



Gendered patterns in small group collaborative interactions over time



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Background

- Peer interactions is a key part in collaborative learning. Numerous evidence has shown having small group discussion is beneficial to academic performance and increased learning experience in online environments [1].
- Language can offer insights about students social, cognitive and affective engagement in a non-intrusive manner, and the advances of computational linguistics approaches offers potential for us to understand learner communication behavior at scale and provide timely feedback during synchronous interactions [2].
- However, male and female students exhibit different discourse characteristics in computer mediated environment [2].
- Understanding how female and male students interact with peers can inform pedagogical decisions on collaborative learning to facilitate effective group discussions. The nuances about learner discourse also be taken into account in developing artificial intelligence systems to support and moderate small group collaborative learning. (maybe move to conclusion)

Participation	• Mean participation of an individual relative to the expected average of the group of its size.
Social Impact	• Measure of how contributions initiated by the corresponding participant have triggered follow-up responses.
Overall Responsivity	• Measure of the tendency of an individual to respond, or not, to the contributions of their peers in the group.
Internal Cohesion	• Measure of how consistent an individual is with their own recent contributions.
Newness	• Measure of how likely for an individual to provide new information or to echo existing information.
Communication Density	• Measure of the amount of semantically meaningful information in utterances.

Fig 1. Definitions of GCA measures.

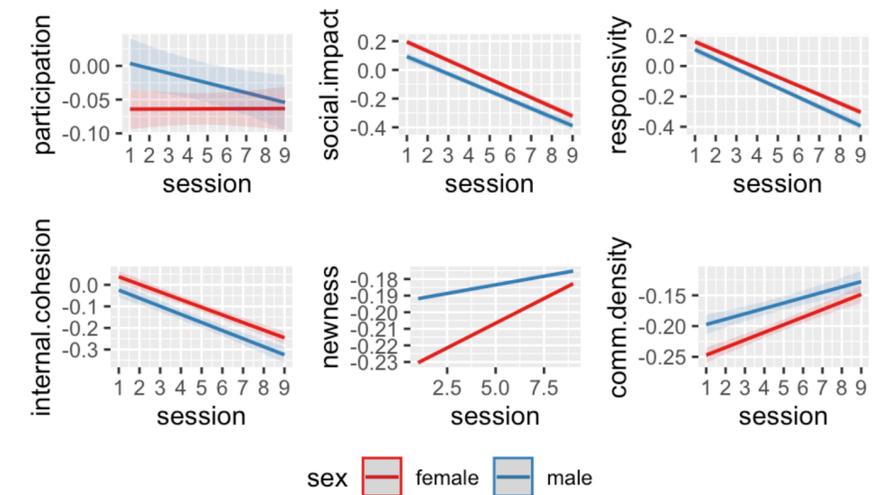


Fig 3. GCA patterns over time by gender

Objectives

Previously, temporal dynamics of student interactions have been examined at the levels of group, course, and learning platforms more broadly [4]. While existing studies that examine temporality in synchronous chats mainly concern discourse processes in a single session, to our knowledge none has reported whether there is change in gender differences during computer-mediated communication across multiple synchronous sessions.

The goal of this work is to explore the temporal differences in the communication between gender. The research questions that we ask are:

- Are there differences in the communication pattern for male and female students over multiple synchronous discussion sessions?
- Does the gender difference in student discourse change over time?

Method

[Participants] The data was collected in the fall of 2014 in an online introductory psychology course. Students enrolled in the class participated in multiple group discussions and daily quizzes across the semester. For this study, we focus on the 9 synchronous group discussions that took place over the semester. Participants (N= 1598) were randomly assigned to small groups of 3-5 people, to have an 8-minute non-directed discussion.

[data processing] We extracted chat data in each group and processed with a linguistic method call Group Communication Analysis(GCA) to quantify students interaction [3]. This approach accounts for temporal and semantic aspects of discourse to reflect individual's intra- and interpersonal processes with respect to the group. Figure 1 provides the definition of each of six dimensions capture by GCA.

[Analysis] To address our first research question, we performed Analysis of Covariance (ANCOVA) to analyze the gender difference in the six GCA measures, controlling for ethnicity, age, socioeconomic status. For the second research question, we fitted mixed models for the interaction effect between session and gender to examine gender differences over time.

Results

For RQ1, We found significant gender differences in every GCA measures ($p < .01$). As shown in figure 2, female students exhibited on average higher social impact, internal cohesion, and overall responsivity. Male students exhibited higher average participation, newness, and communication density.

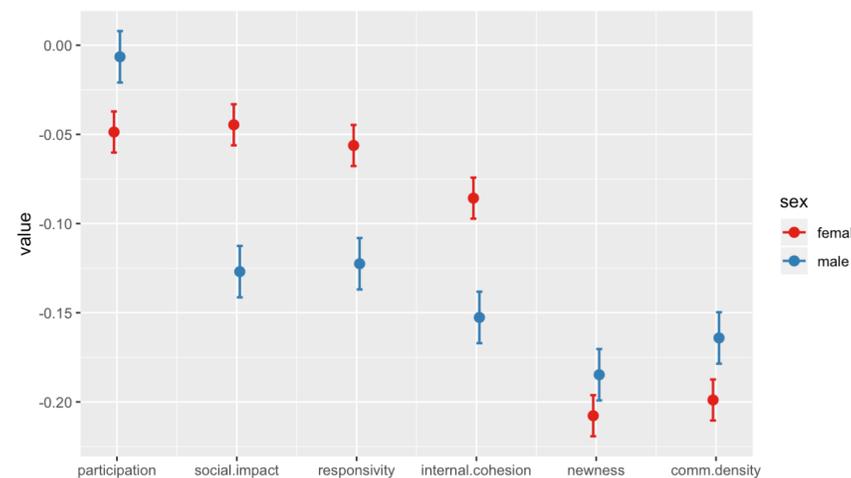


Fig 2. Gender difference across GCA measures

For RQ2, we observe that gender differences for some GCA measures remain consistent while others changed over time. As shown in figure 3, the gender differences over social impact, overall responsivity, and internal cohesion remain relatively unchanged over time. When we look across each session, gender differences changed in measures for participation, newness, and communication density. The model for participation shows that male students' participation decreases more sharply over time with marginal significance. Models for newness show that the amount of new content increased more within females' discourse ($p = .05$). Similarly for communication density, although both gender increased the amount of meaningful information in utterances over time, slightly more change took place for female students ($p = .06$).

Discussion

In this exploratory analysis, we found emergent gender differences in students' overall communication patterns. We found that female students discourse display greater impact on their peers, being more cohesive, and responding to group contributions. This is consistent with our previous findings looking at a single long discussion session [2]. Although there is a trend in decline over the semester, potentially due to fatigue effect, females consistently outperformed males on these three communication.

Interestingly, although students' communication pattern over time changed in the same direction, the degree of change were different for male and female students. The gender gap came close for participation, with males starting at a higher point but decreased more sharply over time. Although male students presented more new content and communicate more concisely at the aggregated level, these gender differences became less pronounced over time as females gradually caught up on these measures. In future research, we plan examine the potential effect of topic given on different sessions over the semester.

References

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