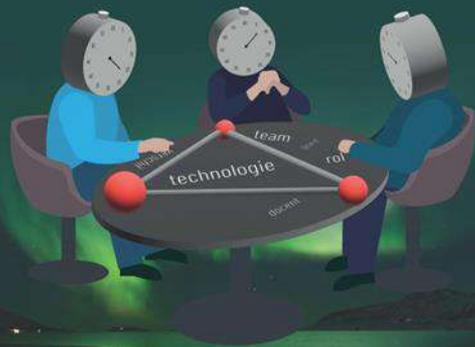


Measuring the Unmeasurable?

Towards Automatic Co-located Collaboration Analytics



Sambit Praharaj



Measuring the Unmeasurable?

Towards Automatic Co-located Collaboration Analytics

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Measuring the Unmeasurable?

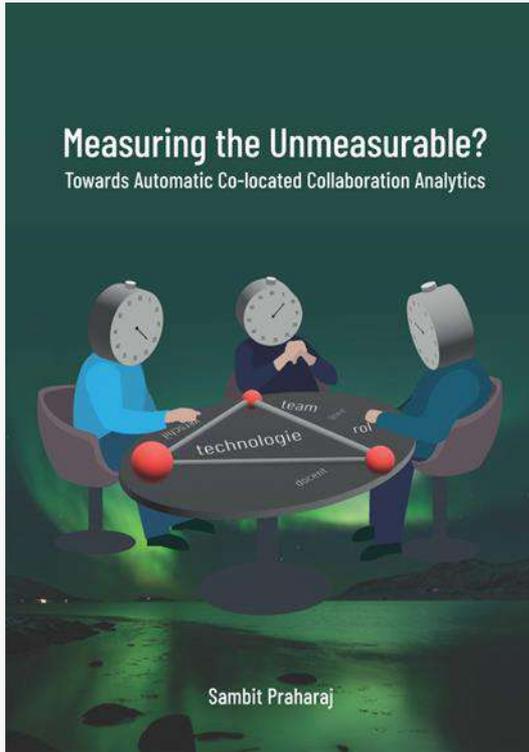
Towards Automatic Co-located Collaboration Analytics



Sambit Praharaj



on Analytics



RESEARCH
FOR THE
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Measuring the Unmeasurable?

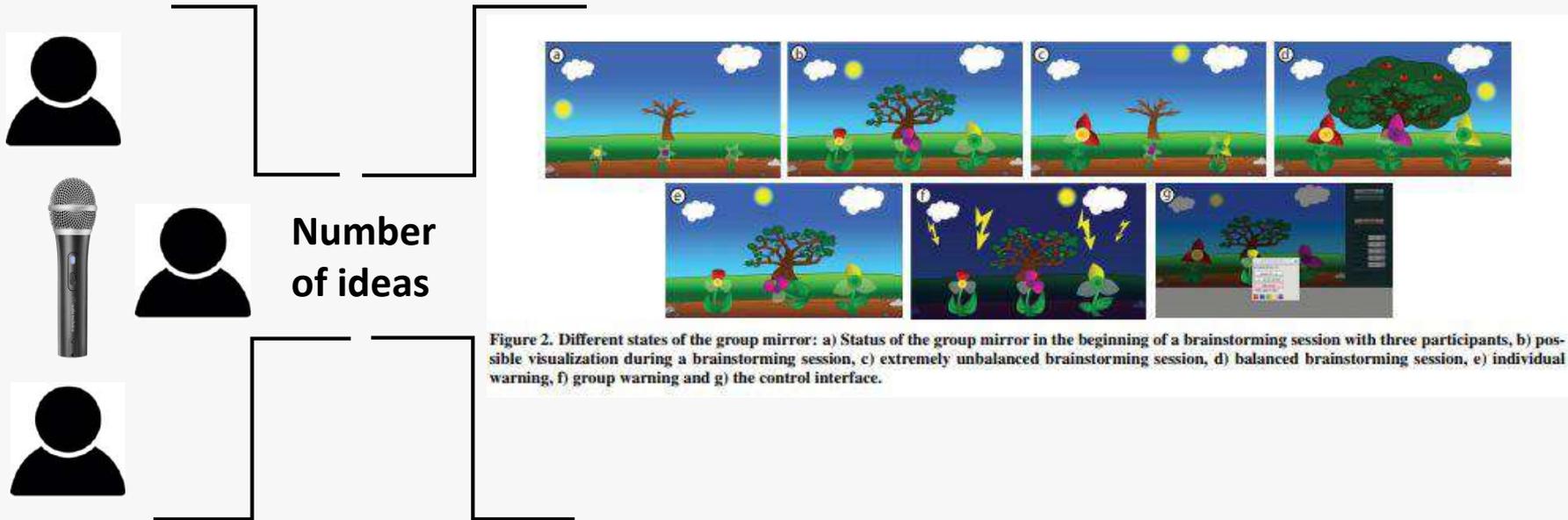
Towards Automatic Co-located Collaboration Analytics

Sambit Praharaj

Why is Collaboration important?

- Collaboration is an important in demand 21st century super skill

How can we measure the quality of co-located collaboration?



Our Tree Live Feedback in CSCL 2019, Lyon



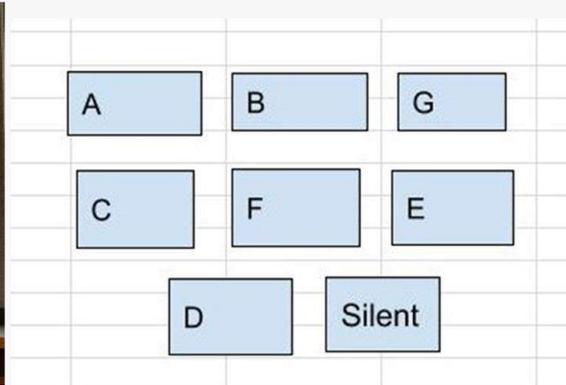
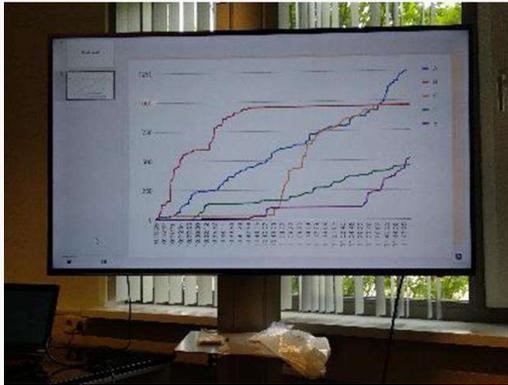
Our Tree Live Feedback in CSCL 2019, Lyon



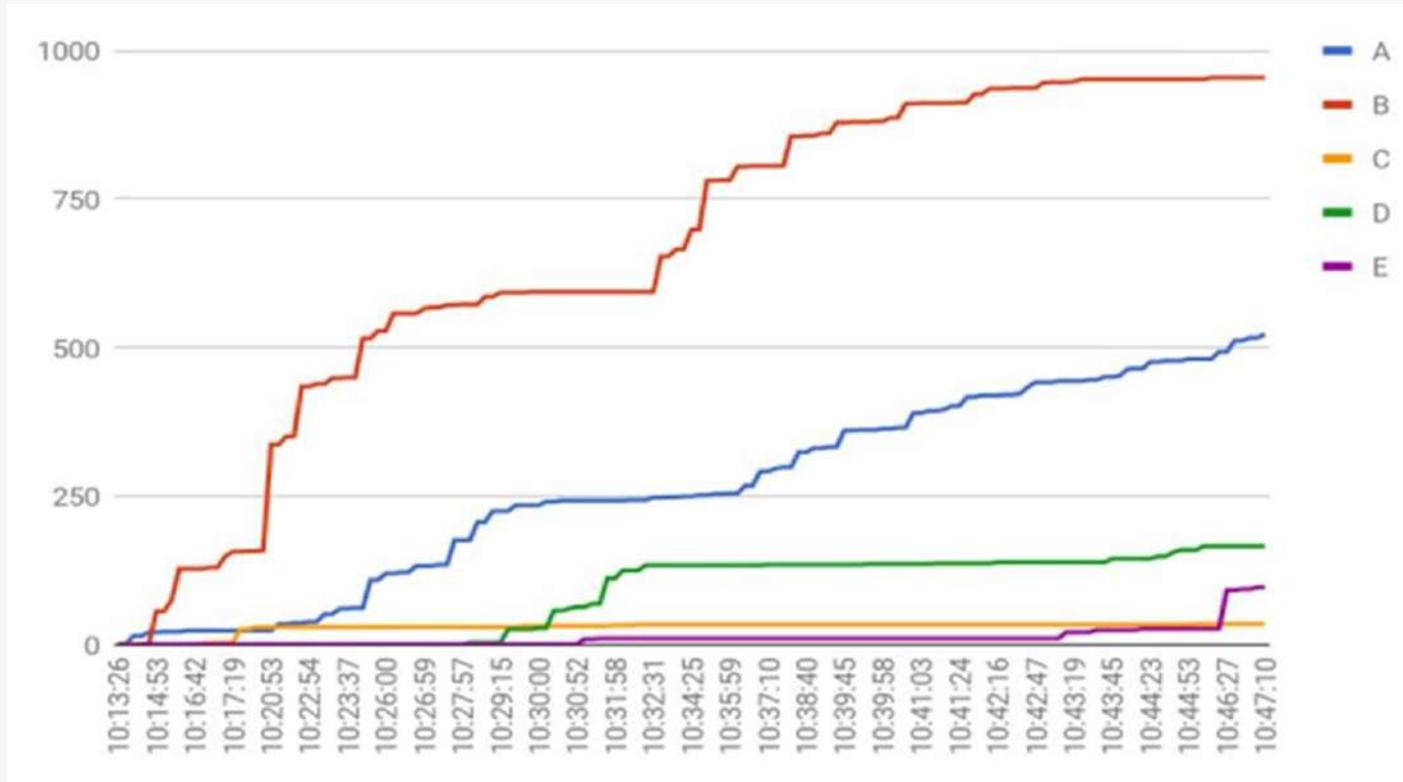
Speaking time -> Growth of tree

Turn-taking -> Number of branches

Woz Study



Woz Study



Aims

- *Identifying indicators* of co-located collaboration (CC) from group speech data **(RQ 1)**

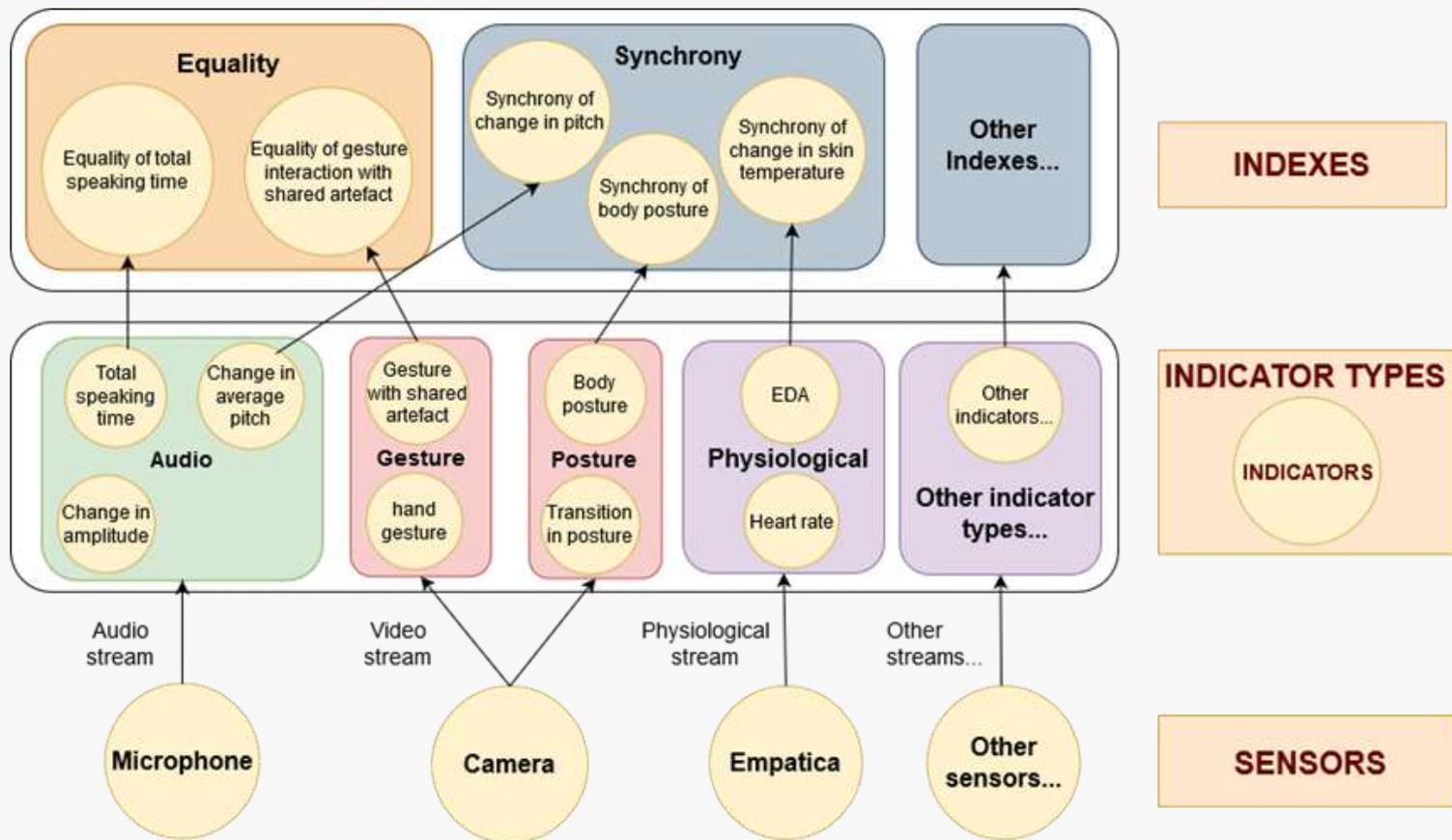
Aims

- *Identifying indicators* of co-located collaboration (CC) from group speech data **(RQ 1)**
- *Analyzing* the CC indicators from group speech data automatically **(RQ 2)**

Aims

- *Identifying indicators* of co-located collaboration (CC) from group speech data **(RQ 1)**
- *Analyzing* the CC indicators from group speech data automatically **(RQ 2)**
- *Visualizing* the indicators of CC **(RQ 3)**

Define CC Indicators and Quality (RQ 1)



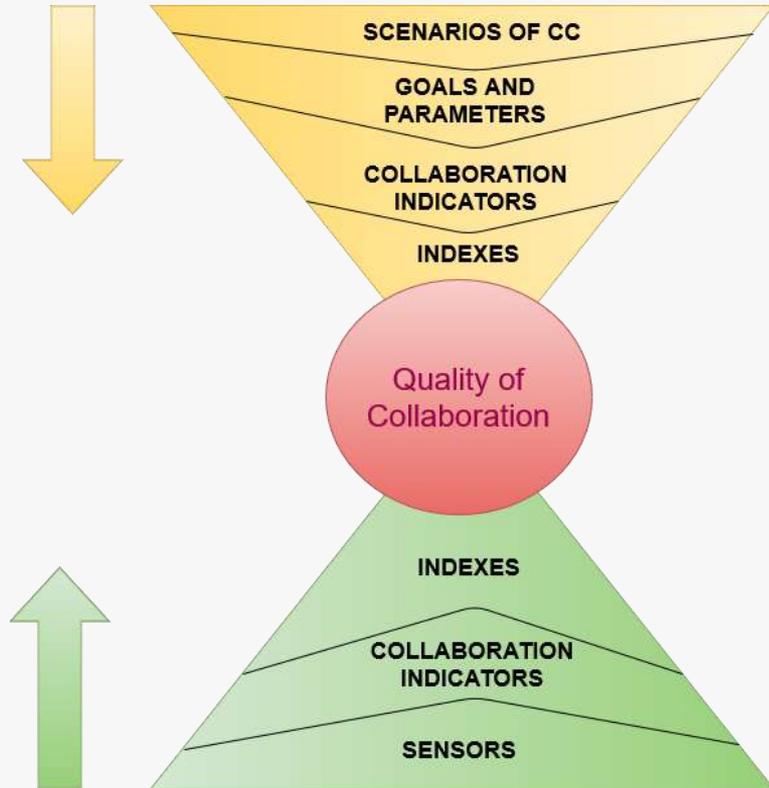
Operationalizing CC Quality

Parameters	Indicator types	Indexes
Expertise ↑	Audio Posture Gesture Writing	Dialogue management * Synchrony *, IA * Synchrony *, IA * Synchrony *, IA *
Dominance ↓	Audio Posture Gesture Writing Self-reports	Equality Synchrony , Equality Synchrony, Equality Synchrony *, Equality * Equality

Operationalizing CC Quality

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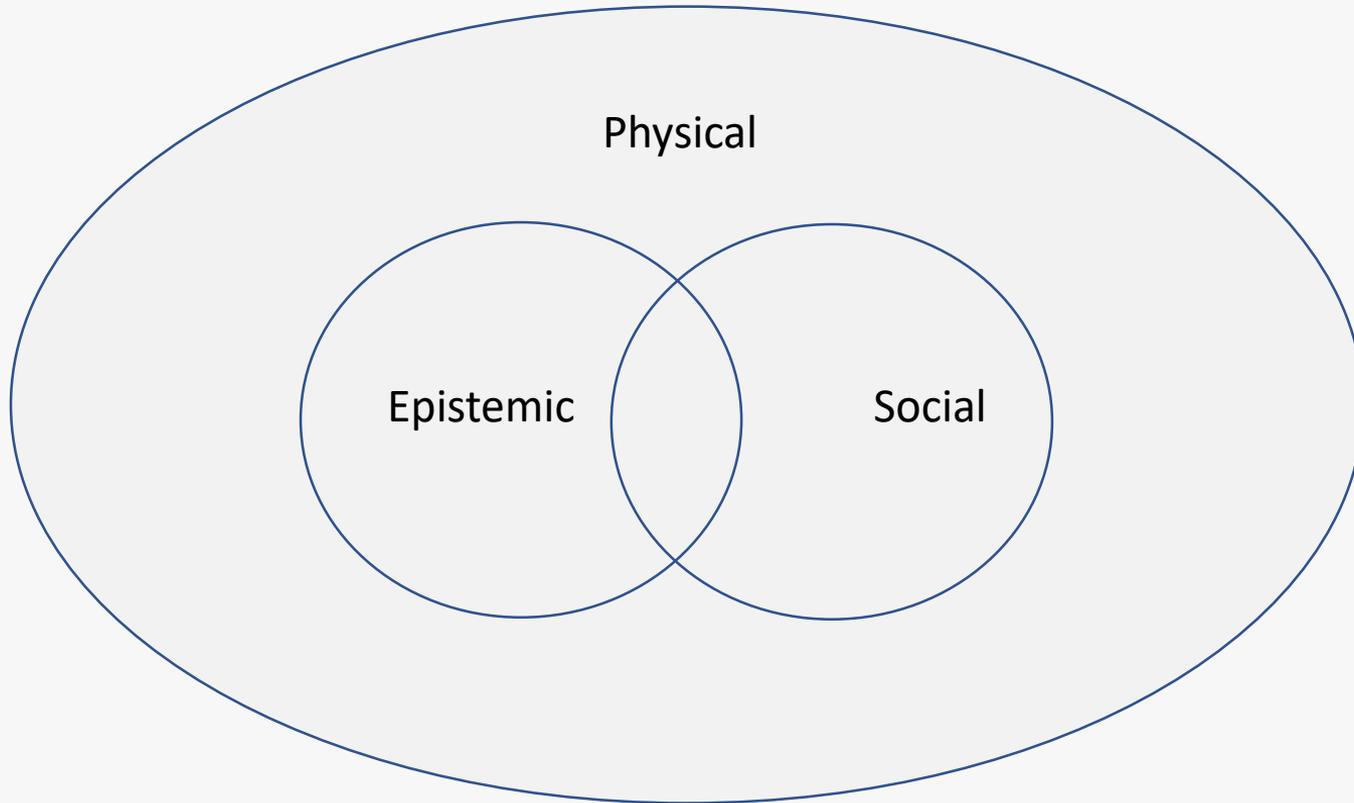
CC Quality



Major Gaps

- “How” group members speak ↑↑
- “What” they speak ↓
- Some studies analyzing the “what” stay on the surface level
- CC analytics setups are *semi-automated, manual* or in *lab settings* ↑↑

Spaces of CC



Sensor-based Automatic CC Analytics (RQ 2, RQ 3)

- 14 collaborative game design sessions to design a learning activity in a university
- Session -> Different phases
- Group members had preassigned roles and conversations were in Dutch

Sensor-based Automatic CC Analytics Set up



Limited Edition: LAK20 Version

Fellowship of Learning Activity and Analytics (FoLA2)

Marcel Schmitz, Maren Scheffel, Roger Bemelmans, and Hendrik Drachler. 2019.

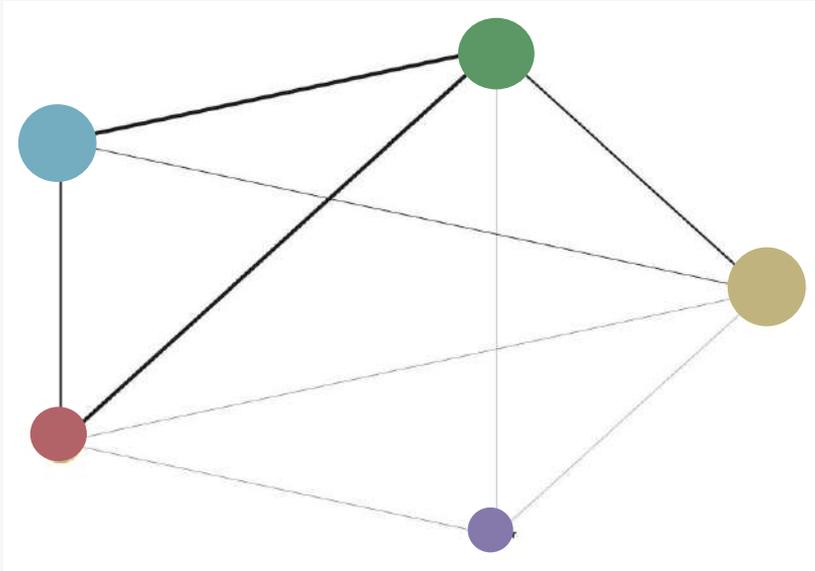
Fellowship Of The Learning Activity - Learning Analytics 4 Learning Design Game. <https://doi.org/10.25385/zuvd.9884279>

<http://www.fola2.com/>

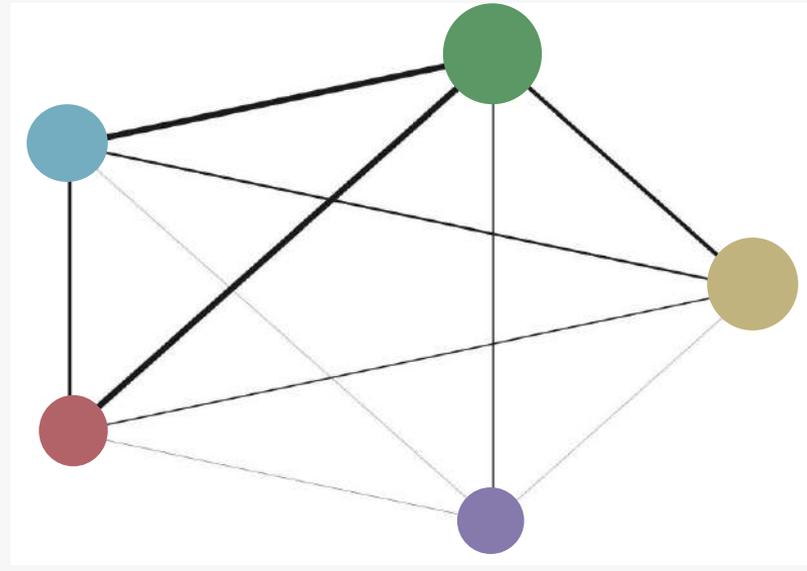
<https://game.fola2.com/>

Praharaj, S., Scheffel, M., Schmitz, M., Specht, M., & Drachler, H. (2021). Towards automatic collaboration analytics for group speech data using learning analytics. *Sensors*, 21(9), 3156.

Visualizations of Social Space (How)



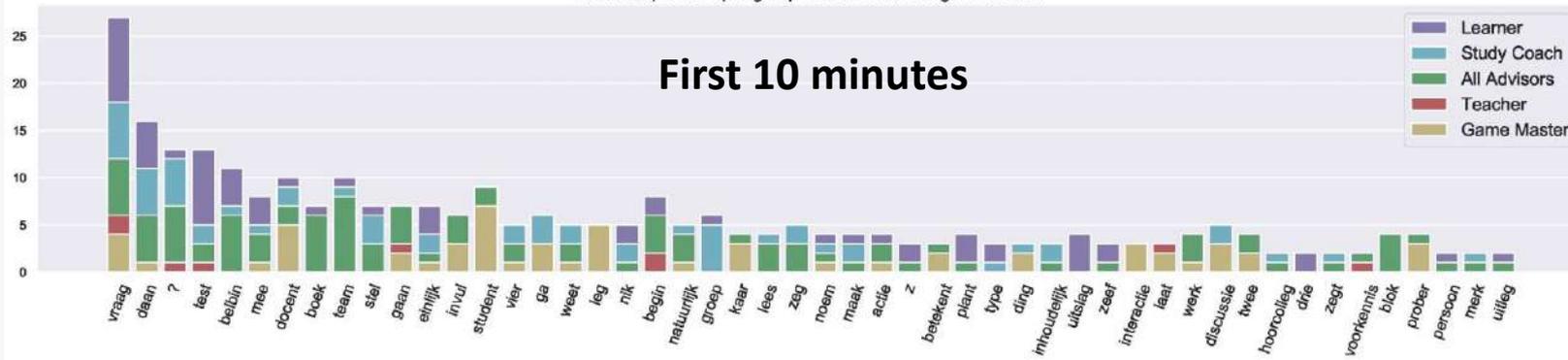
First 10 minutes



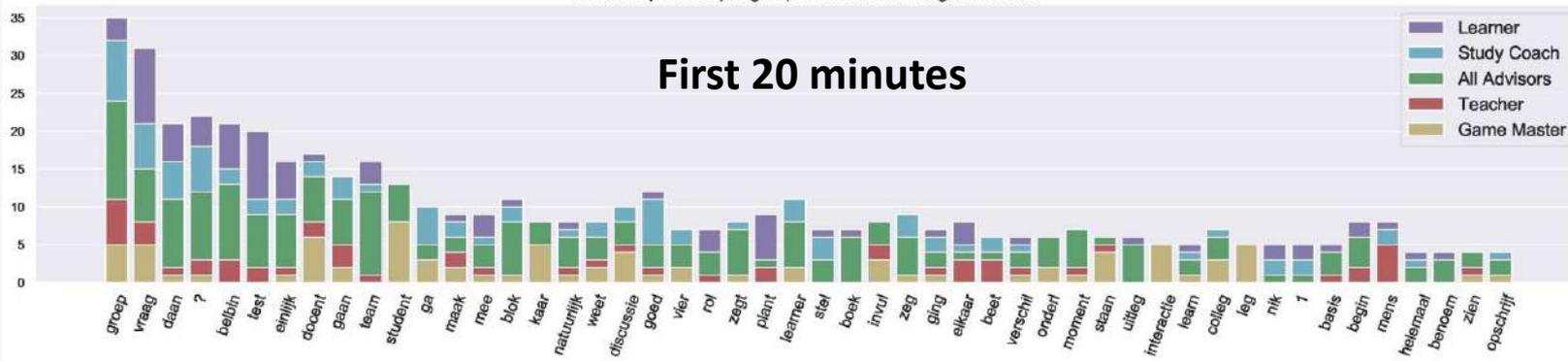
First 20 minutes

Visualizations of Epistemic Space (What)

Word frequencies per group member with the game master

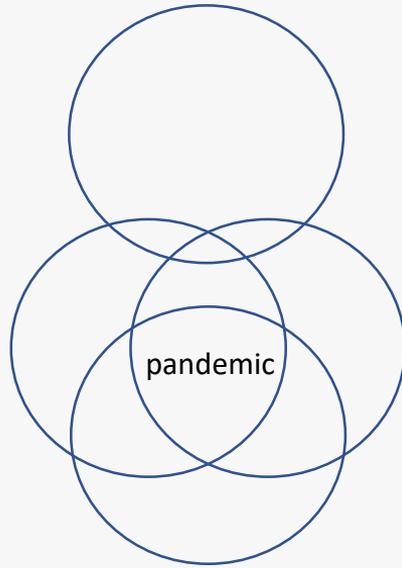


Word frequencies per group member with the game master

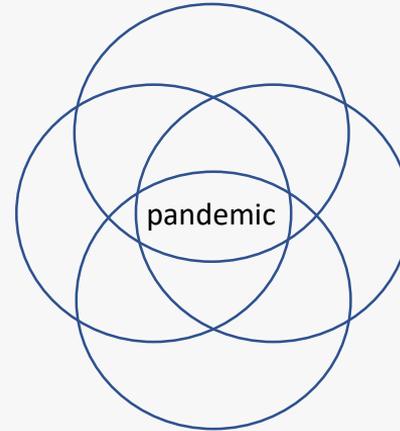


From keywords to knowledge convergence

Discussion about Covid



First 15 minutes



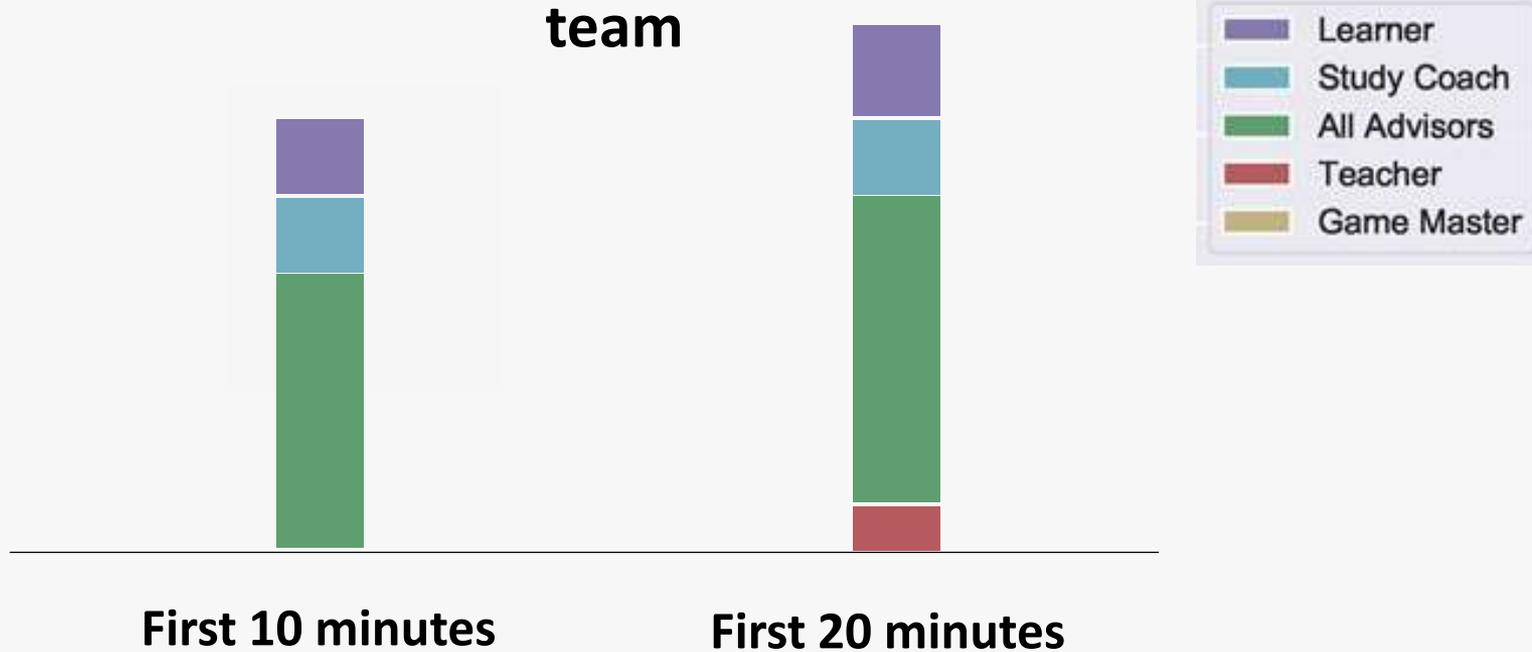
First 30 minutes

Collaborative Convergence

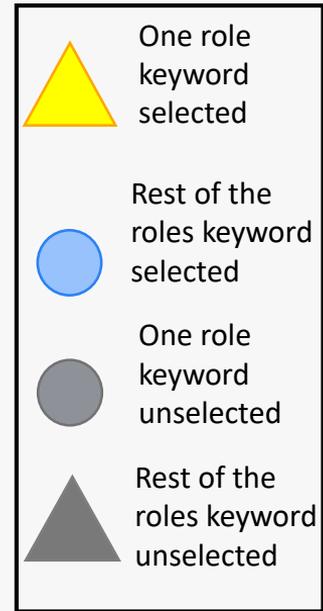
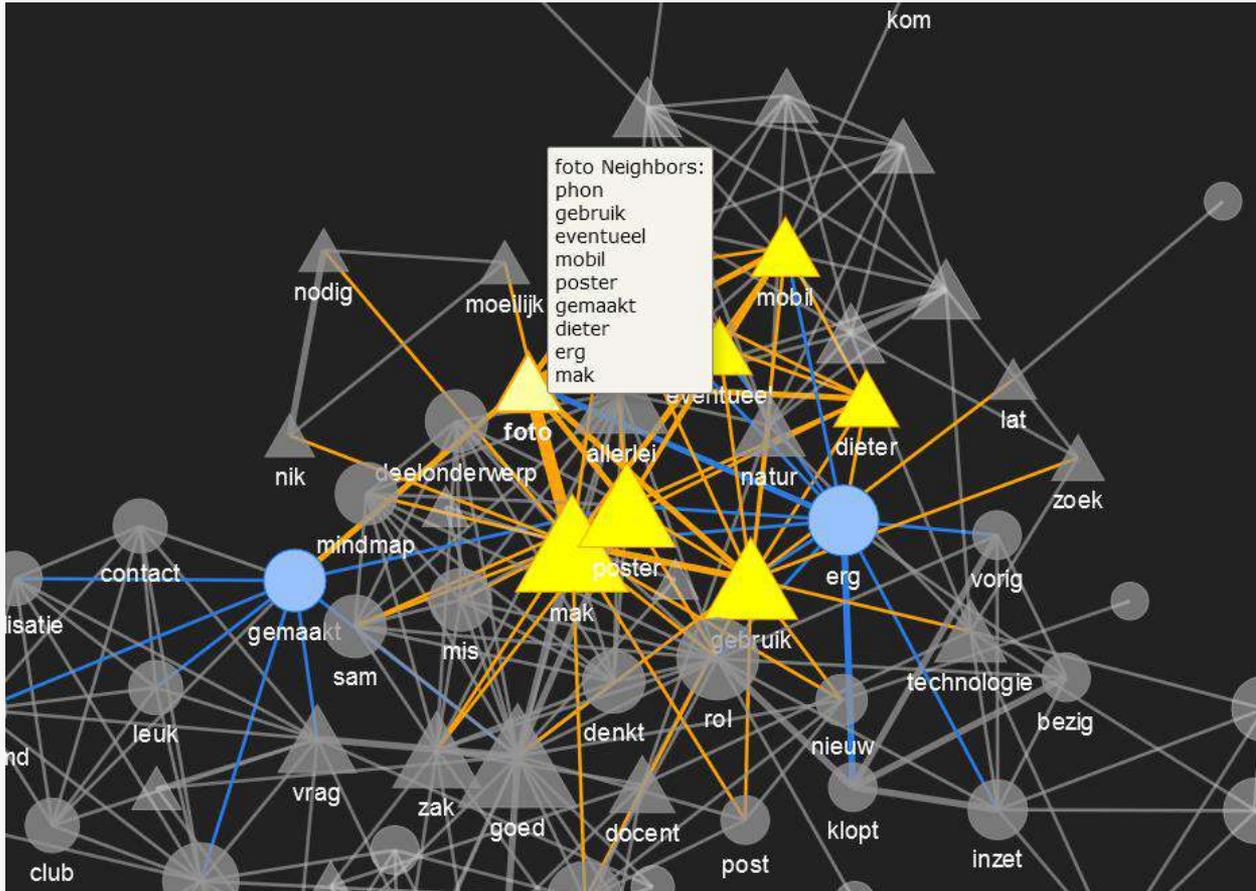
team



Collaborative Convergence



From keywords to phrases



Frequency vs Centrality

Frequency	Betweenness Centrality	Eigenvector Centrality
good	good	make
make	team	poster
moodle	use	good
use	technology	role

Dashboard -> Social (How) + Epistemic (What) Space



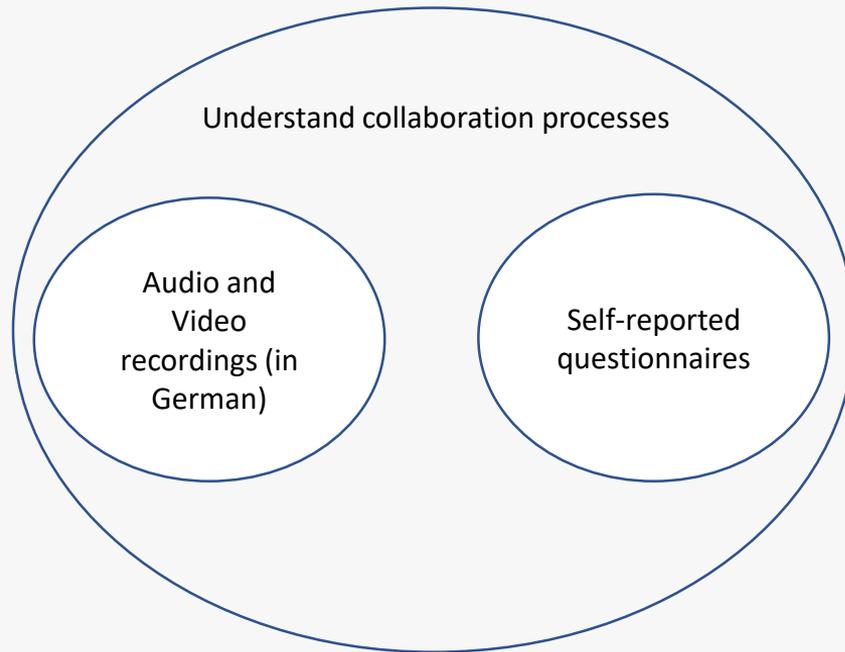
Challenges

- Technical
 - Modifying the names in the text corpus after speech to text transcription
 - Sentence boundary segmentation, cleaning contextual stop words and stemming the corpus
- Educational
 - Stakeholder based dashboard design
 - What information can be distilled on the dashboard for the teacher or student to act meaningfully?
 - How would these visualizations look like?

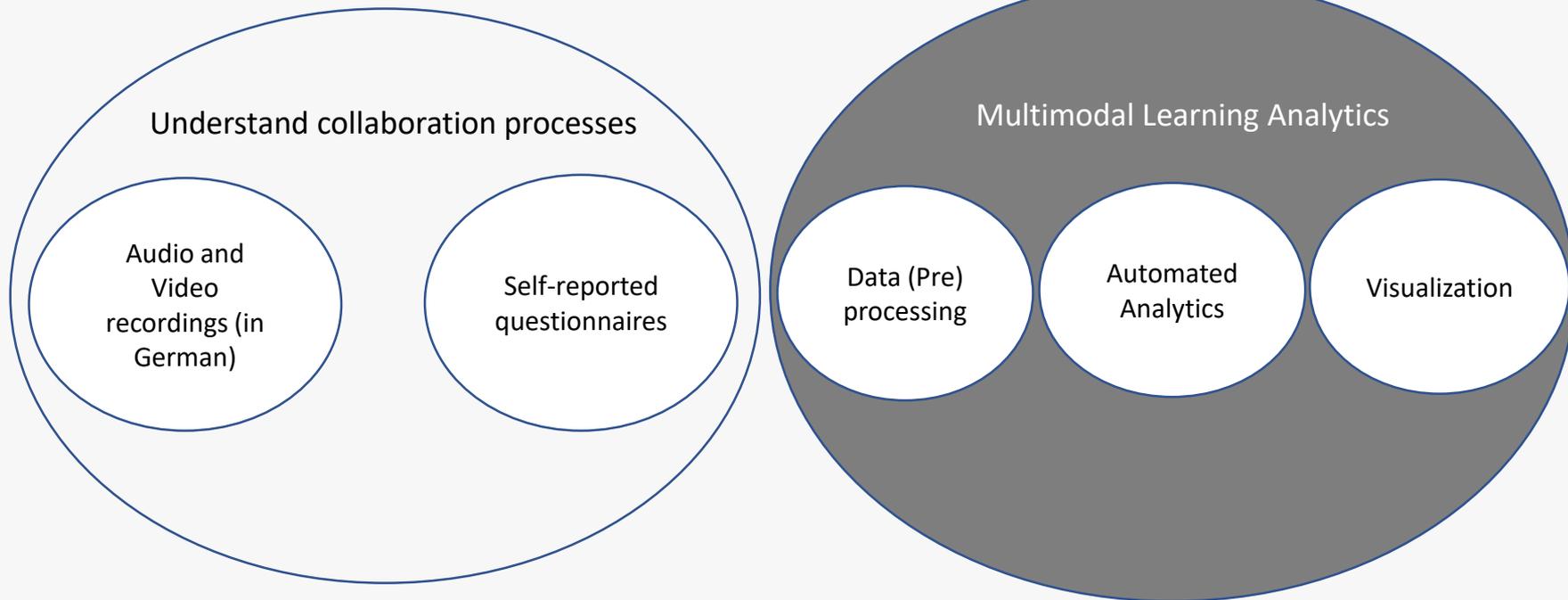
Ideas for future research in postdoc?

?

What do we have now?



Where can we go from here?



Looking Forward: Main RQ

- How can we support learner or teacher with automated collaboration analytics?
 - Dashboard -> Meaningful intervention by teacher
 - Dashboard -> Meaningful group or individual action for collaboration

Contact me?

- <https://linktr.ee/sambitphd>
- <https://bit.ly/autocollabanalytics>