

# Effect of Visual Presentation Format and Recall Directions on Error Patterns During a Letter Span Task in Deaf Signing and Hearing Nonsigning Adults



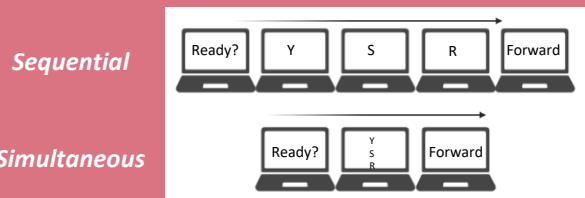
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## BACKGROUND

- Reduced forward simple spans in Deaf signers, but backward results inconsistent<sup>1</sup>
- Deaf signers proposed to be able to take advantage of visuospatial configuration<sup>2</sup>
- Serial recall error patterns have not been well studied<sup>3,4</sup>
- M<sup>3</sup> model of serial recall motivates tests of position binding and activation quality<sup>5</sup>

## METHOD

- Samples of Deaf ( $n = 33$ ) and Hearing ( $n = 32$ ) college students matched on age, sex, education
- Sequential and Simultaneous list presentations

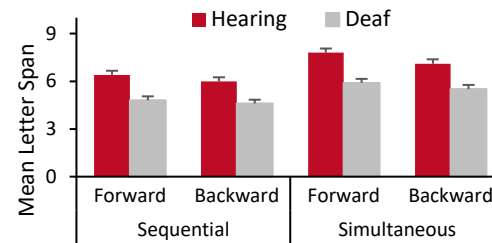


## DEPENDENT MEASURES

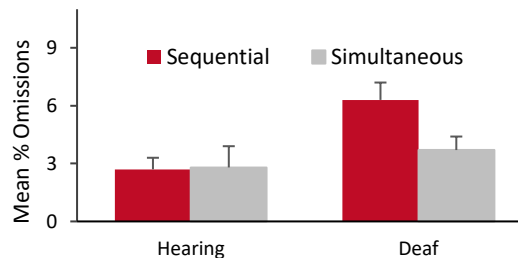
- **Span:** # letters correctly recalled in order
- **Omission errors:** % recall positions left blank
- **Other Item errors:** % correct letters in incorrect position
- **Non-Presented Lure (NPL) errors:** % non-presented letters recalled
- **Item Position Binding Score:** % correct letters – [% other item errors + % NPL errors]
- **Item Activation Score:** % other item errors + % NPL errors

## RESULTS

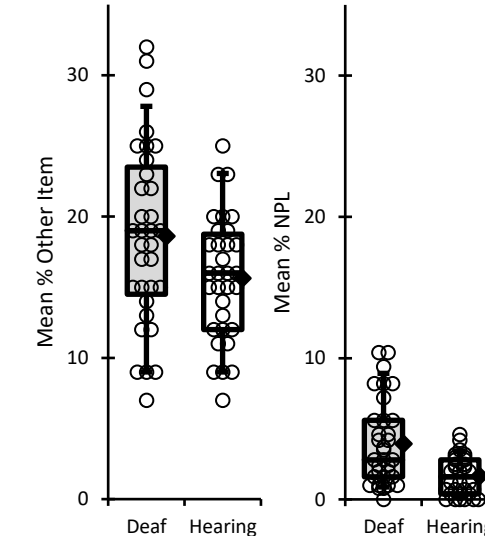
**1 Letter Span: Deaf < Hearing ( $p_s < .001$ )<sup>6</sup>**  
 Sig. group, recall direction & presentation format ( $p_s < .001$ ), no interactions ( $p_s > .15$ )



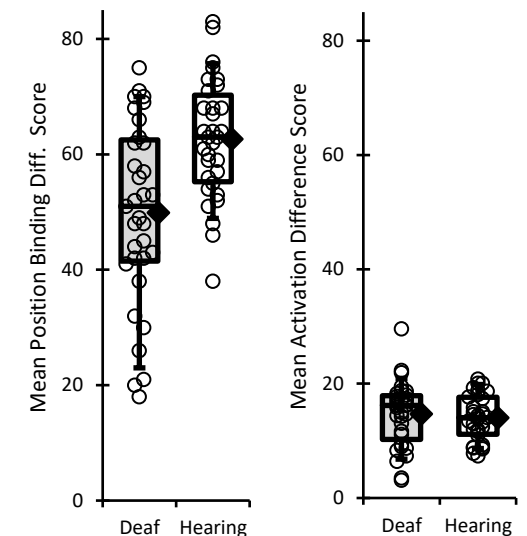
**2 % Omission Errors: Simultaneous presentation equates Deaf & Hearing**  
 Sig. interaction ( $p < .05$ ), sig. Deaf comparison ( $p < .05$ )



**3 Other Item & NPL Errors: Deaf < Hearing ( $p_s < .001$ )**



**4 Item Position Binding: Deaf < Hearing ( $p < .001$ ), no sig. diff. Item Activation ( $p > .64$ )**



## TAKE-AWAY MESSAGES

- Simultaneous presentation increased span scores for BOTH groups
- Deaf signers uniquely capitalized on simultaneous presentation to differentially reduce omission errors
- Deaf signers show lower item position binding scores, consistent with a positional binding issue in serial recall tasks<sup>3</sup>

### References

- <sup>1</sup>Andin, et al. (2013). Similar digit-based working memory in deaf signers and hearing non-signers despite digit span differences. *Frontiers in Psychology*, 4. <https://doi.org/10.3389/fpsyg.2013.00942>
- <sup>2</sup>Hirshorn, E. A., Fernandez, N. M., & Bavelier, D. (2012). Routes to short-term memory indexing: Lessons from deaf native users of American Sign Language. *Cognitive Neuropsychology*, 29(1-2), 85-103. doi:10.1080/02643294.2012.704354
- <sup>3</sup>Bavelier, D., et al. (2008). Ordered short-term memory differs in signers and speakers: Implications for models of short-term memory. *Cognition*, 107(2), 433-59. <https://doi.org/10.1016/j.cognition.2007.10.012>
- <sup>4</sup>Gozzi, M., et al. (2011). Looking for an explanation for the low sign span. Is order involved? *The Journal of Deaf Studies and Deaf Education*, 16(1), 101-7. <https://doi.org/10.1093/deafed/enq035>
- <sup>5</sup>Oberauer, K., & Lewandowsky, S. (2019). Simple measurement models for complex working-memory tasks. *Psychological Review*, 126(6), 880-932. doi:10.1037/rev0000159
- <sup>6</sup>McFayden, T. C., & Multhaup, K. S. (2014, May 1). *Can deaf signers use visual codes to reduce reported deficits in serial recall?* [Poster presentation]. Midwestern Psychological Association Conference, Chicago, Illinois.