Analysis of Laughter in Cohesive Groups

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Abstract

Group cohesion describes the tendency of the group members' shared commitment to group tasks and the interpersonal attraction among them. This paper presents a preliminary analysis of occurrence of laughter with respect to group cohesion using a corpus of multi-party interactions. Results indicate that the occurrence of *laughter* is higher in cohesive segments and a strong positive correlation exists between the perceived level of cohesion and laughter.

1 Introduction

Group conversation is a frequently used form of communication for discussing, making decisions and exchanging ideas in groups, through different settings (e. g., meeting, conference, council, party etc.). In this research work, we focus on a group phenomenon that emerges over time i. e., group cohesion (Santoro et al., 2015). Cohesion describes the tendency of group members' shared bond or attraction that drives the members to stay together and to want to work together (Casey-Campbell and Martens, 2009). Several existing works in literature have associated group cohesion with group performance, team satisfaction and adherence (Beal et al., 2003). Automatic estimation of cohesion can be useful for multimedia tagging and automatic analysis of meeting data to measure the performance. While works in literature provide a detailed analysis of the features e. g., prosody, visual energy that measure cohesion, they do not look at social signal cues per se e. g., laughter.

In multi-party interactions, humans communicate and coordinate with each other via a number of verbal and nonverbal behaviours. Laughter is a commonly used non-verbal vocalisation that usually indicates a positive affect. It plays a vital role in regulating topics (Holt, 2010), and is observed to occur frequently in meetings. Laughter is an essential form of social relief during interactions and indicates a cooperative intent. It is said that laughter establishes a form of bond in social groups and makes people feel more comfortable, and this can be attributed as one of the evolutionary aspects(Gervais and Wilson, 2005). Since cohesion is associated with bonding, feedback and support, we hypothesize that instances of laughter are frequent in highly cohesive meeting segments. We also hypothesize that shared laughter improves cohesiveness in groups and therefore more common is high cohesive meeting segments.

This article is a first step towards developing a computational model of cohesion estimation in multi-party human-human interactions. This paper provides a preliminary analysis of how laughter is linked to the group cohesion in a corpus of human-human interactions.

2 Cohesion

One of the earliest definitions of cohesion was proposed by Festinger et. al., "as the total field of forces that act on members to remain in the group" (Festinger et al., 1950). Several other researchers provided definitions that included "attractiveness to the group" (Back, 1951) or "commitment to the group" (Piper et al., 1983) or "commitment of members to group task" (Goodman et al., 1987). However, these definitions perceived cohesion as a uni-dimensional construct. Carron et. al., defined cohesion as *"a dynamic process that is reflected in tendency of group to stick together and remain united in pursuit of its goals and objectives"* (Carron, 1982) that looked at it as a multi-dimensional construct. A multi-dimensional model was proposed: group-individual and task-social (Carron et al., 1985). Braaten proposed a five-factors model for group cohesion in group psychotherapy: attraction and bonding, support and caring, listening and empathy, self-disclosure and feedback, process performance and goal attainment (Braaten, 1991). Another model was

proposed by Carless and De Paola (Carless and De Paola, 2000) which is a three factor model with task cohesion, social cohesion and attraction to group. An observation of the existing models and definitions helps identify two constructs of cohesion i.e., attraction to the group or interpersonal attraction (analogous with social cohesion) and commitment to the task (analogous with task cohesion).

3 Data

In this section, we present the data corpus used for this analysis. The Augmented Multiparty Interaction (AMI) corpus (Carletta et al., 2005) consists of multimodal recordings of four participants in scenario-driven meetings where each participant has a role to play. A portion of corpus was annotated for task and social cohesion values by Hung et. al., (Hung and Gatica-Perez, 2010). In total, 120 two-minute segments were extracted randomly from the corpus. The segments were annotated manually by a group of 21 annotators using a 27-item questionnaire on a 7-point Likert scale. Each video was annotated by three different annotators. We calculated the inter-annotator agreement using a one-way, average consistency ICC measure. The agreement between the annotator groups were above 60%. We then calculated the average rating of cohesion for a given segment based on the scores available. The mean rating of 4.63 and stdev of 0.89. Based on the mean rating we categorised the segments as low cohesion or high cohesion. Our data consists of 64 segments with high cohesion rating and 56 segments with low cohesion rating.

We extracted the laughter instances from the transcription files available with the corpus. The number of laughter instances extracted in total are 784, from which 205 instances were extracted from the 56 low cohesion segments and 579 instances from the 64 high cohesion segments. We calculated the average occurrence of laughter per segment by calculating the total number of instances extracted for a given segment and dividing it by four to get the average.

4 Results and Analysis

Initially, we verify the assumption of normality of the data distribution using Shapiro-Wilk test. In order to verify our hypothesis for this preliminary study, we perform the Mann-Whitney test and Spearmann's rho on the data.

Results indicate that laughter was observed more

frequently in high cohesion segments than low cohesion segments. The average occurrence of laughter per segment was lower in low cohesion segments ($M = .91$, $SD = 0.98$) than in high cohesion segments ($M = 2.26$, $SD = 2.31$) with $p < .001$. Figure 1 shows a box plot of average instances of laughter of the dataset. We also found that shared laughter instances i.e., where two or more participants laugh simultaneously occurred three times more frequently in high cohesion segments in comparison to low cohesion segments. Further, from the Spearmann's correlation test, we found that laughter tends to be higher in segments with high cohesion scores $r_s = 0.75$, $p < .05$.
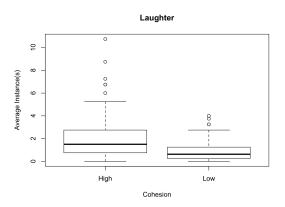

Figure 1: Box plot of average instances of laughter ($p < .001$) for low and high cohesion segments

5 Conclusion and Future Work

Our aim was to recognize non-verbal social cues, laughter in particular, associated with cohesion. Our initial assumptions was that laughter associated with positive affect and bonding occurs frequently in high cohesive segments. This assumption was verified and we also observed that instances where more than one participant shared a laughter is common in cohesive segments. This is in line with several studies on laughter in groups which state that "laughter establishes a form of bond in social groups and makes people feel more comfortable" (Glenn, 2003).

Future work will include a qualitative analysis of laughter occurring in low cohesive segments. In the current analysis we do not distinguish between the type of laughter or the emotion conveyed through it (Mazzocconi et al., 2018). We want to perform further analysis to understand the different types of laughter that occur in low and high cohesive segments.

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