The Impact of Cognitive Conflict on Team Performance

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Abstract

The results of research on diversity in teams suggest that it offers both a great opportunity for organisations as well as an enormous challenge. However, current research is plagued by a lack of overall consistency, indicating that the relationship between diversity and team performance is not well understood. This study examines the components of cognitive conflict in order to assess whether construct operationalisation may explain this inconsistency. Analysis of the existing operationalisations of cognitive conflict reveals that it incorporates both disagreement about information and reasoning, and debate of rival hypotheses or recommendations. We propose that functional diversity leads to cognitive disagreement but not debate, and that debate enhances knowledge creation, with which cognitive disagreement shows no relationship. Our results support these hypotheses, which provide a powerful explanation for the contrary results found by researchers investigating cognitive conflict. Given that extant measures of cognitive conflict include scale items which measure both debate and cognitive disagreement, cognitive conflict may be viewed as an aggregate measure of these two distinct constructs. This study contributes to research on diversity and conflict by providing an explanation for contrary results, and by providing a detailed operationalisation of cognitive conflict and its component constructs. It also contributes to research into creativity and innovation by providing insight into the dynamics underpinning knowledge sharing and creation.

Keywords: Knowledge creation, teams conflict

1. Introduction

The results of research on diversity in teams suggest that it offers both a great opportunity for organisations as well as an enormous challenge. Numerous studies have suggested that more diverse teams have the potential to consider a greater range of perspectives and to generate more innovative and higher-quality solutions than less diverse teams (Austin, 1997). For example, in a study of the top management teams of banks, Bantel and Jackson (1989) found that the more heterogeneous the team was in terms of functional background, the greater the number of innovations the bank had made. However, the mechanism through which diversity affects performance is not straightforward. Ancona and Caldwell’s (1992) study of 45 product teams indicated that diversity had a negative direct effect on innovation and team-related performance, but it had a countervailing positive indirect effect on innovation through its association with an increased frequency of communication with those outside the product team. In contrast, meta-analyses have revealed a negative relationship, inconsistent or no relationship between team heterogeneity and innovation (van Knippenberg et al., 2004; Webber and Donahue, 2001).

What stands out in this literature is a lack of overall consistency, indicating that the
relationship between diversity and team performance is not well understood. There have been a series of suggestions regarding these conflicting results, many of which have cited moderator or mediator variables. Researchers have proposed, for example, that the relationship between functional diversity and performance is mediated by member commitment, decision comprehensiveness and conflict (Jehn et al., 1999; Riordan and Shore, 1997; Simons et al., 1999). These studies have sought to understand how, that is through what mediating factors, diversity impacts performance.

In this study, we investigate a single mediating variable, cognitive conflict, and its impact on the relationship between functional diversity and knowledge creation. Previous research investigating the mediating role of conflict has yielded inconsistent results (De Dreu and Weingart, 2003; Jehn, 1995). This study examines the components of cognitive conflict in order to assess whether construct operationalisation may explain this inconsistency. We propose that cognitive conflict is composed of two distinct constructs that impact differentially on dependent variables (such as team performance) and are affected differently by independent variables (such as team composition). This proposition is significant because it provides a powerful explanation for ambiguous findings in research investigating the antecedents and consequences of cognitive conflict and, in particular, lends clarity to the pathway through which diversity impacts decision-making and knowledge creation.

2. Conceptual background and hypothesis

Functional diversity is described as the extent to which a team is composed of members with different functional backgrounds (Pelled et al., 1999; Shaw and Barrett-Power, 1998) and is a defining characteristic of cross-functional teams (Pelled et al., 1999). Cross-functional teams, those comprised of members from different functional areas (Pelled et al., 1999), are increasingly used in organisations in central business tasks requiring the solution of complex problems, particularly those requiring the generation of ideas (Van der Vegt and Bunderson, 2005; West and Anderson, 1996).

Research into functional diversity’s impact generally assumes that it can have either a positive or negative influence on team outcome. A positive outcome is associated with access to a diverse range of knowledge and perspectives which provides not only an increased pool of resources, but also an opportunity for novel connections, cognitive stimulation and the generation of creative ideas (Ancona and Caldwell, 1992; DeDreu and West, 2001; Paulus and Yang, 2000). A negative outcome is associated with factors including increased emotional conflict consequent to misinterpretation of disagreements or in-team/out-team social categorisation (Amason, 1996; Pelled et al., 1999). This study investigates one variable, cognitive conflict, defined as task-centred conflict behaviour including the questioning, challenging and the direct and open presentation of rival hypotheses or recommendations (Pelled et al., 1999; Simons et al., 1999) in an attempt to understand how functional diversity contributes to positive teams outcomes. Cognitive conflict has been investigated previously; however, the present study differentiates itself from previous research by explicitly investigating the operationalisation of cognitive conflict.

Analysis of previous efforts to operationalise cognitive conflict reveals that it incorporates both disagreement about information and reasoning, and debate of rival hypotheses or recommendations (Jehn, 1995). For example, Jehn (1997) used the following four scale items to measure task-related conflict: “How much conflict of ideas was there in your team?,” "How different were your views on the content of your project?,” "How much did you talk through disagreements about your team projects?,” and "How much disagreement was there about task procedure in your team?". It appears that the first two items reflect the level of cognitive disagreement in the team, defined as the extent to which members disagree or have differences of opinion relevant to the teams task, while the third item reflects a behavioural
response to conflict, which arguably reflects the construct of debate, defined as the extent to which the group talked through their disagreements. It is proposed that the construct, cognitive conflict, incorporates two components that are sufficiently different to warrant conceptual distinction.

_Hypothesis 1: Cognitive conflict is composed of two component constructs: cognitive disagreement and debate._

Previous research investigating the antecedents of cognitive conflict, found that because functional background is so related to work, people are particularly likely to draw on belief structures based on functional background when addressing workplace issues (Pelled et al., 1999). Group members with different functional backgrounds have divergent preferences, interpretations and even values. Combined, these may constitute cognitive diversity sufficient to trigger intra-group cognitive conflict. However, the argument that, as diversity increases, task-related conflict is also likely to increase due to incongruent task perceptions, points only to an increase in disagreement and not debate. Debate is a behaviour and can therefore be differentiated from cognitive disagreement associated with a group’s task, which may emerge or be perceived without consequent interaction or advocacy. Differences in knowledge do not necessarily lead to debate (Simons et al., 1999). Debate requires the expression of alternative views and knowledge, but is focused on the rigorously analysis, questioning and challenging of issues and opinions (Chen and Tjosvold, 2002; Tjosvold and Poon, 1998).

_Hypothesis 2: Functional diversity will be significantly and positively related to cognitive disagreement, but show no significant relationship with debate._

Previous research has evidenced numerous connections between knowledge creation and diversity. The extent to which group members actively utilise opposing or conflicting ideas positively affects the groups’ ability to resist conformity pressures, increases the tendency for conceptual differentiation and divergent thinking, and facilitates the application of different perspectives to codified knowledge, all of which are linked to the emergence of new ideas (Bhatt, 2000; Brown and Duguid, 2001; DeDreu and West, 2001; Gruenfeld et al., 1998; Nemeth, 1986; Nemeth et al., 2001; Nemeth et al., 2003; Tushman, 1977; Van Dyne and Saavedra, 1996). This indicates that diversity’s link to knowledge creation is underpinned by the rigorous analysis of alternative perspectives, which has been identified as a consequence of cognitive conflict. Cognitive conflict has been linked to improved performance because it results in the consideration of more alternatives, the more careful consideration of alternatives, and fosters a deeper understanding of task issues. However, while debate allows the consideration and deeper understanding of more alternatives, and therefore promotes integration across diverse knowledge sources (Simons et al., 1999), cognitive disagreement does not necessarily facilitate deeper understanding. To enable effective debate, members must express opposing and diverse views and knowledge, and rigorously analyse issues and opinions relevant to the task (Chen and Tjosvold, 2002; Tjosvold and Poon, 1998), whereas disagreement does not require open consideration of alternative perspectives.

_Hypothesis 3: Debate will be significantly and positively related to knowledge creation, however cognitive disagreement will demonstrate no significant relationship with knowledge creation._

3. Method

3.1 Procedure and sample

In order to test the hypotheses, a survey-based study was conducted. The questionnaire was distributed with a covering letter instructing participants to choose a team of which they were a member and that had at least two other members, and to complete the questionnaire referring to the same most recent situation in which the team made a non-routine, complex
decision. Instead of collecting data from all members of each participating team, we used an informant sampling approach which has been utilised in similar studies (Simons et al., 1999; Van der Vegt and Bunderson, 2005). Our requirement was to receive data from at least two members – participants were required to complete one questionnaire themselves and request another member of the team to fill out a separate questionnaire. The questionnaire instructed participants that to be included in the study responses were required from two team members. Five hundred and fifty questionnaires were distributed to postgraduate business students from a university in Ireland and a university in Australia, who were asked to recruit a team from their workplace. Responses from seventy teams were returned completed, representing a response rate of thirteen percent.

3.2 Measures

Cognitive conflict: Four items measured cognitive conflict based on Jehn et al. (1997), for example, “How many disagreements over ideas were there in your team?”. The alpha coefficient for cognitive conflict was 0.67. These four items included the debate and cognitive disagreement items described below.

Debate: Two items measured debate based on Jehn et al. (1997), and Simons et al. (1999). The two items were “How much did you talk through disagreements about your team project?” and “Did the group discuss disagreements in an attempt to work them through to a solution?”. The alpha coefficient for debate was 0.85.

Cognitive Disagreement: Two items measured cognitive disagreement based on Jehn et al. (1997). The two items were “How many disagreements over ideas were there in your team?” and ”Were there differences of opinion about any important issues?”. The alpha coefficient for cognitive disagreement was 0.73.

Knowledge Creation: Knowledge creation was operationalised in terms of its output, as the generation of new ideas (Beech et al., 2002; Bryant, 2005; Fong et al., 2007; Parent and Gallupe, 2000). Three items measured knowledge creation, for example, “Did the team develop any new ideas that were incorporated into the decision?”. The alpha coefficient for this measure was .78. This study employed a graphic line segment scale to measure dependent responses, which represents nearly continuous dependent response measure (Russell and Bobko, 1992). The independent variables were measured using a 7-point Likert scale which are best classified as ordinal scales, however, according to Johnson and Creech (1983) there is relatively little harm in treating Likert scales as continuous variables when there are five or more categories.

In order to assess interrater reliability we calculated interrater agreement (James et al., 1984) and intraclass correlation coefficients with ICC (1) indicating the ration of between-team to total variance and ICC (2) representing the reliability of average team perceptions (Bliese and Halverson, 1996). The results justified averaging responses and testing our hypotheses on a team level. It is standard practice to consider aggregation of individual-level measures to the team level as appropriate if the mean rwg value for the teams in the sample equals or exceeds .70 (Klein and Kozlowski, 2000). The ICC (1) result indicated that team membership accounted for a reasonable proportion of the variance in individual responses (James, 1982). The ICC (2) result indicates that team means were reasonably stable (Bliese and Halverson, 1996).

3.3 Control variables

In line with previous research indicating a relationship between available knowledge and group outcome, task complexity and routine, and team size and tenure were used as control variables (Jehn, 1995; Tushman and Nadler, 1978). Task complexity and routine was controlled for by specifying that members had to complete their survey with reference to a complex, non-routine task (Jehn, 1995). Team tenure was measured by respondents stating the
length of time that members had been working together as a group. Team size was measured as the number of group members.

4. Analysis and results

The data were assessed for multicollinearity or high correlation between independent variables. Table 1 shows the correlations among the independent variables. The largest correlation among predictor variables was .28. These magnitudes suggest that multicollinearity was not a serious problem as the general rule is that no correlation coefficient should exceed .75 (Tsui et al., 1995).

In order to test hypothesis one, and to ensure that debate and cognitive disagreement were distinct constructs, factor analysis of cognitive conflict was undertaken. The results generate support for two distinct factors captured within the cognitive conflict scale items (Table 1).

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<th>Table 1. Variable correlation coefficients</th>
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**p<.01
*p<.05

Multiple regression analysis was employed to test all further relationships. To test the second hypothesis, the dependent variables, cognitive disagreement and debate, were regressed on the independent variable, functional diversity. As expected, cognitive disagreement was significantly and positively related to functional diversity ($\beta = .22, p < .1$), however no significant relationship was evidenced between functional diversity and debate ($\beta = .07, ns$).

To test the second hypothesis, the dependent variable, knowledge creation, was regressed on the independent variables, cognitive disagreement and debate. As expected, debate was significantly and positively related to cognitive diversity ($\beta = .71, p < .01$), however no significant relationship was evidenced between cognitive disagreement and knowledge creation ($\beta = .01, ns$).

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<th>Table 2. Rotated component matrix</th>
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Extraction method: Principal component analysis
Rotation method: Varimax with Kaiser normalisation

5. Discussion

The purpose of this research was to investigate the impact of cognitive conflict on knowledge creation. The results provide support for the existence of two distinct constructs captured by extant cognitive conflict measures. These constructs, debate and cognitive
disagreement, have distinct relationships with the independent variable, functional diversity, and impact differentially on knowledge creation.

This study has a number of limitations, including a reliance on single source data and small sample size. It is possible that our findings reflect only common method variance. There are strong reasons for believing that perceptual measures of knowledge creation are more useful than objective, external measures. An objective measure would not take into account the knowledge created that was developed within the team’s discussion, but not incorporated into the final decision because of factors such as timing and political variables (Amason, 1996). Perceptual measures of relative status judged by those who are aware of the context within which the decision is made, is an important attribute (Amason, 1996). Procedural attempts were made to reduce the risk of bias caused by common method variance by incorporating the remedies advocated by Podsakoff et al. (2003) into the research design. We also investigated the possibility of single-source bias by employing a Harman’s single factor test (Podsakoff and Organ, 1986). The underlying assumption of this procedure is that if common method variance is an issue in this study, either a single factor will emerge or one factor will account for the majority of covariance among variables (Podsakoff and Organ, 1986). In this analysis, the unrotated factor solution did not identify a single or common factor as explaining the majority of the variance in the set of items. These results serve to reduce the possibility that common method variance influenced the test of the hypothesis. Nonetheless, future work could reduce the potential confounds associated with common method variance by using longitudinal designs and objective measures.

The sample size may have lowered the power to verify construct reliability and to detect significant relationships. However, the results supported most hypotheses and the response size was larger than the average size reported by Cohen and Bailey (1997) for work teams research. The response rate raises the possibility of selection bias. However, this poses less of a threat when relationships among variables are studied, because the sample selection would have to be linked to a relationship moderator in order to yield misleading results (Pelled et al., 1999). Comparison to known population characteristics indicates that the pattern of employment was similar for respondents and for enrolled students, which lessens the risk of response bias (Armstrong and Overton, 1977; University College Dublin, 2004). Future research should focus on replicating this research with larger samples to overcome the limitations and restrictions to generalisability associated with the current sample size.

Despite these limitations, this study contributes to existing knowledge in a number of areas. Our findings have potential to explain the contrary results found by researchers investigating cognitive conflict. Given that extant measures of cognitive conflict include scale items that measure both debate and cognitive disagreement, cognitive conflict may be viewed as an aggregate measure of these two distinct constructs. When team behaviour in response to cognitive disagreement incorporates debate, measures of cognitive conflict will be associated with positive team outcomes. In contrast, when measures of cognitive conflict reflect higher levels of cognitive disagreement of members, and lower levels of debate, such measures will be associated with negative team outcomes.

The creation of knowledge has previously been linked to enhanced product development and software development capabilities, innovation, quality of problem solution and overall effectiveness at the team level (Fong, 2003; Nonaka and Takeuchi, 1996; Ravichandran and Rai, 2003; Senge, 1990), and the results of this study indicate that this relies on the process of debate which provides an enhanced capability to generate and analyse alternatives, and to identify and resolve threats (Fong, 2003; Simons et al., 1999).

Previous research has advocated the use of functionally diverse teams to facilitate the assimilation of disparate knowledge by teams members as they operate in a boundary-spanning role by exchanging knowledge with members from distinct functional areas (Swan
et al., 2002). Bringing individuals from diverse functional areas together, provides the potential to bridge structural holes, or gaps in the knowledge flow, between disconnected functional areas (Burt, 2004). However, our results indicate that co-locating representatives from different nodes in a knowledge network temporally and spatially is insufficient. Our findings show that the process of debate is necessary to facilitate the brokerage of knowledge across these previously disconnected nodes (Burt, 1997), thereby connecting previously segregated accumulated knowledge (DeDreu and West, 2001; Huang and Newell, 2003; Jehn et al., 1997; Randel and Jaussi, 2003; Vissers and Dankbaar, 2002). This study also yielded no evidence of a relationship between cognitive disagreement and knowledge creation, which may indicate that the manifestation of different ideas is less important than the processes used to explore and challenge members’ positions. Future research should be directed to investigating this proposition.

To conclude, this study contributes to research on diversity and conflict by providing an explanation for contrary results, and by providing and a detailed operationalisation of cognitive conflict and its component constructs. It also contributes to research into creativity and innovation by providing insight into the dynamics underpinning knowledge sharing and creation.

References


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