

# Language and Space in Human-Computer Interaction

Vivien Mast (Bremen)

If someone asks us how to get to the train station – do we respond with “On foot”, “turn left at the church and then go straight until you reach the train station after 500m”, or “Rotate your body 87 degrees counter-clockwise, then walk 23 steps, then move for five minutes in the western direction...” (Tenbrink, 2012). And what is the meaning of “left” anyway?

Spatial language is ubiquitous in everyday language – we refer to objects and talk about their locations, we ask for the way and give route instructions. While for us humans spatial language is intuitive and easy to use and understand, in human-computer interaction it poses difficulties: The meaning of spatial terms cannot be easily defined. What should be said, and what words mean depends strongly on context.

In this workshop, we will look at empirical studies that examine the principles underlying human spatial language and dialogue. But we will also see how these empirical results can be applied for building systems that understand and generate natural language in spatial human-computer interaction. This includes group work where you will analyse and compare different empirical studies, and relate them to application scenarios. You will also gain hands-on experience with some simple computational methods. No experience in programming or computer science is needed, as we will deal with those issues only from a linguistic and conceptual point of view.

## Day 1:

On the first day, we will start with an overview of the topic: What is spatial dialogue, and which elements are important? What kinds of dialogue systems are there, and the basic structure of a dialogue system. Then we will start with our first main topic, object reference.

## Day 2:

On the second day, we will look at locative expressions and route instructions.

## *Suggested Reading*

Clark, H. H. & Bangerter, A. (2004). Changing Ideas about Reference. *Experimental Pragmatics*. Hampshire, NY: Palgrave Macmillan.

Gapp, K.-P. (1995). An Empirically Validated Model for Computing Spatial Relations. *Proceedings of KI-95*. Berlin, Heidelberg: Springer.

Tenbrink, Thora. 2012. Relevance in spatial navigation and communication. In Cyrill Stachniss, Kerstin Schill, and D. Uttal (Eds.): *Spatial Cognition 2012*, LNAI 7463, pp. 358--377. Springer, Heidelberg.

Zimmer, H., Speiser, H., Baus, J., Blocher, A. & Stopp, E. (1998). The Use of Locative Expressions in Dependence of the Spatial Relation between Target and Reference Object in Two-Dimensional Layouts. *Spatial Cognition: An Interdisciplinary Approach to Representing and Processing Spatial Knowledge, 1404*, 223–240. Berlin / Heidelberg: Springer.

