Socio-cognitive mechanisms of symbolic communication

Programme and abstract booklet

Tilburg centre for Cognition and Communication
Tilburg University, 26 January 2012

Sponsors:

Programme:

8:30 – 9:00	Registration
9:00 – 9:15	Welcome by Paul Vogt
9:15 – 10:15	**Keynote lecture**: Aylin Küntay, Koç University. *How does extended referential discourse integrate speech and other communicative devices in early child-caregiver interaction?*
10:15 – 10:45	Coffee break
10:45 – 11:30	Tony Belpaeme, Plymouth Univeristy. *Understanding the acquisition of symbolic communication through robotic models*
11:30 – 12:15	Afra Alishahi, Tilburg University. *Cross-situational word learning and the role of context*
12:15 – 13:15	Lunch break
13:15 – 14:00	Paul Vogt, Tilburg University. *Cultural, social and cognitive mechanisms of language acquisition: a multi-disciplinary approach*
14:00 – 14:45	Pierre-Yves Oudeyer, INRIA Bordeaux. *Boostrapping fluid learning of linguistic interaction through general imitation mechanisms*
14:45 – 15:30	Asli Özyürek, Radboud University & Max Planck Institute for Psycholinguistics, Nijmegen. *Multimodal approach to symbolic communication: What do gestures reveal about language, cognition, and development?*
15:30 – 16:00	Coffee break
16:00 – 17:00	**Keynote lecture:** Luc Steels, Vrije Universiteit Brussel & Sony CSL Paris. *How we do experiments in cultural language evolution*
17:00 – 17:30	Panel discussion
17:30 – 18:30	Reception

Abstracts:

Aylin Küntay, Koç University

How does extended referential discourse integrate speech and other communicative devices in early child-caregiver interaction?

Language is often presented to children by caregivers in extended discourse structures that include successive utterances of varying form but similar communicative intent, i.e. variation sets. Referential variation sets are a specific type of variation sets where reference to the same entity is maintained across continued discourse. I will present data about how non-speech communicative devices are integrated into speech by caregivers and toddlers during interactions about new and maintained communication about references within variation sets. I will suggest that such extended discourse structures imbued with non-speech communication cues are helpful for children to figure out form-meaning correspondences, at least in certain contexts.

Tony Belpaeme, Plymouth Univeristy

Understanding the acquisition of symbolic communication through robotic models

Developmental psychologists have proposed a range of strategies and constraints used by children to support their language acquisition. For example, in the cross-situational learning strategy children will induce the meaning of a word by statistically tracking which objects are in view when a word is used; the object that appears most frequently across exposures is then associated with the word. At the moment it is not entirely clear what the effectiveness is of various learning strategies and biases, and how they can be combined to facilitate language learning. Computer models and implementations on robots help us put flesh on the bones of these theories. This talk will present a number of computer models and robot experiments using humanoid robots, which help us form a clearer picture of language acquisition. Not only do these models and experiments provide clarity, they can also be used to make predictions on how children learn.

Afra Alishahi, Tilburg University

Cross-situational word learning and the role of context

Learning the meaning of words is one of the most important aspects of language acquisition: children must first learn words before they can combine them into complex utterances. Many theories have been developed to explain the impressive efficiency of young children in acquiring the vocabulary of their language, as well as the developmental patterns observed in the course of lexical acquisition. A major source of disagreement among the different theories is whether children are equipped with special mechanisms and biases for word learning, or their general cognitive abilities are adequate for the task. We present a novel computational model of early word learning to shed light on the mechanisms that might be at work in this process. The model learns word meanings as probabilistic associations between words and semantic elements, using an incremental and probabilistic learning mechanism, and drawing only on general cognitive abilities. The results presented here demonstrate that much about word meanings can be learned from naturally-occurring child-directed utterances (paired with meaning representations), without using any special biases or constraints, and without any explicit developmental changes in the underlying learning mechanism. Furthermore, our model provides explanations for the occasionally contradictory child experimental data, and offers predictions for the behaviour of young word learners in novel situations.

Paul Vogt, Tilburg University

Cultural, social and cognitive mechanisms of language acquisition: a multi-disciplinary approach

Assuming that the cognitive mechanisms that underlie child language acquisition are universal, it is crucial study how differences in social interactions across (and within) cultures relate to language development. I will present a study in which we investigate the relation between different forms of engagements and gestures surrounding infants and their vocabulary development from different cultures in Mozambique and the Netherlands. One of the objectives of this study is to use the resulting empirical data to verify theories of language acquisition using computational modelling. I will present some results we have obtained so far from our study in Mozambique and illustrate how we can use this to model child language acquisition.

Pierre-Yves Oudeyer, INRIA Bordeaux

Boostrapping fluid learning of linguistic interaction through general imitation mechanisms

Recent conceptual and technical advances have been made in the field of robot learning of motor skills by imitation, allowing a human to teach a robot how to achieve complex motor tasks depending on complex dynamic sensori contexts. I will show that these computational frameworks can be used in such a way that social and interaction skills, and linguistic skills in particular, be acquired seamlessly with exactly the same internal mechanisms and representations as those for context-dependant motor learning. In particular, I will show how these mechanisms can allow a robot to discover that certain behaviors of social partners (in one of the modalities that is not known initially, e.g. vocal or hand gestures) are actually communicative signs, and at the same time that these signs shall trigger responses which are either overt actions or internal cognitive operation which correspond to their meanings. This computational model allows to go one step further in the study of the interaction between action and language: Indeed, beyond considering language as grounded in sensorimotor development, it proposes that the bootstrapping of language may actually be understood as a particular case of general context-dependant learning of sensorimotor skills through interaction with others.

Asli Özyürek, Radboud University & Max Planck Institute for Psycholinguistics, Nijmegen

Multimodal approach to symbolic communication: What do gestures reveal about language, cognition, and development?

Symbolic communication in humans is rarely carried out by the speech channel alone but is almost always accompanied by hand/body gestures linked temporally and semantically to what is conveyed in the speech. Gesturing during language use is an integral part of language and everyday communication. People use gestures frequently in all ages, cultures and in all kinds of communicative contexts and even in various communicative impairments (e.g., autism, aphasia etc.)-contrary to the intuitions that gestures might play less of a role in (healthy) adults or in some cultures etc.

In this talk I will review evidence showing that gestures used during speaking are in fact quite linked to the cognitive and social / communicative processes going on during speaking and might even provide additional insights about language-specific thinking patterns of speakers of different languages. In addition I will show how children born to different languages learn the language /

culture specific multimodal symbolic communication patterns of they are born into and what this reveals about their development of language and cognition in general. Thus I will argue that understanding human symbolic communication and its cognitive and social underpinnings needs to be embedded within a multimodal approach.

Luc Steels, Vrije Universiteit Brussel & Sony CSL Paris

How we do experiments in cultural language evolution

The first part of the talk outlines the methodology that our group is using to explore the cultural evolution of language. It is based on the notion of a language game and focuses on different domains of language, such as space, time, argument structure, agreement, determiners, etc. The methodology starts from reconstructing language systems from human natural languages and then gradually abstracts out the learning, invention, and alignment needed to explain the origins of such systems. The second part goes into more detail. I will focus in particular on the question of the origins of compositional meaning and discuss through case studies how this can be framed in terms of evolutionary theory.