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Cognitive Conflict in Forum Discussions on Scientific Topics

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Abstract: An online experiment (N = 96) explored which factors encourage readers to respond in an online forum discussion about the pros and cons of alternative medicine. After indicating their attitude on this issue, participants read an online discussion containing 24 pro and con posts about alternative medicine. Thus, cognitive conflict could be computed as the distance between person and post. Furthermore, participants had the opportunity to respond to whichever post(s) they liked. Results indicated that greater cognitive conflict was associated with higher likelihood of responding. This effect was attenuated in posts with high emotionality. Finally, greater conflict was associated with longer responses. Implications for research in CSCL and social psychology are discussed.

Keywords: Cognitive conflict, attitudes, online forum discussions

1. Introduction

Communication lies at the heart of any computer-supported collaborative learning (CSCL) activity, as without communication there is no collaboration. Moreover, since Cohen's (1994) seminal paper it is held that there is a positive relationship between communication and learning: individuals learn in cooperative or collaborative settings inasmuch as they discuss within their group.

It has long been held that some types of discussions might be more beneficial for groups than others. Based on Piagetian notions, Doise and Mugny (1984) posited in their socio-cognitivist approach that group discussions are particularly fruitful if group members have different viewpoints on an issue. This should give rise to cognitive conflicts in an individual, expressed by the Piagetian learning mechanisms of disequilibration and equilibration through assimilation or accommodation (Piaget & Inhelder, 1969). Consequently, some collaborative learning methods are explicitly geared at creating cognitive conflict in a group (e.g. Johnson & Johnson, 1979).

Large parts of CSCL research investigate discussion patterns among learners and try to unravel how cognitive conflicts among learners can be negotiated to create joint meaning and better understanding (e.g. Stahl, 2005). However, most of these studies examine patterns of discussion in individual case studies. The present study tries to uncover some factors that explain patterns of group discussions on a more general (and potentially generalizable) level. It partially replicates and builds on an earlier study which used the think-aloud approach on a much smaller sample (Buder & Rudat, 2014).

2. The Present Study

While previous research has provided ample evidence that cognitive conflict leads to learning (Johnson & Johnson, 1979), and that participation leads to learning (Cohen, 1994), the present study explores the "missing link", i.e. the relationship between cognitive conflict and participation (without looking at learning results). In order to test for this relationship, cognitive conflict was defined as the absolute distance between an individual's attitude and the attitude expressed through an utterance that the individual processes. In order to keep the "external" part of cognitive conflict constant, it was decided to investigate our research questions in an online experiment. In the context of a controversial online forum discussion about a scientific topic (alternative medicine), all participants of our study were confronted with the same discussion posts. The posts were constructed and pretested such that they varied in their expressed "attitude" as well as their emotionality.

Participants were given the opportunity to respond to whichever post they wanted to. It was expected that greater cognitive conflict (distance between a reader's attitude and a post's attitude)

would lead to a higher likelihood of responding. Following inconclusive results in our previous think-aloud study (Buder & Rudat, 2014), we did not hypothesize about the influence of post emotionality.

3. Method

96 German-speaking participants, recruited through a university portal for psychological experiments, finished the online study (29 male, 67 male, average age 25.8 years). The material consisted of a fictitious online discussion about the advantages and disadvantages of alternative medicine. An initial discussion entry was followed by 24 actual discussion posts (12 providing arguments in favor, and 12 providing arguments against the use of alternative medicine). Moreover, half of the discussion posts were composed in an emotional style, using emotionally laden words. Exact attitude ratings and emotionality ratings of each post (on Likert scales) were yielded through prior testing.

In the main study, participants first had to rate their attitude with regard to the topic (for vs. against the use of alternative medicine) on a 6-point Likert scale. After that, the alternative medicine discussion was displayed on a computer screen. By clicking on a box adjacent to each discussion post, participants could indicate that they would like to respond to this message. Participants were then given the opportunity to write their reply in a text box that opened upon clicking on the box. Participants were not requested or required to respond at all.

In order to test our assumptions, we computed a set of multiple regressions. First, we looked at the relationship of reader attitude and post attitude on the likelihood of responding. Then we added post emotionality into the regression equation. Finally, we explored the impact of these variables on response length of messages.

4. Results

The first regression model tested the likelihood of responding to a discussion post based on reader attitude and post attitude. As expected, neither reader attitude alone (z = -.354, p = .72) nor post attitude alone (z = 1.755, p = .08) predicted response likelihood. However, the reader attitude by post attitude interaction was significant (z = -3.381, p < .01). The relationship between cognitive conflict (reader attitude – post attitude) and response rate is depicted in Figure 1. The larger the cognitive conflict, the more likely it is that a participant responded on the controversial issue of alternative medicine.

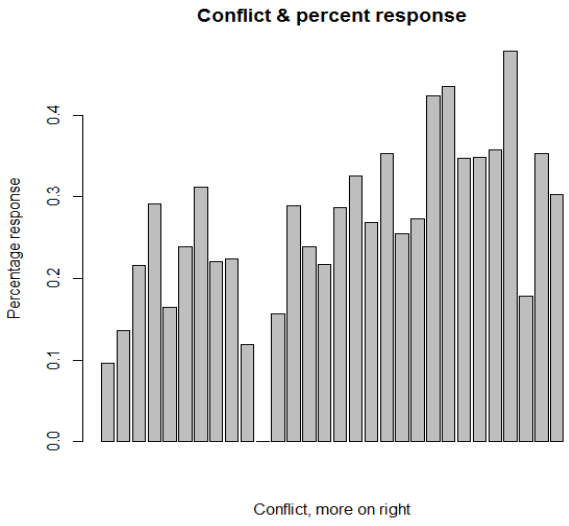

Figure 1. Relationship between cognitive conflict and likelihood of responding

A second analysis added post emotionality into the regression equation. Once again, neither reader attitude (z = -1.367, p = .17) nor post attitude (z = 1.127, p = .26) predicted participation rate.

Moreover, emotionality of a post did not have a direct effect ($z = 1.585$, $p = .11$). However, apart from the expected 2-way interaction between reader attitude and post attitude ($z = -3.894$, $p < .01$) we also yielded a significant 3-way interaction between reader attitude, post attitude, and post emotionality ($z = 2.705$, $p < .01$). Further analyses showed that post emotionality had a moderating effect on cognitive conflict. Participants were less likely to respond to a highly conflicting post when that post was emotionally laden rather than neutral. In contrast, participants were more likely to respond to a non-conflicting post when it was emotionally laden rather than neutral.

Finally we examined the impact of reader attitude, post attitude, and post emotionality on the length of response (number of characters). The only significant term of the regression equation (again) was a 2-way interaction between reader attitude and post attitude ($z = -3.534$, $p < .01$). This finding indicates that greater conflict (person attitude x post attitude interaction) is related to longer responses. However, the absence of main effects or interactions involving post emotionality suggests that the emotionality of a message does not have an influence on message length.

5. Discussion

An online study with 96 participants showed clear evidence that readers of online discussion forums on controversial scientific issues are more likely to respond to a discussion post the more this post deviates from their attitude. They did not only respond more when a post was conflicting, their responses also tended to become longer – conflict breeds online productivity.

This study was conducted in an informal learning setting. However, we are confident that some of the findings also apply to "typical" CSCL fields (institutionalized, formal learning scenarios): practitioners are well advised to frame scientific issues in terms of controversies. This will increase cognitive conflicts in learners, and generate more discussion. As active participation in a discussion requires deep elaboration of one's thoughts, conditions conducive to learning might be the result.

The current study also has interesting implications for social psychology as its results are in contradiction to the well-established tendency of people to attend to non-conflicting information (confirmation bias; Hart, Albarracin, Eagly, Brechan, Lindberg, & Merrill, 2009). The fact that we have essentially found a kind of "disconfirmation bias" with regard to online discussion forum behavior raises a couple of interesting theoretical questions: Is there an underlying mechanism behind these two conflicting findings? Under what conditions does a confirmation bias turn into a disconfirmation bias? We are currently exploring these questions in a series of further experiments, ultimately hoping to uncover some of the mechanisms that explain how people deal with and learn from conflicting pieces of information.

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References

Buder, J. & Rudat, A. (2014). Antecedents of replies and non-replies in online discussion forums: Evidence from a think-aloud study. In Liu, C.-C. et al. (Eds.) *Proceedings of the 22nd International Conference on Computers in Education. Japan: Asia-Pacific Society for Computers in Education* (pp. 19-21).

Cohen, E. G. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research, 64*, 1-35.

Doise, W., & Mugny, G. (1984). *The social development of the intellect.* Cambridge: Cambridge University Press.

Hart, W., Albarracin, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin, 135*, 555-588.

Johnson, D. W., Johnson, R. T. (1979). Conflict in the classroom: Controversy and learning. *Review of Educational Research. 49,* 51–69.

Piaget, J. & Inhelder, B. (1969). *The psychology of the child*. NY: Basic Books.

Stahl, G. (2005). *Group cognition: Computer support for collaborative knowledge building*. Cambridge, MA: MIT Press.