Fourth International Workshop on Evolutionary Cognitive Sciences

Physical and Psychological Reasoning in Infancy

June 25, 2006
The University of Tokyo, Komaba, Japan

10:05-11:35

Causal Reasoning in Infancy

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We assume that infants possess a physical- and a psychological-reasoning system; and that core notions within each system provide infants with a causal framework that helps them make sense of events. Within the physical-reasoning system, core notions include persistence, force, inertia, and weight. Within the psychological-reasoning system, core notions include disposition, goal, perception, and belief.

When watching a physical event (e.g., a ball that rolls behind a screen), infants' physical-reasoning system builds a specialized physical representation of the event, which is used to interpret and predict its outcome. Similarly, when watching a psychological event (e.g., a human agent that reaches for and grasps a ball), infants' psychological-reasoning system builds a specialized psychological representation of the event, which is used to interpret and predict its outcome.

Research is attempting to shed light on (1) what information infants include in their physical and psychological representations of events, and how that information becomes richer and more complete with age and experience; and (2) how infants interpret this information, bringing to bear both their core knowledge and the hypotheses or rules they develop to better predict outcomes.

In my talk, I will first summarize findings from the past 10 years on the development of infants' physical reasoning (focusing on events involving hidden objects). Next, I will present recent findings on infants' psychological reasoning (focusing on events in which human agents act on objects).

11:40-12:10

Infants' recognition of televised events

Naoko Dan

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Although televised images are presented to infants in everyday life and also in developmental research, many questions remain unanswered about infants' recognition of them. How do infants associate televised events with real world events? Can infants differentiate them as adults do? To answer these

questions, we adopted a procedure in which televised objects and real objects were mixed in one task. In experiment 1, we examined whether 6- and 10-month-olds would use information presented via television to solve a kind of non-search AB task in the real world. The results indicate that infants of both ages can use them. To inspect the nature of recognition underlying their success, in experiment 2, a kind of occlusion task was used. In the task, a toy car ran down a slope and went behind a screen. Then the screen was removed and infants found nothing there. When the first half of the event was presented by TV, only 6-month-olds (not 10-month-olds) expected that the car in TV should come out to the real world. These experiments suggest that infants develop their knowledge on TV images in the later half of their first year, and become sensitive to the discontinuity between the TV and real worlds.

12:10-13:10

Lunch

13:10-14:10

Emotion Processing in the Infant Brain:

Electrophysiological Insights into Infants' Perception of Emotion from Face and Voice

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Infants develop in a world filled with other people. Relating socially to others has not only profound effects on what they feel, think and do, but is also essential for their healthy development and for optimal functioning throughout life. Therefore, to develop an understanding of other people is one of the most fundamental tasks infants face in learning about the social world. Interacting with others by reading their emotional expressions is an essential skill for humans. Reading emotional expressions during interpersonal interactions permits us to detect another person's emotional state or reactions, and can provide cues on how to respond appropriately in different social situations. How infants' perception of emotional expressions develops has been studied extensively using behavioral methods. However, we poorly understand the brain processes that underlie infants' behaviorally exhibited capacities. Therefore, a series of three ERP studies was conducted in which infants' perception of facial emotional information (Study 1) and vocal emotional information (Study 2) were examined separately, and then, in a third study (Study 3), the integration of emotional information from face and voice was investigated.The findings from all three studies will be discussed in relation to each other as well as to other behavioral and neurophysiological work. Moreover, based on the empirical data implications and directions for future work will be formulated.

14:15-14:45

Biological Motion Detection in Infancy

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To detect others' action is one of the vital ability to live in our social world and our visual system is tuned for detecting such information. For example, we can vividly perceive the movement of a human figure from just a dozen moving points of light within several hundred milliseconds. This phenomenon is well known as an example of biological motion (BM) perception (Johansson, 1973).

To date, several behavioral studies indicate that infants can discriminate between BM and scrambled motion (SM; SM has the same velocity vector as biological motion but randomized initial starting points) in the first few months of life (e.g. Bertenthal et al., 1987; Fox et al., 1982).

However, the neural response to BM perception has not been well investigated from a developmental point of view. To clarify this point, event-related potentials (ERPs) in 8-month-old infants during the perception of BM or a SM were measured. The result indicates that activation of the right hemisphere in 8-month-old infants was similar to that of adults, suggesting that the neural substrates for processing BM perception begin to mature at around 8 months of age.

14:50-15:50

Repetition effects reveal multiple levels of face representationsin infancy

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