Is the Ecological Momentary Assessment a Valid Methodology in Audiology?

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INTRODUCTION

- Ecological Momentary Assessment (EMA) was designed to overcome major disadvantages of self-report outcome measures such as recall bias and low contextual resolution.
- In EMA, repeated, real-time data collections are conducted.
- Because the individual's experiences are recorded immediately or in a short time frame, EMA is less affected by recall bias.
- EMA has high contextual resolution, because information about the listening context can be collected in each assessment.
- However, the validity of EMA in audiology is unknown.
  - EMA assumes that respondents can approximately report on listening experiences and describe the characteristics of listening contexts. It is unclear if respondents can do so in the real world.
  - EMA generated data is notoriously noisy due to uncontrollability of real-world environments. To remove the noise, EMA uses repeated assessments and aggregates the data. It is unknown whether the aggregated EMA data are consistent with established knowledge/theory in audiology.
- Experiment 1: Can hearing-impaired adults approximately rate their speech recognition performance in the lab and characterize listening context of semi-controlled real-world conversations?
- Experiment 2: Is the pattern of the from repeated assessments consistent with established knowledge in audiology?

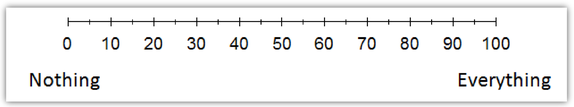
EXPERIMENT 1 METHODS

Participants

- Eight experienced hearing aid using adults
- Age 31-80 (mean = 67.4)/ 4 Males, 4 Females

Laboratory Procedures

- Connected Speech Test (CST) sentences
- Multi-talker babble noise fixed at 60 dBA
- Each participant was tested in three conditions:
  - **Standard**: Fixed SNR across 20 sentences
  - **Roving**: Variable SNR across 20 sentences
  - **Long-term Roving**: Variable SNR across 60 sentences
- Each type of condition was conducted at -6, 0, and +6 dB,
- Participants were instructed to repeat as much of each sentence they heard as possible.
- Participants were asked to rate how much speech they understood.

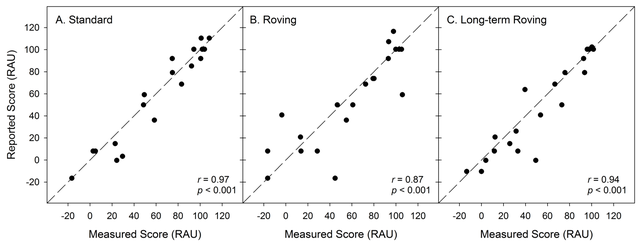


Field- based Procedures

- Participants walked around with two normally hearing research assistants to a variety (10) of different listening environments.
- Each participant then described the situations :
  - Listening environment
  - Speech location
  - Noisiness
  - Noise location
  - Indoor space
  - Presence of carpeting

  → Reverberation
- The two research assistants described each listening situation from the point of view of the participant.

EXPERIMENT 1 RESULTS



Q1. Where were you?
- ☐ Outdoor, moving traffic
- ☐ Outdoor, other than traffic
- ☐ Indoor, other than home, 10 or fewer
- ☐ Indoor, crowd of people, 11 or more

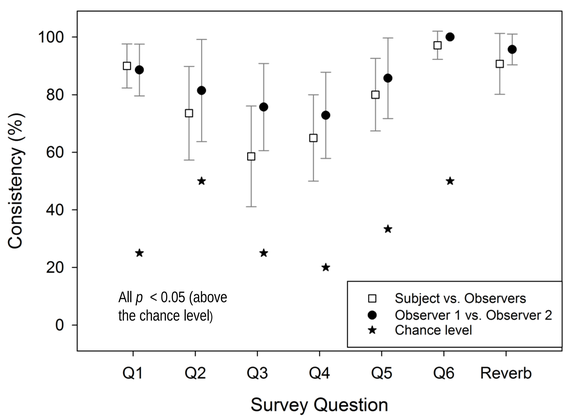
Q2. Where was the talker most of the time?
- ☐ Front
- ☐ Other than front

Q3. On average, how noisy was it during the listening event?
- ☐ Quiet
- ☐ Somewhat noisy
- ☐ Noisy
- ☐ Very noisy

Q4. Where was the noise most of the time?
- ☐ Front
- ☐ Rear
- ☐ Side
- ☐ All around
- ☐ NA/Quiet

Q5. Compared to an average living room, how large was the room?
- ☐ Smaller
- ☐ About average
- ☐ Larger

Q6. Was there carpeting?
- ☐ Yes
- ☐ No



EXPERIMENT 2 METHODS

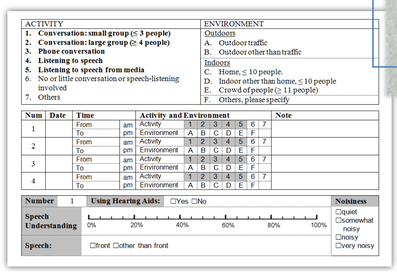
Participants

- Twenty-seven adults with hearing impairment
- Age 40-88 (mean = 66.3)/ 7 Males, 20 Females

EMA Journals and dosimeters

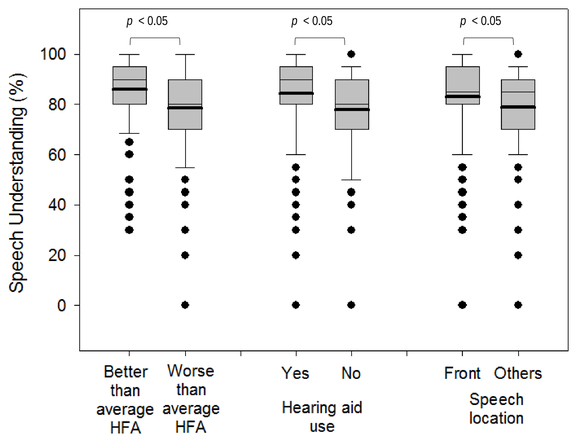
- Paper-and-pencil journal
  - 7 days
  - Major listening condition longer than ten minutes
    - Activity
    - Environment

      } Event
    - Speech understanding
    - Speech location
    - Noisiness
    - Hearing aid use
- Larsen Davis Spark 703 noise dosimeter
- Participants maintained their regular daily activities and schedules



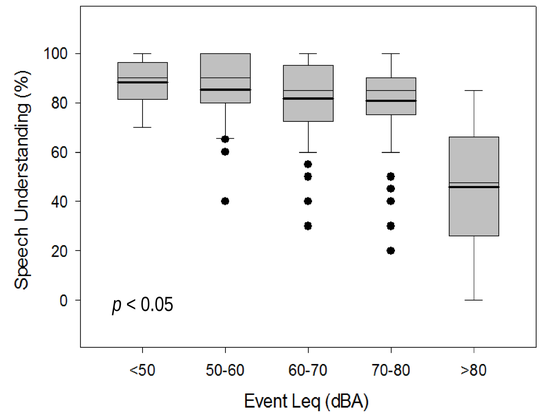
EXPERIMENT 2 RESULTS

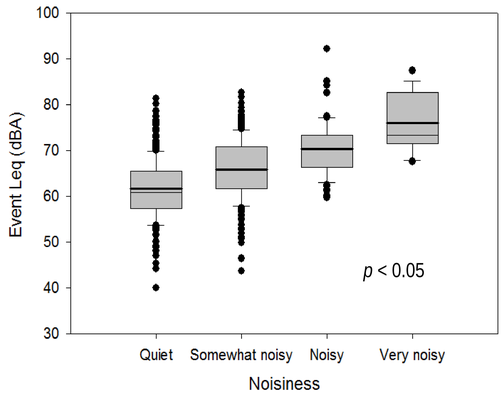
- A total of 1267 journal entries covering 2032.1 hours of dosimeter recordings



(HFA: high frequency hearing loss average; threshold averaged across 1k, 2k, and 4k Hz)

EXPERIMENT 2 RESULTS (Continued)





- Better speech understanding significantly associated with lower HFA (less severe hearing loss), the use of hearing aids (better audibility), front-located speech (visual cues), and lower event Leq (better signal-to-noise ratio)
- Higher noisiness rating significantly associated with higher event Leq

DISCUSSION and CONCLUSIONS

- The two experiments were designed to provide validity evidence for the EMA methodology in audiology.
- At the micro level, Experiment 1 suggested that adults with hearing impairment were able to estimate their listening experiences (i.e., speech understanding) and characterize listening contexts in EMA surveys.
- At the macro level, Experiment 2 indicated that the pattern of the data aggregated across multiple assessments was consistent with the established knowledge.
- Taken together, the two experiments suggest that EMA is a valid methodology in audiology.
- More research needs to be conducted in the future to examine other psychometric characteristics of EMA in audiology such as test-retest reliability and sensitivity.

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