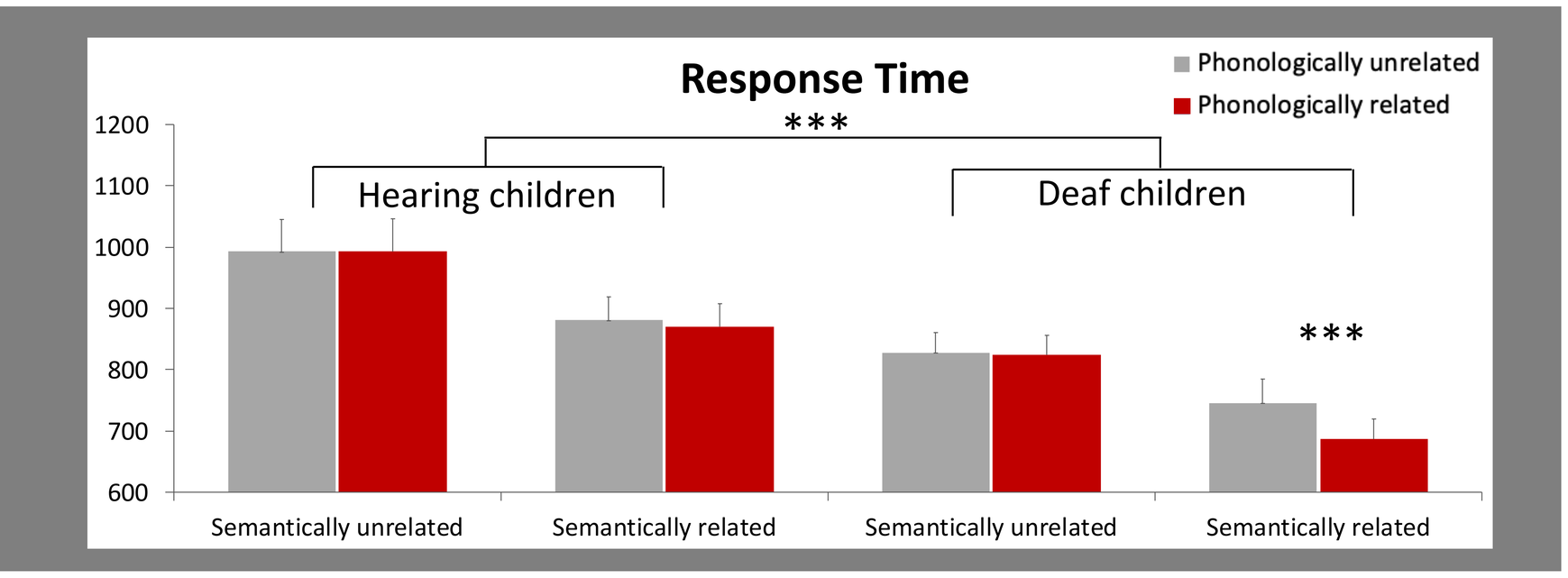
Deaf middle school bilinguals activate ASL signs while reading English words

Connected, but not confused:

Deaf middle school students co-activate English print and American Sign Language in a monolingual semantic judgment task



Background

- Bilingual lexical processing: Target language and non-target language simultaneously activated

  Marian & Spivey, 2003

- Deaf and hearing bilingual adults activate signs when reading printed words

  Chiu et al., 2014; Giezen et al., 2015; Kubuş et al., 2015; Meade et al., 2017; Morford et al., 2011, 2014, 2017, 2019; Quandt et al., 2018; Shook & Marian, 2012; Villameriel et al., 2016

- **Question**: When in development is cross-language activation observed in deaf signers?
- **Approach**: Investigate written word processing in bilingual (American Sign Language and English) deaf middle school students.

What did we expect?

Hypothesis 1: Deaf bilingual middle schoolers *already have* connections between signs and print words Ormel et al. 2012

→ASL phonology will facilitate response times during monolingual English semantic judgment task

Hypothesis 2: Deaf bilingual middle schoolers *have not yet developed* connections between signs and print words

→No effect of ASL phonology on monolingual English semantic judgment task

Our findings support Hypothesis 1:

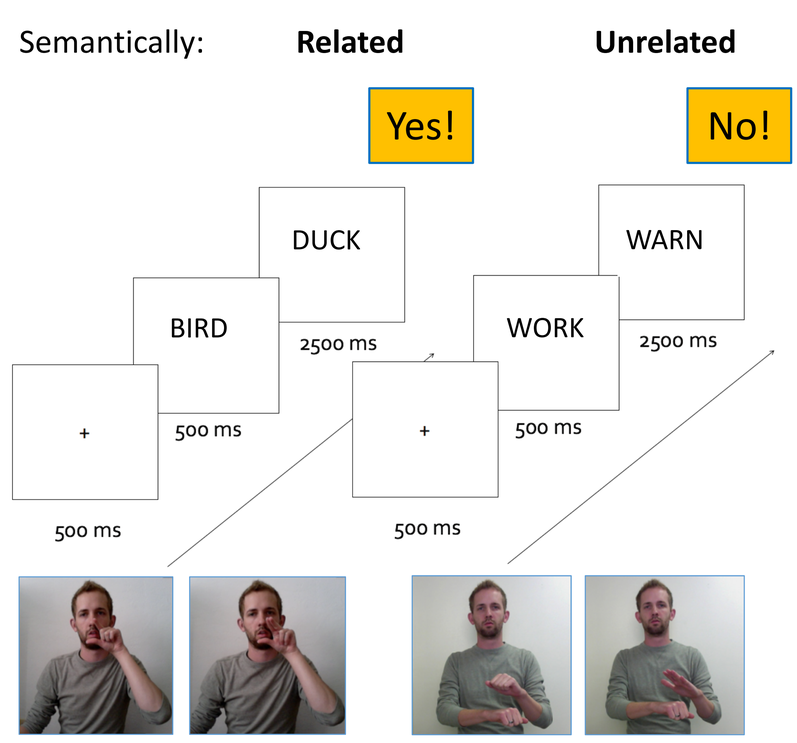
- Evidence for existing connections between signs and printed words while language proficiency is still developing.
- Deaf bilingual middle school students show advantage in processing the semantics of written English words.
- Being bilingual in two languages, which differ in modality, does not cause confusion.

Results & Discussion

- Cross-language activation: Deaf group showed facilitation effect ($p < 0.001$)
- No effect in hearing controls
- Deaf children responded significantly faster than hearing group ($p < 0.001$)
- Groups did not differ in accuracy scores ($p > 0.1$)

Method

- **Implicit priming** paradigm by Morford et al. 2011 (adapted from Thierry & Wu, 2007)
- Monolingual English semantic judgment task
- Half of English word pairs had phonologically related translation equivalents in ASL
- Phonologically related translation equivalents shared at least two phonological parameters
- **Experimental group**: 39 deaf ASL-English bilingual children (age range = 11–15 years)
- **Control group**: 26 hearing English monolinguals (age range = 11–14 years)
- **Analyses**: Mixed effects linear regression, semantically related and unrelated conditions analyzed separately



References

Chiu, Y.-S., Kuo, W.-J., Lee, C.-Y., & Tzeng, O. J. L. (2016). The explicit and implicit phonological processing of Chinese characters and words in Taiwanese deaf signers. *Language and Linguistics, 17*(1), 63–87. doi:10.1177/1606822X15614518.

Giezen, M. R., Blumenfeld, H. K., Shook, A., Marian, V., & Emmorey, K. (2015). Parallel language activation and inhibitory control in bimodal bilinguals. *Cognition, 141*, 9–25. doi:10.1016/j.cognition.2015.04.009.

Kubuş, O., Villwock, A., Morford, J. P., & Rathmann, C. (2015). Word recognition in deaf readers: Cross-language activation of German Sign Language and German. *Applied Psycholinguistics, 36*(4), 831 – 854, doi:10.1017/S0142716413000520.

Marian, V., & Spivey, M. (2003). Competing activation in bilingual language processing: Within- and between-language competition. *Bilingualism: Language and Cognition, 6*(2), 97–115. doi: 10.1017/S1366728903001068.

Meade, G., Midgley, K. J., Sevcikova Sehyr, Z., Holcomb, P. J., & Emmorey, K. (2017). Implicit co-activation of American Sign Language in deaf readers: An ERP study. *Brain and Language, 170*, 50–61. doi:10.1016/j.bandl.2017.03.004.

Morford, J. P., Kroll, J. F., Piñar, P. & Wilkinson, E. (2014). Bilingual word recognition in deaf and hearing signers: Effects of proficiency and language dominance on cross-language activation. *Second Language Research, 30*(2), 251–271, doi: 10.1177/0267658313503467.

Morford, J. P., Occhino, C., Piñar, P., Wilkinson, E., & Kroll, J. F. (2017). The time course of cross-language activation in deaf ASL-English bilinguals. *Bilingualism: Language and Cognition, 20*(2), 337-350, doi:10.1017/S136672891500067X.

Morford, J. P., Occhino, C., Zirnstein, M., Kroll, J. F., Wilkinson, E., & Piñar, P. (2019). What is the source of bilingual cross-language activation in deaf bilinguals? *Journal of Deaf Studies and Deaf Education*. doi: 10.1093/deafed/enz024.

Morford, J. P., Wilkinson, E., Villwock, A., Piñar, P. & Kroll, J. F. (2011). When deaf signers read English: Do written words activate their sign translations? *Cognition, 118* (2), 286-292, doi:10.1016/j.cognition.2010.11.006.

Ormel, E., Hermans, D., Knoors, H., & Verhoeven, L. (2012). Cross-language effects in written word recognition: The case of bilingual deaf children. *Bilingualism: Language and Cognition, 15*(02), 288–303.

Pan, J., Shu, H., Wang, Y., & Yan, M. (2015). Parafoveal activation of sign translation previews among deaf readers during the reading of Chinese sentences. *Memory & Cognition, 43*, 964–972. doi:10.3758/s13421-015-0511-9.

Quandt, L. C., & Kubicek, E. (2018). Sensorimotor characteristics of sign translations modulate EEG when deaf signers read English. *Brain and Language, 187*, 9–17. doi:10.1016/j.bandl.2018.10.001.

Shook, A., & Marian, V. (2012). Bimodal bilinguals co-activate both languages during spoken comprehension. *Cognition, 124*(3), 314–324. doi:10.1016/j.cognition.2012.05.014.

Thierry, G., & Wu, Y. J. (2007). Brain potentials reveal unconscious translation during foreign-language comprehension. *Proceedings of the National Academy of Sciences, 104* (30), 12530–12535.

Villameriel, S., Dias, P., Costello, B., & Carreiras, M. (2016). Cross-language and cross-modal activation in hearing bimodal bilinguals. *Journal of Memory and Language, 87*, 59–70. doi:10.1016/j.jml.2015.11.005.

Contact: agnes.villwock@uni-hamburg.de

Twitter: @AgnesVillwock

Scan the QR code for a signed version of our poster in ASL!

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

GALLAUDET UNIVERSITY

DEPARTMENT OF LINGUISTICS

Agnes Villwock
Erin Wilkinson
BriAnne Amador
Pilar Piñar
Jill P. Morford