

INVESTIGATING TWO METHODS FOR COMPARING HEARING-AID SETTINGS DURING GROUP CONVERSATIONS

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INTRODUCTION

Communication in complex situations is one of the most important challenges to focus on within the hearing-aid industry today. Interestingly, there are currently few methods that specifically and systematically measure hearing-aid benefit in group conversation scenarios that simulate acoustics and communication tasks realistically.

The aim of this study was to recommend a method to assess the utility of hearing-aid settings in live group conversations, using Paired comparisons and Ratings.

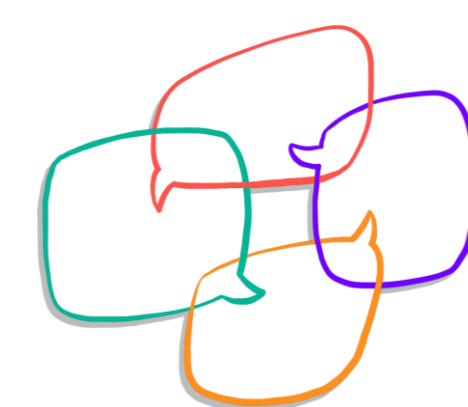
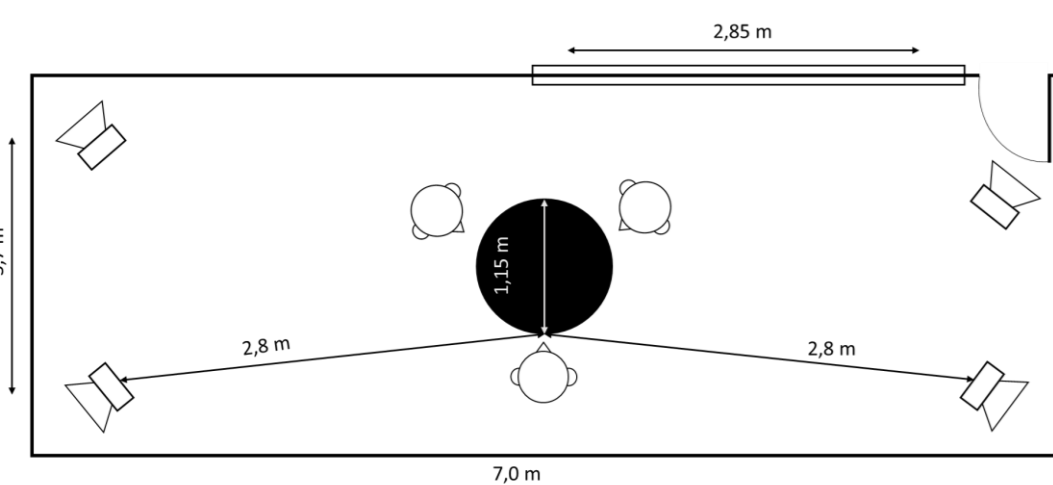
RESEARCH QUESTIONS

1. How well do results in terms of hearing-aid functionality agree between the two methods?
2. Is the hearing-aid program with the highest rating of functionality also the preferred program in paired comparisons?
3. Which of the two methods is more feasible?

METHODS

27 Participants (15F, 12M) in 9 triad groups

Mean age: 74 years
Mean PTA4: 48 dB



Business meeting 45 dB(A)
Dinner in public 67 dB(A)

Binaural test hearing-aids and two programs (A and B) with different directionality settings

Group conversations (4 min) using consensus questions

Two evaluation methods:

- During a conversation, participants either switched between programs A and B [PC], or the program was fixed
- Balanced scenario order, hearing-aid program was blinded
- After each conversation, 7-step rating scales:
 - Which program did you prefer? PC
 - How well did the hearing aids function? Preferred program (PC)
 - How well could you hear? Preferred program (PC)
 - How well could you say what you wanted? Preferred program (PC)
 - How well did the conversation flow? Preferred program (PC)

ANALYSIS

EmaCalc [1-2]: Bayesian analysis for nominal categories (called "situations") and ordinal ratings (called "attributes"; here the "How well..." rating scales)

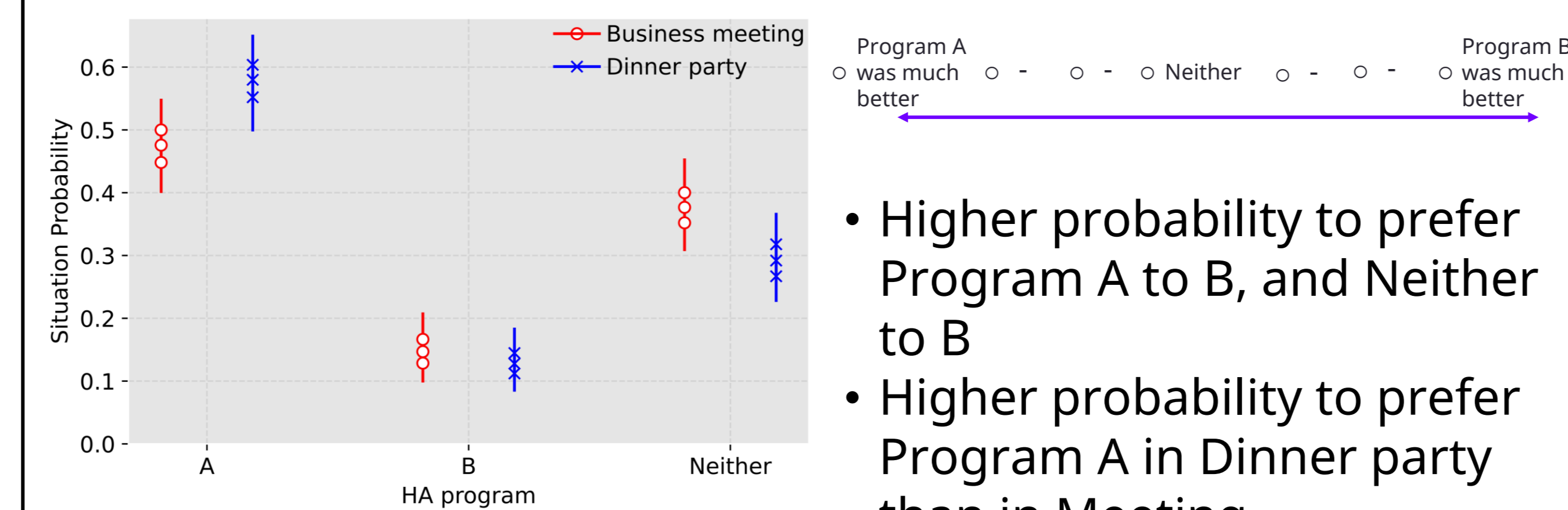
Probability distributions estimated for:

- Population mean for each situation (preferring A, B, or neither, in each conversation scenario)
- A latent random variable, for each attribute and participant, whose outcome determines the participant's ratings
- Population mean for each attribute's latent random variable

Thresholds between alternatives on the rating scales estimated on the latent variable for each attribute and participant

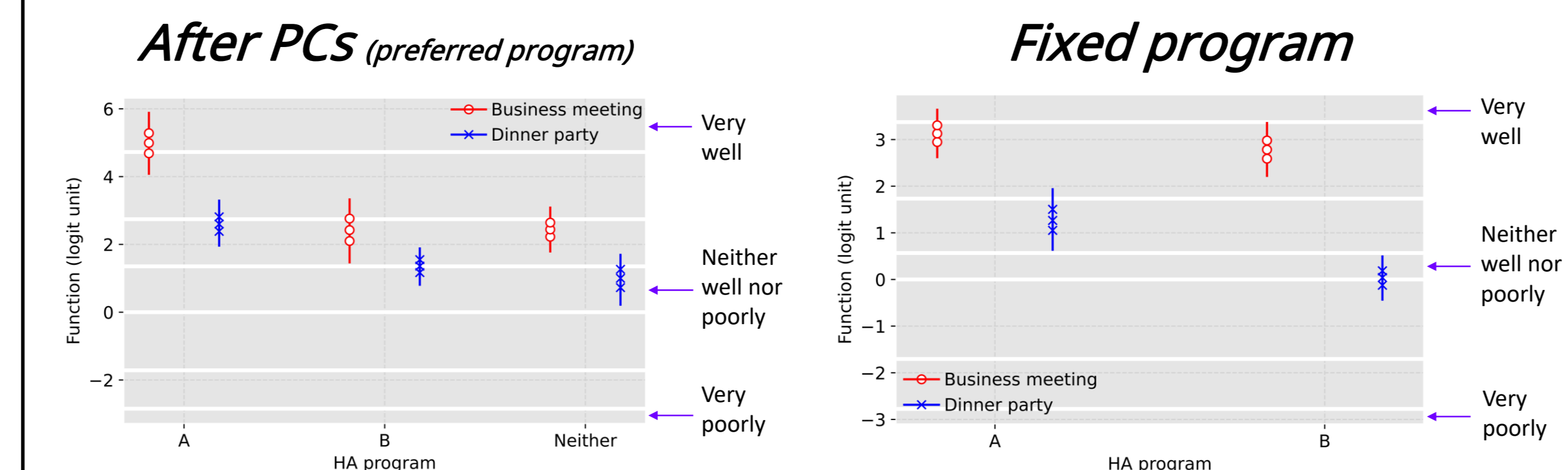
RESULTS

PAIRED COMPARISONS



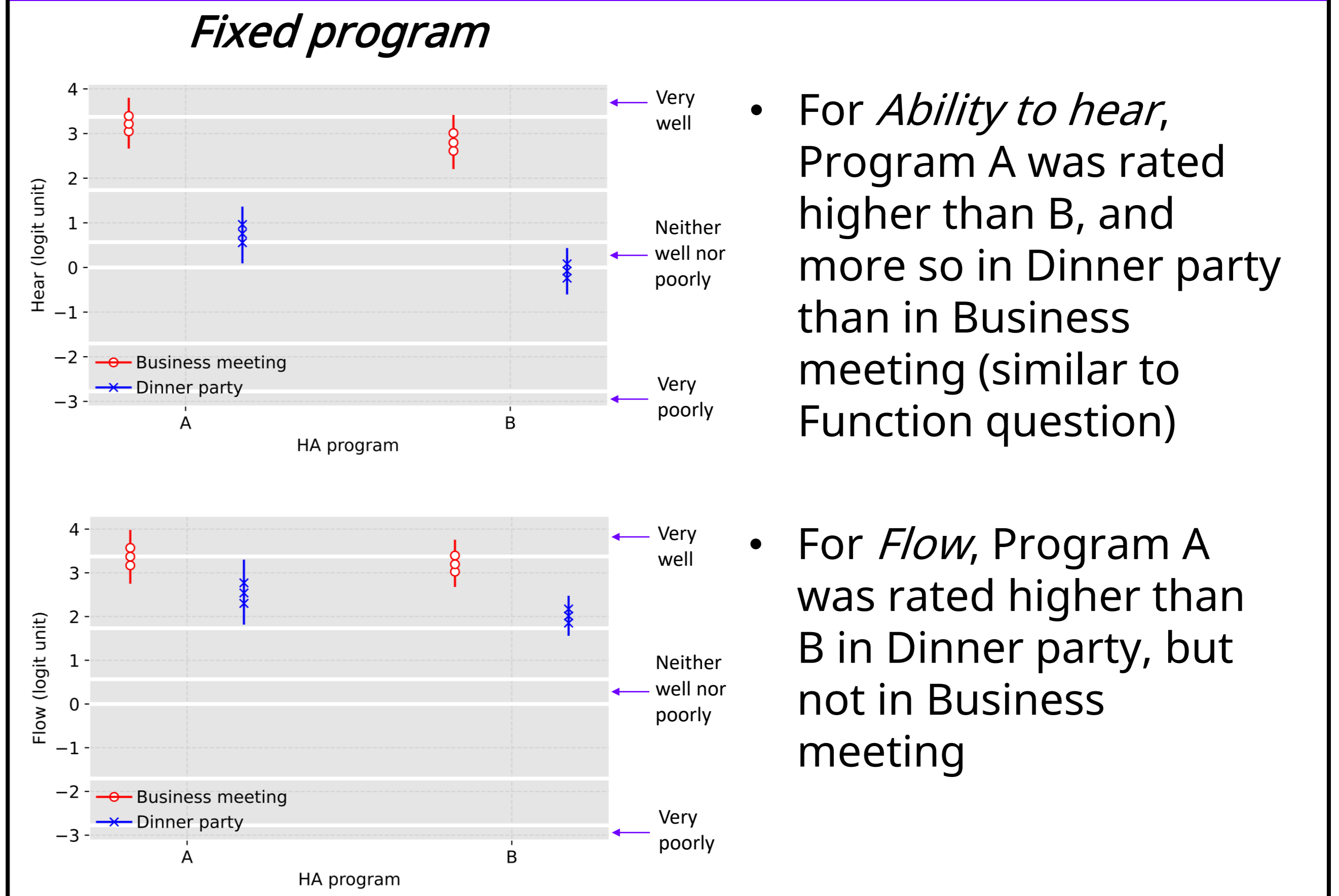
- Higher probability to prefer Program A to B, and Neither to B
- Higher probability to prefer Program A in Dinner party than in Meeting

RATINGS



- Overall function of Program A was rated higher than B regardless of method
- The smallest A-B difference was observed for "Fixed program" in Business meeting
- Program B (least preferred) had more positive ratings in "Fixed program" than "After PCs"

RESULTS



- For *Ability to hear*, Program A was rated higher than B, and more so in Dinner party than in Business meeting (similar to Function question)
- For *Flow*, Program A was rated higher than B in Dinner party, but not in Business meeting

CONCLUSIONS

1. Function ratings in agreement for both methods overall, except for Program B in Business meeting
2. Function ratings in Fixed program reflected preference for A over B in Dinner party, but less so in Business meeting
3. The two methods seemed equally feasible:
 - a. Flow was generally rated high regardless of method
 - b. Unsupervised conversations between three participants worked well

REFERENCES

- [1] Leijon, A., et al. (2023). Bayesian analysis of ecological momentary assessment (EMA) data collected in adults before and after hearing rehabilitation. *Frontiers in digital health*, 5: 1100705.
- [2] EmaCalc, <https://pypi.org/project/EmaCalc/>

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