Learning auditory distance perception over multiple days: Role of sound level and reverberation-related cues

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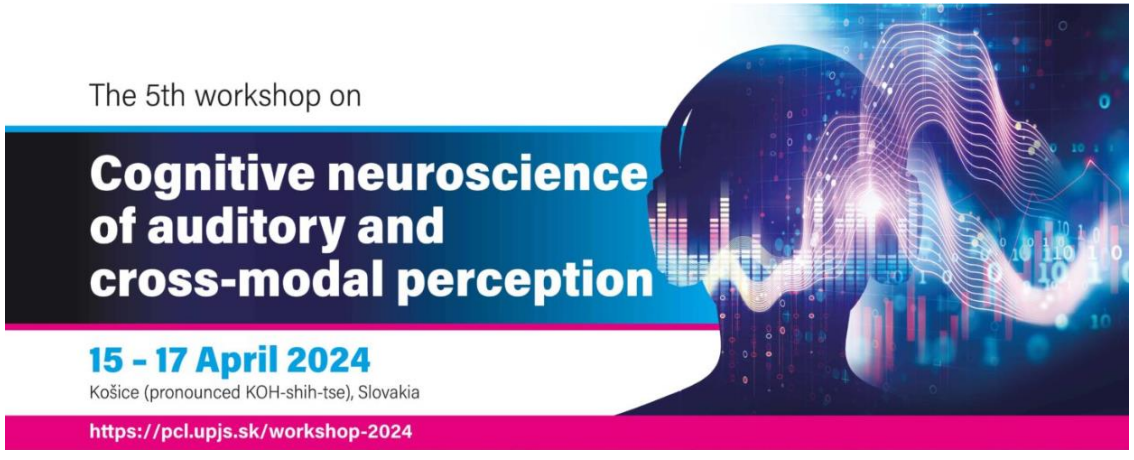
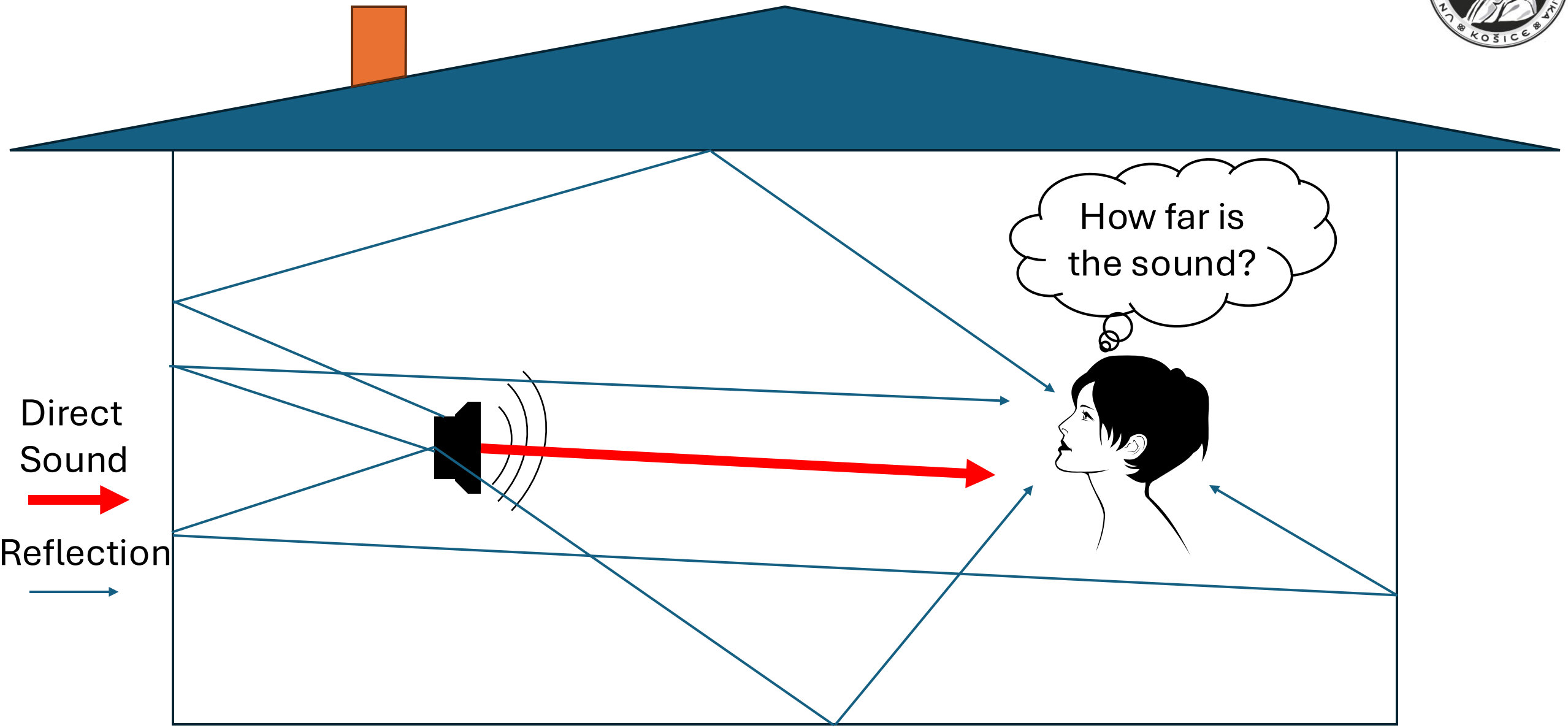
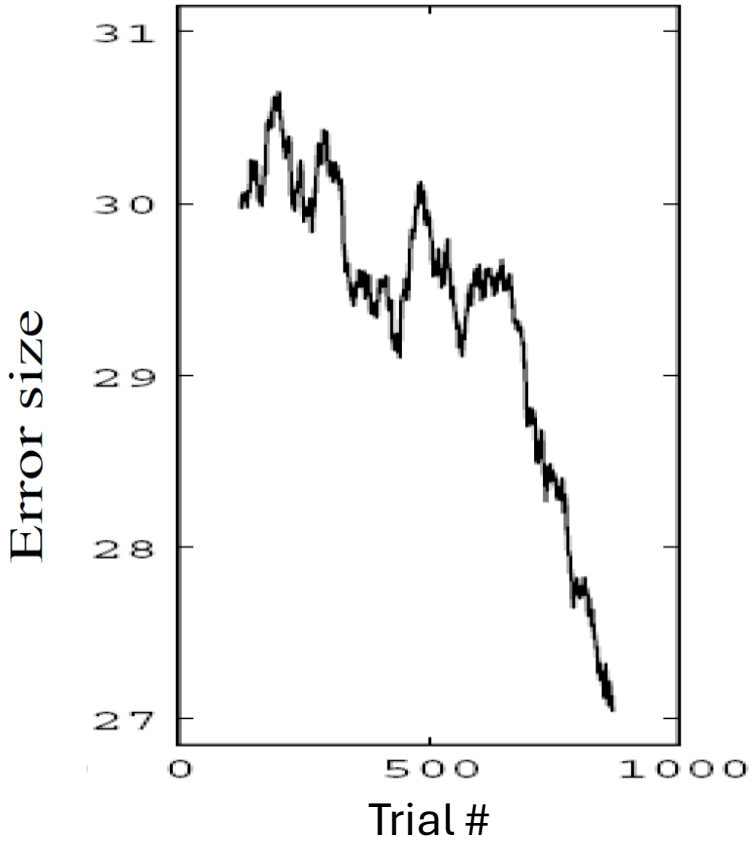




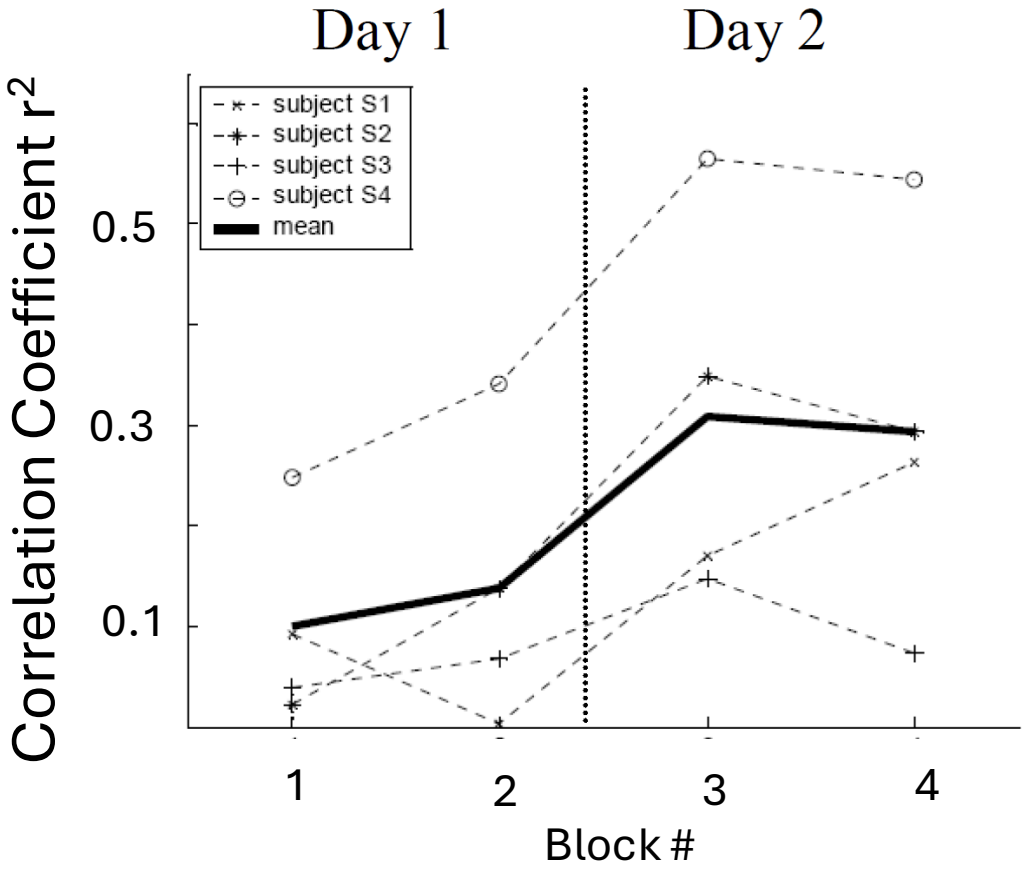
http://www.shmector.com/

Distance Judgements Improve over Days of Training witout Feedback

Last session of multi-day training



Shinn-Cunningham (2000)



Kopčo et al. (2004a)

When Cues Become Unreliable

- Schoolmaster et al. (2004), Kopčo et al. (2004b)
  - **Distance Localization Task** in Virtaul Acoustics
  - **Room Acoustics** was either **FIXED** or **MIXED** on trial-by-trial basis (roved)
  - Distance Localization was **BETTER in FIXED than in MIXED**
  - **Learning** was **impaired by MIXED** but not FIXED

- Kopčo et al. (2012)
  - Distance Discrimination Task
  - **Sound Level Cue** was **ROVED** (randomized) on trial-by-trial basis
  - Distance Localization is Possible with ROVED level

Hypotheses

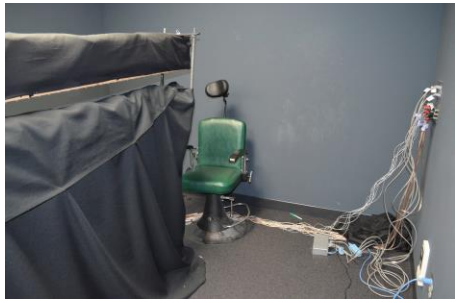
H1: People **improve spontaneously** in **distance localization task** over **multiple days**.

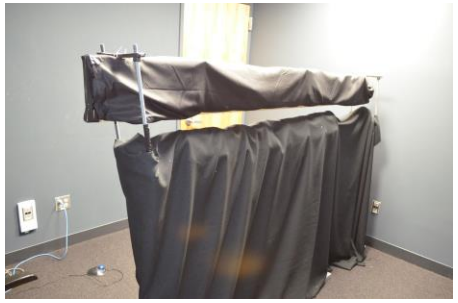
H2: Inconsistent (**roved**) level cues **impair initial performance** but **help learning** of distnace mappings.

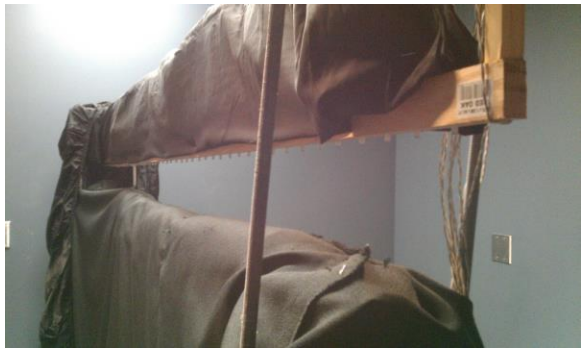
H3: Memmory consolidation is necessary for learning of distance mappings.

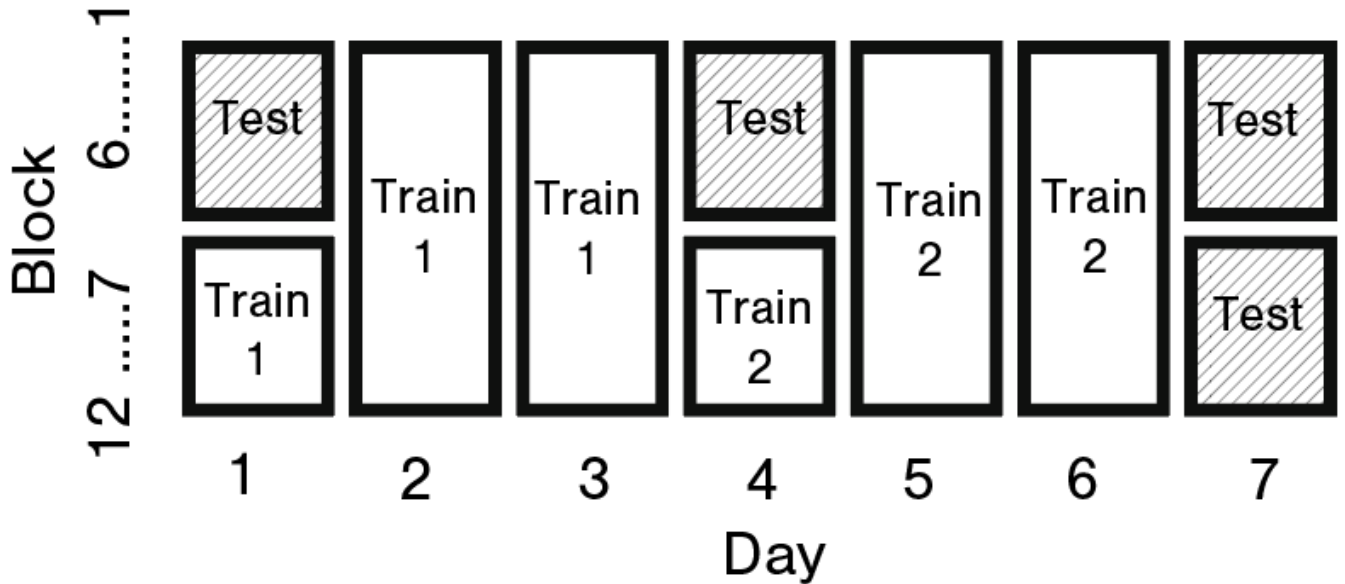
Approach

- **Distnace localization task without feedback** over 7 days
- Two types of blocks of 64 trials:
  - F – level is Fixed
  - R – level is Roved on trial-by-trial basis
- 300 ms broadband noise, visual pointer
- 0.69 m – 2.04 m
- 4 groups per 8 people
- Spearman‘s Rank Coefficient

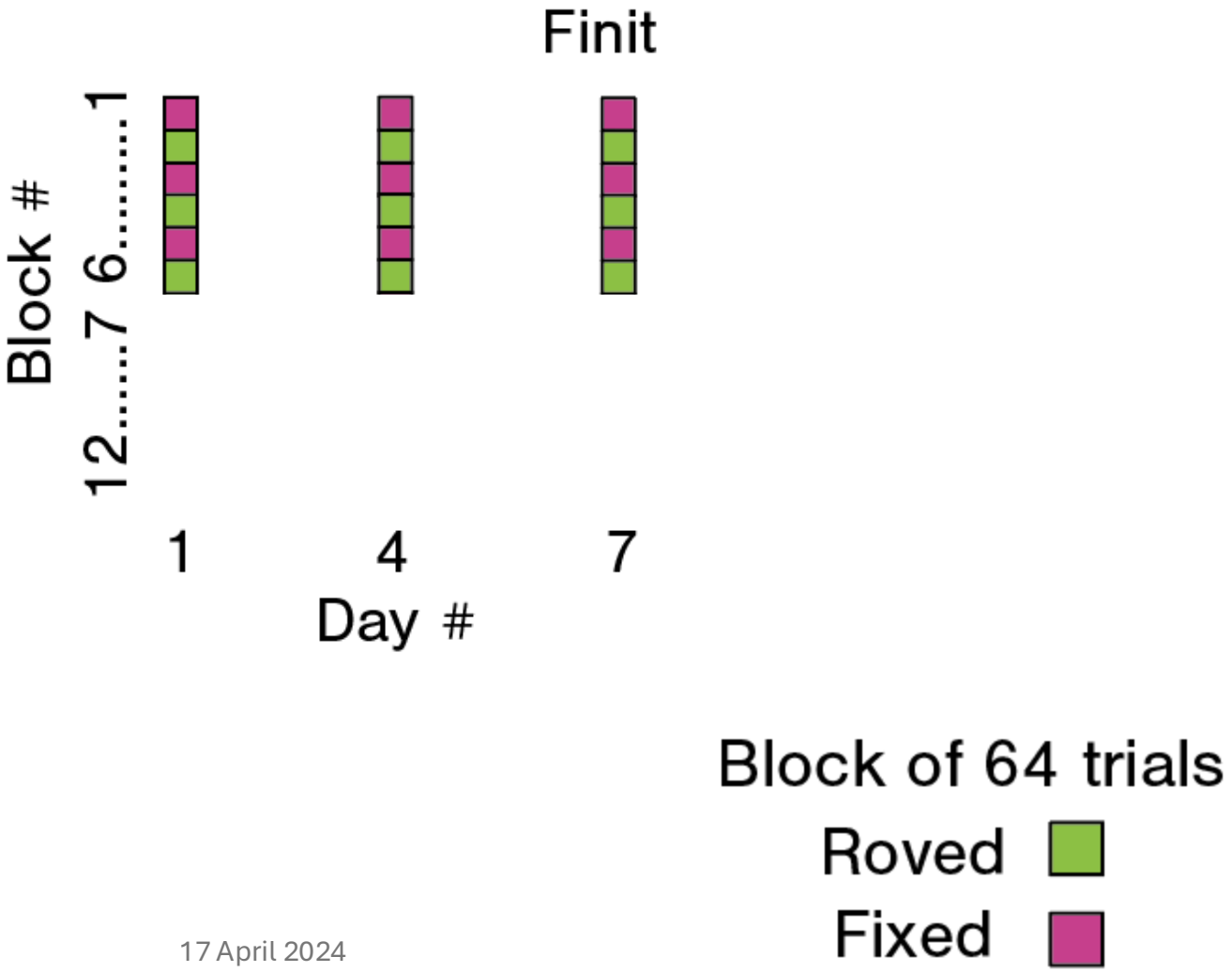




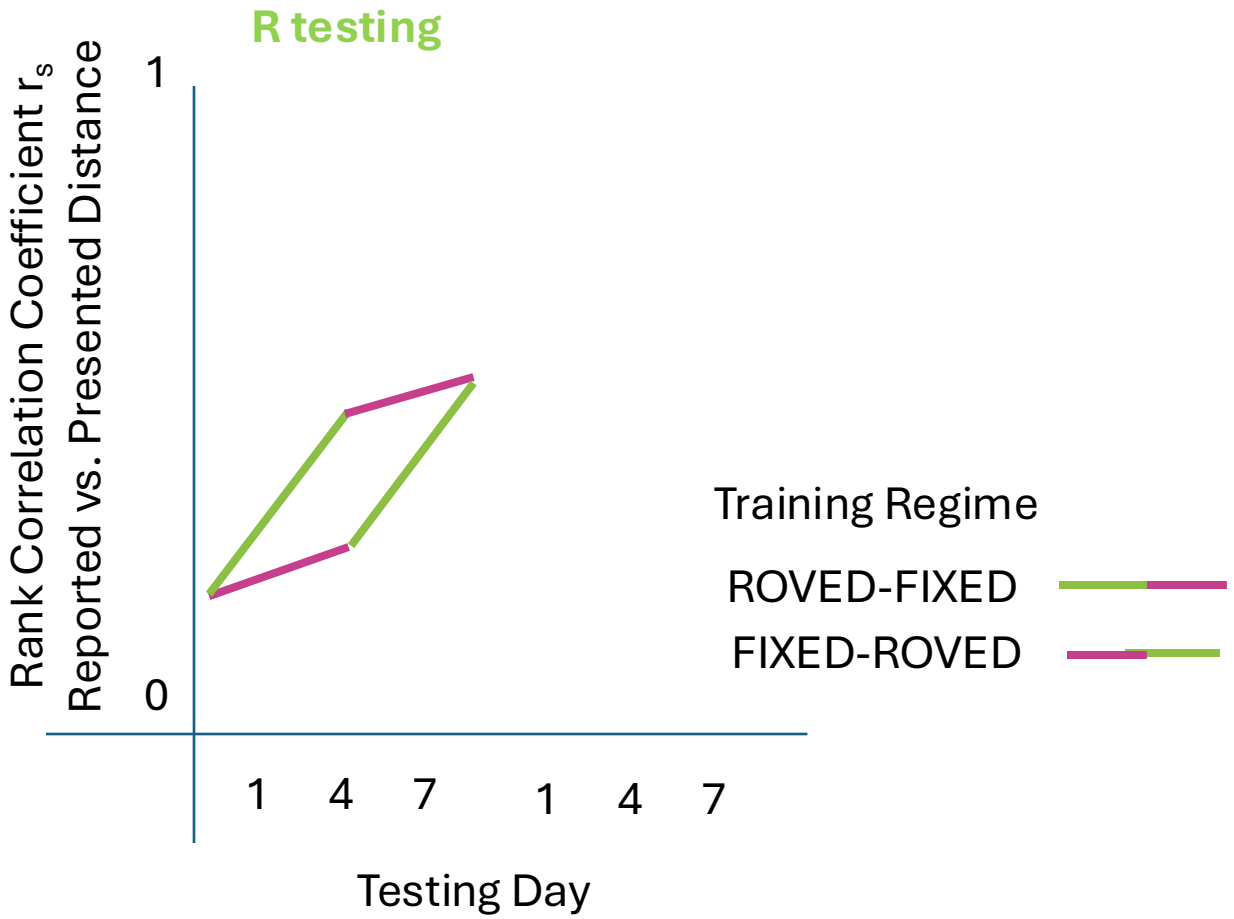




Testing (Finit, Rinit) - Training Block Structure

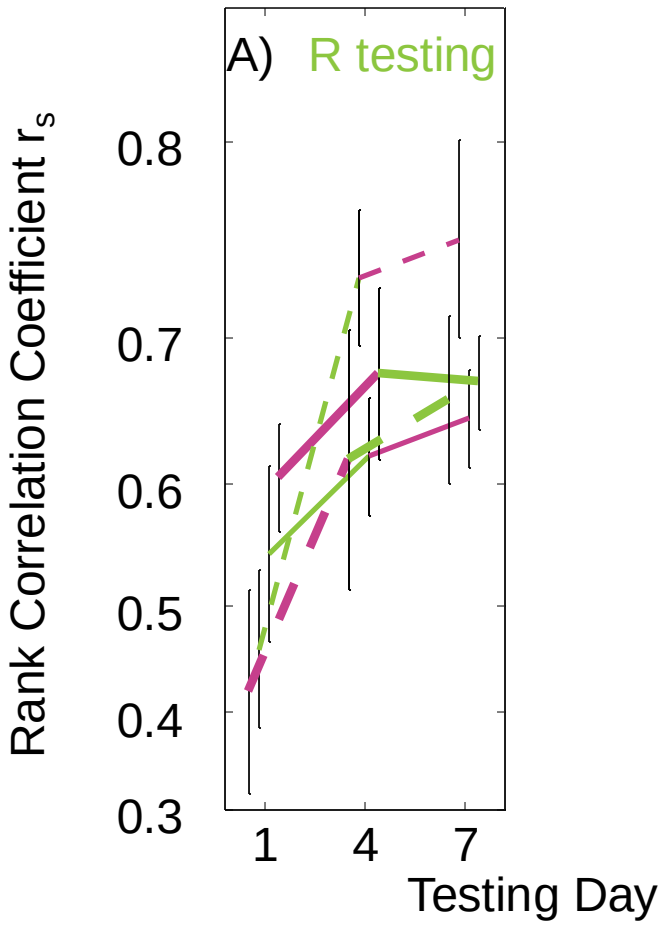


Predictions



Testing: Blocks 1-6 of Testing Days 1, 4, 7

Results



Legend:

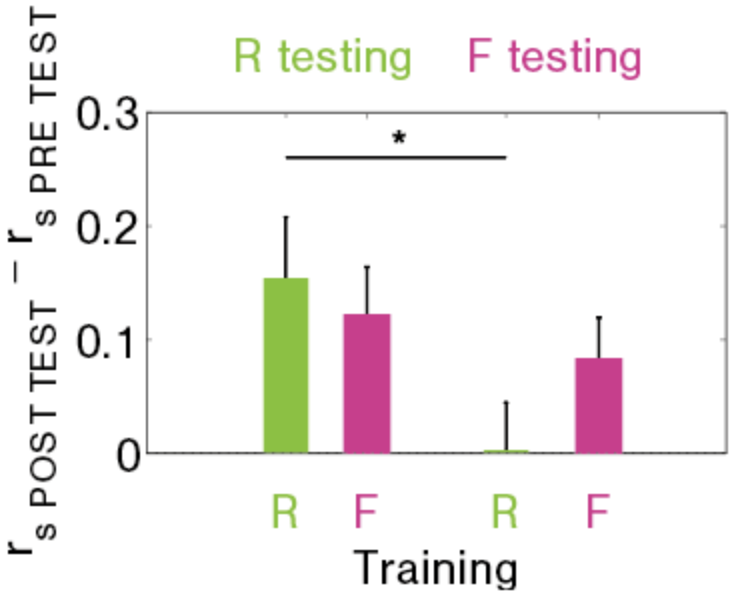
Rinit

ROVED-FIXED

FIXED-ROVED

1. **People improve after R and F training.**

2. **Initial testing condition (Rinit, Finit) influenced performance.**

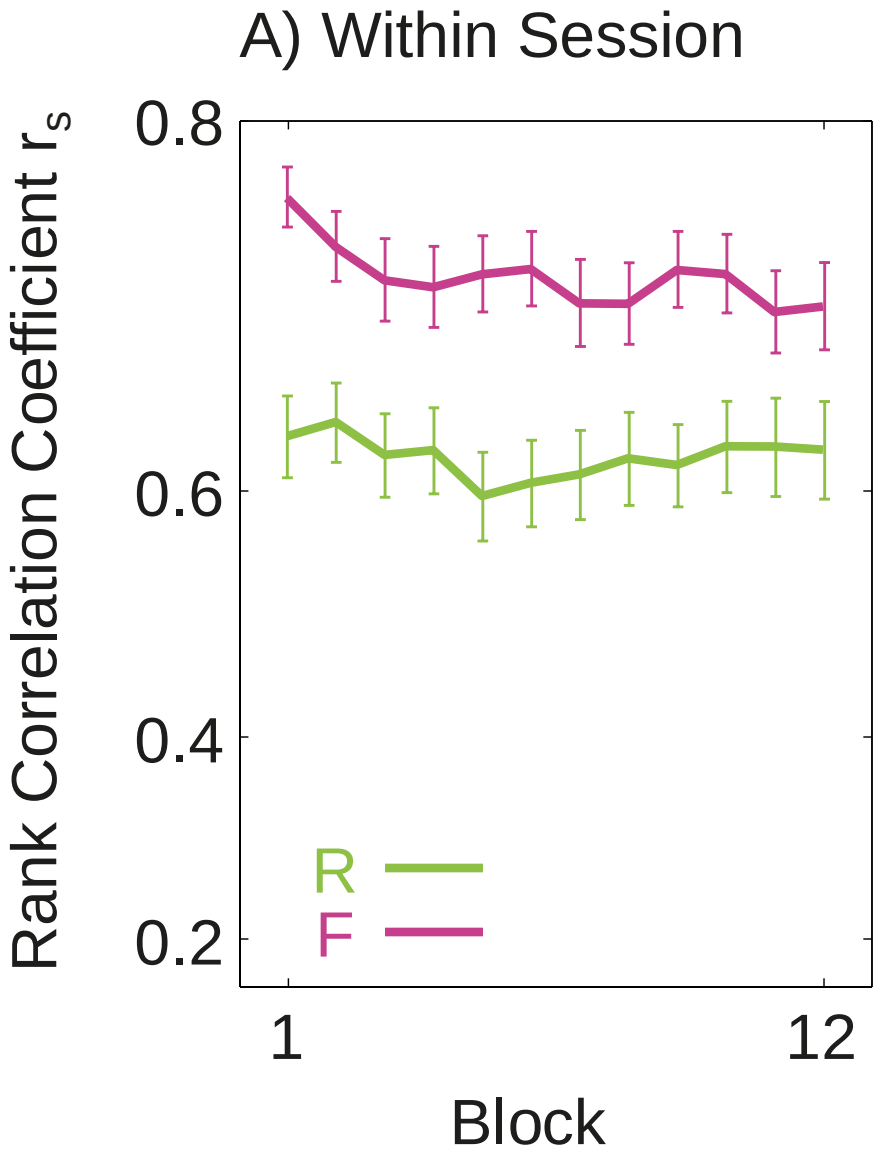


3. **Learning transferred only after FIXED training.**

Results

A) WITHIN
F decreases slightly and R stays constant.

B) BETWEEN
F increases between training, R increases only at testing block



Discussion

Training on R and F produced comparable improvement in the trained condition, but only the F training also generalized to untrained condition.

Testing performance was influenced by initial exposure during testing. Rinit performed worse in pretest than Finit but improved during at midtest (Day 4).

F training improved between sessions.

For R training, the effect was observed only at transitions between testing and training, suggesting that it was more the interleaved F runs during the tests that caused the improvement than the R training.

We are looking at the correlation of responding with the rove level and the initial performance during the testing blocks.

Acknowledgements

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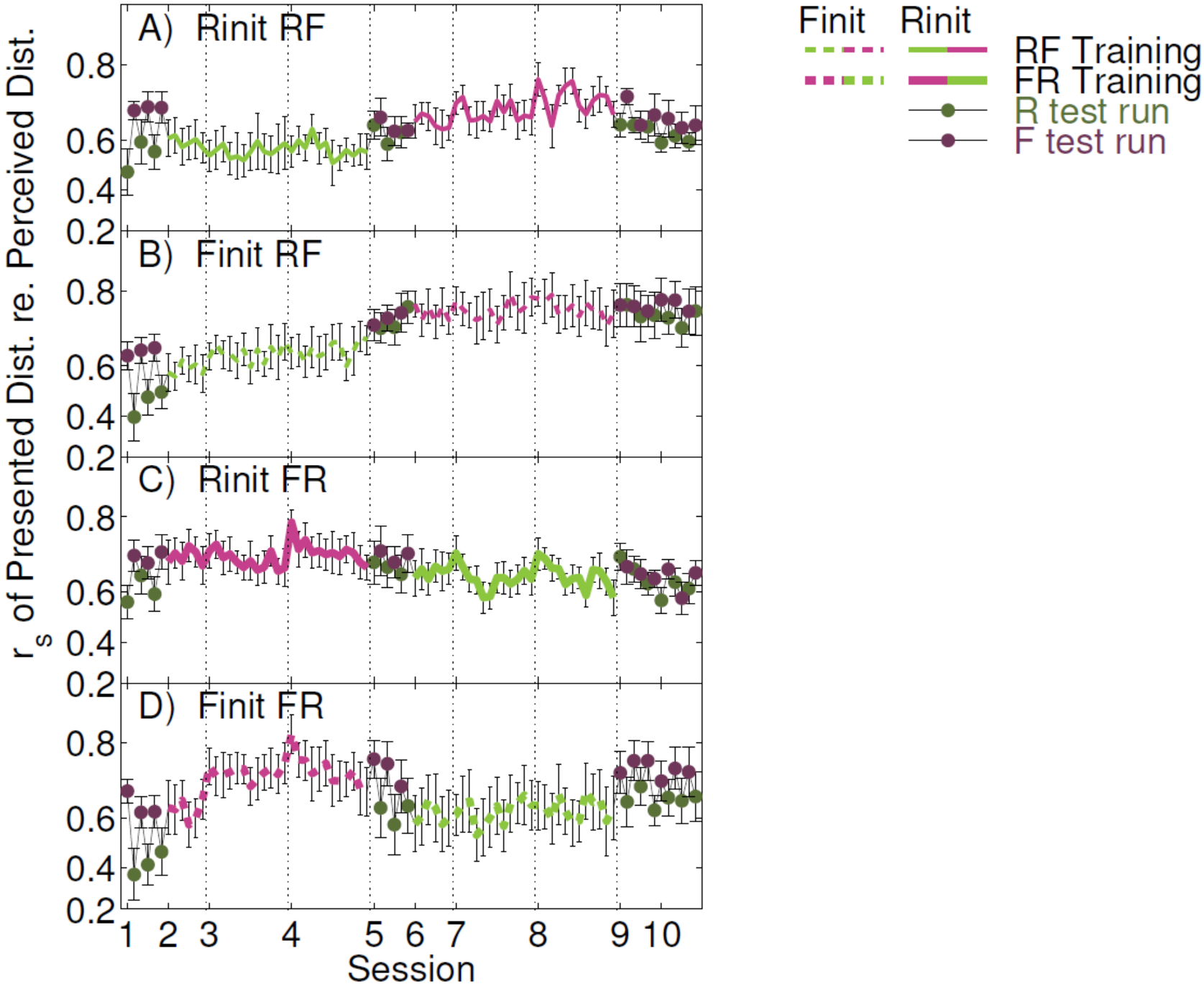
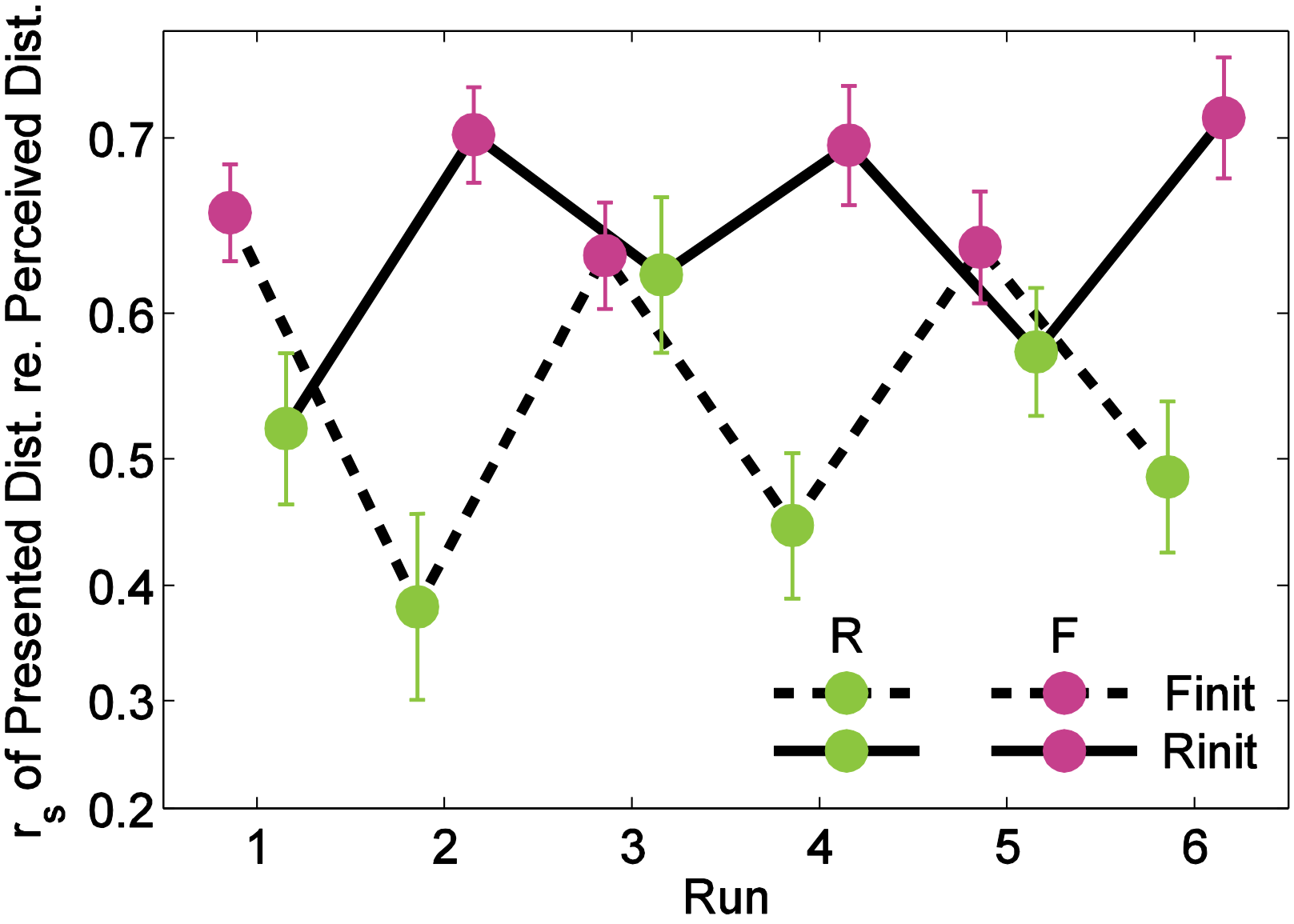
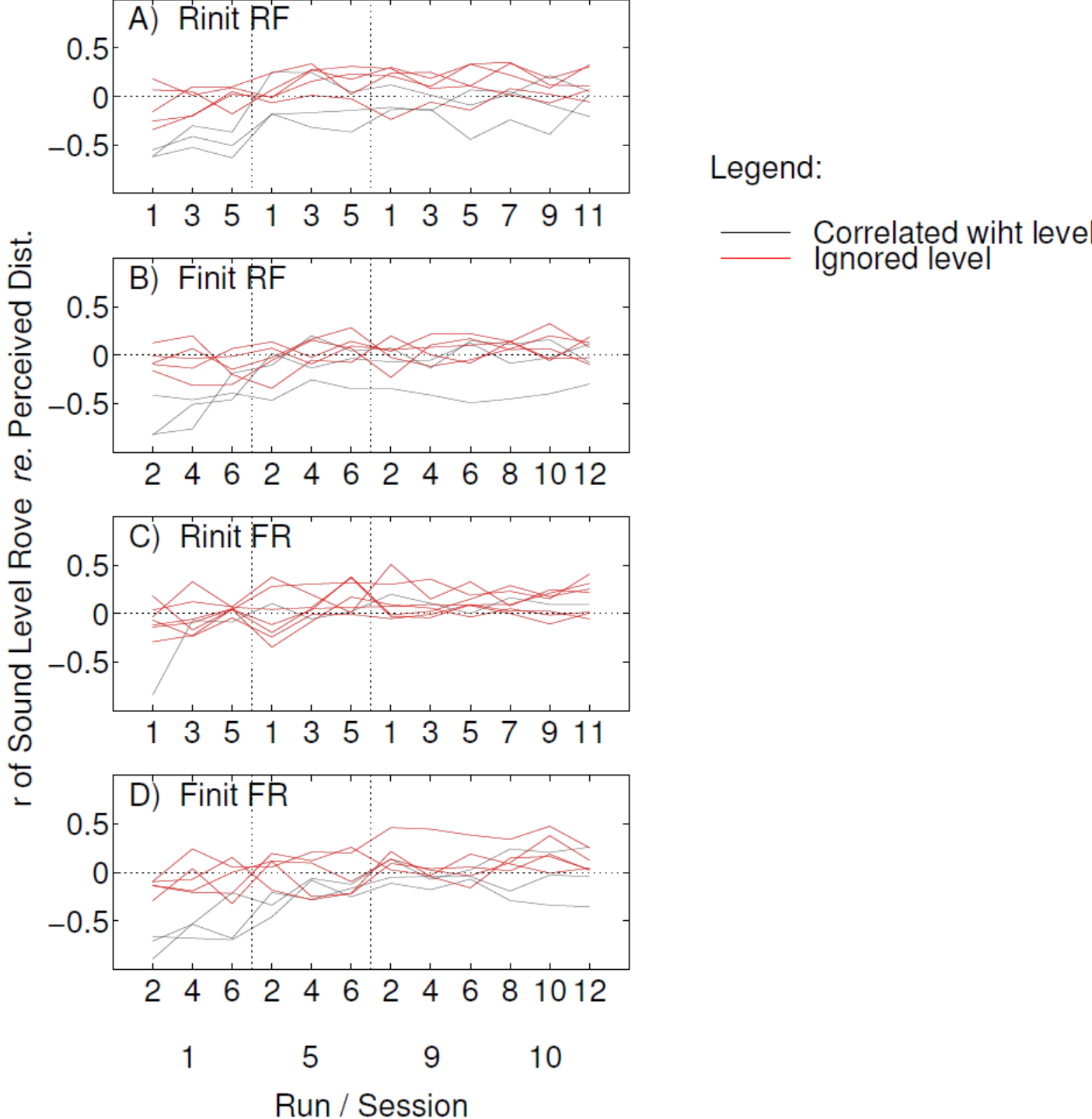

A) Rinit RF
B) Finit RF
C) Rinit FR
D) Finit FR
r_s of Presented Dist. re. Perceived Dist.
0.2
0.4
0.6
0.8
1 2 3 4 5 6 7 8 9 10
Session
Legend:
Finit Rinit
RF Training
FR Training
R test run
F test run


r_s of Presented Dist. re. Perceived Dist.
0.7
0.6
0.5
0.4
0.3
0.2
1
2
3
4
5
6
Run
R
F
Finit
Rinit


A) Rinit RF
B) Finit RF
C) Rinit FR
D) Finit FR
0.5
0
−0.5
1 3 5 1 3 5 1 3 5 7 9 11
2 4 6 2 4 6 2 4 6 8 10 12
r of Sound Level Rove re. Perceived Dist.
1
5
9
10
Run / Session
Legend:
Correlated wiht level
Ignored level