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Chapter 22
Motivation Towards Closure and Cognitive Resources: An Individual Differences Approach

Małgorzata Kossowska, Edward Orehek, and Arie W. Kruglanski

Introduction

Motivation and cognitive ability represent two basic determinants of information processing, influencing the ability to learn new knowledge and to carry out judgment and decision making tasks. However, cognitive and motivational influences on the results of information processing and performance are usually studied separately. On the one hand, numerous studies have investigated the role of cognitive-intellectual abilities in predicting individual differences in task performance. On the other hand, incentives, goal assignments, achievement motivation, expectancies, subjective valuation of outcomes, self-efficacy expectations, and a host of other motivational factors have been shown to influence goal choice, intended effort, task behavior, and mental performance. While the body of literature examining the role of cognitive ability and motivation in task performance is growing (e.g., Mitchell & Silver, 1990; Harris & Tetrick, 1993; Thompson, Roman, Moskowitz, Chaiken, & Bargh, 1994; Muraven & Slessareva, 2003), little research has been conducted on the cognitive processes involved in, and affected by, motivation (but see Kossowska, 2007a, b).

Therefore, this chapter aims to explore the relationship between epistemic motivation (need for cognitive closure) and cognitive ability (working memory processes[1]), as well as their influence on task performance. Need for (nonspecific) cognitive closure has been described by Kruglanski (1989; Kruglanski, Webster, & Klem, 1993; Webster & Kruglanski, 1994) as a dimension of individual differences in the striving for clear and certain knowledge, aimed at reducing the sense of cognitive uncertainty. During the last 20 years, the nature of the need for closure and its influence on both cognitive and social functioning has been extensively researched (e.g., Kruglanski et al., 1993; Webster & Kruglanski, 1994; Ford & Kruglanski, 1995; Dijksterhuis, van Knippenberg, Kruglanski, & Schaper, 1996). However, the cognitive processes contributing to (or related to) this motivation remain unknown. Based on considerations to be outlined shortly, we assumed that the need for

[1] We use the concept of working memory as it has been defined in the literature over the past two decades (for overview see: Feldman-Barrett, Tugade, & Engle, 2004). In fact, there is no universally agreed upon definition of WM. There are several aspects or components to working memory as resource allocation, buffer size, or processing capacity, and individual differences in working memory function could presumably result from each of them and from their interaction.

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closure may go hand in hand with certain cognitive limitations, related to working memory functioning. Moreover, it is expected that the relationship between need for closure and performance of judgment/decision tasks is mediated by a limitation in cognitive ability.

Individual Differences in Need for Cognitive Closure

According to the theory of lay epistemics, a person's epistemic motivations regulate the process of knowledge acquisition (Kruglanski, 1989). They are classified along a continuous dimension ranging from closure seeking to closure avoidance. The need for closure reflects the degree to which a person desires a definite answer to a question, any answer, as opposed to confusion or ambiguity (Kruglanski, 1989; Ford & Kruglanski, 1995). High levels of the need for cognitive closure favor a superficial analysis of incoming information, and motivate the search for information consistent with already existing knowledge structures. The resulting mental representation is often simplified; however, it ensures a sense of clarity, predictability, and order. High levels of the need to avoid closure are associated with a pronounced tolerance, and even a preference for, ambiguity, and uncertainty. When their need to avoid closure is high, individuals are inclined to avoid the formation of final judgments, leading to an openness to new information. Instead, knowers high on the need to avoid closure are motivated to perceive situations in a complex and nonstereotypical manner, to consider alternative interpretations, and to accommodate existing schemas to new information.

A considerable amount of research attests that people with the high degree of the need for closure make more stereotypical judgments (Dijksterhuis et al., 1996), rely on early information in impression formation (Kruglanski & Freund, 1983; Webster & Kruglanski, 1994), resist persuasion when firm knowledge is already held (Kruglanski et al., 1993), are less likely to assimilate new information to existing beliefs (Ford & Kruglanski, 1995), and exhibit a preference for conventional politics (Jost, Glaser, Kruglanski, & Sullaway, 2003; Kossowska & Van Hiel, 2003). Furthermore, the need for closure has been shown to lead to negative reactions to group deviates (Kruglanski & Webster, 1991), in-group favoritism (Shah, Kruglanski, & Thompson, 1998; Kruglanski, Shah, Pierro, & Mannetti, 2002), and to induce a task rather than a socio-emotional orientation to group activities and to foster conformity pressures during group discussions (De Grada, Kruglanski, Mannetti, & Pierro, 1999).

In general, the need for closure arises in contexts in which the benefits of closure, such as predictability and action, seem important or when an absence of closure seems costly. For example, time pressure implies the danger of missing an important deadline and therefore elevates the need for closure (e.g., Kruglanski & Freund, 1983). Another cost of lacking closure stems from the difficulty of further information processing. In instances in which processing seems effortful, laborious, or otherwise costly, need for closure is correspondingly heightened (e.g., Webster, Richter, & Kruglanski, 1995). Finally, need for closure is aroused when the task appears intrinsically dull and nonattractive (e.g., Webster, 1993). Under such circumstances, closure serves as a means of escaping an unpleasant (and, hence, subjectively costly) activity. As with the need for closure, the need to avoid closure is assumed to be based on the perceived costs of closure or cognitive commitment (e.g., envisioned penalties for an erroneous closure or perceived drawbacks of actions implied by closure), and/or the perceived benefits of suspending judgment (e.g., immunity from possible criticism of any closure) (Webster, 1993; Kruglanski, 1989). Intrinsic task interest may also represent a subjective benefit, because it instills the need to avoid closure and to prolong one's preoccupation with the task.

Thus, the foregoing findings suggest that the individual's motivation with respect to closure may vary as a function of the situation (see: Kruglanski, 2004). However, the need for closure is also conceptualized as a relatively stable individual difference dimension assessed via a questionnaire,

including several facets: (1) a preference for order and predictability, (2) an intolerance of ambiguity, (3) decisiveness, and (4) a tendency toward closed mindedness (Kruglanski, DeGrada, Mannetti, Atash, & Webster, 1997; Mannetti, Pierro, Kruglanski, Taris, & Bezinovic, 2002; Kossowska, Van Hiel, Chun, & Kruglanski, 2002). Individuals with a high level of need for closure prefer order and predictability, are more decisive, more closed-minded, and uncomfortable with ambiguity. Such differences may spring from various sources, such as cultural norms, personal socialization histories that place the premium on confidence, "know how" and/or do not provide a comfortable environment to explore novel/uncertain stimuli. It is also likely that individual differences in elementary cognitive processes are important antecedents of individual differences in this need.

Thus, need for closure is claimed to be both a situationally induced motivation and a dimension of relatively stable individual differences, assumed to be functionally equivalent (i.e., the most effects of situational demands were replicated by means of individual differences measure of the need for closure, see for overview: Kruglanski & Webster, 1996). In the present work, we refer to the need for closure as assessed by an individual difference measure. The proposed line of studies is important because the previous research largely neglected to study this motivation as a stable individual characteristic in the relation to cognitive abilities. Thus, the results of the analysis seems to be important in the sense of extension our knowledge about cognitive-motivation interactions in general, as well as the cognitive nature of need for closure preference in specific.

Possible Cognitive Processes Contributing to the Need for Cognitive Closure

One possibility explored in what follows is that people with high degree of need for closure may strive for simplification, predictability, and stability in their views when the informational complexity in the environment exceeds their ability to manage it. If so, behaviors such as the reduction of information processing, as well as the structuring and simplification of information – typical of individuals high in the need for closure – could result from cognitive system limitations, which pose difficulties for the handling of complex information. Grounds for such expectations are provided by results of studies in which cognitive capacity reductions were induced via time pressure (Kruglanski & Freund, 1983), mental fatigue (Webster et al., 1995), environmental noise (Kruglanski et al., 1993), or alcohol ingestion (Webster, 1993). In varied experimental conditions, such manipulations "mimicked" or exerted the same effects as the need for closure measured as an individual difference variable. This raises the possibility that the need for closure as a relatively stable personality characteristic arises out of long standing "wired in" limitations in one's cognitive ability.[2]

But what may determine whether an individual's cognitive abilities are ample or limited? Salthouse (1988) noted that at least three different metaphors could be used to characterize the potential nature of processing ability and the associated effects of the level of performance. Cognitive ability might be thought of in terms of *speed* (how quickly information can be processed in working memory, e.g., Halford, Wilson, & Phillips, 1998), *space* (capacity available for storing information in working memory, e.g., Cowan, 2001), or *energy resources* available for initiating and supporting specific cognitive operation in working memory (e.g., Just & Carpenter, 1992). Recently, resource limitations have also been characterized in terms of *control mechanisms*, whereby indi-

[2] Note that need for closure is not an explicit index of cognitive resource usage, nor it is necessarily related to diminishing resources. As indicated by research involving this construct, however, high need for closure does appear to reflect a preference for relatively simple, routinized cognitive operations. Up to this point, there has been little work regarding factors responsible for determining one's need for closure. One potential way that such preference may be developed is through diminution of resources.

vidual differences in cognitive performance are tied to an individual's ability to maintain information in an active state ready to use in current processing or inhibit extraneous task information from entering working memory (e.g., Engle, Tuholski, Laughlin, & Conway, 1999; Kane, Bleckley, Conway, & Engle, 2001; Salthouse, Hambrick, & Lukas, 1996; Hess, 2002).

The series of studies presented here explored the possible relationships between need for closure understood as individual characteristic and these different conceptualizations of cognitive resource limitations (see also: Kossowska, 2007a, b).

Need for Cognitive Closure and the Rate of Processing Information

Most researchers define working memory as a system that holds certain mental contents in an active or accessible state (storage function), affording the performance of cognitive operations on these particular contents (executive function) (Salthouse, 1990; Baddeley, 1996; Oberauer, Suss, Wilhelm, & Wittmann, 2000). Storage components (called STM) is assumed to be limited and these limitations not only place restrictions on the performance of memory related tasks *as such*, but also of complex cognitive tasks such as problem solving, text analysis, or discourse comprehension (Miyake & Shah, 1999).

One way of overcoming this general limitation is tied to the *rate* of processing current information. Fast processing results in a better and more efficient handling of the complexity of the surrounding environment (Kyllonen & Christal, 1990; Miller & Vernon, 1992; Embretson, 1995). We can therefore deduce that individuals capable of a fast processing rate may be able to handle complex informational tasks with relative ease. On the contrary, individuals with a slow rate of processing may find complexity taxing and exhibit a tendency to structure and simplify reality. Thus, we assumed that need for closure should be characterized by a slow rate of information processing in storage buffer of working memory.

To test the rate of information processing, we used a computerized modification of Saul Sternberg's classic task (1969). This task has been used often in studies on the functioning of memory and intelligence (see Nęcka, 1992; 1997). The present version of the task involves a modification, namely a significant – almost threefold – increase of the rate of stimulus exposure. This alteration was intended to prevent participants from the use of mnemonic techniques. The procedure of the task was as follows: sets of digits between 0 and 9 appeared successively in the same location in the middle of a computer screen. The first digit was preceded by an asterisk (*) intended to attract the participants` attention and to fix their gaze on the middle of the screen immediately prior to the presentation of the stimulus series. The same asterisk appeared after the last digit in order to prevent storage of the last stimulus in sensory memory after the expiration of its presentation (Sperling & Speelman, 1970; Roediger, Marsh, & Lee, 2002; Berti & Schroger, 2003).

The digit sets presented to participants contained four, six, or eight digits. After the last digit in the presented set, a target digit appeared at the bottom of the screen. Participants' task was to press the right arrow on the keyboard (representing YES), when the digit was in a set presented earlier, or the left arrow (representing NO) when it was not. The computer recorded the reaction time and its correctness for all 144 trials.

To carry out this activity, participants need to hold the relevant cognitive content (i.e., the given digit set) in an accessible state and search it to decide whether it includes the target. The mean number of accurate responses is operationally defined as the participants` score and is treated as an indicator of storage-process efficiency. The reaction time of correct responses is considered an index of the rates of information search in working memory. Such search consists of successive comparisons of internal representations of the test stimulus to the appropriate symbols in memory, each comparison yielding either a match (a YES response) or a mismatch (a NO response).

The faster the reaction time, defined as the time from the onset of the stimulus to the occurrence of the response, the faster the processing of information in storage buffer. The more accurate the responses, the more elements from the presented set are assumed to be stored in the working memory.

Participants also responded to the Polish version of the Need for Closure Scale (Webster & Kruglanski, 1994; Kossowska, 2003). The scale consists of 42 items divided into five facet scales: (1) preference for order and structure in the environment, (2) predictability of future contexts, (3) decisiveness of judgments and choices, (4) affective discomfort occasioned by ambiguity, and (5) closed-mindedness. Prototypical items from each subscales of NFCS are as follows: "I think that having clear rules and order at work is essential for success" and "I believe that orderliness and organization are among the most important characteristics of a good student" (Preference for Order); "I do not like to be with people who are capable of unexpected actions" and "I do not like to go into a situation without knowing what I can expect from it" (Preference for Predictability); "I tend to put off making important decisions until the last possible moment" and "When I go shopping, I have difficulty deciding exactly what is that I want" (Decisiveness); "I do not like situations that are uncertain" and "I enjoy the uncertainty of going into a new situation without knowing what might happen" (Discomfort with Ambiguity); and "I always see many possible solutions to problems I face" and "When considering most conflict situations, I can usually see how both sides could be right" (Closed-mindedness). Participants answered on 6-points scales, with 1 = "strongly disagree" and 6 = "strongly agree." Each respondent's composite need for closure score was calculated by summing across all items (after reverse scoring the appropriate items).

The results indicated that individuals with high need for closure took significantly longer to react in both conditions of the task (YES as well as NO) as compared to individuals with low need for closure (see Fig. 22.1). This finding indicates that the rate of information search is slower in general for individuals with high (vs. low) need for closure. Note also that the slower reaction times of high versus low need for closure individuals were consistent across the three set sizes (see Fig. 22.2). This data supports the hypothesis that high need for closure individuals process information at a slower rate than individuals low on the need for closure.

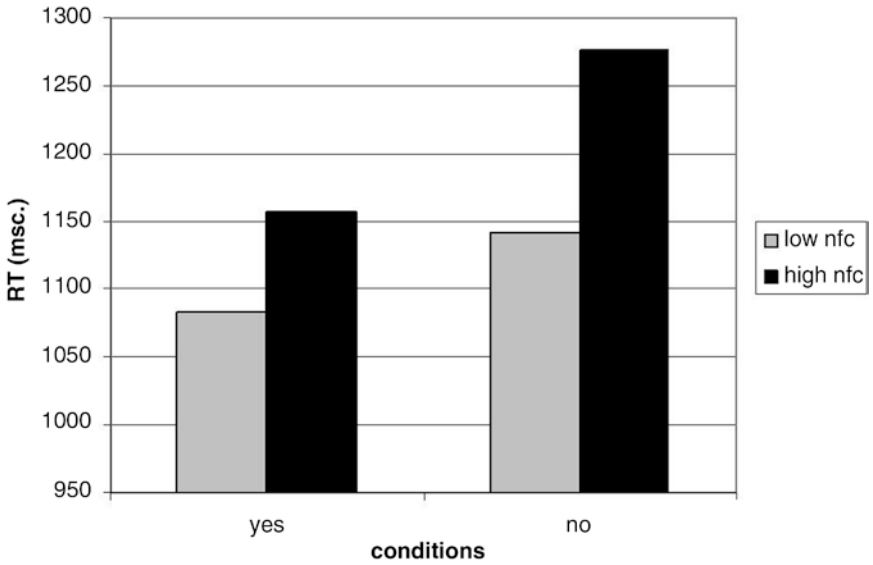

Fig. 22.1 Mean reaction times (in milliseconds) in search for information in working memory task under "yes" versus "no" conditions

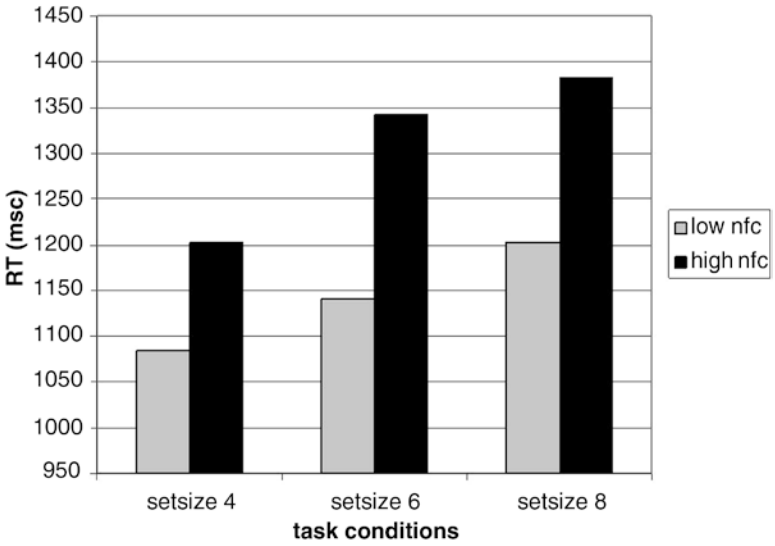

Fig. 22.2 Mean reaction times (in milliseconds) in search for information in working memory task regard to different set sizes

Finally, there was no significant difference between high versus low need for closure individuals in the accuracy of responses. This result suggests that high (vs. low) need for closure individuals are not less motivated to do well on the task, and reaction time differences between them reflect the limitations of their cognitive apparatus.

Might it be the case that high (vs. low) need for closure people are slower because they are more motivated to be accurate? This is unlikely in light of two considerations. First, no accuracy differences between high versus low need for closure individuals were found. Secondly, extensive prior evidence (Kruglanski & Webster, 1996; Kruglanski, 2004) suggests that need for closure is *inversely* related to accuracy concerns, and in fact a common way of situationally lowering the need for closure has been via accuracy instructions known to instill a "fear of invalidity" (Kruglanski & Freund, 1983; Kruglanski & Webster, 1996).

Need for Cognitive Closure and Working Memory Capacity

Working memory capacity, the construct typically measured by span tasks,[3] reflects the general capability to maintain information relevant to task goals, in a highly active state (e.g., Kane et al., 2001). Although the need for such active maintenance will be minimal in many contexts, it will be particularly important under conditions of interference. Interference slows and impairs memory retrieval and therefore puts a premium on keeping task-relevant information highly active and easily accessible. Individual differences in working memory capacity reflect the degree to which distracters capture attention away from actively maintaining goal-relevant information in working memory.

[3] Span task or operational span task – the task is to solve simple math equations while simultaneously remembering unrelated words.

Thus, content and goal oriented behavior in interference rich conditions requires both active maintenance of relevant information and the blocking or inhibiting of irrelevant information (De Jong, Berendsen, & Cools, 1999; Engle et al., 1999; Kane et al., 2001). We expected the need for closure to be associated with worse performance on the operation-span task. These results could be interpreted as smaller working memory capacity for high need for closure individuals.

Moreover, it is well established that social perceivers use normative judgment and decision rules only when sufficiently motivated (e.g., by "fear of invalidity") and when capacity for detailed processing is unconstrained (see: Chaiken, Liberman, & Eagly, 1989; Neuberg & Fiske, 1987; Tetlock, 1983; Kruglanski et al., 1993). The reduced cognitive and/or motivational capacity is more likely to lead to biased outcomes (e.g., Wang & Chen, 2006). Thus, assuming that working memory capacity is related to individual differences in need for cognitive closure, we expected that working memory capacity should mediate the relationship between need for closure and the well studied effects of information processing, as for example, the amount of prototypical information sought in a judgmental task.

It is well known that high need for closure affects the type of information sought, not merely its amount (e.g., Trope & Bassok, 1983; Mayseless & Kruglanski, 1987). Specifically, previous research has found that high need for closure individuals preferred prototypical information about the category, e.g., information on whether the individual possessed the prototypical features of an architect (interest in visual aesthetics, mathematical ability, creativity, elegant lifestyle), while attempting to test the focal hypothesis that she/he was an architect (Kruglanski & Mayseless, 1988). By contrast, individuals experiencing low need for closure preferred diagnostic information capable of discriminating among different possibilities regarding the target's professional affiliation (Trope & Bassok, 1983; Kruglanski, 2004). For example when testing the focal hypothesis that a target is an architect, individuals low on the need for closure generated the competing alternative that she/he might be a painter instead, and proceeded to seek diagnostic information with regard to the architect versus painter possibilities. Thus, low need for closure participants preferred information about mathematical ability and elegant lifestyle (presumed characteristics of architects but not painters), rather than information about creativity and interest in visual aesthetics (presumed common to both) (see Kruglanski & Mayseless, 1988).

We tested the expectations derived from previous study on restrictions of hypothesis generation under high need for closure in two studies (Legierski & Kossowska, 2008). In one of them, participants' working memory capacity was assessed using the operation-word span task (OSPAN), in which they solved series of simple mathematical operations while attempting to remember a list of unrelated words (La Pointe & Engle, 1990). Participants saw one operation-word string at a time, and each set of operation-word strings ranged from two to six items in length (e.g., $(5 \times 1) - 4 = 2$? beach). The OSPAN score was the sum of the recalled words for all sets recalled completely and in correct order. Additionally, we used exactly the same judgmental task as did Kruglanski and Mayseless (1988, Experiment 2). Participants were told that the experiment concerned people's ability to identify the occupations of others from evidence about their personalities. They were further told that their task would be to select interview questions they would use to determine whether an interviewee was a painter. A subtle mention of an alternate hypothesis was made by casually noting that "the interviewee could, of course, be a member of a different profession; for instance, he or she could be an architect." Participants were then handed a 32-item questionnaire (previously prepared and tested) including architect-characteristic values (high vs. low), painter-characteristic values (high vs. low), and architect versus painter diagnostic values (high vs. low). They were asked to select the 16 most useful questions for testing the target hypothesis. We computed a painter versus architect diagnostic ratio as an index of diagnostic information usage. They also completed the Polish version of the Need for Closure Scale (Kossowska, 2003).

First, as expected, the results of the study revealed that high need for closure participants performed less well on the OSPAN task than low need for closure participants. Moreover, high need for closure participants also obtained a lower indicator of the diagnostic information usage than low

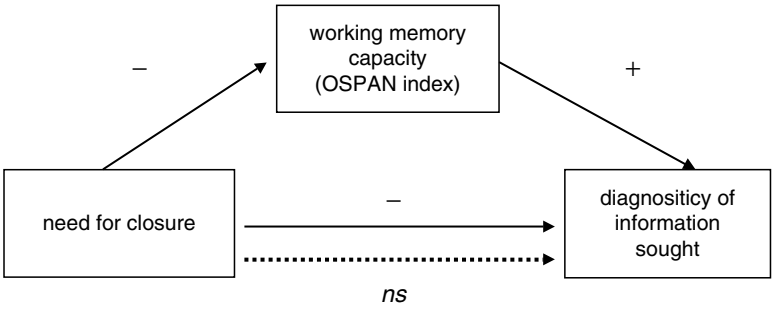

Fig. 22.3 Relationship between need for cognitive closure, working memory capacity, and the type of information sought

need for closure participants. As regards the mediation hypothesis, need for closure affected both the cognitive capacity variable as well as the type of information seeking variable (i.e., less diagnostic information). The working memory capacity variable affected the type of information sought. High (vs. low) working memory capacity participants searched more for diagnostic information. When the index of working memory capacity was controlled for, the relationship between need for closure and type of information sought dropped to nonsignificance, while the influence of working memory capacity remained significant. Thus, the results of this analysis confirm the assumptions that working memory capacity mediates the relationships between need for closure and type of information sought (see Fig. 22.3).

The results of the study described above supported the notion that variations in need for closure are related to variations in working memory capacity. Need for closure is related to limited working memory capacity measured by OSPAN task. Moreover, the results indicated that working memory capacity accounted for the relationship between need for closure and performance on a judgmental task. These findings provide evidence for our conceptual claim that need for closure is related to limited cognitive ability.

Need for Cognitive Closure and Ability to Controlled Processing

A basic assumptions underlying most research on cognitive functioning, including work in the social domain, is that executive cognitive functioning is governed in part by resources reflecting the cognitive system's ability to control cognitive activities and processes, particularly those performed simultaneously (Kahneman, 1973; Daneman & Carpenter, 1980; Hunt & Lansman, 1986; Stankov, 1988; Just & Carpenter, 1992). Older accounts viewed executive functions from a resource-sharing framework – the level of performance depends on the volume of resources, which can be flexible allocated, depending on the processing needs of the person, for a particular task, in particular context (Norman & Bobrow, 1975; Daneman & Merike, 1996; Engle, Kane, & Tuholski, 1999; Nęcka, 1999; Thompson et al., 1994; Hess, 2002). The greater the overall resource pool, the more resources individuals can allot to activities and tasks in which they are engaged. Furthermore, the larger the total volume of resources, the less are the negative effects of resource depletion caused by a number of activities carried out concomitantly, or by an excessive complexity of current cognitive activities (Stankov, 1988; Nęcka, 1999).

Currently, it is assumed that executive functions reflects individual differences in the ability to control attention associated with the central executive aspect of working memory (Engle et al., 1999). It can be thought of as an individual difference in the "source of goal-directed attention" that serves

to activate, maintain or suppress memory representations. From the perspective of dual – process models of the mind, extremely popular in social cognition area (see Feldman-Barrett et al., 2004), individual differences in working memory functions likely influence the capability to engage in controlled processing, thereby determining persons` ability to control thoughts, feelings, and actions.

If it is assumed that individuals' need for closure is related to their limitations in executive functions, it follows that individuals with a high need for closure should be characterized by lesser cognitive ability, allocable to currently performed activities. Results of considerable studies (i.e., Baron, 1986; Dijksterhuis et al., 1996; Huguet, Galvaing, Monteil, & Dumas, 1999; Chajut & Algom, 2003) are consistent with such a possibility. This research attests that in conditions of cognitive load (and high need for closure) participants exhibit a tendency toward more schematic, stereotypical, and simplified judgments of reality. In the absence of cognitive load (and with low need for closure), participants perceive objects as more differentiated, complex, and less stereotypical. Under cognitive load, cognitive ability to controlled processing diminished relatively quickly for those who begin with smaller ability, and such individuals tend to take judgmental "shortcuts," using readily available cognitive patterns. They behave, thus, in a way typical of that exhibited by individuals with a high dispositional need for closure.

Accordingly, in the next set of studies (see: Kossowska, 2007a), we further investigated the hypothesized link between need for closure and limitation in control aspect of working memory. The results of the preceding studies are consistent with the notion that individuals with high (vs. low) need for closure have a cognitive deficit with regard to a processing of information in working memory (i.e., rate and capacity of information processing). If such deficits are due to limited cognitive control processes, participants with a high (vs. low) need for closure should show an impairment on a task particularly demanding to engage in controlled processing. Moreover, we expected that the relationship between need for closure and the range of information processing in a decision task would be mediated by a limitation in ability to controlled processing (an executive aspect of working memory).

In one of our studies, participants performed a task involving a random generation of intervals (known as the RIG task, Baddeley, Emslie, Kolodny, & Duncan, 1998), before performing the SciPic decision task (e.g., Payne, Bettman, & Johnson, 1993); participants subsequently completed the Polish version of the Need for Closure Scale (Kossowska, 2003).

The activity of generating random intervals is difficult, places significant load on the cognitive system and cannot be automatized (Wagenaar, 1970; Rapoport & Budescu, 1997). Therefore, researchers agree (e.g., Baddeley et al., 1998) on its particular capability of draining cognitive resources. This is so because the generation of random intervals requires the overcoming of strong automatisms, both learned (e.g., involved in the generation of letters or digits series) as well as inborn (e.g., a tendency to behave rhythmically) (Folkard & Monk, 1980). An increase in the predictability of the series (i.e., reduction in its requisite random nature) is thus taken to indicate an ability to controlled processing.

Participants' specific task of 5 min' duration is to strike the left mouse-key, using the dominant hand, in a completely arythmical manner. The ratio of random to rhythmical instances is recognized as an indicator of the ability to controlled processing allocated to this priority task. The calculation procedure for doing so was developed by Vandierendonck (2000). We expected that high (vs. low) need for closure would be negatively related to performance on this task.

The participants also completed SciPic – a computer-based information acquisition task (Payne et al., 1993; for detailed procedure see Kossowska, 2007b). The task was presented in the form of a 4×6 matrix, with four alternatives described by six cues (attributes) each. The task for the subject in each trial was to choose one of the four options presented in the table. Subjects could search the table by opening the covered cells with a mouse click. In order to open the next box, they had to close the previous one first. The final choice was also made by clicking the mouse on one of the four buttons on the screen. In this experiment, the subjects had to make 24 decisions. Two variables

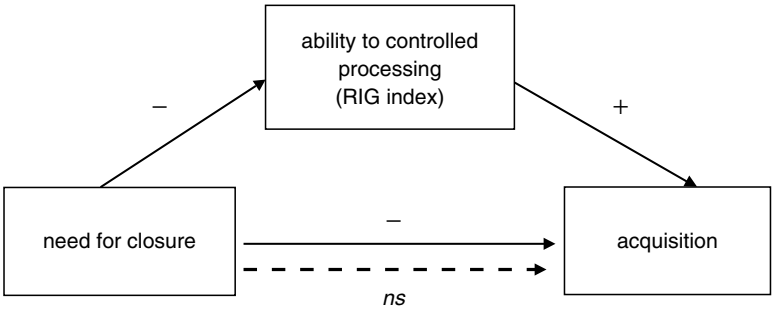

Fig. 22.4 Relationship between need for cognitive closure, ability to controlled processing, and the type of information sought in decision task

were used as indicators of information search: *decision time* – the average time participants spent while making the decision, and *acquisition* – the average number of information boxes opened.

As predicted, individuals with high (vs. low) need for closure generated significantly more rhythmical keystroke-sequences. These findings are consistent with the notion that high need for closure individuals exhibits a lesser ability to controlled processing than low need for closure individuals. In addition, the results showed that need for closure affected both the ability to controlled processing variable as well as the information search variable. Ability to controlled processing was also positively related to the acquisition of information. When controlling for the index of executive function of WM, the relationship between need for closure and the information search index turned nonsignificant, while the influence of ability to controlled processing remained significant. Thus, the results of this analysis confirmed the assumption that executive aspect of WM mediates the relationships between need for closure and information search (see Fig. 22.4).

The above analysis supported the notion that need for closure is related to limitations in ability to controlled processing measured by the random interval generated task. Moreover, the results indicated that a variable measuring an executive functions accounted for the relationship between the need for closure and performance in an information search task.

Motivation toward Closure and Cognitive Resources – Final Remarks

The purpose of this chapter was to summarize evidence supporting the notion that stable individual differences in the need for cognitive closure, tapped by the Need for Closure Scale (Webster & Kruglanski, 1994) are associated with identifiable individual differences in cognitive ability, specifically working memory functioning. We have considered the motivation toward closure because it represents a ubiquitous aspect of human functioning affecting all judgments and decision making in social and nonsocial contexts. Prior research has demonstrated that situational constraints on individuals' cognitive ability, such as time pressure, noise, mental fatigue, or alcoholic intoxication (for a review see Kruglanski, 2004) induce a momentary need for cognitive closure that significantly affects their manner of mental functioning (Kruglanski & Webster, 1996; Webster & Kruglanski, 1998). Accordingly, we have hypothesized increase in need for closure in conjunction with limitations that reflect diminishing resources, such as those having to do with basic cognitive skills. Although some researchers (e.g., Smith & DeCoster, 2000) suggested that motivation and capacity constraints have independent effects on information processing, from our standpoint (and in the light of the results of our studies), the two may not be completely independent.

The results of our studies consistently supported the above predictions. Specifically, the results of set of studies indicated that individuals characterized by a high (vs. low) need for cognitive closure exhibited a slower short – term memory search (set of Studies 1; Kossowska, 2005), lower working memory capacity (set of Studies 2; Legierski & Kossowska, 2008), and lower ability to controlled processing (set of Studies 3; Kossowska, 2007a). Moreover, we have provided evidence suggesting that limited processing ability mediates the relationship between need for closure and the type of information sought in a judgmental task (set of Studies 2) and the extent of information search in decision task (set of Studies 3).[4]

We have suggested that individual differences in need for closure are related to individual differences in cognitive capacity. Important question arises, however, due causality assumptions. On the one hand, it is possible that limitations of cognitive processes constitute need for closure. In support for the assumed causal direction in which cognitive resources induce a need for closure, the obtained results echo prior findings involving the situational inductions of the need for closure through various constraints imposed on participants' cognitive resources, namely time pressure, ambient noise, fatigue, or alcoholic intoxication (Kruglanski & Webster, 1996; Kruglanski, 2004). The three sets of studies provide multiple sources of evidence that are easy to explain according to a single principle stating that cognitive ability limitations is related to need for closure because of the need to simplify complex informational arrays. However, an alternative explanation of these findings would suggest that the need for closure contributed to the differences in cognitive ability measured in the studies. The mediation analysis reported in Sects. "Need for Cognitive Closure and Working Memory Capacity" and "Need for Cognitive Closure and Ability to Controlled Processing" of studies add slight support for this assumption. To argue for the reverse causal direction would require a different explanation for each cognitive ability task and the exclusion of the experimental research attesting to changes in need for closure as a result of cognitive load.

Finally, we are not presently proposing that cognitive capacity limitations constitute the sole source of individual differences in the need for cognitive closure. Other potential factors having to do with the individuals' family dynamics, cultural values, or personal history could well constitute additional sources of this motivation. Further research is needed to investigate these possibilities and also to determine whether these potentially diverse sources of the need for closure are functionally equivalent in shaping this important motivation.

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[4] The question could arise if it might be a case that there is a 'third party' factor accounting for the results of our studies. The obvious candidate could be a level of intelligence. Individuals high in need for closure often limit their information processing activities. This may suggest a negative relationship between need for closure and intelligence. Empirically, the relationship between need for closure and intelligence is nonsignificant (see Webster & Kruglanski, 1994; Kossowska, 2003).

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