Processing of regular metonymy: computational and neurological studies

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This talk will complement the workshop focus on logical metonymy by looking at "regular" metonymy, i.e. cases such as sentence (1) where "Lockerbie" stands for the air disaster near the Scottish town "Lockerbie"

(1) Because of Lockerbie, the United States still shun Qaddafi.

I will first present computational studies on the automatic recognition and interpretation of such metonymies, arguing that for a large portion of them no knowledge-intensive search or inference procedure is necessary. Instead they can be handled via classification algorithms in a machine learning paradigm. I will present a publicly available dataset annotated for metonymy, whose analysis supports that position. In addition, I will analyse the results of my own as well as 6 other systems for metonymy resolution on that dataset, showing that the machine learning approach can successfully resolve a substantial percentage of metonymies.
However, this evaluation will also make clear that, although successful to a certain degree, the state-of-the art in metonymy resolution has plateaued. I will discuss what is in my view necessary to push forward the state of the art in the future.

In the second part of my talk, I will present recent experiments on human processing of metonymies using event-related functional magnetic resonance imaging (fMRI). This is the first functional imaging study on metonymy, concentrating on healthy subjects. We show that reading metonymies relative to literal sentences reveal signal changes in a predominantly left-lateralized fronto-temporal network with maxima in the left and right inferior frontal as well as left middle temporal gyri. Activation of this network in our study might be a correlate of integrating semantic and world knowledge during comprehension of metonymies. We compare our results to the prediction of linguistic theories of lateralization of figurative language. Hemispheric lateralisation during metonymy processing is also of clinical interest, since some patient populations show altered metonymy comprehension skills. These are for example patients with autism or schizophrenia. A possible, still yet speculative assumption is that dysfunction or delayed development of the fronto-temporal network that was detected in our investigation plays a role in defective metonymy appreciation in these disorders. We are currently investigating the fMRI correlates of metonymy resolution in schizophrenia using an identical paradigm.

The computational work was conducted in collaboration with Malvina Nissim (University of Bologna) and the neurological work in collaboration with Alexander Rapp and colleagues (University of Tuebingen).