

# Theory of mind in language, minds, and machines: a multidisciplinary approach

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## List of publications

#### Asterisks denote equal contributions.

- Van Dijk, B.M.A. and Van Duijn, M.J. (2021). Modelling Characters' Mental Depth in Stories Told by Children Aged 4-10. In Fitch, T., Lamm, C., and Leber, H., editors, *Proceedings of the Annual Meeting of the Cognitive Science Society*, volume 43, pages 2384-2390.
- Van Dijk, B.M.A.,\* Van Duijn, M.J.,\* Verberne, S., and Spruit, M.R. (2023). ChiS-Cor: A Corpus of Freely-Told Fantasy Stories by Dutch Children for Computational Linguistics and Cognitive Science. In Jiang, J., Reitter, D., and Deng, S., editors, *Proceedings of the 27th Conference on Computational Natural Language Learning*, pages 352-363. Association for Computational Linguistics.
- Van Dijk, B.M.A., Spruit, M.R., and Van Duijn, M.J. (2023). Theory of Mind in Freely-Told Children's Narratives: A Classification Approach. In Rogers, A., Boyd-Graber, J., and Okazaki, N., editors, *Findings of the Association for Computational Linguistics*, pages 12979-12993. Association for Computational Linguistics.
- 4. Van Duijn, M.J., Van Dijk, B.M.A., and Spruit, M.R. (2022). Looking from the Inside: How Children Render Character's Perspectives in Freely-told Fantasy Stories. In Clark, E., Brahman F., and Iyyer, M., editors, *Proceedings of the 4th Workshop on Narrative Understanding*, pages 66-76. Association for Computational Linguistics.
- Van Dijk, B.M.A., Van Duijn, M.J., Kloostra, L., Spruit, M.R., and Beekhuizen, B.F. (2024). Using a Language Model to Unravel Semantic Development in Children's Use of a Dutch Perception Verb. In Zock, M., Chersoni, E., Hsu, Y., and

De Deyne, S., editors, *Proceedings of the 8th Workshop on Cognitive Aspects of the Lexicon*, pages 98-106. European Language Resources Association.

- 6. Van Duijn, M.J.,\* Van Dijk, B.M.A.,\* Kouwenhoven, T.,\* De Valk, W.M., Spruit, M.R., and Van Der Putten, P.W.H. (2023). Theory of Mind in Large Language Models: Examining Performance of 11 State-of-the-Art Models vs. Children Aged 7-10 on Advanced Tests. In Jiang, J., Reitter, D., and Deng, S., editors, *Proceedings of the 27th Conference on Computational Natural Language Learning*, pages 389-402. Association for Computational Linguistics.
- 7. Van Dijk, B.M.A., Kouwenhoven, T., Spruit, M.R., and Van Duijn, M.J. (2023). Large Language Models: The Need for Nuance in Current Debates and a Pragmatic Perspective on Understanding. In Bouamor, H., Pino, J., and Bali, K., editors, *Proceedings of the 2023 Conference on Empirical Methods in Natural Language Processing*, pages 12641–12654. Association for Computational Linguistics.

## **Curriculum Vitae**

Bram van Dijk was born in Bogotá, Colombia in 1991. He obtained his bachelor's degree in Social Science in 2014 and his master's degree in History and Philosophy of Science in 2018, both from Utrecht University. After briefly working as a research assistant for various Dutch universities, he started in 2020 as a PhD candidate collaborating with dr. Max van Duijn's NWO-funded project 'A Telling Story', that was focused on unravelling Theory of Mind in children's stories. In 2023 their joint paper presenting the Dutch children's story corpus ChiSCor won the best paper award at the Conference for Computational Natural Language Learning in Singapore. In the same year, Bram was briefly a visiting researcher at the University of Toronto, collaborating with dr. Barend Beekhuizen on analysing the semantics of children's use of perception verbs. Bram completed courses in deep learning, text mining, and science communication, and co-taught the course 'Sciences and Humanities' in the Media Technology MSc programme as part of developing complementary academic skills in his PhD trajectory. Currently he is working as a postdoctoral researcher in prof. dr. Marco Spruit's Translational Data Science lab at the Leiden University Medical Center, where he focuses on the application of Computational Linguistics in the medical domain.