DOES COGNITIVE STYLE DIVERSITY AFFECT PERFORMANCE IN DYADIC COOPERATIONS?

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ABSTRACT

Given the increasing diversity in modern organizations, this study seeks to investigate the effect of diversity in cognitive styles on dyadic cooperations. A multisource study was conducted with 318 students, who were tested during a 2 month in-company project. The impact of diversity in cognitive style on performance (project score, written task, oral task) and dyad viability was measured. The relationship proved to vary depending on the cognitive style – providing evidence for the complexity and multidimensionality of the concept. More specifically, diversity in planning style led to better performance, while diversity in knowing and creating style lead to a worse performance. These effects were true no matter the type of task (project score, oral defence, written report). The implications of the findings are discussed.

Keywords: dyads, cognitive styles, diversity

Modern organizations rely increasingly on the use of diverse work groups and teams (Bar, Niessen, & Ruenzi, 2008; Kozlowski & Ilgen, 2006). According to a meta-analysis by Richter (2011), teamwork turns out to be an effective means for improving productivity in organizations. Parallel with the increased popularity of teams in organisations, research interest in team composition and characteristics contributing to their effectiveness has grown strongly (for a review, see Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The aim of this kind of research is to gain insight into the determining factors of team effectiveness and ultimately to formulate recommendations for the design of high-performing teams. One particular stream of team research has focussed on the effects of diversity within a team. Despite a longstanding research history, no consensus has been achieved regarding the nature (beneficial or hampering) of the effects of team diversity on team outcomes (Joshi & Roh, 2009; Knippenberg & Schippers, 2007). Generally, research concludes that team heterogeneity is a double-edged sword: it seems to improve the quality of team decision making, but meanwhile also increases the likelihood of process problems (Horwitz & Horwitz, 2007; Stewart, 2006).

This research focusses on a specific type of team, i.e. dyads, given the fact that dyads can be seen as the most fundamental type of team (Bernerth, Armenakis, Field, Giles, & Walker, 2008). In general, research has focussed more on individuals, teams and organizations than on the dyad as a level of analysis (Gooty & Yammarino, 2010). Moreover, dyad research up to now has consisted mainly of dyads with uneven hierarchical levels, i.e. the supervisor with his subordinate (e.g. Collins, Hair, & Rocco, 2009; Ferris et al., 2009; Hsuing & Tsai, 2009; Richard, Ismail, Bhuian, & Taylor, 2009; Werbel & Henriques, 2009), while we will investigate non-hierarchical dyads to disentangle the effects of dissimilarity. As Bernerth et al. (2008) point out, diversity effects may have an even stronger effect in dyads, where one person makes up half of the group.

Diversity can be subdivided into two different types: easily visible, surface-level diversity (e.g. age, gender) and less easily visible, deep-level diversity (e.g. values, attitudes) (Bell, 2007). A lot of effort has been put into investigating the effects of surface-level diversity (see van Knippenberg & Schippers, 2007). However, deep-level composition variables have been suggested to have a stronger effect on team performance (Bell, 2007; Harrison, Price, Gavin, & Florey, 2002; Hollenbeck, DeRue, & Guzzo, 2004). Few studies take both types of diversity into account (e.g. Harrison et al., 2002). Therefore, in this study, we will focus on cognitive styles and cognitive ability as deep-level diversity variables, while simultaneously controlling for differences in age and gender (surface-level). Cognitive styles are fairly stable individual differences in perceiving and processing information, in

solving problems and learning, and in relating to each other (Peterson, Rayner, & Armstrong, 2009; Witkin, 1976). Few studies have focussed on the effects of diversity in cognitive dimensions on team performance (Harrison & Klein, 2007; Horwitz & Horwitz, 2007; Knippenberg & Schippers, 2007; Mannix & Neale, 2005). Cognitive diversity is inherent to cooperation between people, yet organisations are mostly not aware of its existence and implications (Aggarwal & Woolley, 2010). This paper is constructed as follows: since researchers often remain unclear about the type of diversity they are investigating (Harrison & Klein, 2007; Harrison & Sin, 2006), we start by defining diversity and clarifying the different types that exist. We will elaborate on the paradigms that are used to explain previous diversity research results. Next, we will summarize the current views on cognitive styles and its effects on outcomes. In this paper, we will make a distinction between two types of outcomes, namely cognitive (dyad performance) and affective (dyad viability). We investigate our hypotheses in a multi-source study with 318 Master in Management students working on a two month in-company project.

THEORETICAL FRAMEWORK

Diversity

Research results on the effects of diversity on a variety of team outcomes have been mixed and inconsistent (Mannix & Neale, 2005; Webber & Donahue, 2001). The inconsistent results might have something to do with a variety of variables, such as the type of diversity measured, the social context, the type of tasks, etcetera (Knippenberg & Schippers, 2007; Mannix & Neale, 2005). Diversity is essentially the difference between individuals on one or multiple given attributes (Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998). Harrison and Klein (2007) warn against terminology confusion when talking about differences. We follow them by defining diversity as 'the distribution of differences among the members of a unit with respect to a common attribute X' (Harrison & Klein, 2007, p. 1200). According to these authors, there are three different kinds of diversity: seperation, disparity and variety. Seperation refers to differences in opinion or lateral position (attitude, value). Disparity concerns differences in concentration of resources or social assets (pay, status). Variety refers to differences in kind or category (e.g. functional background, experience). In this study we will focus on diversity in cognitive styles. Given that cognitive styles shape how a person perceives, thinks, and solves issues (Messick, 1976), cognitive style diversity falls into the seperation category, which focusses on differences in opinions, beliefs, values and attitudes (Harrison & Klein, 2007).

Bell (2007) makes a distinction between surface-level composition variables and deep-level composition variables. Surface-level variables refer to demographic characteristics such as gender, age, tenure, etcetera; these variables are observable attributes or social categories, readily dedected by group members. Deep-level variables refer to underlying psychological characteristics such as personality factors, values, and attitudes. This type of variables takes time and interaction to detect. Deep-level composition variables can be context-dependent variables or relatively constant team member characteristics. Surface-level variables have often been studied, but researchers now suggest that deep-level variables can have a stronger influence on team performance (Harrison et al., 2002; Hollenbeck et al., 2004). Previously, surface-level variables were sometimes used as proxy for deep-level variables (Philips & Loyd, 2006). But this has proven to be both methodologically and empirically invalid (Lawrence, 1997; Mannix & Neale, 2005). Both variables can be present in the group but with different effects (Philips & Loyd, 2006). Because of this we will take both types of variables into account, namely cognitive style and cognitive ability as deep-level variable, whilst controlling for age and gender as surface-level diversity variables.

Previous research has shown that diversity in group composition can have both positive and negative effects (e.g. Joshi & Roh, 2009; Knippenberg & Schippers, 2007). Accordingly, two different paradigms are used to explain these apparantly contradictory results.

The 'supplementary view' stipulates that diversity has a negative effect on a variety of outcomes, since people prefer to work with others similar to themselves. Higher levels of diversity are linked to less positive views about other team members and can lead to conflict. This view builds on the similarity-attraction paradigm (Byrne, 1971), the attraction-selection-attrition theory (Schneider, 1987; Schneider, Goldstein, & Smith, 1995), social identity theory (Tajfel, 1978) and self-categorization theory (Turner, 1982). All these theories add up to the idea that 'birds of a feather flock together'. The 'complementary view' considers diversity to be a resource rather than a burden. This view builds on the cognitive resource diversity theory (Horwitz, 2005) or complementary hypothesis (Harrison et al., 2002), also termed the value-in-diversity hypothesis (Nakui, Paulus, & Van der Zee, 2011). Diversity is seen as positive, since every group member brings his or her own cognitive resources to the table, thereby improving problem-solving capability and promoting creativity and innovation (Basset-Jones, 2005; De Dreu & West, 2001; Richard, 2000).

Cognitive styles

Cognitive styles are stable attitudes and preferences that determine the way a person perceives, remembers, thinks and solves problems (Messick, 1976). They have been suggested to influence almost all human activities that imply cognition (Messick, 1976). Cognitive styles thus have

the potential to fundamentally affect interpersonal relationships (Armstrong, 1999; Armstrong, Allinson, & Hayes, 1997; Messick, 1976; Witkin & Goodenough, 1981).

Previous research has been limited to a dichotomous approach of cognitive styles, namely analytical versus intuitive cognitive style, whereby people with an analytical cognitive style favour rational decision making and people with an intuitive cognitive style favour intuitive decision making (Allinson & Hayes, 1996). However, bipolar unidimensional cognitive style models are under debate (e.g. Coffield, Moseley, Hall, & Ecclestone, 2004; Hodgkinson & Sadler-Smith, 2003). Multidimensional cognitive style models offer a valuable alternative. A classification and instrument of particular interest to this study is the Cognitive Style Indicator (CoSI; Cools & Van den Broeck, 2007). The CoSI classifies three cognitive styles: a knowing, planning, and creating style. People with a knowing style are people characterized by a drive for data and facts. Planners have a need for structure and value preparation and planning. People with a creating style like out-of-the box thinking and experimentation.

Research in group dynamics suggests that individual characteristics are important in determining group effectiveness (Armstrong, 1999; Shaw, 1981). Cognitive similarity for instance, has been argued as beneficial for dyads as far back as 1960 (Triandis, 1960). Because of the similar way dyad members with a cognitive fit evaluate events, communication is more effective, mutual liking hightens and a better progress is made in achieving interaction goals (Triandis, 1960; Witkin & Goodenough, 1981). Matching has indeed been reported as having a direct effect on performance (e.g. Dunn, 1987; Dunn, Beaudry, & Klavas, 1989; Dunn et al., 1990; Sein & Robey, 1991) or indirectly via a positive effect on attitudes (e.g. Cooper & Miller, 1991; McCaulley, 1978; Renninger & Snyder, 1983). Cognitive misfit has been suggested to lead to conflict due to differences in interests, values, and problem-solving techniques (e.g. Kubes, 1992; Leonard & Strauss, 1997; Rickards & Moger, 1994; Tullett, 1995). It's a long-held view that cognitive similarity leads to enhanced mutual liking, beter progress and increased communication effectiveness (Triandis, 1960; Witkin, Moore, Goudenough, & Cox, 1977). If people have a completely different approach to a task, they will have conflicting expectations or goals. This results in different behaviors with regard to effort, goal setting, planning and communication (Lawrence, 1993; Peeters, Rutte, Van Tuijl, & Reymen, 2006). Such differences can pose a threat on the potential effectiveness of the dyad. Similarity can potentially increase the predictability of behavior of the other dyad member, thereby faciliting cooperation, anticipation of each other's actions and interpretation of assignments (Bauer & Green, 1996; Bernerth, Armenakis, Feild, Giles, & Walker, 2008; Meglino, Ravlin, & Adkins, 1991; Schein, 1985). All though some have remained sceptical regarding the positive benefits of matching people according to their style (see Armstrong, Allinson, & Hayes, 2001), research into the matching of cognitive styles leans towards the similarity-attraction paradigm (Byrne, 1971), thus implicating a negative effect of diversity on

performance. Previous research has linked diversity in cognitive styles to interpersonal relations. Due to a lack of research relating diversity in cognitive styles to team performance, we draw a parallel with research on interpersonal relations.

Based on previous research, we thus hypothesize:

H1: Diversity in cognitive style will negatively affect outcomes in a dyadic cooperation.

In this study we will focus specifically on diversity of three different cognitive styles, namely knowing, planning and creating style. We will investigate the effect of these different styles on different types of outcome (see Figure 1). Because the project was a complex, long-term task, we believe that diversity in knowing style will lead to a decreased performance. If only one of the two dyad members has a tendency to gather all necessary facts and figures, the work will be produced with uneven quality. The low quality work will be immediately comparable to the high quality work and make the deficiencies more salient, thereby downgrading the overall impression of the work (Mohammed & Angell, 2003). In addition, the person with a higher knowing style, may feel inequity in the contributions to the project. Conflicts can arise, undermining team performance (Mohammed & Angell, 2003).

H1a: Diversity in knowing style will negatively affect the general performance in a dyadic cooperation.

High-performing teams need more than just taskwork (Salas, Sims, & Burke, 2005). Amongst others, they require the ability to coordinate in order to reach task objectives. An important aspect of coordination is planning, or the "set of practices and devices used by a team to manage the more stable and predictable aspects of its work, such as deadlines, plans, schedules, and programs" (p. 163, Rico, Sanchez-manzanares, Gil, & Gibson, 2009). In order to reach its goal, the dyad needs to set the goal, plan the time and invest effort to complete the task on schedule. If a fundamental disagreement exists on how to approach the planning, this may hinder the timely completion of the task or project. Indeed, effective coordination and planning is critical to succesful completion of tasks in groups (Janicik & Bartel, 2003). We therefore hypothesize:

H1b: Diversity in planning style will negatively affect the general performance in a dyadic cooperation.

To date, no research has yet investigated what happens in terms of performance effects if you put people with creative and non-creative cognitive styles together. What we do know is that team creativity is in large part explained by team member creativity (Pirola-Merlo & Mann, 2004) and employee creativity is an important source of performance, innovation and competitive advantage (Hirst, van Knippenberg, & Zhou, 2009). Due to the lack of research herein, we follow Peeters et al. (2006) in taking an exploratory approach for this hypothesis. We draw a parallel to intellectual openness as defined by the Big Five. Openness has been strongly linked to creativity, thinking outside of the box and looking for new perspectives (Bernerth et al., 2008; Buss, 1991; Costa & McCrae, 1992). Bernerth et al. (2008) found diversity in intellectual openness to be negatively related to the assessed quality of a dyadic relationship. We therefore hypothesize that, similarly to intellectual openness, diversity in creativity will have a negative influence on dyadic cooperation:

H1c: Diversity in creating style will negatively affect the general performance in a dyadic cooperation.

Task type

The type of task has an effect on the relationship between composition and team outcomes (e.g. Mohammed & Angell, 2003). According to Mohammed and Angell (2003) a written and an oral task differ in their level of interdependence, i.e. the extent to which team members must actually work together to perform the task (Van de Ven, Delbecq, & Koenig, 1976). While the students could handle the written task based on pooled (team members work separately) or sequential (work flows from one team member to the other) interdependence, reciprocal interdependence (work flows between members back and forth) is needed to fulfill the oral task (Mohammed & Angell, 2003). The higher the task interdependence, the more the team members have to interact to accomplish their task (Aubé & Rousseau, 2005). The written task is a more cognitively oriented task in which a lower level of interdependence is required. Team members can divide the different subtasks and work rather independently. We do not expect diversity of the team members' cognitive styles to have a significant effect on the written task. In contrast, with regard to the oral task, a greater level of coordination is necessary as students present their project in a reciprocally interdependent manner. Thus, we expect cognitive style diversity to be more salient and negatively effect the oral outcome.

H2a: diversity in the knowing, planning and creating style will not affect the written outcome in a dyadic relationship.

H2b: diversity in the knowing, planning and creating style will negatively affect the oral outcome in a dyadic cooperation.

Next to performance measures, we measured affect as well, in the form of dyad viability. Dyad viability is dyad satisfaction combined with the behavioral intent of working together again in the future (Balkundi & Harrison, 2006). The similarity-attraction paradigm (Byrne, 1971) and attraction-selection-attrition theory (Schneider, 1987; Schneider et al., 1995) posit that likeness is a determinant of positive interpersonal interaction. In short, people are attracted to others with similar characteristics. Satisfaction of team members is essential for the potential of working together again in the future, or working in team in general (Peeters et al., 2006). Attachment to the team and member's willingness to be part of the team leads to team viability (Balkundi & Harrison, 2006). Indeed, hetereogeneity has previously been linked to decreased team viability (Hackman, 1990). Employee's experiences in a cooperation have been found to have a significant effect on future performance (Lester, Meglino, & Korsgaard, 2002; Nerkar, McGrath, & Macmillan, 1996). A negative experience can thus have an effect on the future effort invested in dyadic cooperations. Previous studies suggest that individuals who are similar to the other members of their team report greater satisfaction with the team (Barsade, Ward, Turner, & Sonnenfeld, 2000; Keinan & Koren, 2002), enhancing viability. We therefore predict the following:

H3: Diversity in all three cognitive styles will negatively affect the viability of a dyadic cooperation.

Lastly, in all company projects, the satisfaction of the client is important as a performance indicator for the dyad's effectiveness. We expect that each of the outcome variables (cognitive outcomes (global project score, written task, oral task) and affective outcomes (viability)) will have a positive effect on the satisfaction of the company.

H4: The outcome variables will have a positive effect on the satisfaction of the company.

While testing the deep-level variable cognitive style, we simultaneously control for the surface-level variables that previously have been known to impact performance: age (Although with varying effects; see Ng & Feldman, 2008) and gender (Shore et al., 2009). Moreover, we take cognitive ability into account as an extra deep-level variable that may be of influence (e.g. Barrick, Stewart, Neubert, & Mount, 1998; Neuman & Wright, 1999). Indeed, general mental ability has been found to be a strong predictor of performance in two meta-analyses (Devine & Philips, 2001; Stewart, 2006). In order to test these hypotheses a multisource study was conducted with dyadic management student teams working on a two month long in-company project.

Sample and procedure

Participants were 318 Master in Management students (209 men, 109 women) from a leading European business school, grouped into 159 dyads. Ages ranged from 21 to 38 (M = 23,81, SD = 1.69). A questionnaire assessing cognitive styles was distributed in the beginning of the academic year. At the end of the academic year, each dyad completed a two month company project, the final assignment before getting their Master's degree in Management. Students were grouped in pairs and assigned to companies based on their motivation and functional background. Cognitive style was not used as a selection or composition criterion, resulting in random dyad composition according to cognitive style. Students wrote a report on the proceedings and results of their work (written performance), which they presented in front of a jury (oral performance).

Standards and expectations of the involved companies were high, given the fact that they paid for the services provided during the project. Project scores highly impacted the overall score for the students' diploma. Dyads' results were independently evaluated by the company, a promoter from the business school, and a critical reader. Scores were given on the written report and the oral presentation. In addition, a global projectscore was given by the members of the jury based on a number of indicators such as effort, methodology and content of the report. After the project, students rated their satisfaction regarding the project and process in general and their intent on working together again in the future (viability). The company provided a rating of their satisfaction with the work that was delivered. The students received their grades at the end of the academic year. Since the project and the questionnaires were mandatory for graduating, the response rate was 100%.

Measures

Cognitive style. For measuring cognitive style, The Cognitive Style Indicator (e.g. Cools & Van den Broeck, 2007) was chosen for this study as previous research found strong support for the construct validity and predictive validity of this model with a broad range of participants (e.g. students, managers, employees, entrepreneurs; Cools, Broeck, & Bouckenooghe, 2009a; Cools, Pauw, & Vanderheyden, 2009b; Cools & Van den Broeck, 2008a, b). The CoSI is a questionnaire consisting of 18 items that are rated on a 5-point Likert scale – ranging from 'totally disagree' to 'totally agree'. The CoSI distinguishes a knowing style (4 items; α = .83, e.g. "I like to analyze

problems"), a planning style (7 items; α = .86, e.g. "I prefer clear structures to do my job"), and a creating style (7 items; α = .80, e.g. " I like to extend my boundaries").

Team performance. Team performance, defined as the extent to which a team reaches its goals or mission (Devine & Philips, 2001), was operationalized by using the scores on the project (scale from 0 to 20). In addition to a global projectscore, two seperate scores were given: one on the written report and one on the oral presentation of the project (cognitive outcomes).

Team viability. After their project, but before they received their grades, students were asked to rate their satisfaction and intent to work together again in the future, based on the scale used by Peeters et al. (scale from 0 to 10; 2006). This was assessed after the project was done, given that Peeters et al. (2006) indicate that the most complete picture of satisfaction with the team is obtained in hindsight. To confirm if it was justifified to aggregate the students' rating to the dyad level, the within-group reliability (r_{wg}; James, Demaree, & Wolf, 1984) and intra-class correlations were calculated (ICC(1) and ICC(2); Bliese, 2000). The average r_{wg} level was .93, substanially exceeding the .70 value that is generally deemed adequate to justify aggregating to group level (James et al., 1984). ICC(1), indicating the between group variance to total variance ratio, was .94 and ICC(2), indicating the reliability of a group mean, was .97. Accordingly, aggregation was deemed justified (Bliese, 1998).

Company satisfaction. The company's representative was asked to rate the satisfaction of the company with the result taking into account the usefulness and practical value of the project (scale from 0 to 20).

Cognitive ability. Cognitive ability of the students was operationalized by using the score of the admission exam (0 to 1000) that all students had to attend and pass (minimum of 600), in order to be allowed to follow the management program. This exam consisted of a number of tests that measure analytical skills, language proficiency and general knowledge.

Analysis

As dyads can be diverse or less diverse on the three cognitive styles, we used diversity scores to create a general measure of cognitive diversity. For converting cognitive style scores into a measure of diversity, we followed Harrison and Klein's (2007) recommendations. According to the authors diversity can be operationalized by cumulating absolute or squared distances between pairs of individuals (standard deviation). This was done for the three dimensions of the CoSI, namely knowing style, planning style, and creating style (Cools & Van den Broeck, 2007).

RESULTS

Table 1 displays the correlation matrix, means, and standard deviation for each variable.

Insert Table 1 about here

The purpose of this study was to test the model in Figure 1 that diversity in cognitive styles influences the performance and the viability of the dyad which in turn affects the satisfaction of the company with the performance. We used the AMOS version 19 structural equation modelling package to test the model.

Insert Figure 1 about here

When testing the relationship between separation (diversity) of the cognitive styles and the output of the dyad, we controlled for the mean of the cognitive styles, as recommended by Harrison and Klein (2007). Examination of the parameter estimates revealed that the means, age, gender and cognitive ability (control variables) did not significantly correlate with the outcome variables (written performance, oral performance, global project score, viability). The removal of these variables resulted in a more parsimonious model and provided a better fit for the data.

We first tested the influence of the diversity of cognitive styles on the global project score. The analysis revealed a good fit of the model, $c^2(3) = 1.893$, $p = .60$; NFI $= .99$. We used the Chi-square test as this test is a reasonable measure of fit for models with about 75 to 200 cases. The Chi-square provided an insignificant result at the 0.05 level (Barrett, 2007). The NFI had a value ≥ 0.95 which is recognized as indicative of good fit (Hu & Bentler, 1999). The RMSEA is set to zero if the chi-square is less than degrees of freedom. Kenny, Kaniskan, and McCoach (2011) argue to not even compute the RMSEA for low df models. Figure 1 displays the significant, standardized parameter estimates.

The first hypotheses suggested that diversity in cognitive styles would have a negative effect on the performance of the dyad. The results of the structural equation analysis revealed partial support for this hypothesis. Both diversity in the knowing style (H1a) and the creating style (H1c) affected dyad performance in a negative way; diversity in the planning style (H1b) however had a positive influence on dyad performance.

The second hypothesis posited that diversity in cognitive styles would not affect the written outcome and would negatively affect the oral outcome. The model provided a good fit to the data: $c^2(3) = .833$, $p = .84$; NFI = .99. Hypothesis 2a was supported in that diversity in the different cognitive styles did not relate to the written outcome.

Hypothesis 2b stated that diversity in all three cognitive styles would negatively affect performance on the oral task. The hypothesis was partially supported in that diversity in the knowing and creating style affected the oral outcome in a negative way and diversity in the planning style was positively related to the oral outcome.

The third hypothesis suggested that diversity in the three cognitive styles would negatively affect dyad viability. The hypothesis was partially supported in that only diversity in the knowing style was negatively associated with dyad viability; diversity in the planning style and in the creating style was not significantly related to viability.

With regard to the last hypothesis (H4) we found a significant influence of the written and oral outcome variables on satisfaction as rated by the company. We did not find a significant influence of dyad viability on customer satisfaction.

DISCUSSION

Despite the fact that many organizations use teams to accomplish work, little is known about how the diverse individuals that make up the team, affect the team outcome. This research study was designed to examine the relationships between diversity in cognitive styles and different team outcomes (written, oral, viability). Our results confirm existing literature in the notion that diversity is a complex concept, existing of multiple dimensions (e.g. Harrison & Klein, 2007; Harrison & Sin, 2006). According to Kichuk and Wiesner (1998) team member heterogeneity can be beneficial but homogeneity on some other factors is needed in order to keep team harmony and productivity.

The results of diversity on the knowing and creating style are affirmative of the general tendency in cognitive style research that matching causes positive effects and mismatching negative effects. These findings support the supplementary model suggesting a performance improvement when the team is homogeneous because team members are compatible with one another, communicate better and are more motivated to work together. Bowers, Pharmer & Salas (2000) state that an integration of the literature showed higher levels of performance for homogeneous teams than for heterogeneous teams. First of all there seems to be a small relationship between cohesion and performance (Muller & Copper, 1994). Secondly, the risk of conflict is higher between

dissimilar individuals than between similar individuals and conflict might interfere with performance (Morgan & Lassiter, 1992). However, this does not seem to be true for the planning style. The complementary model suggests a performance improvement when the team is heterogeneous because each team member has unique characteristics which are important to the team. The positive effect of diversity with regard to the planning style can be explained by the "process versus outcome focus" as described by (Woolley, 2009). People with a high score on the planning style have a high degree of process focus, which means they identify the specific tasks that need to be completed, the resources available for doing so, and the coordination of tasks and resources among members and over time (Cools et al., 2009b; Cools & Van den Broeck, 2007; Woolley, 2009). However, being process-focused is often associated with being less flexible in thinking about alternative models for carrying out work (Vallacher & Wegner, 1989). People with a lower process focus may concentrate more on the final outcome than on the means through which it should be reached (Aggarwal & Woolley, 2010). The combination of individuals focussing on the process and individuals focussing on the outcome might be beneficial for knowledge teams working on complex, open-ended tasks and can explain the positive effect of diversity in the planning style on the outcome variables.

As hypothesized, we found a different effect according to task type. The written task, which depends more on pooled or sequential interdependence, is not influenced by diversity in cognitive styles. However, the oral task, which depends more on reciprocal interdependence, is influenced by diversity in cognitive styles with a positive effect of planning diversity and a negative effect of knowing and creating diversity.

In contrast to previous results, we did not find a significant effect for cognitive ability on performance (Barrick et al., 1998; Neuman & Wright, 1999) Although there were differences in cognitive ability (on average 34,39 points), it should be noted that only students with a minimum-score of 600/1000 were selected to start the management program. As a consequence, all participants had a certain level of cognitive ability. The lack of an effect for age on performance is somewhat less suprising: previous research has produced inconsistent results regarding the age-performance relationship (For an overview, see Ng & Feldman, 2008). The lack of significant effects regarding age heterogeneity in our study may be due to the fact that team members did not differ that much with respect to age. 91,9% differed no more than three years in age. In an organizational context, differences may be much larger. Similarly, there was no effect for gender diversity. Previous research into gender diversity has yielded inconsistent results (For an overview, see Shore et al., 2009) and there have been many other studies with insignificant findings (e.g. Ely, 2004; Graves & Elsass, 2005; Leonard & Levine, 2006; Leonard, Levine, & Joshi, 2004; Martins & Parsons, 2007).

There certainly is a need for further research on the matching or mismatching of cognitive styles (Armstrong et al., 2001; Knippenberg & Schippers, 2007). A meta-analysis by Bowers, Pharmer and Salas (2000) showed a positive relationship of diversity (with respect to gender, ability level and personality) with group performance on more complex tasks and a negative relationship on performance tasks. We found a positive relationship as well, but only for the planning style. Diversity in the knowing and the creating style had an overall negative effect on the different outcomes. This shows the importance of a multi-dimensional model of cognitive styles, whereby the analytical dimension is split into a knowing and a planning style, given their differential effects. This is a contribution to the field of cognitive styles: we provided evidence for the multifactoriality of the Cognitive Style Indicator (Cools et al., 2009b; Cools & Van den Broeck, 2007), given the different effects of diversity in planning style versus the knowing style and creating style. This differential effect is reflected as well in the effects of diversity on dyad viability, with a negative effect of knowing style diversity, a positive effect of planning style diversity and no effect of creating style diversity.

Another strength of our research is the combination of multiple sources (student self-rating versus objective projectscores by multiple independent jury members), thereby preventing common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Moreover, since the measurement of cognitive styles and the project took place at the beginning versus the end of the academic year, we separated measuring the predictor and criterion variables (the existence of correlation between covariates; Zuur, Ieno, & Elphick, 2010).

A possible limitation is the fact that the student's grades were subjectively determined. However, the jury existed of two well-trained professionals with extensive experience (the project promotor and an independent rater) providing an academic perspective, and a third jury member from the participating company, providing the business perspective. Multiple rating sources have been found to only moderately agree in their ratings (Brett & Atwater, 2001; Fletcher & Baldry, 2000), providing methodological strength against common method bias. Another possible limitation is the fact that we worked with a student sample. However, the projects took place in actual companies and had real consequences, both for the company (time investment, solution to their problem) and the students (deciding grade). For further generalizeability, the study should be replicated with dyads within an organizational context.

Furthermore, future research should also take process variables into account. The relationship between diversity and group performance has proven to be very complex. Adding process variables such as communication, conflict or trust in the model might provide important

16

additional insights (see Roberge & van Dick, 2010). A promising line of research is not only the use of mediators, but also moderators (e.g. collaboration, team type, task complexity, frequency and duration of interactions) that might influence the relationship between diversity and outcome variables (Horwitz, 2005). Including a qualitative part into the research project could also help to find out why team functioning during the problem-solving task can have an influence on the use of team members' resources and on their performance.

Moreover, the issue of perceived versus actual diversity has been put into the picture (Harrison et al., 2002). We computed a diversity index on the level of cognitive styles, age, gender and cognitive ability. It could be, however, that there is a difference between the actual diversity in the dyad and the diversity perceived by the dyad members (Harrison et al., 2002).

In modern organizations teams are a way to respond quickly to market and technological changes (Ilgen, Hollenbeck, Johnsen & Judt, 2006). This study suggests options to manage diversity in teams. Literature suggests that team diversity can create a competitive advantage if team members have the right characteristics (Horwitz, 2005). Team performance can be increased by manipulating team composition through selection and placement (Bell, 2007). This study suggests that the same is true for dyadic relationships in the work environment. Instead of focussing on the easily detectable, surface-level diversity (such as age and gender), companies should focus on deep-level variability. If not enough attention is paid to the more underlying variables such as cognitive styles, diversity can become a source of competitive disadvantage. Indeed, failure of an organizational dyad or team can prove to be very costly, as teams are often used to solve problems, develop new products and make important decisions (Aggarwal & Woolley, 2010). Moreover, being dissatisfied with the team one works in, might influence the attitude of individuals towards teamwork. Bad experiences in working together can have a profound negative effect on a person's attitude towards cooperating with colleagues, thereby hindering future teamwork (Peeters et al., 2006).

Research on diverse cognitive styles is especially relevant to organizations as organizational teams house cognitive diversity but are mostly unaware of it. If team members are aware of the fact that these differences may play a role in their workforce exchanges, they can try to work through these differences (Bernerth et al., 2008). In practice, teams and dyads are constantly changing entities.

Instead of manipulating the team composition, a more feasible way might be to train the individuals to become aware of their differences and to learn to cope with these dissimilarites (Peeters et al., 2006). Increased awareness of cognitive style diversity can help smoothen cooperation in diverse teams or dyads (Bernerth et al., 2008).

Conclusion

Team diversity is a complex phenomenon and managing diverse work groups is one of the most difficult challenges in modern organizations. The labor force becomes more heterogeneous and more organizations structure work through the use of teams. However, simply creating heterogeneous teams doesn't lead to a better performance. Rather, the success of teams largely depends on the composition of individual characteristics. Our study indicated that an individual's cognitive style can eather improve of decrease performance depending on the cognitive style of the other team member. Understanding these various compositional effects can help organizations compose effective teams and train their team members to cope with these dissimilarities.

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Table 1

Means, Standard Deviations, and Intercorrelations

Variable	M	SD	1	2	3	4	5	6	7
Diversity in knowing style	22.15	17.14	-						
Diversity in planning style	24.89	17.04	-0.66	-					
Diversity in creating style	21.79	16.01	.020	.187*	-				
Written performance	14.99	1.46	-.173*	.171*	-.108	-			
Oral performance	15.10	1.35	-.210**	.161*	-.151	710**	-		
Global project score	15.33	1.29	-.179*	.173*	-.116	.853**	.836*	-	
Company satisfaction	15.55	1.95	-.098	.145	-.047	.514**	.545**	.801**	-
Dyad viability	8.43	.99	-.226**	.080	.032	.313**	.189*	.437**	.299**

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

Figure 1. General model with parameter estimates

Knowing style

-.163 (p = .033)

.801 (p = .000)

Planning style   .190 (p= .015)   Global project score   Company satisfaction
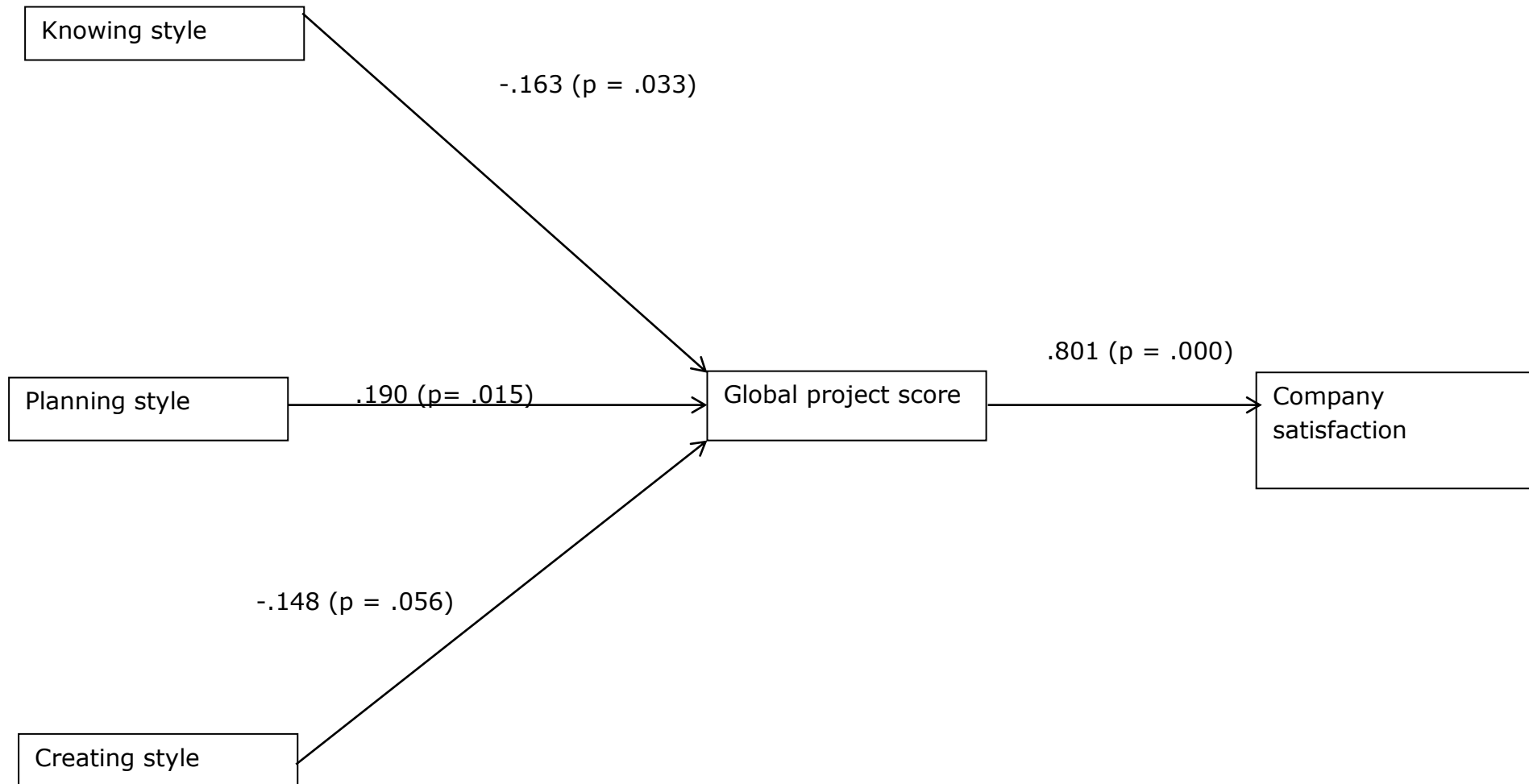
-.148 (p = .056)

Creating style

Figure 2. General model with parameter estimates

Knowing style

Planning style

Creating style

Written task

Oral task

Dyad viability

Company satisfaction

-.149 (p = .057)

-.194 (p = .010)

-.215 (p = .005)

.127 (p = .109)

.182 (p= .018)

.146 (p = .062)

-.058 (p = .464)

-.181 (p = .019)

-.030 (p = .700)

.369 (p = .000)

(p = .001)

.026 (p = .717)