSSION

The present studies examined the effects of the need for closure (NFC) and relative cognitive capacity within Wright and Kirby's (2001) integrative analysis framework. Two major results were obtained, providing novel insights into the integrative analysis framework and the NFC concept. First, our results confirmed the expected pattern of effort expenditure. In particular, participants increased effort with increasing task difficulty only when NFC was low. Below, as a first issue, we elaborate on how NFC can be understood in terms of the integrative analysis framework, and particularly how NFC, as a motivational input, sets an upper limit for effort investment. Second, our results have shown that NFC manipulations have a 'dual effect', i.e., on motivation and relative cognitive capacity, and that the latter effect has a direct negative impact on performance. This result will also be discussed. Next, we go further into the divergences between dispositional and manipulated NFC. Finally, we also address the importance of expanding the integrative analysis framework from cardiovascular responses to actual behavior.

Need for closure in the integrative analysis framework and its interaction with relative cognitive capacity

In line with previous research (e.g., Van Hiel & Mervielde, 2002; Webster et al., 1996) demonstrating that NFC leads to poor information gathering, a first important finding of the present study is that NFC sets an upper limit on invested effort. The distinct contribution of the present studies however lies in its specific interaction patterns. In particular, we were able to show that different NFC conditions yielded effort patterns that fit the integrative analysis framework. In terms of this framework, inferior effort investment behavior is due to a lowered upper limit for the willingness to invest effort in information gathering. In the control and fear of invalidity conditions, effort showed a linear increase when task difficulty was heightened, up to the point where success was viewed as impossible and effort decreased. In other words, as the task became more difficult and required more effort, participants increased effort accordingly because additional effort investment did not surpass the limit imposed by the input motivation. Hence, participants tried to compensate decreased capacity by increased information gathering because their high level of initial motivation allowed for this additional investment. The induction of NFC however, lowers the motivational upper limit for the effort one is willing to invest. In line with our expectations, participants in both the noise and time pressure conditions did not boost their effort when confronted with increasing task difficulty.

These results were cross-validated by the finding that effort invested by low dispositional NFC scorers also increased with task difficulty, whereas high scoring participants did not invest additional effort to compensate hampered relative capacity at higher difficulty levels. Hence, NFC indeed limits the maximum effort people are willing to invest in decision-making.

In conclusion, the interaction between relative cognitive capacity and NFC on information gathering effort occurs because heightened effort investment in response to the increasing task difficulty only emerges with low NFC, whereas this compensation does not occur when NFC is high. Hence, the interaction between NFC and relative cognitive capacity should be understood in terms of NFC imposing a motivational limit on how much people are willing to compensate for depletion in relative cognitive capacity.

How do these findings relate to the few studies that have investigated the interaction effect between relative cognitive capacity and variables resembling NFC? As a cautionary note it should be mentioned that a comparison of these findings is cumbersome for the reasons we have noted in the introduction. Unlike the present results, however, Pelham and Neter (1995) and Bar-Tal et al. (1997) reported cross-over interaction effects. Whereas the results obtained by Pelham and Neter (1995) and Bar-Tal et al. (1997) show opposite effects of motivation in the high versus low relative cognitive capacity conditions, we only found motivational effects when relative cognitive capacity is low. However, we hasten to say that unlike the studies of Pelham and Neter and Bar-Tal et al., we investigated the interaction effect on the amount of (factual) information gathering rather than its effect on the type of information the decision is based on (factual versus heuristic). The less than perfect fit between our data and the results of Bar-Tal et al. (1997) and Pelham and Neter (1995) shows that the nature of the interaction effect depends on which specific element of decision-making is studied and highlights the necessity for further investigation of the simultaneous impact of motivational and cognitive variables on decision-making processes and outcomes. Moreover, the interaction between these two broad determinants indicates that they should not be studied in isolation.

The 'dual effect' of NFC manipulations

Since NFC manipulations are so widely used, we believe it is very important to understand the full complexity and effect of these manipulations. Regrettably, these effects are generally interpreted solely in terms of either motivation or cognitive capacity. The 'additional' impact is often treated as an inconvenient side-effect which is conveniently neglected. Moreover, studies that do acknowledge the potential 'dual effect' often relegate this idea to a paragraph in the general discussion describing it as an issue that requires further research. Despite its complexity, the present research explicitly addressed the 'dual effect' of NFC manipulations because we believe clarification of this issue may improve our insight in its impact and lead to more balanced and more accurate interpretations.

The present findings indeed showed that the NFC manipulations not only affected motivation but also seem to reduce relative cognitive capacity. A first important point here is whether this dual effect renders the incorporation of NFC in the integrative analysis framework problematic when effort investment in information gathering is studied. In our opinion, the dual effect is not incompatible with this framework. In particular, as stated before, the effects of variations in the level of relative cognitive capacity that do not stem from changes in task difficulty can also be accounted for by the integrative framework analysis. Such a cognitive depletion can be represented by a shift of the investment pattern to the left on the X axis of Figure 1, (see Wright and Kirby, 2004) without fundamental consequences for the pattern itself. Therefore, the dual effect does not undermine the interpretation of the NFC X relative cognitive capacity effect on information gathering.

A second relevant issue is that we were able to show that NFC manipulations affected performance as well, again suggesting that these manipulations also alter relative cognitive capacity. That is, Study 2a has shown that imposing time pressure and noise in high relative cognitive capacity conditions

impedes performance up to the level of low relative cognitive capacity. In other words, manipulations such as noise and time pressure impose an additional burden on the individual's relative cognitive capacity (see Bacon, 1974; Easterbrook, 1959; Gonzalez, 2005; Kruglanski & Webster, 1996) which affects performance. Interestingly, because in the present task invested effort and task performance were virtually unrelated, the effect of manipulated NFC on performance cannot be accounted for by an indirect effect via lowered motivational upper limit of invested effort.

Moreover, Study 2b has shown that the effects of NFC manipulations (decreasing motivation and relative cognitive capacity) on performance did not emerge with dispositional NFC (which solely decreases motivation). Therefore, the most plausible interpretation of our results is that the performance effects of experimentally induced NFC should be considered the result of the non-motivational 'side-effect' of these manipulations.

Effects of dispositional and manipulated need for closure

The present results showed similar effects of dispositional NFC and NFC manipulations on patterns of invested effort, reflecting the motivational input. In other words, the convergence of these results attest to the usefulness of dispositional NFC to cross-validate the motivational effects of NFC manipulations. However, at the same time, NFC manipulations impaired performance whereas high dispositional NFC did not, indicating that the inferior cognitive performance resulting from experimentally induced NFC could not be generalized to dispositional NFC.

This result is reminiscent of findings reported by Roets et al. (2007) showing that relative cognitive capacity is *not* an element of dispositional NFC, and of Webster and Kruglanski's (1994) modest correlations found between NFC and

intelligence. Hence, the present results attest to the assumption that dispositional NFC is generally unrelated to individuals' relative cognitive capacity to achieve closure (i.e., making a decision).

The similar effects of NFC manipulations and dispositional NFC on effort investment on the one hand and their distinct impact on performance on the other hand, also demonstrate the importance of cross-validation of findings obtained with NFC manipulations with the dispositional measure of NFC. The present results suggest that studies using time pressure or noise as motivational manipulations are ideally replicated with the dispositional measure of NFC, in particular when scholars wish to substantiate the motivational nature of their effects. Without such cross-validation, alternative interpretations in terms of capacity depletion cannot be fully excluded.

Extending the integrative analysis framework to behavioral data

Finally we want to draw attention to the findings of Study 1 that has convincingly shown that the framework outlined by Wright and Kirby (2001) – originally developed with cardiovascular responses as the dependent variables – can be extended to include behavioral data. This finding meaningfully extends the utility of the framework, because the traditionally used cardiovascular responses only provide an indirect assessment of effort which may be contaminated by other factors. For example, when NFC is manipulated, cardiovascular measures may be susceptible to stress induced by these manipulations, irrespective of effort investment. Indeed, time pressure induces stress and negative affect, thereby increasing cardiovascular responses (e.g., Hutt & Weidner, 1993; Wahlstrom, Hagberg, Johnson, Svensson, & Rempel, 2002). Similar findings have been reported for noise (e.g., Smith, Whitney, Thomas, Perry, & Brockman, 1997). These

unintended effects of time pressure and noise thus increase cardiovascular responses, counteracting the hypothesized decrease in cardiovascular responses caused by reduced effort. This would imply that cardio-vascular measures are not suitable to detect changes in invested effort induced by NFC manipulations because cardio-vascular expressions of reduced effort may be cancelled out by the opposite effects of increased arousal on these measures. Moreover, Roets and Van Hiel (in press) found that in decision tasks, even dispositional NFC invokes these arousal effects. Expanding the integrative analysis framework to include behavioral measures therefore increases its empirical potential in a wide variety of research.

Conclusions

The present studies aimed to resolve some problematic issues in the research on NFC and its interaction with relative cognitive capacity in particular. We were able to demonstrate that information gathering in decision-making is generally determined by cognitive capacity relative to the task demands, but NFC limits the maximum effort one is willing to invest in information gathering. Additionally, the present studies corroborate the assumption that need for closure manipulations yield a 'dual effect' leading to impaired cognitive capacity as well as reduced motivation.

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Chapter 6:

Why some hate to dilly-dally and others do not: The arousal-invoking capacity of decision-making for low and high-scoring need for closure individuals[13]

ABSTRACT

The present research investigates the arousal-inducing capacity of decision-making with individuals differing in their chronic levels of need for closure (NFC). Study 1 (N = 40) revealed increased systolic blood pressure and heart rate as well as a rise in self-reported feelings of distress among high-scoring NFC individuals. Study 2 (N = 29) indicated that as long as no conclusive solution is obtained, a progressive increase of arousal measured by galvanic skin response emerged among high-scoring NFC individuals, whereas no such effects were found for low NFC individuals. In the discussion, we argue that decision-making acts as a stressor for high NFC individuals and we elaborate on the motivational nature of NFC.

[13] This chapter has been accepted as an article in Social Cognition.:
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INTRODUCTION

People face numerous decision-making situations in their everyday life, ranging from trivial decisions on what brand of product to buy to potentially life-changing ones such as career choices. Unlimited individual choice and opportunities for personal decision-making are highly valued and considered beneficial to the individual. However, recent research has suggested a more skeptic perspective on the psychological benefits of unlimited choice and some scholars even speak of 'the tyranny of choice' (Schwartz, 2000). Indeed, Bellah, Madsen, Sullivan, Swinder, and Tipton (1985) already reported that people feel increasingly uneasy about their life decisions because they are unsure whether they are making the right choices. In 'The Paradox of Choice', Schwartz (2004) argues that while some choice is better than no choice, too much choice presents its own set of problems. Put briefly, when people have too many options they may become anxious because deciding upon one course inevitably means foreclosing other attractive options. Along similar lines, Iyengar & Lepper (2000) have demonstrated that choice can be demotivating and dissatisfying. Moreover, the studies of Dijksterhuis (2004, Dijksterhuis & van Olden, 2006) demonstrated that conscious deliberation of the alternatives in decision-making not necessarily results in better decisions and greater satisfaction with the decision.

Importantly, although well-informed and thoughtfully considered decisions might be perceived valuable, the process to achieve such decision is often experienced as stressful. Therefore we believe that it is important not only to understand how stress affects decision-making, but also how decision-making elicits stress.

The effects of Induced Stress on Judgment and Decision-making

Since the 1940s to the present, the effect of stress on human performance in general and decision-making in particular has been a blooming research topic in several domains of psychology (e.g. Broder, 2003; Cohen, 1952; Keinan 1987; Rothstein, 1986). In a wide variety of research it has been demonstrated that stressors such as time pressure (e.g., Payne, Bettman, & Luce, 1996), noise (e.g., Hockey, 1970), perceived threat (e.g., Janis & Mann, 1977), as well as more naturally occurring life-event stressors (e.g., Keinan, 1987) may increase errors made on cognitive tasks. Importantly, these stressors also alter information processing by inducing the use of simple decision strategies, stereotyped and habitual thought, as well as a failure to sample complex hypotheses and solutions (e.g., Hockey, 1979; Mandler, 1979; Van Hiel & Mervielde, 2006).

In this line of research, stressors are assumed to have direct as well as indirect effects on judgments, and the relative importance of these effects may vary according to the stressor involved (Staal, 2004). Direct effects of stress operate on the cognitive level and are often associated with available cognitive resources. Indirect effects of stress originate from psychological responses associated with increasing task demands, such as frustration or discomfort. From the latter perspective, task motivation can be considered as an important indirect effect of stress. In particular, stressors may produce changes in decision-making because they affect task motivation.

In a comprehensive review of the research on the effects of stress and arousal on decision-making and judgment, Staal (2004) concluded that the overall finding emerging from all these studies is that decision-making under stress generally tends to "become more rigid with fewer alternatives scanned" (p. 68). Additionally, stressful situations also seem to induce the tendency to "persist with a method or problem-solving strategy even after it has ceased to be helpful" (p. 68).

Exactly these two typical ingredients of decision-making under stress have been assumed to represent the core processes underlying the need for closure (Kruglanski, 1989; Kruglanski & Webster, 1996). Manipulations of need for closure (NFC) often include variables that have been studied as stressors (e.g., time pressure, noise), but in NFC theory their effects have been primarily interpreted as motivational, whereas classic interpretations frame these effects in terms of cognition and cognitive capacity.

Towards an individual differences perspective on stress in decision-making

Importantly, the NFC theory is not limited to the effects of situational variables on decision-making. Webster and Kruglanski (1994) also advanced the basic idea that, regardless of situational stressors, individuals differ in their dispositional desire for clear-cut and unambiguous answers. Obviously, people are motivated to satisfy their desires and needs. Therefore NFC is often referred to as a motivational variable. That is, when closure is absent, people with a high need or desire for closure will be motivated to take action to achieve the desired end state of closure.

To measure individual differences in NFC, Webster and Kruglanski developed the NFC scale (see also Kruglanski, De Grada, Mannetti, Atash, & Webster, 1997; Roets & Van Hiel, 2007; Roets, Van Hiel, & Cornelis, 2007). Five major aspects were identified to broadly represent the NFC construct. According to Webster and Kruglanski (1994), individuals with a high level of dispositional NFC *prefer order* and structure in their lives, abhorring unconstrained chaos and disorder. They also *prefer predictability* reflected in a desire for secure and stable knowledge, which is reliable across circumstances and unchallenged by exceptions, affording predictability for future contexts. High NFC individuals also experience an urgent desire to reach closure in judgments and decision-making, reflected in their

decisiveness and they feel *discomfort with ambiguity,* experiencing situations as aversive when they are devoid of closure. Finally they are *closed-minded*, reflected by the unwillingness to have their knowledge challenged by alternative opinions or inconsistent evidence.

The quest for studies bearing on individual differences variables in the context of decision-making is certainly not new. Folkman, Schaefer, and Lazarus (1979), for example, argued that: "One of the most interesting directions of past thought and research on uncertainty is the adaptation of a personalistic rather than a situation-based perspective. It would seem reasonable to expect that people vary in their ability to remain in a state of uncertainty without undue distress…" (pp. 279-280). Regrettably, not many studies have followed this path, with the exception of studies using the NFC questionnaire. The existence of individual differences in the sensitivity to uncertainty has in fact been the starting point in the conceptualization of the dispositional measure of NFC. Basically, dispositional NFC reflects individual differences in what Webster and Kruglanski (1994) call "the desire for *an* answer on a given topic, *any* answer, … compared to confusion and ambiguity" (p. 1049). The uncertainty aspect is probably best captured by the facet scale 'discomfort with ambiguity' referring to the experience of the absence of closure as aversive and frustrating (see Webster & Kruglanski, 1994). Other facet scales such as the 'preference for order and structure' (as opposed to chaos) and 'preference for predictability' (as opposed to irregularity) can also be considered discrete manifestations of a heightened sensitivity to uncertainty.

Since its introduction, the NFC scale has been successfully used as a cross-validation of experimental inductions of NFC through stress manipulations. Webster and Kruglanki (1994) demonstrated that primacy effects in impression formation are stronger for subjects classified as high (vs. low) on the NFC scale, replicating studies in which NFC was manipulated through increased time pressure (Kruglanski

& Freund, 1983). Also, Kruglanski, Webster, and Klem (1993) revealed that the effects of high dispositional NFC on resistance to persuasion were similar to those of environmental noise. Furthermore, Webster (1993) replicated the effects of situational induction of NFC through reduced task attractiveness with dispositional NFC, the dependent variable being the tendency to commit to the correspondence bias in attitude attribution.

Based on the evidence that the NFC scale cross-validates the effects that can be ascribed to stress induction obtained by NFC manipulations, it is appealing to hypothesize that the NFC scale captures individual differences related to stress in decision–making, making it a viable instrument to explore the personalistic approach to stress (see Folkman et al., 1979). This type of research may therefore provide valuable insights in how dispositional traits shape individual decision-making.

The present research

Although Webster and Kruglanski (1994) compellingly addressed the idea that individuals differ in their desire for clear-cut and unambiguous answers, no research has yet been conducted into whether this desire is related to actual distress and arousal, and to date the nature of this potential relationship has been left unexplored. Specifically, little is known as to the role of individual differences in explaining the effects of stress in decision-making situations. The present research aimed to define how individual differences in NFC affect arousal and subjective feelings of distress in the decision-making process. We believe that the potential effect of dispositional NFC on the level of arousal may shed a different light on the idea that NFC represents ‘cognitive laziness’ and may provide a new impulse for research on the relation between uncertainty tolerance, stress and cognitive functioning.

In the first study, we tested the hypothesis that higher NFC is associated with higher levels of physiological arousal and subjective distress. In particular, we examined whether arousal during a cognitive decision task was elevated for high NFC scorers compared to low NFC scorers. In this study, level of stress was assessed by cardiovascular measures, as well as by self-reports of subjective feelings of '(di)stress' or negative activation.

In the second study we endeavored to replicate the relation between NFC and arousal using a different task and a different physiological arousal measure (i.e., galvanic skin response). Moreover, in this study we assessed the temporal progression of arousal from the beginning of the task right up to the discovery of the task solution.

STUDY 1

Method

Participants and procedure

Forty undergraduate students (74 % female, mean age = 19.6) completed a task adapted from Mayseless and Kruglanski (1987) as previously used by Roets et al. (2006). Participants were asked to identify a single digit (ranging between 1 and 6) on a computer monitor. The digit was masked by an array of '&' symbols before and after exposure. Participants could get additional exposures each time they pressed a button (i.e., '7'). They were allowed to operate this button an unlimited number of times until they felt able to reach a decision regarding the digit's identity. After they confirmed their decision by pressing another 'identification' button (1 to 6), a new digit was displayed. All participants completed one exercise trial and one experimental block. The length of exposure was 50 ms for each trial. In the experimental block, trials were presented for 210 seconds, with a maximum of 120 trials.

Measures and apparatus

A reassembled NFC scale (*M* = 3.52 , *SD* = .41) in which the original Decisiveness items were replaced by those of the alternative Decisiveness subscale was administered before the experiment and was used as a measure of dispositional NFC (see, Roets & Van Hiel, 2007). The scale showed sufficient internal consistency, Cronbach's α = .82.

Cardiovascular measures were taken with a standard OMRON M6 upper arm blood pressure monitor on the non-dominant upper arm, once before the start of the experiment and twice during the experimental block (after 60 and 180 seconds). A digital screen, only visible to the experimenter, displayed systolic and diastolic blood pressure (in mm Hg) and heart rate. Deflation errors or movement artifacts were also signaled on the display. Pre-experimental diastolic BP (*M* = 121.21, *SD* = 11.94), systolic BP (*M* = 68.59 *SD* = 6.14) and heart rate (*M* = 80.76, *SD* = 11.20) were used to control for baseline individual differences in cardiovascular responses. Standardized residuals were computed using linear regression analyses on the means of the experimental systolic and diastolic blood pressure and heart rate respectively, including the pre-experimental levels on these variables as a predictor (for a similar procedure, see Waldstein, et al., 2004).

Additionally, immediately after completing the experiment, participants completed a selection of affect-related adjectives derived from the PANAS (Watson, Clark, & Tellegen, 1988) and the circumplex model of Russel (1983) on 5-point Likert scales (1 = very weak; 5 = very strong). They retrospectively rated the extent to which the emotion was present whilst completing the task. The emotion adjectives used were 'Elated', 'Active', 'Excited' and 'Enthusiastic' representing pleasant activation, 'At ease', 'Calm', 'Relaxed' and 'Serene' referring to pleasant deactivation, 'Jittery', 'Guilty', 'Upset' and 'Hostile' representing unpleasant

activation, and ‘Tired’, ‘Depressed’, ‘Bored’ and ‘Droopy’ referring to unpleasant deactivation.

Examination of the actual structure of the item set was achieved by following the procedure reported by Russel (1980; see also Wiggins, 1979). Principal Component Analysis with VARIMAX rotation was conducted, extracting two components from the set of adjectives. The first component, explaining 23.41% of the variance, could be interpreted as the negative – positive dimension. The second component, explaining 18.46% of the variance, represented the active - passive dimension. In Figure 1, the variables are plotted on the two dimensions, corroborating our a priori grouping.

To obtain a pure measure for each of the emotion quadrants, a score was obtained for each category using Principal Component Analysis (PCA). These separate PCAs explained 64.45 %, 56.51%, 45.10% and 70.51% of the total variance for negative activation, positive activation, negative deactivation, and positive deactivation, respectively (all *M*’s = 0 and *SD*’s = 1).

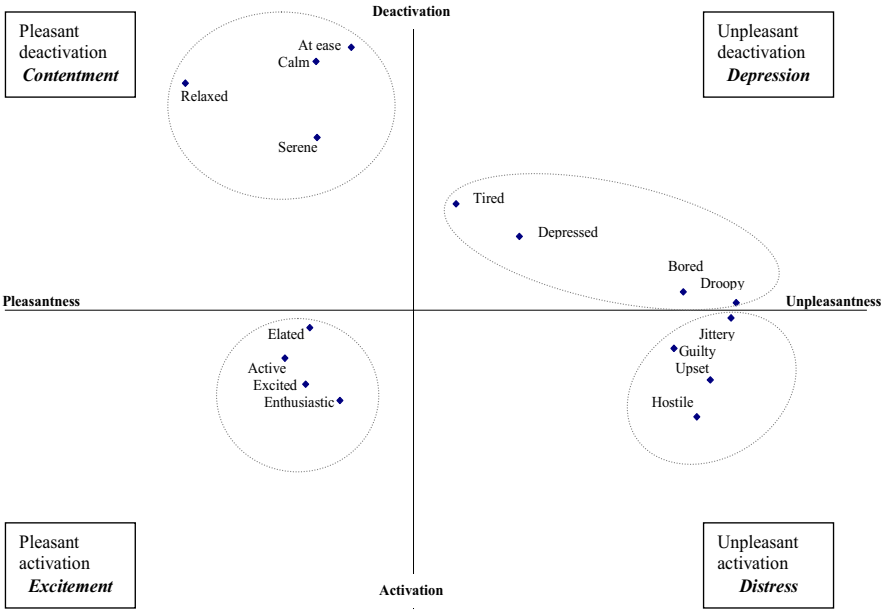

Figure 1. Sixteen adjectives plotted in the circumplex model of affect.

Results

The relationship between dispositional NFC and cardiovascular measures is reported first, followed by the analysis of the relationship between NFC and self-reported emotions.

Cardiovascular reactivity during the task for high and low NFC individuals

First we tested if individual differences in NFC are related to cardiovascular response during the decision task. Regression analysis revealed a significant effect for NFC on systolic blood pressure, $F(1, 32) = 5.04$, $p < .05$, $\beta = .37$. A similar effect of NFC was obtained for the heart rate measure, although this effect only

reached marginal significance, $F(1, 32) = 3.44$, $p < .10$, $\beta = .31$. No significant effect was found on diastolic blood pressure, $F(1, 32) = .24$, *ns*, $\beta = .16$. These results thus indicate that during the decision task, higher dispositional NFC tended to be positively associated with higher cardiovascular reactivity, which represents higher levels of arousal.

Subjective experience of the task for high and low NFC individuals

Next, regression analyses were conducted to test the effect of dispositional NFC on each of the four emotion categories. Results showed no significant effect of NFC on positive feelings of activation, $F(1, 37) = .00$, nor did we find a significant effect on passive positive feelings; $F(1, 37) = .05$, and passive negative feelings, $F(1, 37) = .03$. However, individual differences in NFC were significantly related to self-reported negative activation during the task, $F(1, 37) = 4.31$, $p < .05$, $\beta = .32$.

The correlations between any of the cardio-vascular measures on the one hand and the subjective reports of the four emotion categories were all non-significant (ranging from $r = -.25$ to .19, all *ns*).

Discussion

The present study shows that high NFC individuals experience more stress compared to low NFC individuals on physiological as well as subjective self-report measures.

Although only the relationship between NFC and systolic blood pressure reached conventional significance levels, it should be stressed that all relationships moved in the predicted direction. Moreover, previous studies have reported that systolic blood pressure is most systematically influenced by sympathic discharge to the heart (Brownley, Hurwitz, & Schneiderman, 2000).

Blascovich, Mendes, Hunter, and Salomon (1999, see also Wright & Kirby, 2001) identified two distinct patterns of cardiovascular reactivity: challenge and threat. The challenge pattern is associated with increased cardiac activity and reduced vascular resistance. Typically, when a task is perceived as a challenge, heart rate increases whereas blood pressure is stable or reduced. However, when the task is seen as a threat, not only is cardiac performance (e.g., heart rate) increased, but there is also a significant increase in blood pressure. Considering that in the present experiment high NFC individuals not only exhibit a substantial raise in heart rate, but also a significant increase in systolic blood pressure, it is suggested that the decision-making task was perceived as a threat (hence aversive) rather than a challenge.

The idea of high NFC individuals experiencing more stress was corroborated by the results of the self-report measures. No effect of NFC was found for self-reported positive feelings whereas NFC did have an effect on negative feelings. This finding attests to the fact that being subjected to 'decision-making stress' has apparent negative valence for high NFC individuals rather than a mere decrement in positive valence. Most importantly, however, only feelings of distress (negative activation) and not feelings of depression (negative deactivation) are heightened in high NFC individuals, confirming the hypothesis that individual differences in NFC map onto negative emotions with high arousal/activation, which have previously been considered as representative of self-report measures of stress (e.g. King, Burrows, & Stanley, 1983; Mackay, Cox, Burrows, & Lazzerini, 1978).

Although objective measures of arousal and subjective feelings of distress both are increased in high NFC participants during the decision-task, these measures were not significantly related to each other. A possible explanation for the absence of a significant relationship between the real-time objective measures and the

retrospective subjective measures may involve individual differences in the appraisal of physiological arousal and recall of this appraisal.

Importantly, previous research (e.g. Wright and Kirby, 2001) has revealed that cardiovascular response may also depend on cognitive effort. Therefore, an alternative interpretation of the present results could be that high NFC individuals put more effort into completing this type of decision task, showing elevated levels of cardiovascular response as a result. However, this interpretation is refuted by the findings of Roets et al. (2007) who also used this task and convincingly demonstrated that dispositional (as well as situational) NFC is not associated with increased cognitive effort. In fact, when task demands are considerable, high NFC is even associated with decreased cognitive effort. Additionally, the same study demonstrated that dispositional NFC had no effect on task performance, which refutes alternative explanations in terms of hampered (working memory) capacity.

STUDY 2

The second study addressed two issues. First, we tried to replicate Study 1, using a different decision task and a different measurement of arousal. Second, we investigated the temporal progression of arousal. The previous study revealed that high NFC individuals generally experience higher arousal levels during task completion, but it is possible that the level of stress is not constant, but steadily increases during the completion of a decision task. Indeed, Kruglanski and colleagues (Kruglanski, 1990; Webster and Kruglanski, 1994) defined NFC as the urge to settle for *any* answer, as opposed to sustaining further ambiguity, which would make the experience of any further postponement of closure bothersome. The level of arousal could therefore be expected to continue to increase during the task as long as no conclusive answer is found, especially among high-scoring NFC

individuals. Additionally, we examined to what extent arousal diminished once a conclusive solution was found.

Method

Participants and procedure

Twenty-nine undergraduate students (79% female, mean age = 19.3) completed a computer task adapted from Van Hiel and Mervielde (2002, Exp. 1) in which they had to assign figures to one of two categories. Stimuli were rectangles embedded in a grid and defined by their height on the Y-axis and the position of a small vertical line on the X-axis. The values on the two dimensions ranged from zero to nine. Using the formula $|x - y| < 3$, each of the figures could be correctly assigned to a category. If true, the figure had to be assigned to category A. If false, the figure had to be assigned to category B.

Participants received instructions (for an elaborated version of the instructions, see Van Hiel & Mervielde, 2002) informing them that they would see geometric figures defined by their values on the two dimensions and that they had to decide for each figure whether it was an A-figure or a B-figure. Participants were told that the A-figures could be distinguished from B-figures according to a logical rule and that they would receive feedback on the correctness of their response after each trial. Figures were presented in blocks of 40 trials with a short break between blocks. The experiment ended when the rule had been discovered (i.e., when 19 out of 20 consecutive figures were correctly allocated to a category). In order to get acquainted with the experimental situation, three pre-experimental trials were presented before the experimental series.

Measures and apparatus

Participants completed the NFC scale with the new Decisiveness items (Webster & Kruglanski, 1994; Roets & Van Hiel, 2007), which yielded sufficient internal consistency, Cronbach's α = .93 (*M* = 3.67, *SD* = .59).

Galvanic skin response was measured using a GSR2^{TM} unit which required participants to place index and middle finger from the non-dominant hand on the sensing plates. Responses per second were recorded using the compatible Calmlink® biofeedback software for Windows®. The task was launched as soon as galvanic skin responses stabilized.

Mean skin response was computed for the first twenty experimental trials (referred to as phase 1), which was used as a baseline to compare subsequent skin responses. That is, the value of this baseline is subtracted in all further skin responses to correct for baseline differences in skin response due to individual differences and differences in calibration of the instrument (for each participant, the starting value of the skin response was adjusted to be within the 6000 – 8000 Hz range to ensure optimal readings). The mean level of skin conductance in the first phase was therefore set to zero for each participant. The mean skin response over the last 20 trials (phase 4) was also computed. In this last phase, we can confidently assume that participants knew the correct categorization rule as they made 19 correct judgments out of 20 trials. The trials between the first and last 20 trials were divided into two equal parts (phase 2 and phase 3). For each part the mean skin response was calculated. Deviation from the baseline (in Hz) ranged between -393 and 229 for phase 2 (*M* = 8.06, *SD* = 155,46), between -675 and 617 for phase 3 (*M* = 55.00, *SD* = 267,86) and between -1144 and 796 for phase 4 (*M* = 16.52, *SD* = 399.57).

Analysis of the total number of trials participants needed before they discovered the rule indicated that dispositional NFC had no significant impact,

$F(1,27) = 3.02$, *ns*, which demonstrates that NFC did not hamper performance in this task.

Results

The mean levels of skin response of the four phases were submitted to a repeated measures ANOVA[14]. This analysis revealed significant main effects of phase, $F(3, 25) = 3.20$, $p < .05$, and NFC, $F(1, 27) = 9.30$, $p < .01$. Analogous with the first study, high-scoring NFC individuals reached a higher level of stress than low scorers. Level of stress also increased throughout the phases of the experiment. However, these two main effects were further qualified by a significant interaction effect between phase and NFC, $F(3, 25) = 3.25$, $p < .05$. To visualize the arousal pattern for low- and high-scoring NFC individuals (see Figure 2), the sample was split into two groups using a median split.

As shown by Figure 2, low-scoring NFC individuals showed a slight decrease in arousal during their search for an effective decision rule, which most likely can be attributed to a habituation effect. Once the decision rule was found, arousal further decreased. Conversely, high NFC participants experienced increased levels of arousal during the task as long as the categorization rule was not found. As shown by Figure 2, the progressive rise in arousal came to an end once a successful categorization rule was found. That is, for high NFC participants, finding an effective decision rule resulted in a mere stagnation in the rise in arousal rather than in a decrease.

[14] For the ANOVA with repeated measures, all reported values are based on Wilk's Lambda.

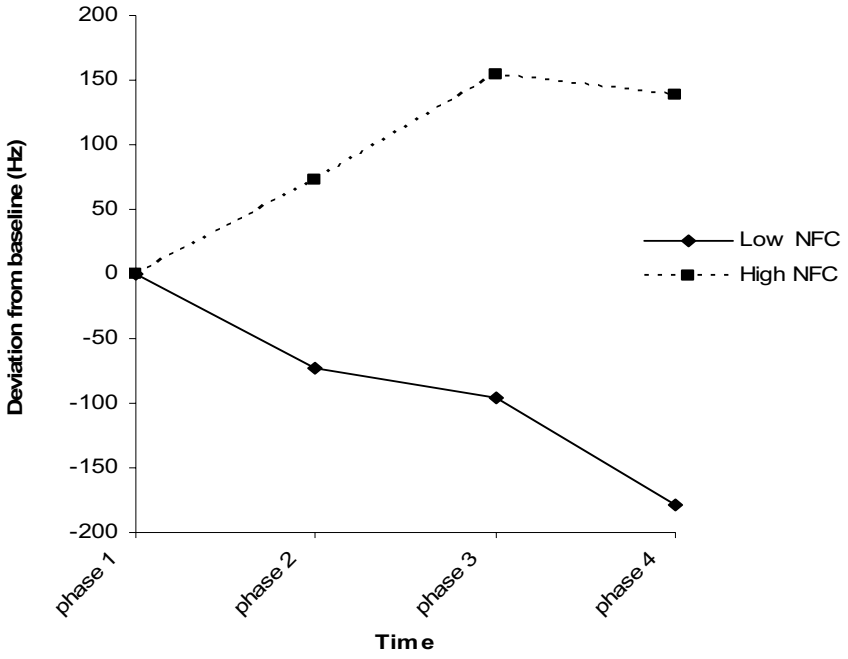

Figure 2. Mean level of arousal for high and low dispositional NFC at phase 1 (baseline), phase 2, phase 3 and phase 4 (decision rule found).

Discussion

The present study yields two important results. First, similar to the results of Study 1, high NFC individuals generally showed elevated levels of arousal. This result therefore demonstrates that the arousal-invoking capacity of decision tasks with low- versus high-scoring NFC individuals generalizes over method of measurement of arousal and decision-making task. Second, it was also shown that a very different arousal pattern emerged for high versus low NFC scorers. High NFC individuals experienced a progressive rise in arousal over time until the decision rule

was found, at which point arousal stagnated. For low NFC individuals, arousal declined during the search for an effective decision rule and once this rule was found, arousal further decreased.

GENERAL DISCUSSION

The present studies clearly demonstrated that during decision-making high dispositional need for closure (NFC) is associated with increased subjective feelings of distress (Study 1) and elevated levels of arousal (Studies 1 and 2). Moreover, in line with the definition of NFC - the urge to settle for *any* answer, as opposed to sustaining further ambiguity (Webster & Kruglanski, 1994) - Study 2 revealed that, in the absence of a correct solution, stress gradually increased among high-scoring NFC individuals.

In the remainder of the discussion, we focus on two important issues. First, we discuss the bidirectional relations between NFC and stress management. Second, we argue that NFC does not necessarily imply a lack of motivation to process information.

The bidirectional relation between NFC and stress

The present results seem to indicate that high levels of dispositional NFC cause stress during decision-making. However, the present data are correlational and no solid inferences about causality can be made. Nevertheless, given that NFC is a stable disposition already present before the completion of the present tasks, it seems fair to conclude that NFC *causes* people to experience more stress during the completion of decision-making tasks.

On a more general level, however, it is interesting to also consider the reversed relation. Is it meaningful to think of dispositional NFC as a consequence of previously experienced stress? In particular, an appealing consideration could be that

dispositional NFC is the result of inter-individual variation with respect to the stress-invoking potential of decision-making. In line with the ideas of Folkman et al. (1979), this argumentation would imply that people differ in the degree to which they experience stress in response to the mere occurrence of situations that require decision-making (i.e., ambiguous situations). For people susceptible to this type of stress, the process of searching for a solution is associated with higher levels of arousal, and as suggested by the present results, even a progressive accumulation of arousal. Because reaching a conclusion puts a stop to the further accumulation of stress, this closure operates as a reward preventing further exposure to the aversive situation. It is therefore suggested that 'escape from stress' may be the underlying drive in the motivational nature and effects of NFC.

In sum, high NFC individuals may have *learned* that making swift decisions is a successful way of coping with the stress they experience when facing decision-making. Holding on to the obtained solution can then be considered a second aspect of this avoidance strategy, preventing the distressing situation from reoccurring.

Need for closure: a mere lack of motivation?

The idea of NFC as a coping strategy raises some questions on the interpretation of NFC as a lack of motivation. Reduced information gathering and the diminished generation of hypotheses as well as the reluctance to reconsider previous judgments typically occur with high NFC individuals and these phenomena can easily be interpreted as 'cognitive laziness' or a lack of motivation (for an overview, Kruglanski, 2004; Kruglanski & Webster, 1996). However, the increased levels of negative arousal that occur with high dispositional NFC, suggest a more refined interpretation which implies that NFC should not only be interpreted in terms of a lack in motivation and deficits in the willingness to invest cognitive effort, but also in terms of a very compelling motivation. In particular, based on the present

research, this motivated tendency may be interpreted as the very basic and powerful motivation to avoid distress.

Hence NFC can be considered a state of increased motivation that reflects a change of priorities rather than a deficit in motivation, overruling other motivations such as the motivation to reach correct and accurate judgments. In line with this interpretation, Kruglanski and Webster (1996) also stated that NFC should be considered as a 'motivated tendency' rather than a deficit.

Conclusion

In the last decades, some researchers (e.g., Schwartz, 2000; Bellah, et al., 1985) argued that the abundance of choice and the focus on making one's 'own decisions' in present Western society may not necessarily improve psychological well-being. Indeed, the present research demonstrates that for some people (i.e., those high in dispositional NFC) the numerous situations requiring decision-making that one faces in everyday life can be a burden rather than a blessing. For these people, decision-making is associated with stress and negative feelings, which may ultimately prove to be a threat to their psychological (and potentially also their physical) well-being.

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Chapter 7:

Research overview and general remarks

This chapter summarizes the most important results of the five empirical chapters. After presenting this research overview, we address the first of two theoretical issues which we believe to be important for understanding the effects of need for closure (NFC) on decision-making. In particular, we attend to the necessity of fundamental research on NFC as a prerequisite for meaningful applied research.

The second theoretical issue will be thoroughly addressed in Chapter 8, in which we try to frame the role of NFC in a more encompassing perspective by reviewing the literature, proposing an integrative model for human decision-making.

DELINEATION OF THE RESEARCH AND SUMMARY OF THE FINDINGS

The debate on the dimensionality of the NFC represented the starting point of the research conducted in this dissertation. In Chapter 2, the two principal positions on this issue were empirically tested and compared. In order to evaluate these positions, we assessed the performance on objective structured tasks that constitute prototypical indicators of seizing and freezing processes. The structural model assessing the relationships between the NFC scale and seizing or freezing behavior supported Neuberg and colleagues' assumptions of a two-factorial structure underlying the NFC scale. However, the two dimensions did not map differentially onto seizing and freezing processes. In particular, significant relationships of equal strength emerged between the dimensions underlying the NFCS on the one hand,

and seizing and freezing indicators on the other. Hence, Neuberg and colleagues' conjecture that decisiveness and NFSS are exclusive analogues of seizing and freezing respectively did not seem to provide the most appropriate interpretation for the apparent two-dimensionality of NFCS.

In Chapter 3 an alternative explanation was therefore examined. Based on a close inspection of the items of the NFC scale and the suggestion of Mannetti, Pierro, Kruglanski, Taris, & Bezinovic (2002) regarding the questionable validity of the decisiveness facet scale, we hypothesized that this facet scale may not measure need for closure, but rather the ability to achieve closure, resulting in a separate dimension in the original NFC scale. Therefore, an alternative decisiveness scale with items referring more specifically to motivation and the desire for quick answers has been constructed. The newly developed items proved to have high inter-item correlations, resulting in a scale with adequate internal consistency. Three main findings were obtained when comparing the alternative decisiveness scale to the original facet scale. Firstly, the new decisiveness scale showed incremental validity above and beyond a measure of ability in predicting seizing behavior, whereas the traditional decisiveness scale only accounted for the variance in seizing that could be attributed to ability. Secondly, the scores on the new decisiveness scale moderated the effect of an experimental manipulation of motivation on the processing of predecisional information, whereas the traditional decisiveness scale did not moderate this effect. Moreover, it was shown that the effect of the new decisiveness scale was not altered by experimentally induced variation of cognitive ability. Finally, replacing the old decisiveness facet scale with the new items substantially improved the one-dimensionality of the NFC scale, increasing its internal consistency and inter-item homogeneity as well as yielding a factor structure in accordance with the NFC theory. Indeed, in line with the assumptions of Kruglanski

et al. (1997) and Webster and Kruglanski (1994), a model with the five facet scales as separate first-order factors and one general second-order factor turned out to be the best fitting model for this re-assembled NFC scale.

To sum up, the results indicated that the old decisiveness scale is marginally related to the other NFC facet scales and therefore should be considered as a separate dimension. However, the new items (probing a *need* to decide) do not load on a distinct dimension, but, instead, constitute an integral part of the fully-fledged need for closure scale. From this perspective it seems reasonable to assume that the divergent findings of Neuberg and colleagues are due to a less than optimal operationalization of 'making quick decisions' as conceived by the old Decisiveness facet scale.

In Chapter 4 we demonstrated how the findings of the previous chapter can shed new light on the interpretation of the results of previous research. We focused on the study of the relationships between NFC, authoritarianism, social dominance orientation, and prejudice and we reassessed these relationships using the alternative facet scale for decisiveness in a reassembled NFC scale. The findings of this study corroborated the findings of Van Hiel, Pandelaere and Duriez (2004) that the original decisiveness facet scale is unrelated to socio-political attitudes like authoritarianism, social dominance orientation, conservatism, and prejudice. The alternative facet scale on the other hand greatly resembled the other NFC facet scales in its pattern of correlations with socio-political variables. Keeping in mind the poor validity of the original facet scale as demonstrated in Chapter 3, the conclusion by Van Hiel et al. (2004) that a person's decisiveness or urgency tendencies do not affect socio-political attitudes should be considered as biased by a less-than-optimal operationalization of the decisiveness concept. We believe that the absence of a relationship between the original decisiveness scale and socio-political

attitudes actually demonstrates that a person's *ability* to decide quickly is not related to these variables. Moreover, the findings obtained with the alternative decisiveness scale, although not explicitly designed to measure only urgency tendencies, led us to the conclusion that both urgency and permanence tendencies are related to socio-political attitudes.

Chapter 5 addressed a second issue that came to the fore when making the explicit distinction between need and ability (see, Chapter 3). In particular, we examined how the information gathering process necessary to arrive at a decision is affected by the interaction between NFC and cognitive ability. This research question was investigated within the integrative analysis framework by Wright and Kirby (2001) which was designed to predict cognitive effort as a function of capacity and motivation. In our research, NFC was used as a specific of expression of the motivation. As expected, the individual's ability or cognitive capacity relative to the task demands determined how much information was gathered. However, NFC posed an upper limit to the information gathering effort people are willing to invest. Hence, the extent of the information search is determined by the interaction between ability, determining the amount of effort one should normally invest considering the task demands, and need, denoting the maximum amount of effort one is willing to invest regardless of task demands.

Finally, in Chapter 6 we explored the physiological correlates of dispositional NFC. The findings with measures of cardiovascular reactivity and galvanic skin response demonstrated that during decision-making, high dispositional NFC is associated with increased subjective feelings of distress (Study 1) and elevated levels of arousal (Studies 1 and 2). Moreover, Study 2 revealed that, in the absence of a correct solution, stress gradually increased among high-scoring NFC individuals. Given the increase in aversive arousal in high NFC individuals, we argued that the dispositional inclination to reach and maintain closure might be the

result of a strategy to avoid high levels of arousal in individuals with low tolerance for ambiguity. Moreover, NFC can then be considered a state of *increased* (avoidance) motivation that reflects a change of priorities rather than a *deficit* in motivation.

FUNDAMENTAL VERSUS APPLIED RESEARCH

The present dissertation focuses primarily on unresolved issues and blanks in the concept, operationalizations, and basics processes of NFC (we refer to this type of research as 'fundamental research'), rather than its relationship with variables of interest in the broad domain of social psychology (referred to as 'applied research'). Although applied research on NFC has been a growing field of exploration in the last decade, we believe this type of research can only reach its full potential when rooted in a strong theoretical and conceptual framework. In other words, a thorough understanding of the concept provided by fundamental research is a necessary requirement to allow for an unambiguous interpretation of subsequent findings in applied research. In the early years of research on the NFC concept, fundamental and applied research kept equal pace with each other and provided a valuable dynamic in the advancement of our understanding of the motivational aspect of decision-making. The fundamental debate on the dimensionality of the NFC scale and its theoretical consequences seemed a promising impulse to further advance our understanding of the exact nature of the NFC and its underlying processes. However, quite the opposite proved to be true: Although the debate exposed some fundamental issues and blanks regarding the NFC concept and scale, reports addressing these issues in an attempt to advance our fundamental understanding of NFC are surprisingly absent. Since then, research on NFC primarily focused on the relationship between NFC and third variables, which we labeled as applied research. These studies have clearly shown that NFC is of great

importance in the domain of motivated cognition and that many key topics in social psychology (e.g. racism, conservatism, and various other inter- and intra-group processes) are significantly influenced by NFC. However, due to the lack of a clear understanding of the NFC concept itself, the exact nature of the NFC effects and the interpretation of the findings of applied research remained ambiguous. In particular, the unclear nature of the underlying dimensionality and the lack of a generally accepted understanding of the scale have caused researchers to apply and interpret the NFC scale at their own discretion, including one-dimensional and multidimensional reports as well as applications in which some facet scales were simply omitted.

The major purpose of this dissertation was therefore to make a helpful contribution to this field of research by advancing the fundamental knowledge on the NFC concept, its operationalisations, and its underlying mechanisms. We believe these fundamental insights will ultimately provide a stronger (and indispensable) base for applied research on this major player in the field of social cognition and social psychology.

Importantly, fundamental research on NFC also offers possibilities that go far beyond the limited scope of the concept itself. In particular, we believe that a thorough understanding of NFC and its mechanisms may pave the way to a more general framework of decision-making and judgment. In the next chapter, we review the research literature on decision-making and propose an integrative model for human decision-making that can guide future research.

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Chapter 8:

A future research direction: Towards an integrative process model of social decision-making.

INTRODUCTION

Human decision-making has attracted considerable research attention in various disciplines within psychology. Models on decision theory have been proposed in mathematical psychology (e.g., Einhorn & Hogarth, 1981; Lehmann, 1957a,b; Slovic, Fischhoff, & Lichtenstein, 1977), whereas research programs in cognitive psychology focused on a multitude of topics such as controlled and automatic information processing (e.g., Nisbett & Wilson, 1977; Shiffrin & Schneider, 1977) and the informative value and effects of emotion on human decision-making (e.g., Schwartz, 1990), to name just a few examples. The term 'decision-making' generates no less than 74,000 hits in the social sciences citation index for the 35-year period between 1972 and 2007, which implies a yearly output of about 2000 articles on this subject.

It is therefore no exaggeration to state that numerous models and theories have been formulated to explain a great variety of decision-making and judgment phenomena. Recently, the need to integrate this flood of different models has become a very prominent issue in psychology research. In the past few years, various authors have made valuable contributions to construct broad models of decision-making that integrate a number of distinct and even unrelated research lines (e.g., Deutch & Starck, 2006; Kruglanski, Dechesne, Erb, Pierro, Mannetti, &

Chun, 2006; Kruglanski, Erb, Pierro, Mannetti, & Chun, 2006; Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007; Sherman, 2006). Nevertheless, the great number of theories and determinants of decision-making makes it virtually impossible to include *every* determinant and relevant process in a single 'all-inclusive' model of decision-making.

The present contribution does not claim to provide an integration of all research findings, but instead we have the modest ambition to develop a model that integrates several broad but complementary research traditions. Reviewing the available models of decision-making, the absence of a conceptual synthesis of the well-established impact of arousal, emotion, cognitive capacity, and motivation is remarkable. In this manuscript we deal with this hiatus, providing a broad, integrative model that focuses specifically on the interplay between these four different 'processes' (arousal, emotion, cognitive capacity, and motivation) in decision-making. The aim of the present study is to develop a model that provides a valuable and substantial extension to the existing ideas on decision-making and recent integrative models, yielding a more complete understanding of human decision-making. Moreover, another important aim here is to investigate the extent to which processes at a more general level can be applied to *social* decision-making.

As an operational definition we define human decision-making as the process of reaching a conclusion or resolution after consideration of already established and newly acquired knowledge and information. Within the vast literature on human decision-making and judgment, several research traditions have addressed the influence of arousal, cognitive capacity, motivation, and emotion (referred to as 'processes variables' in this chapter). Unfortunately, however, these research lines evolved independently and despite various theoretical commonalities and considerable (although fragmented) empirical evidence of connections between arousal, cognitive capacity, motivation, and emotion, only a few attempts have been

made to combine these different processes accounting for decision-making in a single comprehensive model.

We first review various perspectives on decision-making, each of them stressing a particular, specific process as a determinant of decision-making and judgment. Early theorizing and research (e.g., Yerkes-Dodson, 1908; Easterbrook, 1959) has illustrated the impact of *arousal* on performance and decision-making, but these theories also paved the way for more recent perspectives on decision-making that emphasize the importance of *cognitive capacity* (for an overview, see Staal, 2004), *motivation* (e.g., Kruglanski & Webster, 1996) and *emotion* (e.g., Forgas, 1995; Bodenhausen, Kramer, & Süsser 1994).

After reviewing the literature on each of these four process variables, we endeavor to integrate the findings of the different research traditions into one single model of decision-making. In the discussion of this model we point out some promising avenues for future research and we discuss the importance of an integrative perspective that includes multiple direct and indirect processes to explain human decision-making.

Classical theories on performance: focus on arousal

Several scholars (e.g., Yerkes-Dodson, 1908; Broadhurst, 1957, Hull, 1943) have argued that arousal is a key operator in determining performance and decision-making. The Yerkes-Dodson law, represented by the famous inverted U graphic, is the most well-known theory on how arousal affects performance. This law states that moderate levels of arousal result in optimal performance, whereas levels of arousal which are too low or too high degrade performance. The Yerkes-Dodson law has attracted considerable research attention. Many authors have further explored the relationship between arousal and performance (e.g., Duffy, 1941, 1957; Hebb, 1955; Falk & Bindra, 1954; Broadhurst, 1957, Easterbrook, 1959; Selye, 1956), and

alternative models for this relationship have been proposed (e.g., drive theory: Hull, 1943; Spence, 1951).

During this period of great interest in the effects of arousal on performance, some scholars have specifically addressed the influence of arousal on decision-making and the mediating processes that may account for this relationship. For example, using epinephrine and methamphetamine injections as manipulations of arousal, Callaway (1959) has demonstrated the detrimental effect of arousal on information processing in decision-making. Broadbent (1971) asserted that arousal narrows the attentional field, which, in turn, leads to a restriction in the range of stimuli that is processed. Easterbrook (1959) has argued that arousal influences cue sampling (attention allocation), reducing information processing complexity. More recent work by Mano (1994) and Lewinsohn and Mano (1993) shows that arousal reduces both information-processing time as well as attentional capacity.

The evidence on the effects of arousal on decision-making in early and recent studies (e.g., Day, Shyi, & Wang, 2006) is indeed extensive and compelling. The principal remaining issue here is the degree to which these arousal effects are direct or indirect, and, more specifically, the extent to which they are mediated through variables such as cognitive capacity and motivation (see Broadhurst, 1957; Brookhuis & de Waard, 2001; Easterbrook, 1959; Hammond, 2000; Lovallo, 1997; Mattews, 2001; McGrath, 1970; Sells, 1970; Staal, 2004).

The stressor research tradition on decision-making: focus on cognitive capacity

The importance of cognitive capacity in decision-making has been explicitly acknowledged in a large array of studies about the impact of stressors on human performance and decision-making. This ‘stressor’ research tradition evolved ‘naturally’ from the classical arousal theories, convincingly demonstrating that time pressure (e.g., Ben Zur & Breznitz, 1980; Payne, Bettman, & Luce, 1996), noise

(e.g., Hockey, 1970), and perceived threat (e.g., Janis & Mann, 1977; Keinan, 1987), as well as more naturally occurring life-event stressors (e.g., Baradell & Klein, 1993), may increase errors made on cognitive tasks (Leon & Revelle, 1985) as well as alter the way information is processed to reach a decision. Such alterations in information processing were demonstrated by the use of simple decision strategies and stereotyped and habitual thought patterns, as well as a failure to sample complex hypotheses and solutions (Hockey, 1979; Mandler, 1979).

These developments in the study of decision-making converge to the position that arousal is a basic operator, but at the same time cognition based changes in information processing are proposed as the central explanatory element for the observed alterations in the decision-making process. In his review of the literature, Staal (2004) concluded that stressors lead to specific changes in information processes. Firstly, decision-making under stress generally tends to "become more rigid with fewer alternatives scanned" (p. 68). Secondly, stressing situations also seem to induce the tendency to "persist with a method or problem-solving strategy even after it has ceased to be helpful" (p. 68).

Scholars working in this tradition are inclined to attribute these changes in information processing to the fact that stressors induce cognitive depletion. For example, Eysenck and Calvo (1992) have asserted that individuals high in task anxiety (conceived as a stressor) demonstrate lower cognitive efficiency due to the fact that worry and intrusive cognitions compete for the limited pool of cognitive resources. Several authors have argued that decision-making characterized by hypervigilance (a state of disorganized and rather haphazard attentional processing, associated with frantic search, rapid attention shifting, and a reduction in the number of alternatives that are considered - see, Janis and Mann, 1977; Janis, Defares, & Grossman, 1983) is also the result of resource depletion or, in more general terms,

the reduction of cognitive capacity (e.g., Baradell & Klein, 1993; see also Staal, 2004).

The concept of cognitive capacity dates back to the limited-capacity resource models of Kahneman (1973) and Norman and Bobrow (1975). Kruglanski, Erb, Pierro, Mannetti, and Chun (2006) state that cognitive capacity determines the degree to which an individual is able "to thoroughly process and hence fully appreciate the relevance of information given under high task demand conditions" (p. 158), and this basically reflects Wickens' (1991) formula "Performance = Resources / Task Difficulty"[15].

The Need for closure research: focus on motivation

In the last two decades, numerous studies have shown that motivation is an important determinant of decision-making. Motivational constructs such as Need for Closure (Kruglanski 1989; Kruglanski & Webster, 1996), Need for Cognition (Cacioppo & Petty, 1982), Rational and Experiential Thinking (Epstein, 1994; Pacini & Epstein, 1999), and Personal Need for Structure (Thompson, Naccarato, & Parker, 1998) have therefore received a great deal of research attention recently. In particular, the Need for Closure theory by Kruglanski (1989; Kruglanski & Webster, 1996) has been the focus of a lot of research and this theory has evolved as an important motivational account to explain human decision-making. Because of its strong theoretical base and comprehensive empirical support, as well as its wide

[15] We believe it may be useful to incorporate task demands into the concept of cognitive capacity and keep in mind that cognitive capacity actually refers to a 'relative cognitive capacity'. Relative cognitive capacity corresponds to the terminology used by Kruglanski and Webster (1996) to denote the degree to which individuals' capabilities match the task demands. Relative capacity can then be affected in two ways: by changing the amount of available cognitive resources, or by changing the task demands (i.e. increasing difficulty). Low relative capacity will evidently result in a greater impairment of information processing compared to moderate or high relative capacity.

applicability in various areas of (social) psychology research, we chose to elaborate on Need for Closure (NFC) as a prototypical example of motivational processes in decision-making.

Need for Closure (NFC) is defined as the desire for "*an* answer on a given topic, *any* answer … compared to confusion and ambiguity" (Kruglanski, 1990, p.337). Two sequential phases are assumed to underlie this need: the tendency towards urgency and the tendency towards permanence. The first phase refers to the inclination to seize quickly on closure, and this tendency is increased under heightened need for closure conditions. According to Kruglanski and Webster (1996), "Any further postponement of closure is experienced as bothersome, and the individual's overriding sense is that he or she simply cannot wait" (p. 265). The second phase focuses on protecting the answer just obtained or, in other words, holding on to the obtained structure. This freezing process thus strengthens the consolidation of the acquired knowledge and safeguards the knowledge system against new and contradictory information.

Importantly, NFC can be induced by some situations, such as time pressure or environmental noise, but it may also reflect stable individual differences (Kruglanski, De Grada, Mannetti, Atash, & Webster, 1997; Webster & Kruglanski, 1994). According to Kruglanski and Webster (1996): "Individuals at the need for closure end of the continuum may display considerable cognitive impatience or impulsivity: They may "leap" to judgment on the basis of inconclusive evidence and exhibit rigidity of thought and reluctance to entertain views different from their own." (p. 264).

The lack of openness to new or additional information and evidence is one of the most important implications of NFC theory. It has been illustrated by a lowered sensitivity to alternative hypotheses (Kruglanski & Mayseless, 1988) and preference for simplified judgment (Webster & Kruglanski, 1994; Van Hiel & Mervielde, 2003), but

also by a higher resistance to persuasion (Kruglanski, Webster, & Klem, 1993), a less extensive search for information (Klein & Webster, 2000; Kruglanski, Peri, & Zakai, 1991; Van Hiel & Mervielde, 2002), and the use of cognitive heuristics such as numerical anchoring (Kruglanski & Freund, 1983).

NFC should be considered as a prototypical example of motivational mechanisms that affect the information processing goals, determining the extent of information processing prior to making judgments, as well as determining which strategy an individual follows to reach a decision. It seems obvious that one's motivation determines how much information he or she is willing to consider before making a decision. However, we believe it is crucial to keep in mind that motivation not only determines the amount of information that is considered, but also affects the very nature of the information that is processed (see also Kruglanski & Webster, 1996), for example by increasing the search for prototypical rather than diagnostic information (e.g., Kruglanski & Mayseless, 1988, Mayseless & Kruglanski, 1987).

Importantly, the NFC perspective has also stressed that the alleged effects in 'pure' decision-making occur in the social and interpersonal domain as well, affecting more distal variables that are considered important in social psychology research such as racism (e.g., Roets & Van Hiel, 2006, Chapter 4) and leadership preferences (Pierro, Mannetti, De Grada, Livi, & Kruglanski, 2003). These important consequences of social decision-making are addressed in more detail further on.

Mood induction research: focus on emotions

In addition to the arousal, stressor and motivation literature on decision-making, a growing number of studies (e.g. Bodenhausen, Kramer, & Susser, 1994; Mackie & Worth, 1989; Wegner, Petty, & Smith, 1995) have demonstrated that emotions have an impact on decision-making. Although the aforementioned theories

focusing on arousal, cognition, and motivation implicitly recognized that emotions may shape decision-making, these theories only consider emotions to be a by-product, and the exact nature of its influence has received little attention. For example, NFC theory states that the postponement of a decision is experienced as 'aversive', but the exact nature of this presumably negative emotion is not expounded at greater length and its consequences have only been considered in terms of motivation. In the early arousal theories and the stressor literature, negative affect is highly entwined with arousal and manipulations used in this line of research generally involved the induction of a negative mood to some degree. However, despite the induction of these emotions, arousal and the associated decrease in cognitive resources are considered the key operators in the decision-making process, whereas the specific type of emotion and its valance have not been fully considered.

It is nevertheless important to study the impact of emotion on decision-making in its own respect. Research on arousal, stressors, and NFC has only addressed negative arousing emotions, which represent a limited part of the emotion domain (see Russell, 1980). In particular, the effects of positive feelings on decision-making have been largely neglected in this literature, whereas in emotion research, it is exactly this type of emotion that was found to have detrimental effects on information processing. The association between a state of happiness and the use of a superficial and a cursory style of thinking has been firmly established (e.g., Mackie & Worth, 1989, 1991; Schwarz, Bless, & Bohner, 1991; Worth & Mackie, 1987). In particular, several studies have demonstrated that feelings of happiness decrease message scrutiny and increase the use of stereotypes and other heuristics as a basis for judgment when compared to neutral or sad moods (e.g., Wegener, Petty, & Smith, 1995; Bodenhausen, Kramer, & Susser, 1994). Additionally, happy moods decrease attention to argument strength in persuasion tasks (e.g., Schwarz, Bless, & Bohner, 1991), whereas such effects were not found with sad or neutral moods.

These findings led researchers to conclude that “happy moods are associated with a heuristic processing style in which attitudes and judgments are based on peripherical cues rather than a thoughtful consideration of the information, whereas sad moods are associated with a systematic processing style in which attitudes and judgments are based on a careful scrutiny and elaboration of information” (Isbell, 2004; p. 341).

THE INTEGRATIVE MODEL

Considering the vast amount of research on the various aspects that contribute to the way people reach decisions and judgments, a broad theoretical model incorporating the ideas from these distinct research traditions appears to be indispensable for seeing the wood for the trees. Moreover, a comprehensive model should advance our understanding of the relationships among the core elements from each of these research lines, because such connections have been neglected in previous research on decision-making. Therefore, we try to synthesize the variety of research evidence in a broad and comprehensive theoretical model of decision-making, as depicted in Figure 1.

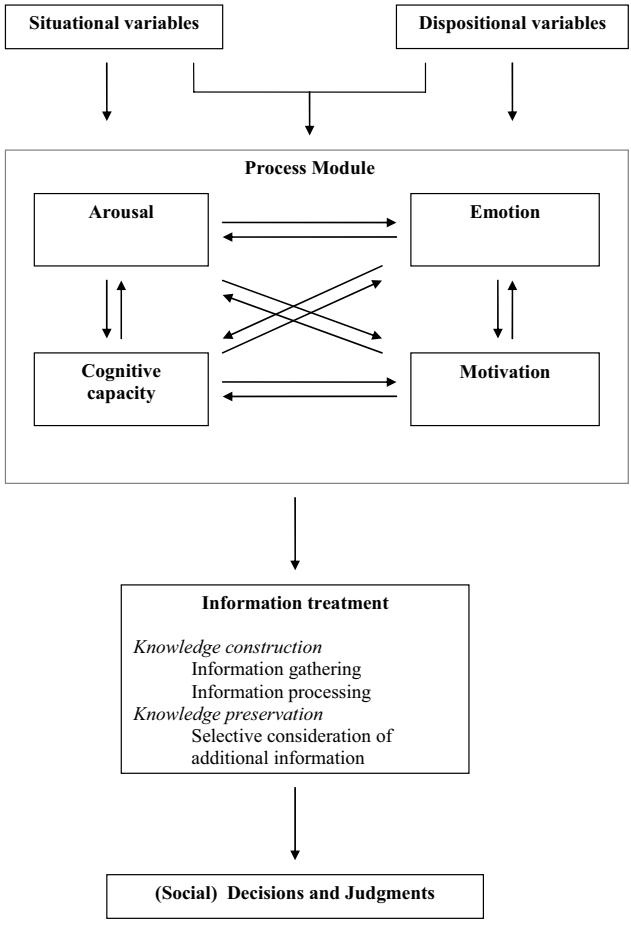

Figure 1 Integrative model of decision making (saturated model)

The model depicted in Figure 1 is referred to as 'a saturated model' because it contains all possible relationships between the four process variables of arousal, cognition, motivation, and emotion. In the remainder of the paper we argue that some of these paths have little theoretical or empirical relevance and should be omitted. Other relationships, however, are considered to represent important paths in

our model. This means that some of these paths have been firmly established by empirical studies and have been shown to yield intriguing research questions over the years. Other paths of great theoretical relevance have received remarkably less research attention and should be considered promising avenues for future research. We therefore aimed to arrive at a more parsimonious model that accommodates for the most important relationships and interactions between the process variables.

This model recognizes that situational as well as dispositional variables (input) can direct the four main determinants of decision-making: arousal, cognitive capacity, motivation, and emotion. In the present model, these variables constitute a 'process module' and they are assumed to be partially interdependent and their effects on information treatment are considered to act through mediation or in interaction with each other. The empirical evidence for the relations among these determinants is reviewed and elaborated upon below. The information treatment component of this model entails knowledge construction and knowledge preservation, which seem to be captured well by the distinction between seizing and freezing processes delineated in NFC theory and Staal's (2004) two typical ingredients of how information treatment is affected by stress (i.e., scanning fewer alternatives and persisting with a decision strategy that becomes suboptimal). Finally, as a last step in our model, changes in information treatment have a direct influence on general and social judgments and decisions.

In the following, we discuss the model starting with the input variables which include situational and dispositional variables. Next, we elaborate on the relationships and interactions within 'the process module' comprising arousal, cognitive capacity, motivation, and emotion. Finally, we go further into the effects of these processes on how people handle information and we argue that these effects are meaningful to understand judgments, which should be considered in their social context.

Input: situational and dispositional variables

Firstly, we address how situational variables as well as individual traits affect the different elements in the process module underlying decision-making. Whereas the importance of both input factors has been acknowledged in NFC theory, the research traditions that attended to arousal, cognitive capacity, and emotions have focused almost exclusively on situational manipulations, largely neglecting the role of individual traits. However, in their work on human stress and cognition, Folkman, Schaefer, and Lazarus (1979) have already argued that: "One of the most interesting directions of past thought and research on uncertainty is the adaptation of a personalistic rather than a situation-based perspective. It would seem reasonable to expect that people vary in their ability to remain in a state of uncertainty without undue distress…" (pp. 279-280). Therefore, it is our firm belief that in a comprehensive model of decision-making both dispositional and situational variables should be included as input factors.

The first factor, comprising various individual dispositions, is relatively stable. Dispositional NFC or individual differences in (in)tolerance of being undecided has already been mentioned as an example of such a stable trait, and numerous studies (e.g., Kruglanski, Webster, and Klem, 1993, Webster, 1993) have demonstrated the major impact of this trait variable on decision-making. However, several other dispositional input factors have been proposed as well. For example, Schwartz (2000, 2004) distinguished two types of decision makers: satisficers and maximizers. The term 'satisficer' refers to a type of decision-making espoused by people who are content to make less than optimal decisions and choose the first option that surpasses some absolute threshold of acceptability. 'Maximizers', however, seek as much information as possible, because they believe this is necessary to arrive at the best solution at hand.

Other dispositional variables that have been reported to influence decision-making include individual differences in Disinhibition (Crone, Vendel, & van der Molen, 2003) and Epistemic preference (Eigenberger, Critchley, & Sealander, 2007). Moreover, several studies have reported on the influence of intelligence on decision-making (e.g., Bröder, 2003), demonstrating that especially fluid intelligence affects performance on dynamic decision-making tasks (Gonzalez, Thomas, & Vanyukov, 2005).

The second input factor is changeable as it depends on the characteristics of the specific situation. Situations in which time pressure, noise, fatigue, or evaluation are present, but also circumstances that induce a positive or negative mood, are examples of such specific situational characteristics that can affect decision-making. The impact of these situational influences has been investigated in numerous studies within different research traditions, establishing their indisputable effects on decision-making in laboratory and real life situations (for an overview, see, Staal, 2004; Kruglanski, 2004).

In our model, these two input factors independently influence emotion, arousal, cognition, and motivation during the decision-making process. However, in addition to the simple effects of situational and dispositional input factors, interaction effects between these variables may also be important. In particular, it can be assumed that the impact of specific circumstances (e.g., time pressure) in a decision-making situation depends at least partly on the dispositional sensitivity to this kind of situation. Regrettably, research on the interplay between disposition and situational variables on decision-making is scarce. An obvious reason for this lack of attention lies in the fact that most studies have focused exclusively on the impact of situational variables, and therefore these studies did not consider a potential situation X disposition interaction.. Unlike the research traditions that focus on arousal, cognition, and emotion, motivational perspectives like NFC theory explicitly

acknowledge the importance of the dispositional factor, but, somewhat surprisingly, even this line of research has paid no attention to the interaction between disposition and situation. Indeed, the dispositional NFC variable has mostly been considered a methodological tool to cross-validate the effects of situational NFC manipulations. In general, scholars in this research tradition think of dispositional and situational NFC as two alternative ways to investigate the same NFC effect on decision-making.

Nevertheless, a limited number of studies have addressed the interaction between disposition and situation, thereby demonstrating the importance of such effects. Wofford, Goodwin, and Daly (1999), for example, have found that low trait anxious individuals are less prone to the negative effects of temporary stressors in terms of cognitive performance than high trait anxious individuals (see also Wofford, 2001; Wofford & Goodwin, 2002). Additionally, Dechesne, Janssen, and van Knippenberg (2000) have reported an interaction between situationally induced mortality salience and dispositional need for closure on social judgments about the in-group. Bröder (2003) investigated the adequate use of different decision strategies in a simulated stock market paradigm. The participants' choice on what decision strategy to use proved to be determined by the interaction between situation and intelligence. These three studies thus show the importance of situation X disposition interaction in explaining decision-making behavior.

Although it seems very likely that a situation X disposition effect is at work in decision-making, the existence and potential nature of these interactions remains unclear and may depend on exactly which dispositions and situations are considered. One possibility is that certain dispositions and situations show a synergistic interaction, yielding a larger combined effect than their separate effects. Conversely, it is also possible that situations and dispositions interact in an antagonistic way, for

example with situational variables only having an effect when similar effects have not been initiated by high levels of the relevant dispositional variables.

We conclude that, at a general level, three propositions can be stated with respect to the impact of input variables on the process module (see Figure 2):

Proposition 1: Individual dispositions affect the process variables underlying decision-making.

Proposition 2: Situations have an effect on the process variables.

Proposition 3: Individual differences and situations have an interactive effect on the process variables.

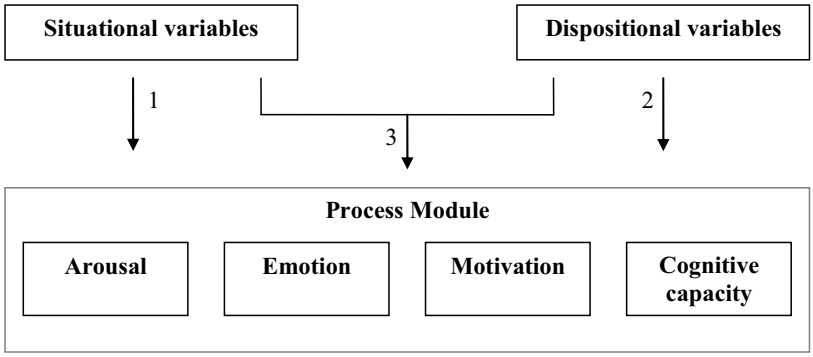

Figure 2. The impact of situational and dispositional factors on the process variables underlying decision making.

To sum up, we believe that incorporating both situational and dispositional variables in a comprehensive model of decision-making is both necessary and useful. The largely ignored domain of potential situation X disposition interactions on decision-making certainly offers opportunities for future research to advance our

understanding of how decision-making is shaped. Indeed, this type of research could delineate several psychological conditions under which situational effects have more versus less impact, and this interaction approach therefore would certainly contribute to our understanding of why these situations have an effect.

Interplay between the determinants of decision-making: Arousal, Emotion, Cognitive capacity and Motivation

We now go further into the elements of the process module. Before we presented the model depicted in Figure 1, we have described the main effects of arousal, cognition, motivation and emotion on their own as if they operated independently. The main effects of the four process variables on information treatment and decision-making are important, but a model with *only* these direct effects would be a blatant simplification of reality. We argue that these variables operate through mediation and that there are important interaction effects between arousal, emotion, cognitive capacity, and motivation on decision-making. To identify the most relevant processes within this module of our model, we extract several combinations of determinants and describe and visualize their relation and combined effects on decision-making in greater detail. However, in order to keep the balance between parsimony and comprehensiveness, we reviewed the relevant literature to determine which relationships are most important for decision-making, omitting the less prominent paths in our model. In particular, we go further into the relationships depicted in Figure 3, which we believe to be the most essential in a general model of decision-making.

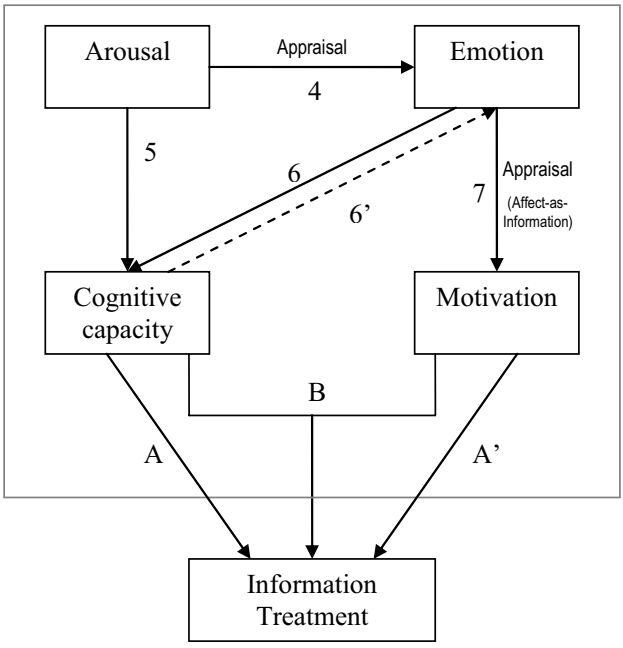

Figure 3. Relationships within the process module of decision making

The relationship between arousal and emotion (path 4)

Although an extensive literature review on the relationship between arousal and emotion is beyond the scope of this present contribution, it is important to address a few issues that clarify the nature of their relationship. Arousal has been assumed to be a causal factor in emotions in several prominent theories for over a century, reflected in the classical work of James (1894), Arnold (1960) and Schachter (1964). Some of these theories assume a direct relationship between arousal and emotion, but the more recent treatments assume that the relationship between arousal and emotion is moderated by appraisal. Depending on the situation and the subsequent appraisal, high arousal can lead to positive as well as negative

emotions. Similarly, very low levels of arousal can be appraised as positive (e.g., contentment) as well as negative (e.g., boredom) - see also Reeve (1992).

Several studies have, however, demonstrated that when people do not have an explanation for their elevated arousal, or when arousal is very high, this generally causes a negative affect (e.g., Maslach, 1979; Zimbardo et al. 1993). In fact, when the source of the arousal cannot be identified, or when appraisal is seriously hampered by the detrimental effect of extreme levels of arousal on the required cognitive recourses (as will be addressed later on), complex appraisal is impossible and arousal is interpreted as aversive by default.

Clearly, then, arousal in itself can be the source of specific emotional states. The effects of arousal on decision-making may therefore depend on the particular emotion that is triggered. However, the fact that high arousal and its appraisal can induce certain emotions does not imply that emotions only stem from (appraisal of) high arousal. Feelings of contentment or depression, for example, occur with low levels of arousal and emotions can differ in affect valence as well as in level of arousal (see Russell, 1980, 1983). Additionally, Sinclair and Mark (1995) demonstrated that the effects of mood states on decision-making may also occur regardless of arousal level (see also, Bodenhausen, Kramer, et al., 1994).

To sum up, although emotions are not determined by arousal alone, arousal is without doubt an important source of emotions. Proposition 4 therefore states that arousal has a direct effect on emotions.

The relationship between arousal and cognitive capacity and between emotion and cognitive capacity (paths 5, 6, and 6')

From the early theorizing on arousal, it has been argued that arousal depletes cognitive (attentional) capacity (e.g., Broadbent, 1971; Callaway, 1959; Easterbrook, 1959; Eysenck, 1977) and recent studies have corroborated this assumption. Baron

(2000), for example, reported that arousal compromises attentional capacity and reduces the ability to evaluate the available information carefully (see also, Lewinsohn & Mano, 1993). This idea has been further supported by Reich and Zautra (2002) who have also concluded that high stress reduces a person's ability to process information. Based on the empirical evidence supporting the classic assumption that arousal reduces cognitive capacity, a causal relationship between arousal and cognitive capacity has been incorporated in the process module of our model, referred to as Proposition 5, stating that arousal has a direct effect on cognitive capacity.

Research on the role of emotions in information processing and decision-making has demonstrated that emotional states also reduce cognitive capacity (e.g., Isen et al., 1982, Shiffrin & Schneider, 1977 for positive moods, and Ellis & Ashbrook, 1988 for negative moods). Several explanations for the effect of mood on cognitive capacity have been put forward by Mackie and Worth (1989). Positive or negative moods may activate positive and negative materials stored in the memory respectively which, in turn, reduce the working space of the limited cognitive system (see also Isen & Schalker,1982; Shiffrin & Sneider, 1977). Moreover, the easy and simultaneous accessibility of these materials may defocus attention (Isen, Daubman, & Nowicki, 1987). A similar mechanism that has been proposed asserts that the emotional material draws attention to itself and act as a distraction, interfering with the ability to engage in careful elaborative processing (e.g., Petty & Brock, 1981; similar explanations have been proposed by Ashcraft, 2002; Ashcraft & Kirk, 2001; Eysenck & Calvo, 1992). Overall, these mechanisms attest to the argument that emotion itself triggers specific emotion-related cognitions which interrupt ongoing cognitive processes, directing attention, memory and judgment to address the emotion-eliciting event itself (Johnson-Laird & Oatley, 1992; Lazarus, 1991b; Lerner & Tiedens, 2006; Schwarz, 1990; Simon, 1967; Tooby & Cosmides, 1990).

Proposition 6 therefore asserts that emotional states have a direct effect on cognitive capacity.

Although both arousal and emotion have been shown to deplete cognitive capacity in a number of studies, an interesting issue here is whether the effect of emotion on cognitive capacity is independent of (and possibly additional to) the effect of arousal. On the one hand, if emotion indeed triggers specific emotion-related thoughts that occupy a portion of the working space, this process is likely to occur for feelings of depression, anger or euphoria alike; that is, regardless of the arousal level of the specific emotion. On the other hand, the finding that arousal in itself reduces cognitive capacity (e.g., Callaway, 1959), suggests that emotion and arousal both have specific effects on cognitive capacity. Regrettably, studies that explicitly test the specificity of the effects of arousal and emotion on cognitive capacity are lacking, and future research should certainly address this issue. In the model we propose here, emotions as well as the degree of arousal are considered to have independent effects on cognitive capacity. Nevertheless, because we also acknowledge that there is a relationship between arousal and emotion, (see path 4, described above) the model does not exclude the possibility that the effects of arousal on cognitive capacity are partially mediated through emotions.

It is also important to note is that the numerous studies that have used the experience of failure on cognitive tasks as a manipulation to induce negative emotional states (for a meta-analysis see Nummenmaa & Niemi, 2004), show that experiencing real or perceived insufficiency of cognitive capacity in itself may also activate or increase negative feelings (represented by path 6' in Figure 3). The reciprocal relationship between emotions and cognitive capacity may amplify the effects on eventual information treatment and may even account for an indirect effect of cognitive capacity on motivation, as will be addressed further on.

The relationship between emotion and motivation (path 7)

Apart from the impact of emotion on cognitive capacity described above, motivational consequences of emotional states have frequently been emphasized as well. A dominant model in emotion literature - the Affect As Information Model (AAI; Schwarz, 1990) - postulates that affect provides individuals with information about the benign or problematic nature of a psychological situation. Positive affect signals that the environment is safe, indicating that careful and detailed processing is unnecessary, which, in turn, decreases motivation to process information. Conversely, negative affect signals the presence of a problem and, therefore, motivates perceivers to scrutinize the situation carefully, leading them to engage in careful and systematic processing. Hence, the AAI model explains the effects of emotion on information processing as being mediated through motivation (see also Wegener, Petty, & Smith, 1995).

Other explanations of the effects of positive affect on information processing also acknowledge the key role of motivation. Mackie & Worth (1989) suggested that a positive mood motivates people to avoid elaborate thinking about an issue because this is experienced as difficult and potentially threatening to the maintenance of the positive mood. No such reduction of information processing due to the positive mood is expected when this information processing is not mood threatening or when it is even supportive for the positive mood. This assumption was corroborated by Wegener, Petty, and Smith (1995) who demonstrated that the effect of positive mood on information processing depends on the 'hedonic' properties of this processing.

Applying the hedonistic principle to negative affect, one would expect that when task engagement contributes to a negative mood, people should be motivated to reach judgment quickly, even when this judgment is based on limited resources, because this is the most apparent way to end the bothersome situation (for a similar

line of reasoning, Wegener & Petty, 1994). In fact, NFC theory also corroborates this idea as it states that when the information processing is perceived as aversive or frustrating, people are more motivated to reach closure quickly (see also Roets & Van Hiel, 2007, Chapter 6). Hence, in line with Lerner and Tiedens (2006), we can conclude that moods "activate a meta-level motivation that influences judgment outcomes and processing" (p.128). In particular, negative moods are generally associated with a 'mood repair' motive, whereas positive moods are associated with a 'mood maintenance' motive. We can therefore conclude that motivation plays an important role in the effects of emotions on information processing. As such, Proposition 7 asserts that emotional states have a direct effect on motivation.

As a cautionary note, however, we would like to mention that, unlike the previous accounts that explicitly incorporate motivation as an explanatory mechanism, not all emotion researchers agree with the idea that motivation plays a role in the impact of emotions on decision-making. Isbell (2004), for example, asserts that recent studies on Schwartz' (1990) AAI model do not support the idea that happiness results in reduced motivation to process information carefully. Isbell (2004; see also Bless, 2001; Clore, Wyer, Dienes, et al., 2001; Wyer, Clore, & Isbell, 1999) states that the confidence in the validity of abstract information, such as stereotypes, scripts, and other general knowledge structures is increased in happy moods and that this increased confidence is the crucial mediating process that explains the effects of emotions on decision-making. However, we do not entirely agree with the assertion that motivation is not involved here. In fact, confidence may be caused by motivational effects as well. Indeed, Kruglanski (2004; Kruglanski & Webster, 1996) considered confidence as a (by)product of increased levels of need for closure.

A second issue we wish to mention is that emotion research gradually moves beyond simply examining the impact of positive versus negative affective states.

Indeed, Appraisal theory (Scherer, 1988; Smith & Ellsworth, 1985) suggests that emotions not only differ in terms of positive-negative valence, but also that they differ in meaningful ways when it comes to appraisal, (un)certainty appraisal being one of them. Lerner and Tiedens (2006) concur with his idea and they have asserted that (un)certainty appraisals have a massive impact on the relationship between emotion and decision-making. These authors specifically argued that "uncertainty reduction has been a widely recognized human motivation" (p.128), and that "… the certainty dimension is more important than the valence dimension in determining whether an emotion results in heuristic or systematic processing. Feeling uncertain has consistently been linked with more systematic processing and feeling certain with more heuristic processing." (p.126). It is thus argued here that the (un)certainty appraisal dimension invokes specific motivations related to uncertainty reduction, which, in turn, have an impact on information processing and decision-making.

To sum up, based on the present overview of the relationship between emotion and motivation, it may be concluded that the effects of emotions on decision-making run through motivational processes which may relate to the hedonistic principle or to uncertainty reduction.

The relationship between arousal and motivation: direct or indirect?

Early research has already assumed a motivational basis of the effect of arousal on decision-making (e.g, Yerkes,-Dodson, 1908; Easterbrook, 1959). In fact, the terms arousal and motivation have even been used interchangeably with regard to the interpretation of the Yerkes-Dodson law. Easterbrook (1959) proposed that the effects of arousal under stress were motivational in nature, serving to organize a course of action better. Welford (1973) has asserted that stress can be viewed as a state of being removed from an optimal condition, suggesting that motivation plays a role in spurring action against this departure from the optimal state.

The question here is whether arousal in itself directly affects motivation or whether this effect is mediated through emotions. We have already argued that people appraise the arousal they experience, which in turn, leads to positive or negative emotions. Negative emotions, then, motivate people to avoid or terminate the situation that caused the arousal, whereas positive emotions motivate people to maintain this (arousal) state and the situation that caused it. This rationale thus suggests that the effects of arousal on motivation are indirect and mediated through emotion. Accounts on the motivational consequences of arousal (e.g., Easterbrook, 1959; Welford, 1973) typically include some degree of appraisal in terms of negative or positive valence. Alternative explanations of the effect of arousal on motivation that do not include emotions are not available in psychological literature. Hence, our model favors an indirect path between arousal and motivation through emotion over a direct relationship.

The relationship between cognitive capacity and motivation (paths 6' and 7).

Some scholars have suggested that relative cognitive capacity and motivation may show a causal relationship. Indeed, Kruglanski and Webster (1996) have argued that changes in cognitive ability can affect motivation. Their findings with respect to resistance to persuasion, derogation of opinion deviates, and judgmental confidence has provided some indirect evidence for the hypothesis that low relative capacity to perform adequately on a task leads to reduction in task motivation in the long run. However, only one study has explicitly tested this relationship (Roets & Van Hiel, in preparation) and found that the negative effect of cognitive resources depletion on information collection was partially mediated through motivation. Future research is therefore needed to provide additional direct empirical evidence for this assumption and the potential role of appraisal in this relationship is in need of further elaboration.

Moreover, an interesting possibility is that the relationship between cognitive capacity and motivation is mediated through emotion. As we have already argued (see path 6'), the experience of failing cognitive capacity activates negative feelings (see Nummenmaa & Niemi, 2004), and negative moods can trigger 'mood repair' motives by which people escape the situation, hence refraining them from exhaustive (i.e., prolonged) information processing.

Because to date the impact of cognitive capacity on motivation lacks conclusive empirical support and especially the nature of this effect remains unexplored, we have not included a direct path in our model between cognitive capacity and motivation. However, given the relation between cognitive capacity and emotion (path 6') and between emotion and motivation (path 7), our model allows for an indirect effect of cognitive capacity on motivation. Proposition 8 therefore states that cognitive capacity has an indirect effect on motivation through emotions.

The main effects (paths A and A') and interaction effects (path B) of cognitive capacity and motivation on information treatment.

The present model presents cognitive capacity and motivation as the two processes that directly affect information treatment. This idea is in line with recent accounts on decision-making. For example, Kruglanski, Pierro, Mannetti, Erb, and Chun (2007) have argued that cognitive resources (relative to task demands) and motivation are the two most important 'decision maker' parameters in human judgment.

Motivation and cognitive ability have been shown to be powerful determinants of decision-making in numerous studies (for an overview, see Kruglanski, 2004; Staal, 2001). However, these research lines have evolved separately and to date only some scholars (Bar-Tal, Kishon-Rabin, & Tabak, 1997;

Pelham & Neter, 1997; Roets et al., 2007) have demonstrated that there is more to motivation and cognitive capacity than their simple main effects. In particular, the impact of these variables can only be fully understood if their interactive effect is taken into account.

A solid basis for understanding the interaction between motivation and cognition on effort spent in decision-making is provided by the integrative framework of Wright & Kirby (2001). These authors asserted that the effort a person spends on a cognitive task is determined by the interaction between task demands (relative cognitive capacity) and motivation. Roets et al. (2007) (Chapter 5) have applied the framework proposed by Wright and Kirby to information gathering investment and have shown an interaction between both these variables on the amount of information that is collected before making a decision. In particular, participants increased their efforts when the task became more difficult (i.e., reduced relative cognitive capacity) as long as additional effort investment is not prohibited by low motivation. However, when the motivation was reduced experimentally or when people had a high dispositional need for closure, the maximum information gathering effort one is willing to invest proved to be considerably lower, which prevented participants from boosting their effort when confronted with a more demanding task.

Given the evidence for the main and interaction effects of motivation and cognitive capacity on information treatment, we have included these effects in our model. In particular, Proposition 9 states that cognitive capacity and motivation have main effects on information treatment. Additionally, Proposition 10 states that in addition to these main effects, the interaction between cognitive capacity and motivation further determines how information is gathered, processed, and preserved

Relationships omitted from the parsimonious model

In the parsimonious model (Figure 3) presented above, we have discussed the most important paths among arousal, emotion, motivation, and cognitive capacity. Compared to the 'saturated model' (Figure 1), we have omitted some paths that were considered less relevant in explaining human decision-making processes. In particular, the direct paths from emotion, cognitive capacity, and motivation to arousal have been deleted because there is no theoretical or empirical basis for such direct causal relations. The direct path from cognitive capacity to motivation is also excluded in the parsimonious model because we favor an indirect relationship through emotion, as we have explained in more detail above. The inverse path (from motivation to cognitive capacity) has also been omitted because there is no theoretical or empirical ground to argue that motivation in itself may increase or decrease cognitive capacity. Similarly, a direct path from motivation to emotion does not represent an interesting possibility, as it seems unlikely that motivation in itself causes a positive or negative mood or any specific emotion.

Information treatment: knowledge construction and preservation

After discussing the 'input' and 'process' stages of our model, we now go into the information treatment module. Specifically, in the present model, arousal, emotion, cognitive capacity, and motivation directly or indirectly affect information treatment, which includes the nature of the information incorporated (i.e., the qualitative aspect) and the extent to which it is gathered and processed (i.e., the quantitative aspect). Indeed, the various research traditions we have discussed so far have shown that the process variables have effects on information treatment. These effects can be divided into two categories; (1) effects on how information is treated in order to reach an initial decision, and (2) effects on the way information is treated later on, once an initial decision has already been made. This distinction between

'knowledge construction' and 'knowledge preservation' is certainly not new, and a similar differentiation has been put forward by NFC theory (i.e., seizing and freezing outcomes, see Kruglanski and Webster, 1996) and the literature on the effects of stress (see Staal, 2004).

The first element, knowledge construction, refers to the initial phases of information gathering and processing. In relevant literature (see Table 1), it is repeatedly argued that knowledge construction varies from limited and theory-driven to comprehensive and data-driven. The second element, knowledge preservation, refers to the finding that, once an initial decision has been made, subsequent information may either be used to change or refine this initial decision, or this information may be neglected or processed selectively to corroborate the initial decision.

Specific dispositional and situational input factors determine how information is treated through changes in the process variables. That is to say, changes in the input factor alter the process module, which in turn, leads to changes in constructing and preserving knowledge. Table 1 provides a sample of research studies illustrating the effects of various input variables on knowledge construction and preservation.

Table 1.

Sample of research studies on the effects of input variables on knowledge construction and preservation

Knowledge construction	**Input**	
Less extensive search for information	e.g., Dispositional NFC, time pressure, noise, fatigue	e.g., Klein & Webster, 2000; Kruglanski, Peri, & Zakai, 1991; Roets, Van Hiel, Cornelis, & Soetens, in press; Van Hiel & Mervielde, 2002; Webster & Kruglanski, 1994; Webster, Richter, & Kruglanski, 1996
Increased use of heuristics	e.g., Time pressure & workload, positive mood, angry mood, anxiety, anger	e.g., Bodenhausen, Kramer, & Susser, 1994; Bodenhausen, Sheppard, & Kramer, 2004; Entin & Serfaty 1990; Lerner, 1998; Sengupta & Johar 2001; Tiedens, 2001; Tiedens & Linton, 2001; Wegener, Petty, & Smith, 1995
Knowledge preservation		
Greater rigidity, fewer alternatives considered	e.g., Time pressure, stress, dispositional NFC	e.g., Cohen 1952; Kruglanski & Mayseless, 1988; Kruglanski, Webster, & Klem, 1993; Roets, Van Hiel, & Cornelis, 2006; Staw, Sandelands, & Dutton 1981; Streufert & Streufert, 1981; Walton & McKersie 1965; Webster & Kruglanski 1994; Wright 1974

In Table 1, knowledge construction and knowledge preservation are presented separately only to demonstrate that information treatment is affected before an initial decision is made as well as after this decision is made. However, these two elements of information treatment are highly entwined. In particular, when people are directed towards fast and heuristic-based knowledge construction they generally also exhibit greater knowledge preservation. According to NFC theory (Kruglanski & Webster, 1996), effects on knowledge construction and preservation are sequential and stem from the same preference for closure over ambiguity. The finding that various input variables (e.g., noise, time pressure, dispositional urges for clear-cut answers etc.) have similar effects on both knowledge construction and preservation also attests to the idea that these two elements of information treatment cannot be seen in isolation from each other (see also Staal, 2004).

There is ample empirical evidence for the effect of input factors through process variables on information treatment for the process variables cognitive capacity and motivation, but such straightforward evidence for arousal and emotion, especially on knowledge preservation, is less abundant. Importantly, in our model, only cognitive capacity and motivation have a direct effect on information treatment whereas arousal and emotions affect information treatment indirectly through cognitive capacity and motivation. The effects of arousal and emotion thus depend on how they influence cognitive capacity and motivation, and this may explain why the effects of arousal and emotions on information treatment tend to be more difficult to interpret and often allow for multiple explanations.

Another important issue in the present context is whether there is a universally desirable way of treating information. Traditionally, human decision-making has been interpreted in terms of the cognitive miser perspective (Taylor, 1981), which basically states that people are limited in their cognitive resources and therefore take shortcuts whenever they can (see Fiske & Taylor, 1991). According to

this perspective, the use of heuristics, limited information gathering, and the unwillingness to consider alternative judgments should be considered as 'cognitive laziness', whereas extensive information gathering, data-driven decisions and openness to modify the decision when additional information becomes available should be considered to be a better approach to reach decisions.

Over the years, however, scholars have questioned the validity of the cognitive miser perspective, and Fiske and Taylor (1991) have introduced the term 'motivated tactician' to describe the decision maker more accurately. This motivated tactician is a "fully engaged thinker who has multiple cognitive strategies available and chooses among them based on goals, motives, and needs" (p. 13). The model we present here can also be framed within this motivated tactician perspective. In other words, depending on the processes that take place in the process module, the 'choice' is made between elaborative and cursory processes. In other words, heuristic, limited information processing should not always be seen as a deficient decision-making strategy. According to Fiske and Taylor (1991), the motivated tactician sometimes chooses defensively in the interest of speed or self-esteem, and the mood repair and maintenance motives we discussed earlier can certainly be framed in terms of defense. Also attesting to the idea that comprehensive and deliberate thought does not necessarily yield the best results, Dijksterhuis and colleagues (Dijksterhuis & Meurs, 2006; Dijksterhuis & Olden, 2006) have shown that unconscious thought resulted in more creativity and post-decision satisfaction.

Nevertheless, heuristic information processing and the refusal to consider alternative ideas may contribute to erroneous and simplistic judgments and decision-making with undesirable consequences. Given the focus of much social-psychological research on these negative consequences, we discuss the dangers of cursory information processing on social judgment.

Decision-making in a social context and social decision-making

In the proposed model, we have elaborated on how arousal, emotion, cognitive capacity, and motivation influence and shape how people handle information and reach decisions.

In this section, we argue that decision-making also has pervasive effects on how people deal with their social reality. The social component of decision-making stems from two elements. Firstly, the social context conveys information that the individual decision maker takes into account and the social environment therefore alters individual decision-making. In other words, people make judgments *within* their social environment. Secondly, people make judgments *about* the social context, and these decisions and judgments are not without consequences for people around us.

When a decision or judgment is made within a social context, the available research evidence strongly suggests that other people's opinions and judgments are an important source of information for an individual to make up his or her own mind. Baron (2000) argued that group consensus is a heuristic cue for the correctness of an argument, and the studies of Darke, Chaiken, Bohner, Einwiller, Erb, et al. (1998) revealed that consensus generally influences attitudes through heuristic processing. Additionally, several other authors have argued that people apply an in-group versus out-group categorization scheme on the source of information as a heuristic to identify the validity of the message (Abrams & Hogg, 1990; Mackie, Worth, & Asuncion, 1990). Furthermore, Mackie, Gastardo-Conaco, & Skelly (1992) and Vanknippenberg, Lossie, and Wilke (1994) reported that when an in-group attitude is clear to the group members, subsequent information provided to an individual to reach a judgment is processed in a more heuristic way.

Increased reliance on heuristic information is one of the examples of information treatment in our model (see Table 1). Hence, since in-group consensus

often serves as a heuristic cue for (social) judgment, this would imply that when decision-making processes are guided towards a heuristic processing style, for example in situations of time pressure or noise or with high dispositional NFC, people rely more on the group consensus as a basis of their own judgment. Various studies have indeed corroborated this thesis (e.g., Fu, Morris, Lee, Chao, Chiu, & Hong, 2007) and it has been repeatedly reported that conformity to the group is much more pronounced in the presence of situations that induce heightened arousal and lowered cognitive capacity and/or motivation. In particular, greater conformity to the group and/or derogation of opinion deviants were found with high levels of fear (Darley, 1966), under time pressure or noise (Kruglanski & Webster, 1991; De Grada, Kruglanski, Mannetti, & Pierro, 1999), and with increased death salience (Florian & Mikulincer, 1997). Additionally, Pierro, Mannetti, De Grada, Livi, & Kruglanski (2003) found that groups with members under high dispositional as well as situationally induced need for cognitive closure tended to develop an autocratic leadership structure. Bringing all this evidence together, we can conclude that heuristic information-processing is associated with higher levels of conformity to the group, as well as with greater reliance on the group perspective as a basis for decision-making. We therefore strongly believe that the proposed model can prove valuable to research that seeks to explain and understand the conditions under which group conformity, indoctrination, and propaganda yield their maximal effects.

In addition, people not only make decisions within a social context, but they also make judgments about the social context itself and about other people as a part of their social environment. Since judgments and decisions based on social information are merely a more specific variation of decision-making in general, similar consequences of extent and type of information processing should also apply to decisions and judgments about the social environment. Indeed, several studies have demonstrated that dispositional and situational variables (such as dispositional

NFC or time pressure and noise) affect social evaluations of target persons, for example the increased use of prototypical relative to diagnostic information when judging this target (e.g., Kruglanski & Mayseless, 1988; Mayseless & Kruglanski, 1987), as well as the increased use of stereotypic judgments (Schaller, Boyd, Yohannes, & O'Brien, 1995). Similarly, situational manipulation of a happy mood causes people to judge others based on category membership information rather than individuating information (Bless, Schwartz, & Wieland, 1996) and induce more stereotypic judgments (Bodenhausen, Kramer, et al., 1994). Bodenhausen, Sheppard, et al. (1994) assert that " stereotypes can be viewed as judgmental heuristics that are relied upon by social perceivers whenever they lack the ability or the inclination to think more extensively about the unique personal qualities of outgroup members" (p. 49).

To sum up, people not only make judgments on their own and for themselves, but they also rely on their social environment. Moreover, making judgments about the social context and about other people not only influences the self, but also other persons who participate in the social environment.

GENERAL DISCUSSION

The main aim of the present study was to integrate the findings of the different research traditions into a single model of decision-making. The relevant literature in this context can be distinguished according to its focus on specific process variables: arousal, emotion, cognitive capacity, or motivation. The present integrative model describes the effects of dispositional and situational variables (input variables) on information treatment and decision-making (output variables) through the operation of distinct process variables. Given the explicit focus of the present model on decision-making in it broadest terms, the model's multidisciplinary

and integrative character included elements that are widely accepted in some domains, but may have gone unnoticed in other psychological theories and domains.

Two important innovations result from this model. Firstly, based on this integration, we have been able to delineate un(der)investigated issues that represent specific avenues of future research. Indeed, we started the present inquiry with what we called a 'saturated model' incorporating all possible relationships among the process variables. Subsequently, we evaluated these relationships in terms of their empirical support in previous research and their relevance in explaining decision-making. In this way, we were able to construct a 'parsimonious model' that includes some unattended paths that are worthy of future research attention. Secondly, at a more general and theoretical level, given the firm evidence for the multiple relationships among the process variables (summarized in Figure 3), we strongly believe that treating these variables as if they operate in isolation is a blatant denial of the complexity of human decision-making. Hence, we argue that in order to understand decision-making fully, the simultaneous consideration of these potential mechanisms is primordial to advance our knowledge in this important domain of inquiry.

In the remainder of the discussion, we focus on these two main issues. Firstly, we elaborate upon the specific propositions that have been put forward based on the literature search, and we specify interesting avenues for future research. Secondly, we focus on the way input variables may impact upon multiple processes, as such influencing information processing through several ways.

Promising avenues for future research on the determinants of human decision-making

Reviewing the empirical evidence on the various paths in our model, we have been able to conclude that some of these paths were substantiated by a vast

amount of research, whereas other paths have remained virtually uninvestigated, leaving important blind spots in our understanding of the mechanisms that shape human decision-making. Figure 4, depicting the general model, visualizes this unbalanced research focus. The full arrows represent the relationships that have been amply studied, whereas the dotted arrows represent the relationships that are still in need of more investigation

Some paths that have been investigated extensively in previous studies have acquired the status of established facts. The relationship between arousal and emotion (Proposition 4) has been the subject of the classical theories put forward by James (1894), Arnold (1960), and Schachter (1964), and this issue has generated a growing number of studies over the years. Analogously, a broad research tradition on the effects of arousal and stress on performance (Proposition 5) has firmly established the relation between arousal and cognitive capacity (e.g., Baron, 2000; see also Staal, 2004). Propositions 4 and 5 therefore do not seem to require additional research efforts.

Propositions 6 and 7 also seem to be well-supported. That is, virtually all studies that have focused on the effect of emotions on performance and decision-making have explained these effects in terms of changes in cognitive capacity (Proposition 6) and/or motivation (Proposition 7) (e.g., Mackie & Worth, 1989; Eysenck & Calvo, 1992; Lerner & Tiedens, 2006). However, it should also be noted that the explanations of the effects of emotions are often based on theoretical considerations rather than empirical evidence and that these post hoc interpretations are not undisputed (see, Isbell, 2004). Hence, it is our conviction that emotion literature may still benefit from additional research efforts on the relationship between emotion and cognitive capacity or motivation.

We now elaborate upon which propositions need more attention and seem to be promising avenues for future research.

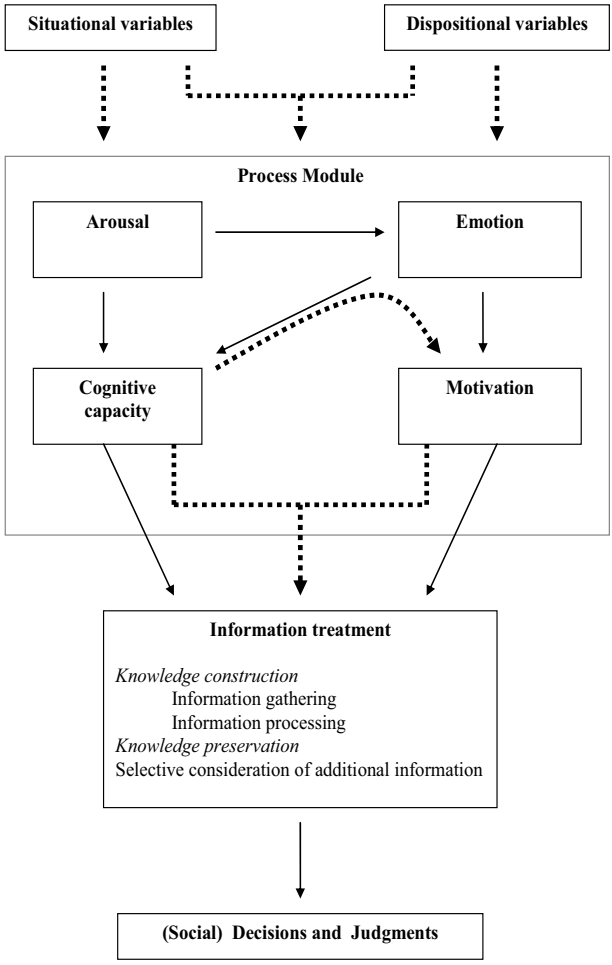

Figure 4: Integrative model of decision making: Paths in need of further investigation

With respect to the effects of input variables (disposition and situation) on the four elements of the process module (arousal, emotion, cognitive capacity, and motivation), two issues deserving of more attention in future research clearly stood out.

Individual dispositions and situations affect the process variables underlying decision-making (Propositions 1 and 2).

It has been shown abundantly in previous research that dispositional as well as situational factors influence arousal, emotion, cognitive capacity, and motivation. These previous investigations, however, have typically focused on only one of these process variables. Little is known about how particular input variables affect other process variables besides the one that is assessed in the study at hand. Conversely, in our model, a single input factor may have direct as well as indirect effects on more than one process variable. An interesting avenue for future research, therefore, is to investigate the multiple effects of the input variables on various processes. We will elaborate on this issue further on.

Individual differences and situations have interactive effects on the process variables (Proposition 3).

The lack of empirical research on the interaction effect between dispositional and situational variables on the process variables represents a second important hiatus in previous research. Moderation effects are especially relevant in the present context because if particular individual differences (e.g. intelligence) make people more or less susceptible to the effects of particular situations (e.g. time pressure), it is suggested that these individual characteristics somehow account for the situational effect (e.g., time pressure has an effect because it reduces cognitive capacity). This moderator approach thus certainly contributes to our understanding of why these situations influence decision-making. An interesting avenue for future

research, therefore, is to probe into the interaction effects between situational and dispositional input factors on the process variables.

Next, we focus on two major issues within the 'process module' that have been neglected in previous research and which definitely deserve further investigation.

The interaction between cognitive capacity and motivation determines how information is gathered, processed and preserved (Proposition 10).

Although some theoretical accounts (e.g., Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007) acknowledge that both cognitive capacity and motivation are important underpinnings of human decision-making, the interaction between these variables has barely been investigated. Importantly, in the occasional empirical studies that have addressed this issue, the interaction effect between these variables on decision-making processes has proved to be substantial (e.g., Bar-Tal, Kishon-Rabin, & Tabak, 1997; Roets et al., 2007).

Kruglanski and Webster (1996) state: "… relative capacity and motivation are multiplicatively interrelated. That is, at least some degrees of capacity and motivation are required for judgmental activity to occur" (p.280). Hence, motivating people to consider all alternatives when making a decision and keeping an open mind to change their decision, if necessary, may be ineffective when the required cognitive resources are lacking due to situational or dispositional factors. Similarly, sufficient cognitive resources does not necessarily mean that people will rely on 'objective' (i.e., non-heuristic) and comprehensive information processing to make decisions if they are poorly motivated.

We thus call for more integration between studies on the cognitive capacity and motivation components of decision-making. Although both motivation and cognitive capacity perspectives have independently generated a large body of

research, hardly any research programs have been initiated to examine this interesting interaction.

Cognitive capacity has an indirect effect on motivation through emotions (Proposition 8).

A major issue in need of further research within the process module is the relationship between cognitive capacity and motivation, potentially mediated by emotions (Proposition 8). Although cognitive capacity and motivation have been widely considered to be of major importance for decision-making, little is known about their potential relationship.

With respect to knowledge construction and preservation processes, one may hypothesize that the experience of failing cognitive capacity activates negative feelings, which, in turn, trigger a decreased motivation to invest cognitive resources when faced with similar tasks in the future. Moreover, one can assume that once the decision is made, additional incongruent information is neglected.

This is an important issue especially when considering its implications on decision-making and even on other domains. For example, in a school context, this would mean that students who earn poor grades may become dissatisfied with school and may subsequently become poorly motivated to engage in school activities (see also, Anderman, & Midgley, 1997). Other studies have also shown that people are less motivated to invest effort when the task at hand has been described as an assignment at which one is not likely to excel (see e.g., Wright and Kirby, 2001). Hence, even the sheer expectation of having insufficient cognitive capacity undermines task motivation.

Hence, theories of decision-making should accommodate the possible relation between cognitive capacity and motivation. Future studies may seek empirical evidence corroborating a causal relation between these variables, and

whether the potential effect of cognitive capacity on motivation is direct or mediated through emotions.

The model in action: from input to decision-making through direct and indirect paths

A second main issue we wanted to consider is the way input variables may impact upon multiple processes, as such ultimately causing differential effects on information processing. Two major concerns are important here. Firstly, in addition to its (obvious) direct effect on a particular process variable, a single input factor (disposition or situation) can have a considerable *indirect* effect on several other process variables as well. Secondly, a single input factor can also have *direct* effects on more than one process variable. The second concern in particular has been neglected entirely in previous research, interpreting the effects of specific manipulations or dispositions on decision-making in terms of a single process variable. In the following, we illustrate the dynamic properties of our model by showing that input variables may have an effect on decision-making through direct and indirect paths.

We first illustrate the importance of indirect effects on the process variables for three input factors: Uncertainty intolerance, intelligence, and arousal invoking substances.

The intolerance of being undecided and the ability to cope with uncertainty are typical examples of dispositional factors that influence decision-making. These dispositions have been considered to have a purely motivational effect, but closer investigation of this issue reveals an 'indirect' mechanism underlying the effect, attesting to the value of our model. In particular, Roets and Van Hiel (in press) have demonstrated that the intolerance of being undecided directly affects arousal (assessed by galvanic skin response and cardio-vascular measures) and emotions.

According to the model we propose, negative emotions and elevated levels of arousal may (directly, path 4, and indirectly, paths 4 & 7 respectively) induce a strong motivation to end the burdensome and aversive decision-making process quickly rather than engage in lengthy and elaborate information processing.. As such, the 'motivational' nature of these dispositional variables may be much more complex (with inclusion of various: indirect paths) than assumed in traditional NFC research, for example.

For other dispositions, the relative importance of the distinct process variables may be different. For example, in the case of intelligence, cognitive capacity plays a prominent role. Nevertheless, we believe that through cognitive capacity, intelligence has an indirect impact on other process variables as well. For example, low cognitive capacity may activate feelings of frustration when the cognitive resources prove insufficient to complete the judgment (path 6'), and because emotions are directly related to motivation (path 7), the motivation to engage in lengthy and effortful information processing may be impeded. Hence, in our model, the effect of intelligence on information treatment is not only determined by its direct effect on cognitive capacity, but also by its indirect effect on motivation.

Indirect effects may also apply to what seem to be 'pure' manipulations at first glance, such as epinephrine injections (see Callaway, 1959). Although this manipulation primarily acts at the arousal level, arousal, in turn, has been demonstrated to influence cognitive capacity (path 5) and emotion (path 4). Again, motivation may decline through its relationship with emotion (path 7). Therefore arousal has a direct effect on cognitive capacity and an indirect effect on motivation. Hence, our model states that epinephrine directly influences arousal, but the eventual effect on information processing and decision-making also occurs indirect via cognitive capacity and motivation.

The previous example of the intolerance of being undecided illustrates that a single input factor (disposition or situation) may also have direct effects on more than one process variable. Environmental noise, for example, is widely used to influence decision-making and has been associated with increased arousal (e.g., Broadbent, 1971; Paulhus & Lim, 1994) as well as lowered cognitive capacity (e.g., Hockey, 1970; Roets, et al., 2007: Chapter 5). A plausible explanation for the effect of noise on cognitive capacity is that noise acts as a distracter, taxing the limited cognitive resources. Indeed, arousal and distraction theories have both been considered valuable explanations for the effect of noise on decision-making (see Hockey, 1978, 1979, 1983; Staal, 2004). Clearly, then, noise produces direct and simultaneous effects on two process variables (i.e. arousal and cognitive capacity), which are accounted for by the present model.

As a cautionary note it is, however, important to signal that most input factors have an effect on decision-making via direct as well as indirect paths. In the case of noise, for example, the effect on cognitive capacity could be considered as a direct effect (i.e., distraction theory), but the effect on cognitive capacity through arousal (path 5) could also be considered an indirect effect. Regrettably, research that tries to delineate the relative importance of direct or indirect effects is lacking, and subsequent research may therefore investigate their relative strength.

Overall, the present model acknowledges that the four determinants from varied research traditions all are important in explaining decision-making. In particular, disposition and situational variables influence one or more processes directly, which in turn, may have an impact on other processes. In the proposed model, it is assumed that this dynamic interplay between arousal, emotion, cognitive capacity, and motivation determines the nature and extent of information treatment shaping the final judgment or decision.

Concluding remarks on the model

The main aim of the model presented here, was to incorporate the findings of various research lines on decision-making with a special focus on how arousal, emotion, cognitive capacity, and motivation shape the manner and extent of information treatment to reach a decision in general and social judgment in particular. We believe the present model is the first one to offer a comprehensive overview of the 'human factors' underlying decision-making. We realize that the interplay between the main determinants is very complex and therefore we do not assert that this model answers all questions on how people eventually reach judgment. Certainly, single studies cannot fully test the validity and implications of the present model or any other broad model on human decision-making. To advance our understanding of the major processes underlying decision-making, a series of studies comprising various input and process variables is necessary. However, we believe this model which integrates different research lines can provide a theoretical framework to consider these various influences on decision-making. Moreover, this framework proposes interpretations of research findings beyond the limited scope of either of the individual research traditions.

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Appendix

Nederlandstalige samenvatting

INLEIDING

In de hedendaagse maatschappij worden keuzevrijheid en persoonlijke autonomie in het nemen van beslissingen als een fundamenteel recht beschouwd. Iedere dag wordt men dan ook geconfronteerd met situaties waarin men beslissingen moet nemen, keuzes moet maken en oordelen moet vormen. Onderzoek naar sociale cognitie wees uit dat het individu dikwijls cognitieve heuristieken hanteert tijdens dit beslissingsproces. Op die manier kunnen beslissingen sneller en vaak ook efficiënter gemaakt worden. Deze strategie geeft echter ook aanleiding tot fouten en vertekeningen in beoordelingen.

Het gebruik van dergelijke cognitieve heuristieken wordt vaak in verband gebracht met een beperkte informatieverwerkingscapaciteit. De processen die hierbij gepaard gaan, werden dan ook voornamelijk uitgelegd in termen van cognitieve variabelen ("koele variabelen"), ondanks het feit dat het belang van motivaties ("hete variabelen") herhaalde malen aangetoond werd. De motivatie om al dan niet over te gaan tot een grondige informatieverwerking is een centraal thema in de behoefte aan cognitieve afsluiting (BCA) theorie die kennisverwervingsprocessen bestudeert.

De BCA theorie van Kruglanski (1989; Kruglanski & Webster, 1996) handelt over de behoefte om tot snelle en definitieve beslissingen en oordelen te komen. Behoefte aan afsluiting wordt gedefinieerd als de wens om zekere en sluitende kennis te bezitten, in tegenstelling tot verdere verwarring en ambiguïteit. Twee sequentiële

processen spelen hierbij een belangrijke rol. Het “seizing” proces refereert aan het snel tot een antwoord of een besluit willen komen. Het “freezing” proces verwijst naar het behouden van en ageren op de vergaarde kennis.

Behoefte aan afsluiting kan door de omgeving opgeroepen worden, bijvoorbeeld door tijdsdruk of achtergrondlawaai. Er zijn echter ook individuele verschillen in de behoefte aan afsluiting. Een individu met een hoge behoefte aan afsluiting heeft een voorkeur voor structuur en voorspelbaarheid, is besluitvaardig, intolerant voor ambiguïteit en enggeestig.

De geslotenheid voor nieuwe informatie en evidentie is één van de belangrijkste gevolgen van de theorie omtrent behoefte aan afsluiting. Deze geslotenheid werd geïllustreerd door een verlaagde gevoeligheid voor alternatieve hypotheses, een verhoogde weerstand tegenover overtuigende boodschappen en een minder grondige zoektocht naar informatie. Effecten van behoefte aan afsluiting werden eveneens genoteerd voor talrijke fenomenen uit de sociale cognitie literatuur, zoals primauteitseffecten in impressievorming, recentheidseffecten, het louter-blootstellingseffect, en de overattributie-vertekening. Bovendien blijkt de behoefte aan cognitieve afsluiting ook een invloed the hebben op variabelen zoals conservativiteit en racisme.

Heden ten dage debatteren Kruglanski en collega's (Kruglanski, De Grada, Mannetti, Atash & Webster, 1997) en Neuberg en collega's (Neuberg, Judice & West, 1997; Neuberg, West, Judice & Thompson, 1997) over het aantal dimensies die de behoefte aan afsluiting en vooral de schaal de dit concept meet, zou bevatten. Kruglanski en collega's stellen dat de behoefte aan afsluiting een éénduidige, latente variabele is die zich manifesteert op verscheiden wijzen zoals in een voorkeur voor orde en voorspelbaarheid, besluitvaardigheid, intolerantie voor ambiguïteit en enggeestigheid.

Recente analyses van Neuberg en collega's (1997) geven echter de aanleiding tot heel andere conclusies. Volgens deze onderzoekers heeft de vragenlijst naar de behoefte aan afsluiting lage interitem homogeniteit en confirmatorische factor analyses wijzen op een multi-factoriele structuur. Daarenboven vonden Neuberg et al. dat deze vragenlijst bestaat uit twee orthogonale factor-analytische dimensies, waarvan de eerste factor hoog ladende items bevat die verwijzen naar de behoefte aan structuur en voorspelbaarheid en de intolerantie voor ambiguïteit schalen. Op de andere factor laden de items die besluitvaardigheid meten.

Neuberg en collega's stelden dat hun bevindingen zich niet enkel beperkten tot de validiteit en de betrouwbaarheid van de behoefte aan afsluiting vragenlijst, maar dat deze evenzeer van toepassing zijn op de interpretatie van de theorie. Naar aanleiding van hun psychometrische analyses formuleerden de auteurs de hypothese dat de twee primaire factoren die aan de basis liggen van de behoefte aan afsluiting, oevereenkomen met de “seizing” en “freezing” processen beschreven door Kruglanski. Het “seizing” proces dat gekenmerkt wordt door een behoefte aan een snel, niet-specifiek antwoord, zou zich manifesteren als besluitvaardigheid. Het “freezing” proces op haar beurt, zou gerepresenteerd worden door een voorkeur voor een eenvoudige structuur (een voorkeur voor orde en voorspelbaarheid en intolerantie voor ambiguïteit). Deze hypothese werd echter verworpen door de originele auteurs van de BCA schaal en afgewimpeld al puur speculatief en niet empirisch gefundeerd.

De verhitte discussie tussen Neuberg en Kruglanski bleef tot heden zonder algemeen aanvaarde oplossing en slechts beperkte inspanningen werden gedaan om deze fundamentele onenigheid uit te klaren. Desondanks bleef de BCA schaal een populair onderzoeksinstrument en onderzoekers gebruikten de schaal als een- of twee-dimensioneel op basis van de persoonlijke voorkeur voor een van de twee posities in het debat.

Dit doctoraatsonderzoek wil een bijdrage leveren in het inzicht in het BCA concept en haar operationalisaties, met het doel de precieze aard en bruikbaarheid van de twee concurrerende perspectieven na te gaan (een- versus twee-dimensioneel). Een oplossing voor deze fundamentele vragen is immers noodzakelijk om de effecten om die gevonden werden met de BCA schaal ondubbelzinnig te kunnen interpreteren.

EMPIRISCHE STUDIES

Op basis van vijf empirische hoofdstukken worden verschillende fundamentele vragen met betrekking tot het BCA concept en haar operationalisaties onderzocht.

Hoofdstuk 2.

In de eerste studie van dit doctoraatsonderzoek werden de twee concurrerende modellen getoetst aan de hand van structurele vergelijkingsmodellen. Hierbij werd op basis van een unidimensionele en een tweedimensionele representatie van de schaal nagegaan in welke mate de voorgestelde dimensies differentiële ladingen hebben op indicatoren van de onderliggende seizing en freezing processen. Deze indicatoren werden bekomen aan de hand van verschillende objectief gestructureerde taken die expliciet gelinkt waren aan slechts één van beide processen. De resultaten gaven aan dat de behoefte aan cognitieve afsluiting schaal het best als tweedimensioneel wordt opgevat. Echter, deze twee dimensies bleken geen differentiële relaties te vertonen met seizing en freezing indicatoren.

Hoofdstuk 3.

Vervolgens werd een tweede onderzoek verricht waarbij de vraag naar de inhoud van de twee dimensies uit de BCA schaal verder werd uitgediept. Meer specifiek werd de hypothese getoetst dat items van één van de twee dimensies peilen naar cognitieve capaciteit en mogelijkheden om snel tot een besluit te komen, eerder dan naar de behoefte of drang om snel dergelijke besluiten te nemen. Vier studies werden uitgevoerd om deze hypothese te toetsen en de gevolgen voor de schaal na te gaan.

In een eerste studie werden nieuwe 'behoefte-items' ontwikkeld als alternatief voor die items waarvan vermoed werd dat ze eerder naar capaciteit dan naar behoefte peilen. Deze items bleken een betrouwbare alternatieve schaal te vormen.

Vervolgens werd in een tweede studie aangetoond dat de nieuwe items predictief waren voor de uitkomst op seizing taken, wanneer werd uitgezuiverd voor de scores op een courante cognitieve capaciteit schaal. De originele items bleken geen predictieve waarde meer te hebben wanneer werd uitgezuiverd voor cognitieve capaciteit.

Bovendien werd in een derde studie een interactie gevonden tussen de nieuwe items en een experimentele manipulatie van behoefte aan cognitieve afsluiting. Een dergelijk effect werd niet gevonden met de originele items. Hierbij werd aangetoond dat de nieuwe items, in tegenstelling tot de originele items, wel degelijk peilden naar een behoefte.

Tenslotte werden in een laatste studie de items waarvan gebleken was dat ze peilden naar capaciteit (20% van de totale itemset) vervangen door de alternatieve behoefte-items. Confirmatorische factoranalyse op deze hersamengestelde schaal wees uit dat een unidimensioneel model de beste fit met de data vertoonde.

Hoofdstuk 4.

In een derde onderzoek werd nagegaan in welke mate de bevindingen uit het voorgaande hoofdstuk gevolgen hebben voor het toegepast onderzoek dat gebruik maakt van de BCA schaal. In deze studie werd specifiek nagegaan hoe de relatie tussen de BCA, autoritarisme, sociale dominantie oriëntatie en racisme het best wordt geïnterpreteerd. Analoog aan de bevindingen van Van Hiel, Pandelaere en Duriez (2004) bleek enkel de dimensie die behoefte aan simpele structuur meet, en niet de originele besluitvaardigheidsdimensie, te correleren met socio-politieke variabelen. Echter, wanneer de nieuwe besluitvaardigheidsschaal werd gebruikt bleek dat de correlaties en mediatiepatronen tussen deze schaal en socio-politieke variabelen gelijkaardig waren aan de resultaten gevonden met de behoefte aan simpele structuur dimensie. Deze studie toont dan ook aan dat de afwezigheid van een verband tussen de behoefte aan besluitvaardigheid en socio-politieke variabelen in voorgaande studies enkel betekent dat de vaardigheid, en niet de behoefte om snelle beslissingen te nemen, ongerelateerd is aan deze socio-politieke variabelen. Deze studie stelt dan ook een verklaring voor waarin autoritarisme, sociale dominantie en racisme beïnvloed worden door zowel de behoefte aan freezing als de behoefte aan seizing.

Hoofdstuk 5.

Het vierde onderzoek gaat verder in op een tweede kwestie die op de voorgrond kwam door het expliciete onderscheid tussen behoefte enerzijds en cognitieve vaardigheid anderzijds. We onderzochten hierbij hoe de informatieverzameling die noodzakelijk is om een beslissing te nemen, beïnvloed wordt door de interactie tussen behoefte (motivatie) en cognitieve vaardigheid (capaciteit). Specifiek werd aan de hand van het integratief model van Wright en Kirby (2001) nagegaan hoe cognitieve inspanning in informatieverzameling varieert in functie van vaardigheid en motivatie (i.e. BCA). Hieruit bleek dat de cognitieve capaciteit ten opzichte van de taakvereisten bepalend is

voor de hoeveelheid informatie die verzameld *moet* worden. Echter, motivatie stelt een bovengrens aan de maximale inspanning men *wil* leveren m.b.t. informatieverzameling. Daarom kan worden besloten dat de omvang van de uiteindelijke informatieverzameling bepaald wordt door de interactie tussen cognitieve capaciteit (de mate van informatieverzameling vereist o.b.v. de taakvereisten) en motivatie (de maximale hoeveelheid informatie men bereid is te verzamelen, ongeacht de taakvereisten).

Hoofdstuk 6.

Tenslotte werden in een laatste onderzoek de fysiologische correlaten van dispositionele BCA onderzocht. Op basis van maten voor cardiovasculaire reactiviteit en galvanische huidrespons bleek dat personen met een hoge BCA tijdens het beslissingsproces meer arousal ervaren. Deze personen rapporteerden ook meer subjectieve stress. Bovendien bleek in een tweede studie dat zolang er geen correcte oplossing was gevonden, de stress gradueel steeg bij personen met een hoge dispositionele BCA. Hieruit werd geconcludeerd dat de dispositioneel bepaalde neiging om snel tot een beslissing te komen mogelijks kan gezien worden als een strategie om hoge stressniveaus te vermijden bij personen met een lage tolerantie voor ambiguïteit.

ALGEMENE DISCUSSIE

In de overkoepelende discussie van dit doctoraatsonderzoek wordt dieper ingegaan op het belang van fundamenteel onderzoek inzake BCA om duidelijke conclusies te kunnen trekken uit toegepaste onderzoek (Hoofdstuk 7). In een tweede punt wordt op basis van een overzicht van de literatuur rond beslissingsprocessen, de BCA als motivationele theorie geïntegreerd in een breder kader waarin ook onderzoekstradities verwerkt worden die een grotere nadruk leggen op arousal,

cognitieve capaciteit en emoties. Op basis van deze vier kernelementen van beslissingspocessen – arousal, emotie, cognitieve capaciteit en motivatie – wordt een integratief model voor het nemen van beslissingen voorgesteld (Hoofdstuk 8).

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