Emergent patterns of intra-team relationships and their impact on team performance: an analysis of teamwork for idea generation

Keywords: teamwork, idea-generation, emergence, leadership, conversation analysis

Extended Abstract

Background and Purpose of the Study: In recent years, both industry and academia have been eagerly promoting and supporting activities to enhance the creativity and innovativeness of people (e.g., employees and students). A number of entrepreneurship development programs have also been conducted, where participants can experience working in teams to experience the process of creating a new business idea and commercializing it. Questions such as how teams should be organized and what kind of relationship building among team members should be encouraged in order for teams to generate good (innovative) ideas are at the core of the field of teamwork and leadership studies. However, much of the existing research discusses the impact of a leader's behaviors on other team members in a team with a predetermined leader. In recent years, the assertion that leadership and followership are emergent in person-to-person interactions (e.g., DeRUE and Ashford 2010) has also received considerable attention. But existing empirical studies have only analyzed one-to-one relationships between leaders and followers, and there is still insufficient research on the emergence of relationship structures among multiple team members.

In this study, we investigate what kind of intra-team relationship structure emerges in the process of generating new business ideas and how it affects team performance in a team consisting of people who do not have a predetermined leader and do not know each other.

Data and analysis approach: We utilized data collected in an online program for entrepreneurship development offered as a federally subsidized program at a university. In this program, participants were randomly divided into terms of four to five people each, and each team was tasked with generating and presenting a business idea. Professional investors and entrepreneurship education instructors scored the quality of the final presentations, and the scores were used in this study as the teams' performance indicators. While existing studies measure team performance by asking members about their satisfaction and self-evaluation through questionnaires, this study has the advantage of objective and quantitative team performance evaluation.

We analyzed the discussion logs using Trint, an AI-powered speech transcription tool. We identified the speaker, the start and end times of utterance, and the utterance content for all conversations in the team discussions. Several researchers then read the discussion logs, manually corrected errors, and furthermore, assigned each utterance one (or more) of 11 different tags (agree, opinion, approval, question, …) depending on its meaning. We also surveyed participants at the beginning, middle, and the end of the program. In particular, the second survey (during the idea generation process) asked each participant about the relationship among team members, asking which team members showed leadership, who they trusted, who influenced them and so on.

Results and implications: One of the findings from our analysis is that teams that can discuss a single topic at length perform significantly better. Better-performing teams had longer

discussions on a topic, not only in the divergent process of generating a lot of ideas, but also in the convergent process.

When we investigated time-series changes in the frequency with which unique keywords (=seeds/cores of ideas) appeared in the discussion (see Figure 1), we found that there were differences in the well and badly performing teams. (Note that by well/badly performing teams, we refer to teams with good/bad final evaluations.) In the well performing teams, keywords appeared in large numbers for short periods, and then disappeared in sequence. In other words, the divergence of discussion was intensive, and then each idea that emerged was discussed in turn in an intensive manner. In contrast, in the teams that performed poorly, ideas appeared in pieces and then disappeared as the next idea appeared.

Then, who was generating new ideas? Who was bringing ideas back up to the floor once they were no longer being discussed? Was each idea being discussed by all team members or just a few? How did these affect team performance? Further analysis of these points yielded several findings (see Figure 2). Teams with good performance (e.g., Team *a*) had a person (*Ta*) who generate many ideas and another person (*Ha*) who took up these ideas again and proposed them to other members after these ideas were no longer discussed. In other words, *Ha* was demonstrating followership to *Ta*. There was yet another person (*Ra*) who was facilitating the discussion, and this person was considered the leader by everyone, according to the survey results. While existing studies (e.g., Mast 2002) argued that people who speak more are more likely to be seen as leaders, our results suggest that the multiple roles (i.e., idea generation, attention to ideas, and discussion facilitation), rather than speech volume, affect leadership/followership and team performance. In contrast, in the badly performing teams (e.g., team *e*) there were two people (*Ne* and *Re*) with high speech volume, and one (*Ne*) regarded the other (*Re*) as a leader and exercised followership. However, *Ne*'s subservience to *Re* was so strong that it established an exclusive relationship with respect to the other members. Therefore, the other members did not regard *Re* as a leader, and did not develop the ideas generated by the discussions between *Re* and *Ne*. This result indicates that (good) leadership and followership cannot be established without being recognized within the team.

We also performed a variety of other analyses and identified differences between well performed teams and badly performed ones – e.g., which semantic tag sequences are more likely to occur (compared to randomized models), which speaker is more likely to say what, and who is likely to follow.

Our analysis revealed linkages between emergent patterns of relationships among multiple team members and team performance. The findings of this study are expected to lead to better team organization, effective discussion interventions, and promotion of relationships that lead to good performance. This study also made theoretical contributions to teamwork science and leadership research. We focused on the co-creation process of leadership and followership, and further demonstrated the importance of the perception of it by other members.

Data from discussions in teams where no predetermined relationships exist among members, and data on the performance of each team, would be invaluable. Since we also have access to data from other entrepreneurship programs, we hope to derive further insights by conducting comparative analysis among programs in the future.

References

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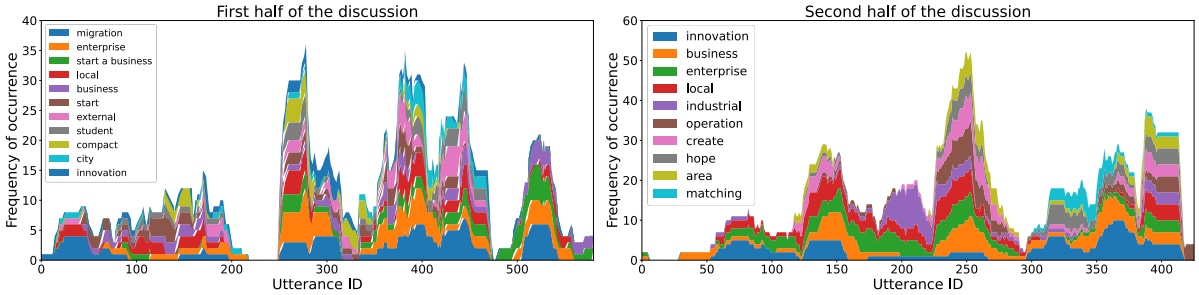
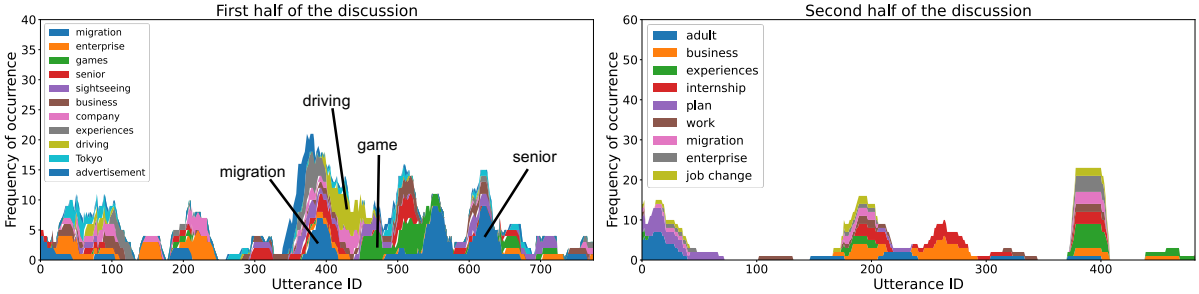


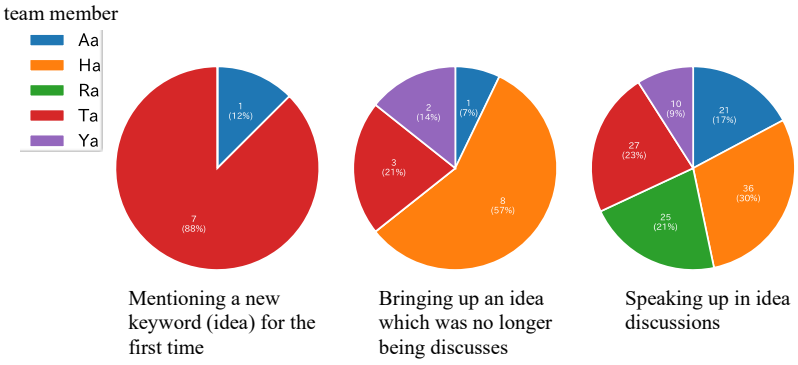
(a) Team *a* (well performing team)



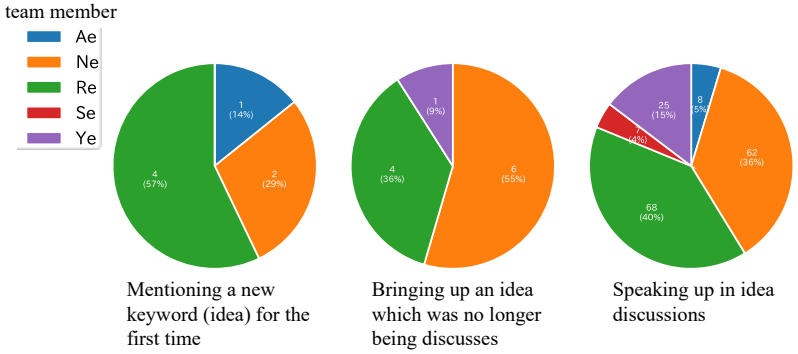
(b) Team *e* (badly performing team)

Figure 1: Frequency of occurrence of keywords (ideas) in utterances

Note: The horizontal axis shows the utterance ID attached to each utterance in sequence from the beginning of the discussion – i.e., it represents the passage of time.



(a) Team *a* (well performing team)



(b) Team *e* (badly performing team)

Figure 2: Number of times each team member was involved in idea generation and discussion