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Understanding Actions and Minds: Integrating recent advances from Philosophy of Mind, Cognitive Neuroscience, Psychology of Language and Communication, Developmental and Comparative Psychology, and Artificial Intelligence

July 5-16, 2004

Course Director: **György Gergely**, Hungarian Academy of Sciences, Developmental Research Institute for Psychological Research, Budapest

Resource Persons: **Paul Bloom**, Yale University, Department of Psychology

Gergely Csibra, Centre for Brain and Cognitive Development, School of Psychology, Birkbeck College

Josef Perner, University of Salzburg, Department of Psychology

Csaba Pléh, University of Szeged, Department of General Psychology

Dan Sperber, Institut Jean Nicod (EHSS and ENS)

John S. Watson, UC Berkeley

Karen Wynn, Yale University, Department of Psychology

Abstract

The summer course is going to provide an advanced-level research-oriented overview of recent advances in the interdisciplinary study of *two central and closely related topics* that are currently in the focus of interest in *cognitive and brain sciences, philosophy of mind, the developmental, comparative, and evolutionary study of social cognition, and psychology of language and communication*. 1. The first topic concerns the mechanisms and organizational principles involved in *the production, representation, and interpretation of intentional actions* in human and non-human organisms, pathological populations (e.g., schizophrenia) and artificial information processing systems. 2. The second topic concerns the study of *the nature, development, and brain mechanisms of the inferential and representational systems specialized for understanding intentional actions and other minds in terms of causal intentional mental states (theory-of-mind)*.

During the first three days of the summer course the participants will take part in the European Science Foundation Exploratory Workshop held at CEU.

Syllabus

Action interpretation and intentionality

Intentionality and executive functions – Joseph Perner

Social Cognition and Brain Mechanisms – Gergely Csibra

Action understanding and mechanisms of observational learning in infancy – György Gergely

The theory of rational action and the principle of rationality - György Gergely

Intentional agents and intentional systems

Foundations of social cognition in the first year of life - Karen Wynn

Development of intentionality – John Watson

Intentionality, communication, and culture

Metarepresentations in evolution, communication, and culture – Dan Sperber

Bodies and souls – Paul Bloom

Action organization and understanding from a historical perspective – Csaba Pléh

Course summaries

Paul Bloom

Bodies and Souls

This seminar will explore the proposal that we are "intuitive dualists". Even young children naturally see physical entities such as objects (bodies) as fundamentally distinct from psychological entities such as minds (souls). This has profound implications for our mental life, and we will discuss domains such as art, religion, humour, morality, and disgust.

Bloom, P. (to appear in 2004). *Descartes' Baby: How the science of child development explains what makes us human*. New York: Basic Books.

Gergely Csibra

Social Cognition and Brain Mechanisms

The course will review recent studies on how action interpretation, mental state attribution, imitation, emotion understanding, and self-awareness are achieved in the cerebral cortex. More and more data, from single cell studies in monkeys to neuroimaging studies in humans, suggest that these cognitive functions are subserved by specialized brain systems. The course will discuss these results in the context of both filogenetic evolution and ontogenetic development.

György Gergely

Action Understanding in Infancy

The course will review the available data on how young infants understand the actions they observe. Young infants seem to appreciate that the behaviour of agents are directed toward goals and predict their future actions accordingly. They are also very sensitive to communicative situations and, when these occur, tend to interpret others' actions as referential. The course will discuss the relation between these early abilities and (1) later "theory of mind" development, (2) similar capabilities of primates, and (3) neural correlates of mental state attribution in adults.

Gergely, G. (2002). The development of understanding self and agency. (pp. 26-46).
In U. Goshwami (Ed.) *Blackwell Handbook of Childhood Cognitive Development*,
Oxford: Blackwell.

Gergely, G., Bekkering, H., & Király, I. (2002). Rational imitation in preverbal infants.
Nature, Vol. 415, p. 755.

Csibra, G., Bíró, S., Koós, O., & Gergely, G. (2003). One-year-old infants use
teleological representations of actions productively. *Cognitive Science*, vol. 27(1),
111-133.

Gergely, G., & Csibra, G. (2003). Teleological reasoning about actions: The
naïve theory of rational action. *Trends in Cognitive Science*, Vo. 7., No. 7. 287-292.

Király, I., Jovanovic, B., Aschersleben, G., Prinz, W., & Gergely, G. (2003). The early
origins of goal attribution in infancy. *Consciousness and Cognition*, (in press).

Joseph Perner

Intentionality and Executive Functions

Course contents are centred around the question of how understanding the mind, in particular, as responsible for generating intentional actions relates to improvements in self control (executive function).

- What is intentional action and what are executive functions (dual control model).
- Brain imaging studies of theory of mind and executive functions.
- Developmental data on children's understanding of desire and intentions and improvements in executive control.

- Perner, J. (2003). Dual control and the causal theory of action: The case of nonintentional action. In N. Eilan & J. Roessler (Eds.), *Agency and self-awareness* (218-243). Oxford: Oxford University Press.
- Perner, J., Zauner, P., & Sprung, M. (revision submitted 10-07-03). "What does 'that' have to do with point of view? The case of conflicting desires and 'want' in German." In J.W. Astington & J. Baird (Eds.). *Why language matters for theory of mind* (pp-pp). New York, NY: Oxford University Press.
- Kain, W. & Perner, J. (1st draft 20-08-03). What fMRI can tell us about the ToM-EF connection. In W. Schneider, R. Schumann-Hengsteler, & B. Sodian (Eds.). *Young Children's Cognitive Development: Interrelationships among Executive Functioning, Working Memory, Verbal Ability, and Theory of Mind* (pp-pp). Mahwah, NJ: Lawrence Erlbaum Associates.

Csaba Pléh

Action organization and understanding from a historical perspective

The course will concentrate on how the notion of animate action was shaped during early modernity, how it developed into mechanical views of actions as reflexes, and how these developments are treated to twentieth century issues about intentionality. Special attention will be paid to three aspects:

- a. The unfolding of the notion of automated action as related to a desantropomorphisation of human understanding
- b. The turn of century debates about the role of intentionality versus mechanical explanation of animal movement
- c. The relations between these events and recent theories of intentional action

Dan Sperber

Metarepresentations in Evolution, Communication, and Culture

Modern pragmatics and in particular Relevance Theory, following Grice's seminal work, sees a speaker's meaning as an overt intention to cause a mental state in the hearer, and verbal comprehension as a process of recognition of such a speaker's intention. Verbal communication so understood presupposes strong metarepresentational abilities. Does this mean that metarepresentational abilities evolved in humans before language, and if so with what functions? To what extent and in which ways do properties of language reflect the role of metarepresentations in verbal communication? Are metarepresentational abilities enhanced by language, and, if so in which ways? The fact that human communication involves intentional action on the mental state of the audience and the recognition by the audience of these intentions entails a difference between comprehension and conviction, i.e. between recognising the communicators meaning on the one hand and accepting it on the other. Because of this, human verbal communication uses a variety of rhetoric tools aimed at persuasion, i.e. at causing not just comprehension but also conviction. Do some of these tools, in particular those having to do with argumentation, exploit metarepresentational abilities, and if so, how? Human culture is made possible by human communicative capacities. How do the actual mechanisms of human communication, and the role of metarepresentations in them, affect cultural transmission, and influence, if at all, the contents of culture? These are the questions that the course will attempt to answer.

John Watson

Development of Intentionality

The lectures will consider "the development of intentionality" from two perspectives. The first entails consideration of criteria for claiming that an organism has intention. Examples will be drawn from normal infants, abnormal children, and artificial life. Theoretical and methodological implications will be raised. The second perspective entails consideration of criteria for claiming that an organism perceives intentions in another. I will propose that this perceptual act can be approached as a sub-set of the general problem of studying if and how an organism perceives dispositional properties in external objects. Again, theoretical and methodological implications will be raised.

Karen Wynn

Foundations of Social Cognition in the First Year of Life

Recent research has been investigating the core cognitive capacities present in infancy that provide babies with the foundations upon which to build an understanding the social world. In this seminar we will review this literature, with a focus on both (1) the origins and development of an understanding of others

as *psychological* (intentional) agents (i.e., agents that have mental states such as goals and desires, and whose actions are related to their goals and desires), and (2) the origins and development of an understanding of others as *social* (interactive) agents that influence each other, interact with each other, and can have thoughts, emotions and dispositions about/towards each other. We will explore such questions as how babies identify intentional agents, how they identify and reason about the goals of intentional agents, and how they understand social interactions between distinct intentional agents. As we pursue these questions, we will also discuss how these initial foundations relate to the more elaborated theory-of-mind present in older children and adults.

As part of this investigation, we will also examine recent work on the development of the 'social emotions' (such as embarrassment, jealousy, etc.) in infancy, exploring what these findings suggest about infants' developing understanding of, and ability to reason about, the content of others' minds.

For more detailed biographies, updated course description, syllabus, reading lists please check <http://www.ceu.hu/sun/index.html>

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