Social vs. Nonsocial Approaches to Visual-spatial Perspective-taking in Deaf Signers and Hearing Nonsigners

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Introduction

There may be different routes to performing visual-spatial perspective-taking (VSPT) tasks: a social embodied one and a nonsocial disembodied one (Kessler & Rutherford, 2010). Shelton et al. (2012) found a correlation between Autism-Spectrum Quotient scores (AQ) and VSPT task performance but only for humanlike targets (e.g., triangles with eyes vs. plain triangles), suggesting that social abilities support performance on social VSPT tasks for hearing speakers. The relation between social abilities and VSPT may differ for deaf signers. Howley & Howe (2004) found that deaf signing children rely more on nonsocial perspective-taking while hearing children rely more on a social approach. Whether this difference in VSPT strategy continues into adulthood is unknown. In addition, adult signers have been shown to outperform non-signers on visual-spatial tasks (e.g., mental imagery; Emmorey et al., 1993). Life-long experience with perspective-taking in a sign language might also enhance performance on VSPT tasks.

Research Questions

1) Does sign language experience improve performance on a nonlinguistic VSPT task?

2) Do Deaf signing adults approach a VSPT task with social or nonsocial strategies?

Participants

44 Deaf ASL signers (23F), 29 native signers
- Age = 30.1 yrs (*SD* = 7.6); Range: 30.4 – 48.5 yrs
- All acquired ASL before 6 years old

45 Hearing nonsigners (32F)
- Age = 23.6 yrs (*SD* = 5.0); Range: 18.0 – 39.9 yrs

Groups balanced on nonverbal intelligence (*Kaufman Brief Intelligence Test - Second Edition*)

Stimuli and Tasks

3 Buildings task (Shelton et al., 2012)

Task: Decide which triangle is at the view depicted by the photograph on the laptop. Press the corresponding colored key on the keyboard.

Conditions

Nonsocial (plain triangles)   Social (triangles-with-eyes)

Note: Nonsocial condition always presented first to avoid carryover effects.

Sample Perspective Photographs

- Plain triangles created a nonsocial context. Triangles-with-eyes created a social context.
- The scene was presented from 8 angles (45° increments) corresponding to the triangles.

Autism-Spectrum Quotient (AQ) (Baron-Cohen et al., 2001)

Task: 50 self-rating questions of personality traits associated with Autism-Spectrum Disorder (adapted for the Deaf participants).

AQ Subscales	
Social Skills	Communication
Attention switching	Imagination
Attention to detail	

Sample AQ item:

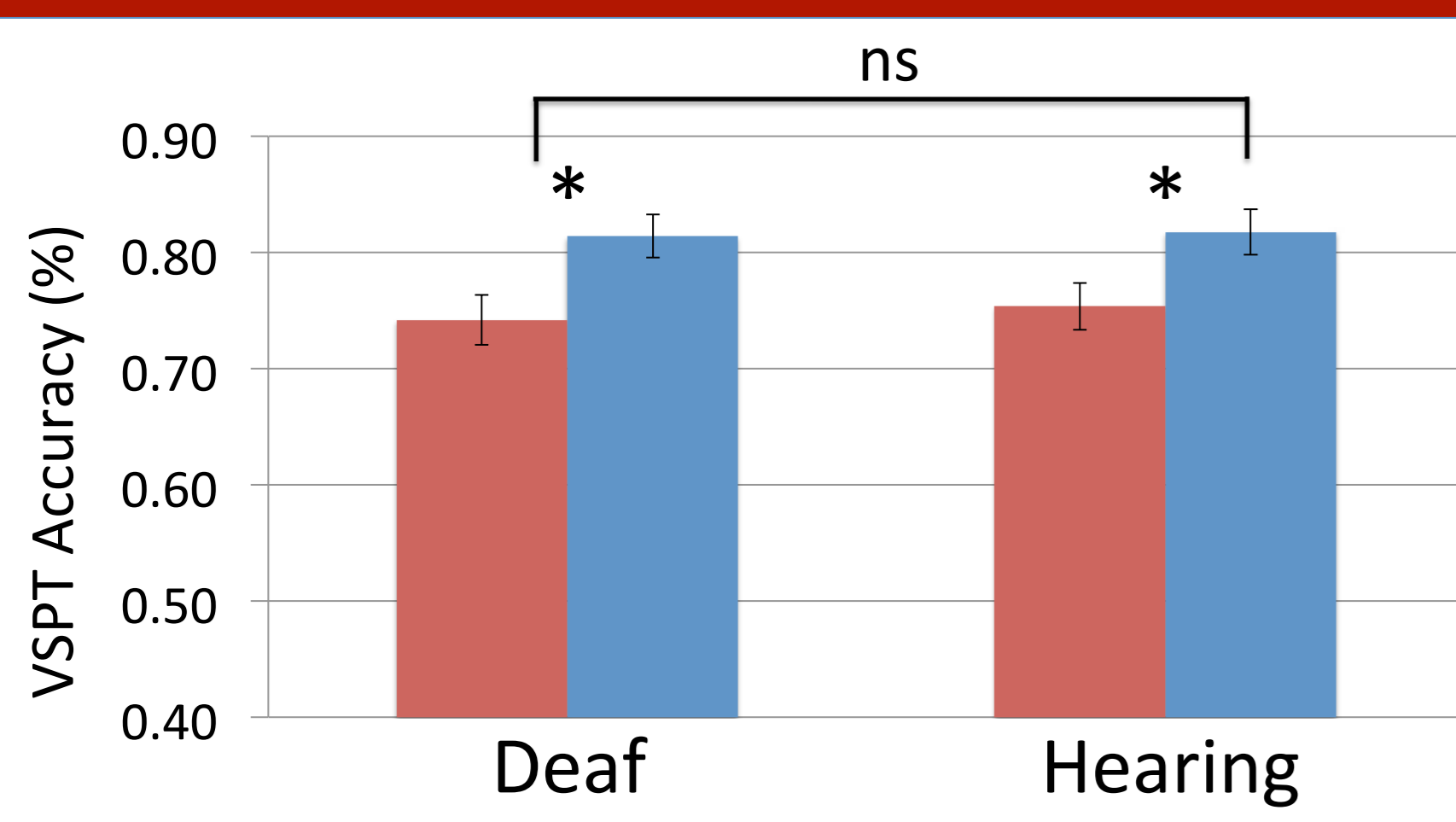"I know how to tell if someone signing with me is getting bored."

definitely agree   slightly agree   slightly disagree   definitely disagree

NonASD-like = 0   ASD-like = 1

25 questions: "agree" = ASD-like
25 questions: "disagree" = ASD-like

Results

- Social condition significantly more accurate than nonsocial condition for both groups, $F(1,85) = 49.0$, p<.001 (likely an order effect)
- No group difference or interaction between Deaf and hearing groups and VSPT accuracy
- RT results are parallel to accuracy

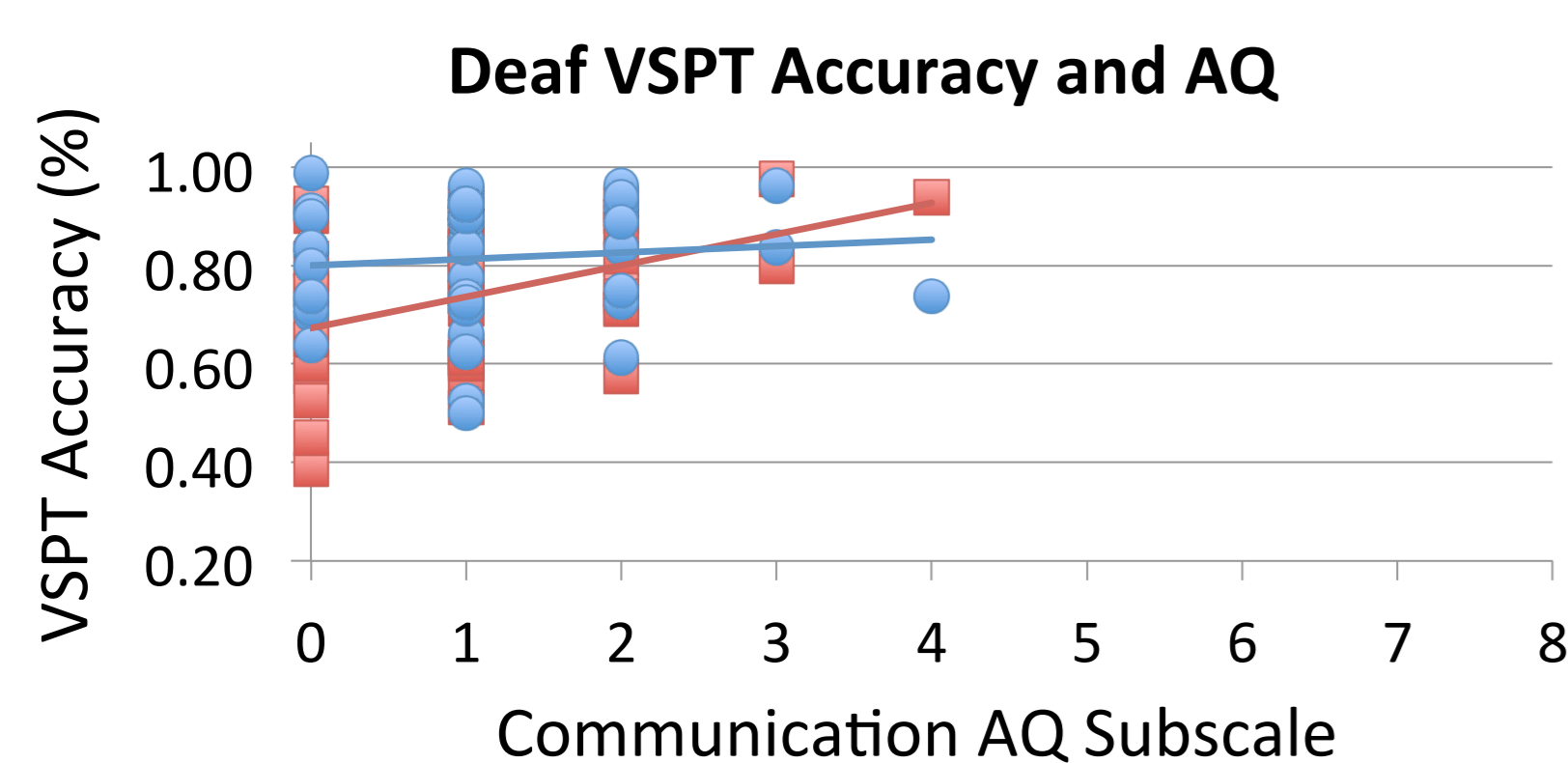### Relationship between VSPT accuracy and AQ Communication subscale
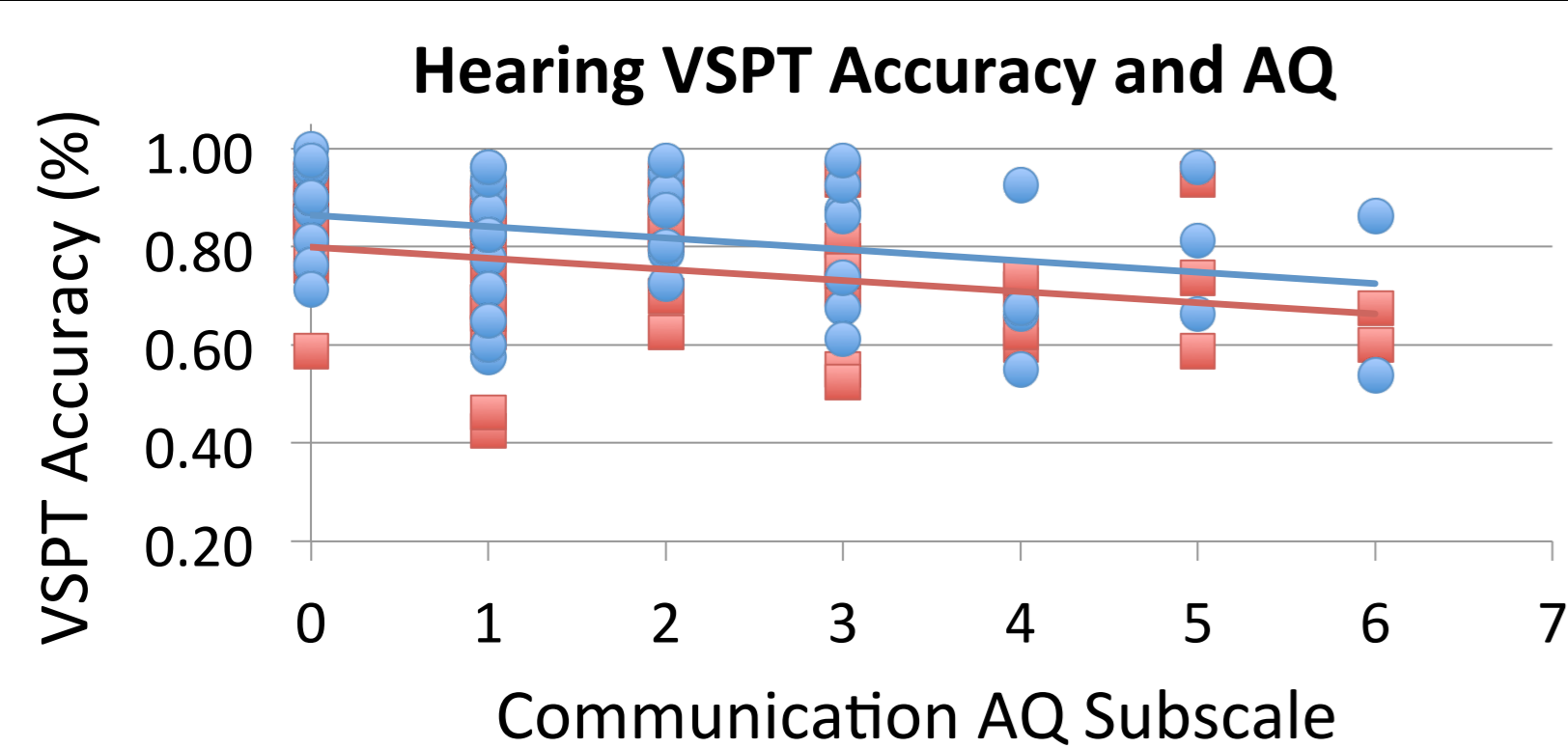
Hearing: nonsocial condition
- Marginal negative correlation (*r*=-.293, *p*=.051)

Hearing: social condition
- Significant negative correlation (*r*=-.305, *p*=.041)

More social/communicative people (lower AQ scores) perform better on the social and nonsocial VSPT tasks

Deaf: nonsocial condition
- Significant positive correlation (*r*=+.434, *p*=.003)

Deaf: social condition
- No relationship (*r*=.107, *p*=.491)

Less social/communicative people (higher AQ scores) perform better on the nonsocial VSPT task

Conclusions

- Deaf signers and hearing nonsigners perform nonlinguistic visual-spatial perspective-taking tasks equally well.
  – Experience with linguistic perspective-taking in sign language does not boost VSPT performance.

- Hearing nonsigners adopt a social/communicative approach to both social and nonsocial VSPT tasks.

- Deaf adults, like deaf children, seem to approach VSPT tasks nonsocially. Individuals with highly social/communicative personalities may experience interference from their social abilities when using a nonsocial VSPT strategy.

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