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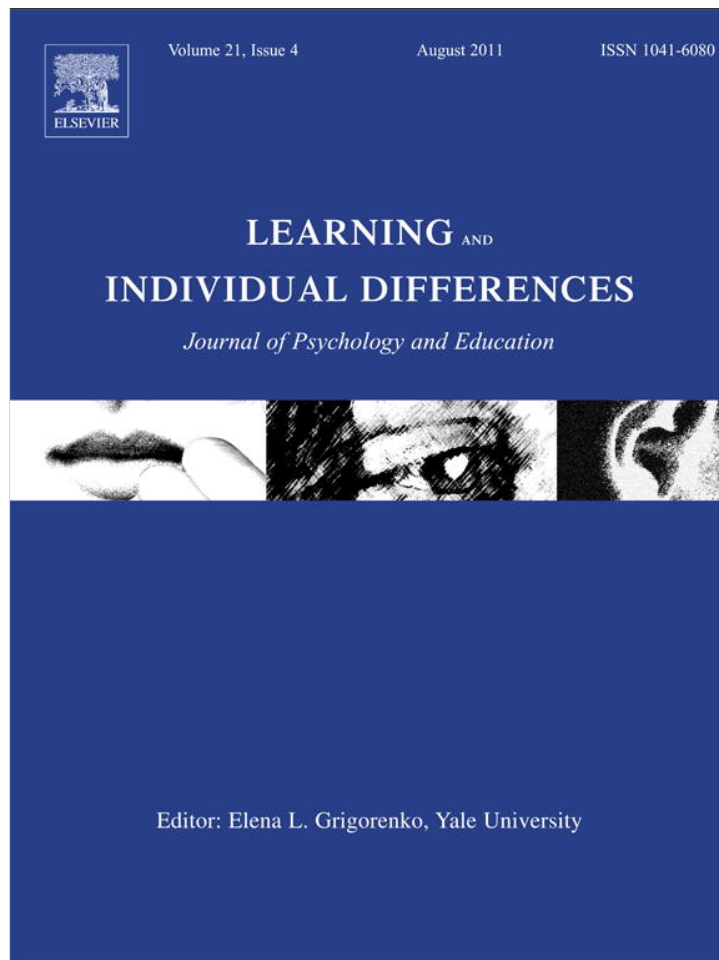
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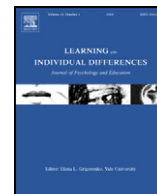
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Need for cognition and active information search in small student groups

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ABSTRACT

In a sample of 213 students organized in 44 groups this study tests the impact of need for cognition on active information search by using a multilevel analysis. The results show that group members with high need for cognition seek more advice in task related issues than those with low need for cognition and this pattern of information exchange is stronger for different gender social interaction than with the same gender social interaction.

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1. Introduction

Need for cognition (NFC) is a central concept for cognitive motivation (Cacioppo, Petty, Feinstein, & Jarvis, 1996) and it describes the desire to seek out and engage in cognitive endeavors (Bertrams & Dickhäuser, 2009; Cacioppo & Petty, 1982). Research to date extensively explored the association between NFC and a large variety of individual differences ranging from intelligence to personality and motivational traits. Individuals high in NFC are better in solving complex problems have higher dispositional self-control and as a consequence have higher school achievement (Bertrams & Dickhäuser, 2009), invest more cognitive resources in information processing (Enge, Fleischhauer, Brocke, & Strobel, 2008; Fleischhauer et al., 2010), are more rational in their decision making style (Curşeu, 2006), tend to seek, acquire, think about and reflect on relevant information when solving cognitive tasks (Cacioppo & Petty, 1982; Cacioppo et al., 1996; Coutinho, Wiemer-Hastings, Skowronski, & Britt, 2005), than those low in NFC.

Previous research also shows that people high in NFC generate more task related cognitive responses and select more task relevant information, while people low in NFC use more heuristic strategies in information search, especially under time pressure (Dickhäuser, Reinhard, Diener, & Bertrams, 2009; Verplanken, 1993). Therefore, most of the research on NFC is concerned with effectiveness of information processing and pays little to no attention to information search in small group settings. In real life situations, most of the information used in problem solving and decision making comes from

social ties (Jansen et al., 2011) and advice seeking is critically important for the learning process in a variety of educational settings (Ryan, Pintrich, & Midgley, 2001). Collaborative learning is a method extensively used in higher education today and peer learning an essential form of student learning in the classroom (Summers, Bergin, & Cole, 2009). The aim of this study is to address the link between NFC and information search behaviors in small group settings.

In the persuasion literature results show that individuals high in NFC think more carefully and are strongly influenced by the quality of arguments in a persuasion situation, while individual low in NFC are influenced by peripheral cues (e.g., credibility of the source) (Cacioppo et al., 1996). As persuasion involves social interaction, the impact of NFC on attitude change and information processing is embedded in a more general social context. Most of the information used in daily cognitive activities comes from our social context and because NFC has a positive impact on general external information search effort (Verplanken, Hazenberg, & Palenewen, 1992), it is not unreasonable to argue that cognitive motivation is a central driver of active information search in social settings.

As members of different social categories are likely to have qualitatively different life experiences, dissimilar others are more valuable as sources of unique/distinct information as compared to similar others (Curşeu, Schalk, & Schrujjer, 2010; Kearney, Gebert, & Voelpel, 2009). People scoring high in NFC have also a strong achievement goal orientation (Fleischhauer et al., 2010), and in order to achieve the maximum cognitive benefits of social exchange relations, they should identify and use the sources of unique and distinct information in small groups. Previous research shows that in small groups the average NFC within groups moderates the impact of diversity on elaboration of task relevant information in such a way that if the average NFC within group is high, the group will benefit more from educational diversity (groups elaborate more on task relevant information) (Kearney et al., 2009). Moreover, unbalanced

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student groups with respect to the NFC of their members experience less task conflict, which in turn leads to lower group creativity and lower group cognitive complexity (Curşeu, 2010). These results suggest that NFC not only impacts on information processing per se, but also influences the active information search in small student groups. Moreover, research shows that NFC reduces prejudice and racism by increasing attributional complexity (Tam, Au, & Leung, 2008), NFC is negatively related to stereotyping (Carter, Hall, Carney, & Rosip, 2006) and dogmatism (Cacioppo et al., 1996), therefore individuals high in NFC are more likely than those low in NFC to acknowledge the value of different others as information resources and thus seek advice across rather than within social group boundaries.

To conclude: (1) NFC is positively associated with the amount of attentional resources allocated to unspecific information search (Engel et al., 2008; Fleischhauer et al., 2010), (2) with external information search effort (Verplanken, 1993; Verplanken et al., 1992), (3) with achievement goal orientation (Fleischhauer et al., 2010) and (4) with less prejudicial behavior and dogmatism towards out-group members (Carter et al., 2006; Tam et al., 2008). Building on a value in diversity argument (dissimilar others are more valuable as sources of unique/distinct information as compared to similar others) (Van Knippenberg & Schippers, 2007), the hypothesis of this study is that in small group settings, individuals high in NFC show higher information search behavior than those low in NFC and this difference is larger for different rather than same gender social interactions.

2. Methods

2.1. Participants

Two hundred thirteen MA students (114 women, 205 Dutch) with an average age of 23.55 years in a Dutch university were distributed into 44 mixed gender groups having 3 to 7 members. The groups were required to write a group assignment (covering 60% of their group grade) and to work together to solve several cases during interactive lectures. At the end of the project, each student was asked to fill in a questionnaire evaluating NFC and the frequency of advice seeking during the semester.

2.2. Measures

NFC was evaluated with a Dutch version of the short variant of the NFC scale (Cacioppo & Petty, 1984). The 18 items were first translated into Dutch and then back translated to English to check for consistency. Responses to scale items (e.g., “I would prefer complex to simple problems” or “I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought”) were recorded on a 5 points Likert scale (1 completely disagree to 5 completely agree). Previous research shows that NFC has a unitary factor structure and good psychometric qualities (Bors, Vigneau, & Lalande, 2006). Cronbach's alpha for this scale was 0.84.

Advice seeking (information search) was evaluated using a single item (strategy common in social network analysis): “If you had to solve a complex problem or if you had a question regarding the group assignment or subjects taught in the MA program in general (including the group projects), to which of your team mates did you turn to for advice?”. Respondents were asked to answer this item for each of their team mates from 0 never to 5 very frequent. Because various patterns of advice seeking are assumed among the group members, no consistency measure was computed for this scale. The scores were further averaged for same gender and different gender advice seeking within each group.

3. Results

Means, standard deviations and correlations for the study variables are presented in Table 1.

Given the hierarchical structure of the data (individuals nested within groups) the hypothesized relation between NFC and advice seeking was tested with hierarchical modeling. For the null model (no covariates) the intraclass correlation coefficient (ICC) is 0.34 for same gender advice seeking and 0.19 for different gender advice seeking, both higher than 0.05, indicating that both dependent variables are influenced by group level factors (Hox, 2002). Given the fact that between group differences are substantial for both dependent variables, traditional ordinary least square techniques are inappropriate because they treat observations at the first level as independent. Therefore, we used the mixed model procedure in the PASW 17 package to perform a multilevel analysis in which the first level is represented by the individual respondents and the second level are the groups in which they are nested. The two dependent variables were evaluated at the first level of analysis, the average advice seeking frequency from members of the same or the opposite gender.

Previous research shows that advice and help seeking behaviors in the classroom settings is influenced by a large variety of factors ranging from individual attributes (e.g., gender, achievement goal orientation) to group level factors (e.g., group norms and climate) (Ryan et al., 2001). Group size has a strong impact on the pattern of communication emerging in groups (Curşeu et al., 2010). Small groups exhibit more direct and efficient intra-group communication while large groups experience more unequal participation, more social loafing due to more complex communication structures associated with a larger group size (Bray, Kerr, & Atkin, 1978), therefore group size is expected to impact on information search behaviors and is added as a predictor in the multilevel model. Moreover, research on gender differences shows that women have a more positive social activity than men (Wood, 1987) and often in small group settings women have a lower status and are more collaborative than men (Carli, 2001). Therefore it is expected that gender also impacts on advice seeking behavior in small group settings and as a consequence is also added as a level 1 (individual) predictor in the model. In order to explore possible interactions of NFC with group size and gender, these interactions were specified in the fixed effects. In order to reduce multicollinearity and to facilitate interpretation, group size and NFC were centered using a grand mean procedure (Peugh & Enders, 2005).

The results of the multilevel analyses are presented in Table 2.

Snijders and Bosker (1999) suggest that R^2 values need to be computed at both levels of analysis. For level 1 (within groups variance) R^2_1 is 0.12 for same gender advice seeking and 0.12 for different gender advice seeking, while for level 2 (between group variance), R^2_2 is 0.26 for same gender advice seeking and 0.35 for different gender advice seeking. Moreover, the ICC for the full model is

Table 1
Means, standard deviations and correlations for all study variables.

	Mean	SD	1	2	3	4	5
1. Gender	1.54	0.50	1				
2. Age	23.55	2.01	-0.12	1			
3. Group size	5.12	1.26	0.00	0.10	1*		
4. Advice (same gender)	2.91	1.54	0.04	-0.00	-0.35**	1	
5. Advice (different gender)	2.49	1.65	0.04	0.00	-0.28**	0.57**	1
6. NFC	3.46	0.514	-0.05	0.00	-0.49**	0.28**	0.30**

Legend: Gender is coded as 1 = man and 2 = woman, NFC = need for cognition.

* $p < 0.05$.

** $p < 0.01$.

Table 2
Results of multilevel analyses for advice seeking in small groups.

Predictors	Advice (same gender)		Advice (different gender)	
	Estimate (SE)	t (p)	Estimate (SE)	t (p)
Intercept	2.95 (0.19)	15.52 (0.0001)	2.69 (0.18)	14.30 (0.0001)
Gender (men)	-0.13 (0.20)	-0.62 (0.53)	-0.28 (0.23)	-1.19 (0.23)
Group size	-0.34 (0.12)	-2.75 (0.008)	-0.22 (0.12)	-1.78 (0.08)
NFC	0.66 (0.32)	2.05 (0.04)	1.14 (0.37)	3.05 (0.003)
NFC×Group size	-0.01 (0.20)	-0.04 (0.96)	0.06 (0.23)	0.30 (0.76)
NFC×Gender (men)	-0.55 (0.39)	-1.38 (0.16)	-0.78 (0.46)	-1.62 (0.09)
ICC (null model)	0.34		0.19	
ρ(ICC for the full model)	0.25		0.07	
R ₁ ² (R ₂ ²)	0.12 (0.26)		0.12 (0.36)	

Legend: Gender is coded as 1 = man and 2 = woman; group size and NFC are centered variables; R₁² = explained variance at level 1 (individual), R₂² = explained variance at level 2 (group), for gender, men is the reference category in the model.

0.25 for same gender and 0.07 for different gender social interactions, meaning that 25% of all unexplained variance after adding the covariates to the model in the first model and 7% in the second can be attributed to differences between groups. Given the fact that the model for advice seeking across gender boundaries has more explained variance and less unexplained variance attributable to between group differences ($Z = 5.19, p < 0.01$), it can be concluded that this model has a better predictive value as compared to the model for same gender advice seeking. NFC is the only significant predictor in the model with different gender advice seeking indicates that the effect of NFC on information search is stronger for different rather than same gender social interactions. However, in order to further test this claim we compared the partial correlation coefficients of NFC on the one hand with same versus different gender advice seeking on the other. Fisher's Z transformation was used on the two partial correlation coefficients (controlling for gender and group size as they are also included in the multilevel model) and their comparison shows that NFC has a stronger association with different gender $Zr_1 = 0.20$ as compared to same gender advice seeking $Zr_2 = 0.15$ ($Z = 2.78, p < 0.01$). Given the fact that (1) NFC adds more to the explained variance for different rather than same gender advice seeking, (2) the standardized estimate of NFC is larger in the second model (advice seeking from members of the opposite gender), and (3) the association between NFC and advice seeking is stronger for different than for same gender social interactions, it can be concluded that the hypothesized positive impact of NFC on information search across rather than within social group boundaries is fully supported. That means that respondents who enjoy being involved in effortful cognitive activities are also more likely to go out asking for advice from their group members. Although the estimate for NFC is significant in both models,

The main effect of group size is significant for advice seeking from same gender team mates and only marginally significant for advice seeking from the opposite gender. This means that members of larger groups report asking for advice less than members of small groups. Therefore advice seeking from similar others is rather driven by group level factors, as illustrated by the high values of the ICC and the significant effect of group size.

The main effect of gender is not statistically significant for neither of the two dependent variables. However a marginally significant interaction effect between NFC and gender emerged for advice seeking from the opposite-gender group members. The positive effect of NFC on advice seeking from members of the opposite sex is stronger for women as compared to men.

4. Discussion

The results reported here have several implications for the NFC literature. First, they show that next to the typical intellectual engagement people high in NFC also actively search for information to a higher extent than people scoring low in NFC. Second, the study shows that this result is particularly strong for the case of cross gender social interactions, showing that people scoring high on NFC are better able to bridge the gender barrier that often blocks communication in small groups. The results also contribute to the small group literature and shows that NFC is an important asset for active information seeking and information integration in small groups. Reaching for information to dissimilar others is essential for reducing the fragmentation within groups, to bridge across subgroups (cliques) and thus is essential for enlarging the knowledge pool of the group and for facilitating information integration. Group members who actively search for information by crossing social group boundaries may play the role of information integrators within groups. This is a plausible explanation for the results reported in Kearney et al. (2009). Because information sharing is essential for the performance of small groups (Mesmer-Magnus & DeChurch, 2009) it is important to further explore the ways in which the benefits of NFC can be further enhanced in real organizational settings. The added value of dissimilar other as information sources depends on the extent to which the attributes used to define social groups are relevant to the specific task performed by a group (Curşeu et al., 2010; Van Knippenberg & Schippers, 2007), therefore a particular area of future research could be the exploration of advice seeking from others who are dissimilar in other visible (e.g., race/ethnicity and age) or less visible attributes (e.g., attitudes, opinions, and type of expertise).

Another interesting result concerns the negative correlations between group size and NFC, possibly explained by the homophily effect (Ibarra, 1992). The groups in this particular study were formed through self selection and it is likely that people high in NFC selected others with similar motivational profiles to form a group. Because people high in NFC were rather selective in their choices, they probably excluded people less motivated to get involved with the task (for more details on competence based selection of team mates see Hinds, Carley, Krackhardt, & Wholey, 2000). This ultimately leads to smaller groups composed of people scoring high in NFC and larger groups composed of people with a lower NFC. Further research should investigate the extent to which cognitive motivation is a critical attribute influencing the selection of potential team mates. Specifically, research should further explore the way in which NFC relates to the apparent tension between homophily and value in diversity arguments.

The negative correlation between group size and information search is likely to be associated with the clique formation in large groups. In order to further test this, the number of within group cliques in advice seeking was correlated with group size (group level analysis). The number of cliques in advice seeking behavior has a positive correlation (0.57, $p < 0.0001$) with group size and thus a plausible explanation would be that in larger groups, individuals' information search is rather clustered and stronger within rather than between cliques. This explanation is also in line with Bray et al. (1978) results, showing that large groups experience more social loafing and less participation. Although larger groups offer a larger number of possible targets for information search, the results of this study show that as group size increases, it becomes less likely that the group members will ask for advice. Two arguments (cognitive load and social comparison) could account for this result. First, as the group size increases, the communication structure of the group become more complex and thus it becomes more difficult for the group members to contribute with their knowledge and expertise. Second, the opportunities for social comparison and the chances of being labeled as incompetent when asking for advice are likely to be higher in large as compared to small groups.

Because NFC is a motivational trait associated with active information search, an area with potential for further research is the exploration of the interplay between NFC and other situational variables that have been explored in previous research in relation to help seeking behaviors in small groups. For example, it has been shown that mastery goal orientation (focus on learning and self improvement) is positively, while performance goal orientation (receiving public recognition for high performance) is negatively associated with help seeking behaviors (Ryan et al., 2001). Further research could explore the effects of the interaction between NFC and mastery versus performance goal orientation on information search and information integration in small groups. As previous research shows, social value orientation impacts on cooperation and information sharing in dyads and groups (Van Lange, 1999), therefore self versus other orientation could also shed more light on the contingencies that explain the impact on NFC as a dispositional attribute on information search and information integration in small groups.

In self-regulated learning environments, NFC affects the process of expectancy formation in such a way that for people high in NFC expectancy formation has a stronger association with task difficulty than for people low in NFC (Reinhard & Dickhäuser, 2009). In other words people high in NFC use more effectively information about task difficulty and thus can better regulate the amount of effort they put in a task and as this study show the extent to which they need to ask advice or support from others in order to perform the task. Further research could explore the way in which the process of expectancy formation and metacognitive competencies relate to information search and how NFC affects this relation.

In collaborative learning environments, NFC is likely to play an important role for the effectiveness of group learning. Group members scoring high on NFC are better able to bridge across social group boundaries and therefore they enrich the knowledge pool of the group and further act as information integrators. Moreover, these results may explain why unbalanced group composition with respect to members' NFC is detrimental for group creativity (Curşeu, 2010). When only one group member scores high on NFC it is likely that information search and information integration in that particular group is low. The lack of information search leads further on to less task conflict (reduced task exploration) and ultimately decreases group creativity. These implications open valuable research directions in small group research by pointing to the impact of individual differences on active information search and interpersonal interactions in work groups. Active information search is essential for group cognitive complexity (Curşeu et al., 2010) and group creativity (Curşeu, 2010) and therefore in practical terms, the results reported here offer new insights for the work group staffing and the design of effective information processing groups. Finally, similar with previous research (Hinds et al., 2000) the present study shows that group members may use competence and motivation based cues when selecting future team mates. Educators should therefore focus on composing rather balanced groups with respect to NFC in order to foster information search and creativity and complex information processing in student groups.

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