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SPECIALTY SECTION  
This article was submitted to  
Human-Media Interaction,  
a section of the journal  
Frontiers in Computer Science

RECEIVED 29 August 2022  
ACCEPTED 30 August 2022  
PUBLISHED 13 September 2022

CITATION  
Böck R and Allen JA (2022) Editorial:  
Group analysis and multi-agent  
interaction—Bridging the gap between  
social investigations and  
computational analysis.  
*Front. Comput. Sci.* 4:1030966.  
doi: 10.3389/fcomp.2022.1030966

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# Editorial: Group analysis and multi-agent interaction—Bridging the gap between social investigations and computational analysis

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## KEYWORDS

editorial, group analyses, multi-party interaction, multi-agent interaction, group interaction

## Editorial on the Research Topic

[Group analysis and multi-agent interaction—Bridging the gap between social investigations and computational analysis](#)

## Introduction and overview on the Research Topic

Human beings are interactive and socially engaged, as they often gather and communicate in either dyads or groups. During such interactions, each communication partner is providing a variety of information, including general information/content, as well as personal and relational information. These communication aspects and information are truly on display in group interactions or multi-party interactions (Böck, 2020; Reed and Allen, 2021).

For many years, analyses of communication were a major objective of several areas within the social sciences, including areas such as investigating inter-personal relationships of the group members and the dynamics of group interaction, cohesion, and performance (Lehmann-Willenbrock and Allen, 2018). In this sense, mainly a human-centered perspective was considered. Meanwhile, computer scientists started to investigate groups using automatic analyses (Böck, 2021), often borrowing theoretical foundations from the social sciences. Unfortunately, these two groups, social scientists and computer scientists, have only begun to collaborate. Yet, these collaborations are beginning to be fruitful, showing interesting and promising results. However, this interdisciplinary exchange of ideas needs to be emphasized, especially with respect to multi-agent interactions where multiple human communicators interact with multiple technical systems (Böck, 2020).

Unfortunately, in particular, the interdisciplinary collaboration between these research communities is currently rather limited. There are some attempts and efforts to link and bring together researchers from the different disciplines (e.g., the Interdisciplinary Network on Group Research, the Geeks “n” Groupies initiative, or the EMERGent workshops), but there is still need for additional efforts. Especially, in terms of collaborative, interdisciplinary papers have (almost) no home because of the limited possible publication options. Therefore, the main purpose of this Research Topic was to provide an outlet for these collaborative initiatives.

This Research Topic provided an opportunity for scholars and researchers to contribute original research articles as well as review articles that will stimulate the continuing effort in group analyses and multi-agent interactions. In addition to methodological and theoretical contributions, we welcomed also practical applications in various Research Topics like (multimodal) group analysis, (multimodal) multi-agent analysis, (multimodal) multi-agent interaction from both communities, also highlighting effects on reactions of technical systems (Weißkirchen and Böck, 2022). We were also interested in the social and technical implications of group investigations, group and teams research using novel technology, and so on, which is of greater importance in the new post-COVID-19 pandemic world (Reed and Allen, 2022). Given this opportunity, we were trying to bridge the gap between social investigations and computational analysis.

## Achievements in the Research Topic

In the following, we briefly summarize the main findings of the papers currently being published in the Research Topic.

Gossip is a common form of communication used by most human beings as they share interpersonal information. In the exploratory study (Begemann et al.), indicate characteristics and extract different prototypical types of workplace gossip expressions and patterns. For this, multimodal field-based recordings of elderly care team meetings are analyzed with respect to the function and valence of the gossip. The authors highlight the implications of their findings regarding negative valences which are embedded in the gossip, indicating interdisciplinary work, for instance, in the analysis of textual representation and acoustic appearance of expressions.

Group assessment deals with the issue of analyzing the group and providing suitable feedback to a group. Assessing and providing feedback to groups is challenging, especially in dynamically changing group situations or environments where multiple groups are interacting. One particular use case is teaching. Som et al. provide an approach which recommends feedback on individual- and group-levels to the teaching person.

Based on audio-visual data, the authors used an evolutionary neural net approach to generate a collaboration assessment of the groups. The networks are trained on real, annotated data from teaching sessions as well as on generated data. Given the assessment, a recommendation system provides possible feedback options.

In Lefter et al. article, the authors combine the issues of affect in groups and automatic analyses of groups. Particularly, situations of escalation and de-escalation in dyads and groups in various public environments are investigated. For the exhaustive experiments, three corpora are utilized, being analyzed on acoustic level. The automatic classification experiments show that in a cross-corpus manner (i.e., data from one or multiple corpora is used for training; the classifier is tested on data from another corpus, unseen during training) already a 63.8% unweighted average recall could be achieved, considering varying group sizes across the samples.

The final paper in the Research Topic was by Siegert et al. They considered the challenging domain of how automatic analysis of multi-agent interactions or group interactions can occur. Specifically, they look at who is speaking, what they may mean, and who are what is expected therefrom, including how to automatically detect the addressee (i.e., addressee detection). Therefore, they provide a systematic overview on current methods, corpora, studies, and achievements, following the PRISMA guidelines. In total, 1,581 studies were investigated, where 23 are considered, that meet the PRISMA criteria, focussing on the acoustic channel. This results in an overview including work done from 2009 to 2021 providing a starting point to approach the community of automatic addressee detection.

## Conclusion

This Research Topic reached multiple researchers from various subdisciplines related to group assessment and analysis, who provide insights to different facets in the research domain. Further, we also combined at least two publishing communities, namely *Frontiers in Psychology* and *Frontiers in Computer Sciences*, thus bridging—or at least diminishing—the gap between the communities. We hope that this endeavor will be pursued until the perceived and real gap between these disciplines is removed entirely.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Funding

This work was supported by the ASAMI project (grant number: I 138, Federal State of Sachsen-Anhalt, Germany). Additionally, this work was supported by NIOSH through their Education and Research Center (ERC) and the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH).

## Acknowledgments

We acknowledge the support of the Editorial team at Frontiers as well as the effort of the reviews.

## References

Böck, R. (2020). *Anticipate the User – Multimodal Analyses in Human-Machine Interaction towards Group Interactions*. Dresden: TUD Press.

Böck, R. (2021). "Affects in groups - a review on automated affect processing and estimation in groups," in *IEEE Signal Processing Magazine* (Piscataway, NJ: IEEE), 74–83.

Lehmann-Willenbrock, N., and Allen, J. A. (2018). Modeling temporal interaction dynamics in organizational settings. *J. Bus. Psych.* 33, 325344. doi: 10.1007/s10869-017-9506-9

## Conflict of interest

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Reed, J. M., and Allen, J. A. (2021). *Suddenly Virtual: Making Remote Meetings Work*. Hoboken, NJ: Wiley.

Reed, J. M., and Allen, J. A. (2022). *Suddenly Hybrid: Managing the Modern Meeting*. Hoboken, NJ: Wiley.

Weißkirchen, N., and Böck, R. (2022). Behaviour of true artificial peers. *Multimodal Technol. Interact* 6, 80064. doi: 10.3390/mti6080064