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Motivational and Cognitive Correlates of Avoidance of Ambiguity: The Role of
Values and Relational complexity

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Abstract

The paper reports on a study examining the association between relational complexity, values (self direction and conformity), and avoidance of ambiguity among German early ($N = 883$, age $M = 11.11$, $SD = .79$) and mid-adolescents ($N = 473$, age $M = 15.97$, $SD = .75$). While self direction values predicted less avoidance of ambiguity for mid-adolescents, conformity values predicted more avoidance of ambiguity among early and mid-adolescents. Relational complexity, measured using the Latin Square task, was not associated with avoidance of ambiguity, but the variables interacted in early adolescence: self-direction values were significantly and negatively related to avoidance of ambiguity among adolescents with high but not low relational complexity. Thus, motivation seems to have a greater association with avoidance of ambiguity when relational complexity is high and ambiguous information can be processed.

Keywords: Avoidance of ambiguity, values, relational complexity, adolescence.

Motivational and Cognitive Correlates of Avoidance of Ambiguity: The Role of Values and Relational Complexity

Motivation and cognition are basic and intricately related determinants of information processing (Kossowska, Orehek, & Kruglanski, 2010; Kossowska, Jaśko & Brycz, 2014). Using a large sample of German adolescents, this paper reports on the relations between motivational factors (self direction and conformity values) and cognitive factors (relational complexity) and the avoidance of ambiguity. In other words, it asks who aspires to process ambiguous information, under is capable of doing so?

Background

Avoidance of ambiguity is one aspect of a need for cognitive-closure, i.e., the desire for a definite answer on any given topic. Specifically, it is the tendency to view ambiguous situations and stimuli as threatening, with a concomitant desire to avoid contact (Webster & Kruglanski, 1994). Studies have found individual differences in the need for cognitive-closure in general and in the avoidance of ambiguity specifically. Some individuals may be more motivated than others to experience high closure and low ambiguity, seeking new knowledge when it is consistent with their existing knowledge, engaging in superficial processing, and creating simplified mental representations (Kossowska, et al., 2010; Kruglanski, 1989; Webster & Kruglanski, 1984). This tendency has far reaching consequences, including prejudiced thinking (Roets & Van Hiel, 2011) or a lack of consideration of alternatives in decision making (Disatnik & Steinhart, 2015).

The antecedents of individual differences in the need for cognitive-closure are not well understood but may include the individual's history of socialization (Dhont,

Roets, & Van Hiel, 2013). Alternatively, they may stem from motivational and cognitive factors, as probed in this study.

Values. Values are abstract motivations guiding individuals' life decisions toward desirable end states. As such, values provide a standard for the selection and evaluation of behaviors, attitudes and ideas in adulthood (Schwartz, 1992) and adolescence (Vecchione, Döring, Marsicano, Alessandri & Bardi, 2015).

Two values are particularly relevant to avoidance of ambiguity. Self-direction values motivate independent thought and action, inspiring individuals to make choices, create and explore (Schwartz, 1992). High tolerance of ambiguity may be driven by self-direction values, as they promote exploration of the environment and deep cognitive processing. In contrast, conformity values motivate individuals to follow social expectations and norms; they are willing to restrain their impulses to maintain harmonious social relations (Schwartz, 1992). The need to avoid ambiguity may be driven by this desire to maintain the status quo and preserve certainty. That said, few studies have found evidence of relations between avoidance of ambiguity and self-direction values versus conformity values (Amit & Sagiv, 2013; Calogero, Bardi, & Sutton, 2009).

Relational complexity. In order to implement many tasks, an individual must grasp the relations between the available variables. The process generates nontrivial cognitive demands that increase with the complexity of relations represented in parallel (Birney, Halford & Andrews, 2006; Halford, Wilson, & Phillips, 2010). Individuals can process increasingly complex relations as they get older, making substantial advances in late childhood and early adolescence (Birney et al., 2006; Dauvier et al., 2014). Relational complexity has a fundamental role in higher cognitive processes (Halford et al., 2010), such as fluid intelligence (Dauvier,

Bailleux, & Perret, 2014), social cognition (Halford & Andrews, 2014), and planning (Halford et al., 2010). This role is especially apparent in developmental periods of increases in the ability to process complex relations (Dauvier et al., 2014).

The need for cognitive closure has previously been associated with elementary cognitive processes. Individuals may be inclined to avoid ambiguity when their cognitive resources are too limited to enable efficient managing of numerous environmental stimuli (Kossowska et al., 2010). Thus, the need for cognitive-closure may be a compensatory mechanism making up for deficits in resources by promoting shallow information processing (Kossowska, 2007). In various studies, individuals reporting a high need for cognitive closure have displayed cognitive deficits, including low rates of information processing (Kossowska et al., 2010), low item storage capacity in working memory (Kossowska et al., 2010), and inability to control attention (Kossowska, 2007).

Current Study

This study goes beyond existing studies by investigating the associations between motivational and cognitive factors and the avoidance of ambiguity. Motivationally, we hypothesize self-direction and conformity values will be associated with avoidance of ambiguity (Amit & Sagiv, 2013). Cognitively, we hypothesize relational complexity will be negatively associated with avoidance of ambiguity, specifically among early adolescents who are gradually mastering complex relational tasks (Dauvier et al., 2014).

Method

Procedure

Data collection took place in Germany between 2007 and 2009. All schools in the state of Bremen and adjacent regions of Lower Saxony were approached; 35%

agreed to invite their students in grades 6, 7, 10 and 11 to participate. Consent forms were sent to parents of students younger than 16 years of age. The questionnaires were anonymous, participation was voluntary, and no reward was offered to participants. Trained researchers explained the instructions and answered questions. The study was approved by the ethical review board.

Participants

The report included 1,361 German adolescents, from two age-groups: early adolescents $N = 883$, age $mean = 11.11$, $SD = .79$, 49% females; mid-adolescents $N = 473$, age $mean = 15.97$, $SD = .75$, 46% females. Participants were all majority members (parents born in Germany). Mothers and fathers completed a ten-year high school (50.5%, 48.3%), a 12-year high school (24%, 26.5%), or higher education (23.2%, 19.4%, respectively). The sample was similar to the population in terms of religion, 61.6% Christians (63.2% in the population; Terwey & Baumann, 2009).

Measures

Avoidance of ambiguity. To avoid fatiguing the young participants with a long survey, three items measuring avoidance of ambiguity were taken from the Need for Closure Scale (Webster & Kruglanski, 1994): "I don't like situations that are uncertain"; "I feel uncomfortable when I don't understand the reason why an event occurred in my life"; "I feel uncomfortable when someone's meaning or intention is unclear to me". Items were rated using a six-point scale, ranging from "*highly disagree*" to "*highly agree*," Cronbach's $\alpha = .64$.

Relational complexity. The Latin Square Task (Birney et al., 2006), used to measure relational complexity, included six items, chosen to represent increasing relational complexity. Each item was an incomplete 4X4 Latin square. Participants determined which of four possible elements should fill a target cell, so that the matrix

satisfied the defining principle, according to which each shape appeared only once in every row or column. Sample items of varying demands are presented in Figure 1.

Value importance. Respondents completed a short 25-item version of the Portrait Values Questionnaire (PVQ25, Schiefer, Möllering, Daniel, Benish-Weisman & Boehnke, 2010). The PVQ includes verbal portraits of individuals. Each portrait describes the goals, aspirations or wishes of an individual, constructed to implicitly tap the importance of one of ten values. This study used two values, each measured by three items. For example, "Thinking up new ideas and being creative is important to her. She likes to do things in her own original way" is an item measuring self-direction values. In contrast, "She believes that people should do what they're told. She thinks people should follow rules at all times, even when no-one is watching" measures conformity values. The participants answered the question, "How much like you is this person?" on a scale of 1-6, ranging from 1 "*not at all like me*" to 6 "*very much like me*". We inferred the importance of their values from their reported similarity to the portraits. As recommended by Schwartz (1992), we controlled for scale use by centering each individual's values on the mean value importance. The values were distributed normally $D_{\text{self-direction}}(963) = .27, p = .09, D_{\text{conformity}}(963) = .27, p = .08$.

Results

Descriptive statistics and correlations of study variables by age-group appear in Table 1.

Hierarchical Model. We tested our hypotheses using hierarchical multiple regression models for self-direction and conformity values, early and mid-adolescents. Gender, centered value importance, and centered relational complexity predicted avoidance of ambiguity. We added a two-way interaction term between value importance and

relational complexity to the model and probed the interaction in a simple slope analysis.

In the model predicting self-direction values (Table 2), gender was not related to avoidance of ambiguity. Among mid-, but not early adolescents, self-direction values were negatively related to avoidance of ambiguity. Surprisingly, relational complexity was not related to avoidance of ambiguity. An interaction between self-direction values and relational complexity among early adolescents increased the R^2 significantly.

We used unstandardized beta weights to plot the interaction (Figure 2; Holmbeck, 2002). Self-direction values were significantly and negatively related to the avoidance of ambiguity among adolescents with high relational complexity, ($-1 SD$) $\beta = -.16$, $p = .005$, but not among those with low relational complexity, ($+1 SD$) $\beta = .10$, $p = .17$.

In the model predicting conformity values (Table 2), gender was not related to avoidance of ambiguity. Conformity values were positively related to the avoidance of ambiguity among early and mid-adolescents, but relational complexity and the interaction term were not related to it.

Discussion

Our study found a complex pattern of associations between avoidance of ambiguity, motivation and cognition. As we hypothesized, avoidance of ambiguity was negatively associated with self-direction values and positively associated with conformity values. On the one hand, the need to avoid ambiguity appears to conflict with the motivation for independent thought and action implicit in self-direction values. In other words, individuals who aspire to self-direction are necessarily faced with ambiguity but have the motivation to tolerate it. On the other hand, it appears to align with the motivation to behave according to expectations and norms, as

represented by conformity values. This makes sense: individuals who inhibit their inclinations and impulses to avoid upsetting close others are less likely to encounter ambiguous social situations, such as changing circumstances or disagreements.

One previous study has examined the association between values and the need for closure. The authors established an association between self-direction versus conformity values and all dimensions of the need for closure, except the avoidance of ambiguity. They concluded self-direction and conformity may represent the two values most closely linked to the need for closure (Calogero et al., 2009). We found associations between these values and avoidance of ambiguity, thereby strengthening the general conclusions of the earlier study.

Interestingly, we found no main effect associations between participants' relational complexity and their reported avoidance of ambiguity. These results suggest the ability to process relations between variables is not a strong determinant of the avoidance of ambiguity. It is possible that other basic cognitive processes, such as processing speed, are more important (Kossowska et al., 2010).

We found self-direction values were negatively related to the avoidance of ambiguity among early adolescents with high relational complexity, but not low relational complexity. It appears that both the motivation to engage in free action and thought (self-direction values) and the ability to engage in deep processing (relational complexity) are needed for individuals to tolerate ambiguity comfortably. The results suggest cognitive ability may be a prerequisite for the effect of motivation on performance. Similarly, within an educational context, adolescents' motivation predicts their reading achievement better for those with higher initial abilities than those with lower initial abilities (Lutz-Klauda & Guthrie, 2015). This interaction was found specifically among early adolescents, the age when the ability to represent

relations between four items consolidates (Dauvier et al., 2014). This age-related development may be a precondition to low levels of avoidance of ambiguity, even in the presence of self-direction motivation.

Strengths, Limitations, Recommendations

The study's large sample of two age-groups provides high statistical power and ecological validity. It also offers a unique combination of motivational and cognitive theory and analysis. However, the study employs an abbreviated measure of ambiguity avoidance, with low reliability, and developmental patterns are based on a cross-sectional sample. Future studies should examine the same questions using a broad measure of the need for cognitive-closure and follow the adolescents longitudinally.

Conclusions

The findings demonstrate the role of values and relational complexity in the avoidance of ambiguity during adolescence. It seems self-direction values promote the willingness to accept ambiguity and thrive in its presence. In early adolescence, the development of relational complexity may be a precondition for this association. Interventions to promote critical and creative thinking among adolescents may consider targeting both motivation and cognition.

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Table 1.

Descriptive Statistics and Correlations among Study Variables

	Early adolescents		Mid-adolescents		<i>t</i>	Correlations			
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		1	2	3	4
1. Avoidance of ambiguity	4.85	1.28	4.57	1.28	3.71**	1	-.04	.17**	-.02
2. Self-direction values	4.31	.61	4.40	.63	-2.68**	-.21**	1	-.39**	.09*
3. Conformity values	3.54	.76	3.41	.78	2.93**	.20**	-.43**	1	-.14**
4. Relational complexity	.78	.20	.75	.21	1.66	-.04	.07	-.11*	1

Note. * = $p < .05$; ** = $p < .01$; Early adolescent correlations above and mid-adolescent correlations below the diagonal

Table 2.

Standardized Regression Coefficients in Hierarchical Linear Regressions Predicting Avoidance of Ambiguity

Variable	Self-direction values				Conformity values			
	Early adolescents		Mid-adolescents		Early adolescents		Mid-adolescents	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Sex	-.05	-.05	.02	.02	-.06	-.05	.03	.03
values	-.06	-.03	-.22**	-.22**	.20**	.18**	.21**	.21**
Relational complexity	-.02	-.02	-.02	-.02	.01	.00	-.02	-.02
Values* relational complexity		-.13**		-.04		.06		.00
R ²	.005	.020	.048	.050	.039	.042	.047	.047
R ² Change		.015**		.001		.003		.000

Note. * = $p < .05$; ** = $p < .01$

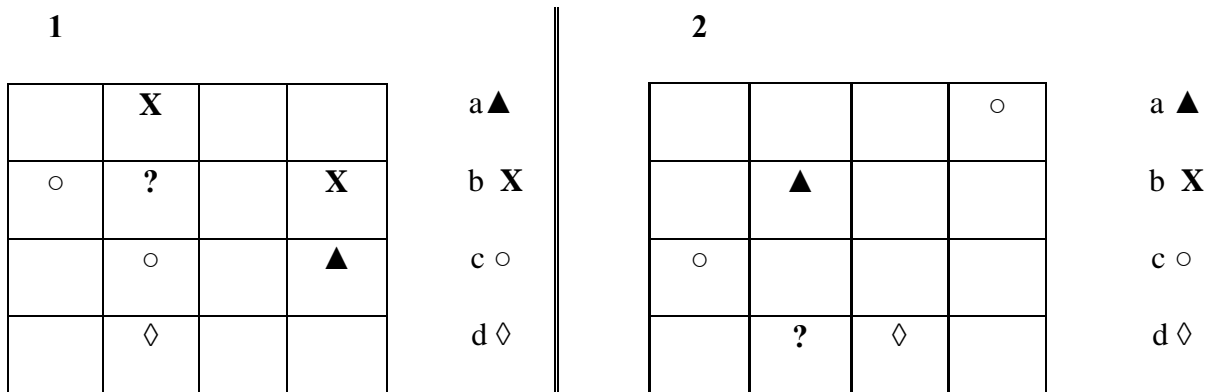


Figure 1. *Sample items for relational complexity scale. Item 1 = low complexity; item 2 = high complexity*

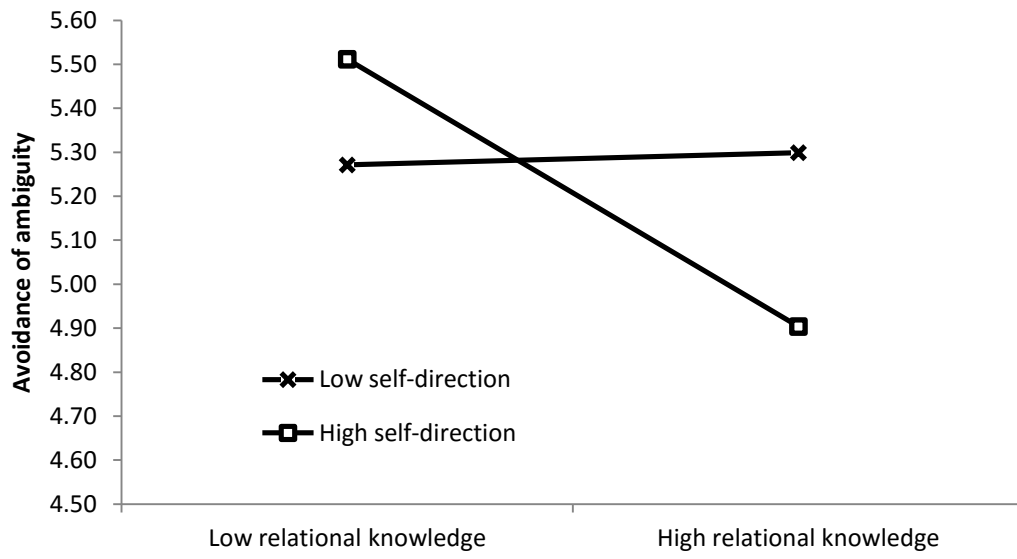


Figure 2. Interaction of relational complexity and self-direction values in predicting avoidance of ambiguity among early adolescents.