

When Productive Talk Fails to Generate Good Outcome: Temporality of Peer Talk in Dialogic Collaborative Problem Solving

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Abstract: Previous research abstracted productive talk moves from high-quality peer talk to scaffold group discussion and promote performance. This study selected two groups with contrast outcomes and similar demographics to examine whether and how the temporal patterns of productive talk moves might impact group outcomes besides their frequency and further inform how to scaffold students on sustainable usage of productive talk moves.

Introduction and method

Dialogic Collaborative Problem Solving (CPS) describes how students solve a problem collaboratively, mainly or wholly through productive talk. Extant evidence has established the benefits of questioning frames or sentence openers in promoting productive peer interactions, such as “why do think...?” “An alternative theory is...” and “Do you agree or disagree...” (King, 2002; Lazonder, Wilhelm, & Ootes, 2003; Teo & Daniel, 2007). Unfortunately, we do not yet fully understand how students chronologically take these moves in high-quality peer talk and how such temporality feature might account for group outcomes except for the frequency.

This study involved two groups (SY8 and SY9) of fourth-grade primary school students selected from a large project on dialogic CPS in mainland China. They were similar concerning intensity of group interaction, member demographics, and recent math grades, but contrasting regarding group outcomes. Content analysis was adopted to capture five types of productive talk moves in peer talk: *reasoning*, *collective reasoning*, *evaluation*, and *invitation*. These five types were summarized based on existing discursive productive talk moves identified in various contexts (e.g., Gillies, 2017; Hennessy et al., 2016; King, 2002; Lazonder et al., 2003; Teo & Daniel, 2007; Webb et al., 2013). *Reasoning* mainly refers to intra-thinking such as elaborating, explaining, speculating or reflecting on one’s own contributions. The other three types belong to inter-thinking. *Collective reasoning* mainly refers to reasoning on other’s or collective contributions. *Evaluation* includes agreement or disagreement; while *invitation* means inviting someone to express new ideas, reason or evaluate.

Results

Epistemic Network Analysis (ENA) (Shaffer & Ruis, 2017) was conducted to reveal the differences across two groups concerning the temporal connections among four types of productive talk (Fig. 1). The window size of moving stanza was set as two so as to identify pairs of talk moves. SY8 (high-performing) revealed three significant move pairs than SY9: *Evaluation-Reasoning*, *Invitation-Reasoning*, and *Invitation-Collective reasoning*. In contrast, SY9 had a significant straightforward connection between individual and collective reasoning. This might indicate that members in SY9 mainly relied on self-nomination in group reasoning; while students in SY8 seemed to have a stronger awareness to seek help or elicit other’s reasoning and revealed more instant evaluations on peer’s reasoning.

The present study zoomed in on the ice-cream item to further investigate how the four types of productive talk chronologically unfolded across two groups. This item required students to calculate the unit prices for one ice cream and one popsicle with known conditions of 22 yuan for two ice creams and four popsicles, and 14 yuan for one ice cream and three popsicles. This study compared one stuck phase for both groups where students reached an impasse after working out the total price for one ice cream and one popsicle.

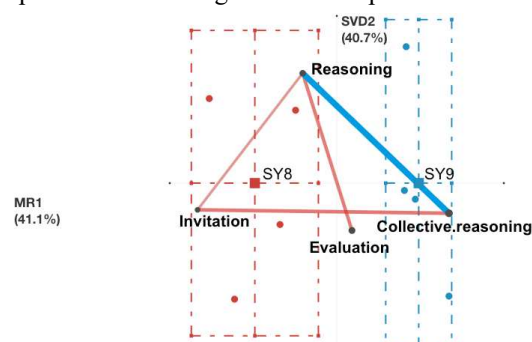


Figure 1. ENA results on move-taking patterns of SY8 (high-performing) and SY9 (low-performing).

In the annotated point graphs of SY8 and SY9 (Fig. 2), two codes were connected with solid arrows when they were in adjacent turns and reciprocally related in terms of function or content. Arrows became dashed when such reciprocal relation occurred with a gap in turns. The visualized moving-taking patterns suggested that SY9 adopted even more intense productive talk moves than SY8 in the stuck phase. However, the move-taking structure in SY8 seemed more coherent and sustained than SY9 indicated by the contrast difference on solid and dashed lines. From turn 45 to turn 52, *Xun*, *Gan*, *Gu* and *Si* continuously built on each other to advance group knowledge and progress towards the goal state. In contrast, SY9 revealed fragmented group thinking flow caused by lots of interruptions and overlook to peer's viewpoints. For example, *An* expressed the same comments on the ineffectiveness of *Yao* and *Li*'s discussion at turns of 70 and 75, but got neglected. *Li* and *Yao* also competed for turns from the turn 64 to the turn 69 which led to interruptions and incoherent reasoning. Consistent with the ENA result, SY8 also revealed more invitational talk moves among reasoning moves. These invitations helped sustain and deepen group reasoning. For example, invitations at turn 45 by *Xun* and at turn 47 by *Gu* helped *Gan* to continue his reasoning and approach the group target.

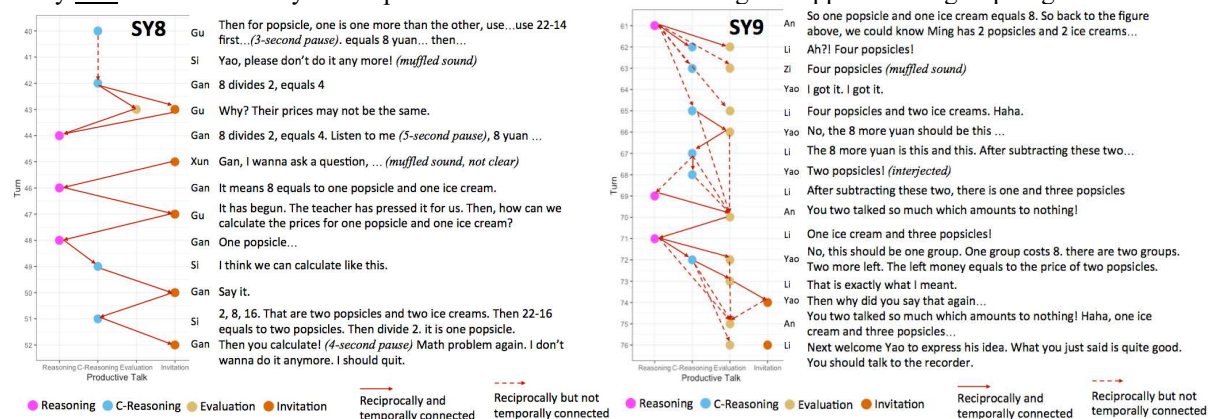


Figure 2. Extracts on one stuck phase of SY8 (high-performing) and SY9 (low-performing).

Discussion and conclusion

To explain when productive talk moves failed to generate good group outcome, this study compared the move-taking patterns across one high-performing and one low-performing groups with comparable intensity of interaction and member characteristics. The preliminary analysis revealed that there was also difference in move-taking patterns that may account for group outcomes as well in addition to how often a group used these productive talk moves. The high-performing group revealed three significant move-taking pairs: *Evaluation-Reasoning*, *Invitation-Reasoning*, and *Invitation-Collective reasoning*. It seemed to have a better socially shared regulation (Järvelä & Hadwin, 2015) and co-regulation (Hadwin & Oshige, 2011) in group discussion through adopting invitational and evaluative talk moves to connect reasoning processes, which was different from the low-performing group which was characterized by more straightforward connections of student reasoning. Group regulations could benefit positive interdependence and cognitive convergence in peer talk both of which were well-established features for successful CPS (Borge, Ong, & Rose, 2015). The specific excerpts of the stuck phase also revealed the high-performing group showed more sustained group thinking flow indicated by long coherent sequences of move-taking, while the thinking flow of the low-performing group seemed more fragmented due to more turn interruptions and the overlook of other's voice. This might also echo the possible benefits of using invitational and evaluative talk moves to connect individual or collective reasoning.

Selected references

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