

**PhD Theses**

**THE ROLE OF MARKED FORMS OF  
CAREGIVER-INFANT INTERACTIONS IN  
CHILDREN'S CONCEPTUAL DEVELOPMENT  
AND THE FORMATION OF THEIR  
REPRESENTATIONAL ABILITIES**

Futó Judit

Supervisor: Dr. Inántsy Papp Judit



UNIVERSITY OF DEBRECEN

Doctoral School of Humanities

Debrecen, 2010.

## **1. AIMS AND SCOPE OF THE DISSERTATION**

The studies presented in this dissertation investigate the question of how the ‘markedness’ of early caregiver-child interactions might foster infants’ conceptual development and the formation of their representational abilities.

Considerable evidence shows that when adults interact with infants, they modify their behavior across a wide range of domains, including speech, facial expressions, gestures and actions. Infant-directed communicative modifications and communicative action manifestations, in general seem to be identified by their special ‘marked’ forms of motor execution.

‘Marking’ is the modified and saliently transformed motor execution of primary procedural motor schemes of intentional actions or emotional expressions. It involves the selective activation of certain components of the primary motor schemes and the transformation of their spatial and temporal patterns which is made possible by the meta-access that humans possess over their primary motor schemes.

‘Marking’ has been identified within the theoretical framework of Natural Pedagogy. ‘Pedagogy’ is hypothesized to be a human-specific adaptation of mutual design whose evolutionary function is the facilitation of fast and efficient intergenerational transfer of relevant cultural information from knowledgeable conspecifics to ignorant juveniles.

‘Marking’ is believed to be employed in two different ways in early ostensive referential communication. First, marking as a pure ostensive cue functions to signal to the addressee that the communicator has the intention to engage him in referential communication and that the content of the knowledge manifestation that follows the ostensive cue conveys relevant and culturally shared information about some essential property of the referent and its kind. The second way that ‘markedness’ is employed in ostensive referential communication is in the form of marked referential knowledge manifestations. In this case, the behavioral manifestations used to express the information to be conveyed are presented in a perceptually ‘marked’ transformed motor format. Such transformations of the primary functional use of the motor skill serve to foreground relevant and background non-relevant parts of the behavior to be learnt.

The first series of experiments (Study 1) presented in my dissertation was aimed to explore if and how a marked form of ostensive communicative cue, namely infant-directed speech might foster infants’ conceptual development by facilitating the establishment of kind representations. This question was investigated within the domain of artifact representation using

an object individuation paradigm. Previous studies suggested that before 12-months of age language is *unique* in its causal power of inducing kind-based representations for objects. We aimed to demonstrate that rather than linguistic labeling *per se*, it is the ostensive communication of some potentially kind-defining property (that could equally be verbal labeling as well as function demonstration) that induces kind-based artifact representation, and therefore facilitates object individuation under 12-months of age. In a series of experiments we tested whether non-verbal ostensive demonstration (using marked ostensive cues) of the functional use of artifacts could make young infants represent such objects in terms of their kinds.

The second study presented in the dissertation investigated the role of marked forms of referential knowledge manifestation in the representational development of infants. In particular, we investigated if and how 1) ‘marked’ forms of (maternal) referential knowledge manifestations about categorical emotions during early contingent affect-mirroring interactions and 2) maternal ‘Affect-Regulative Mentalization’ was related to the representational and affect-regulative characteristics of children’s pretend play at 2.5 years of age.

Based on the Social Biofeedback Theory, early experience with marked referential knowledge manifestations of categorical emotions during contingent affect-mirroring interactions was hypothesized to support the development of second order representations and to familiarize infants with the representational functions of referential ‘decoupling’, ‘anchoring’, and keeping pretence separate from reality. Therefore, early experience with maternal marking was hypothesized to predict a better representational pretence competence at 2.5 years of age.

Having reliable second-order representations of our emotions is a necessary prerequisite of successful emotion regulation. It might, however not be sufficient for it. Possessing effective coping mechanism and having the ability to implement them might be equally important. Correspondingly, maternal ‘Affect-Regulative Mentalization’ that was expected to be related to children’s emotion-regulative abilities.

## 2. THE METHODS USED IN THE STUDIES

### STUDY 1

#### **Participants**

All together 72 infants participated in Study 1 (mean age: 308 days; 39 males, 33 females), 24 children per experiment, 12 infants per condition.

Subjects were recruited via newspaper advertisements. Children came from mixed socio-economic backgrounds and were all native Hungarian speakers.

## **Materials**

### ***Experiment 1 and 2***

Two novel objects (a pink bell-shaped box and red rectangular box), different in shape and color with distinctive functional properties unfamiliar to the infants were used in the experiment. Turning a green circular switch on the red rectangular box caused a melodic sound effect. Pulling the handle of the pink bell-shaped box caused the lights located on the same object to flash.

### ***Experiment 3***

A single object was used in this experiment. It was created by fusing the two artifacts presented in Experiment 1 and 2 into one object which contained all the function-relevant features that were involved in the two functional uses demonstrated in that study. The new pink, bell-shaped artifact could therefore be used for either of the two different functions: turning the dial on its front induced a melodic sound effect, while pulling its handle on its side resulted in the lights on its front to flash.

## **Procedure**

### ***Experiment 1***

#### **Communicative Function Demonstration (CFD) Condition**

At the beginning of each familiarization trial the infant saw the occluding screen only while hearing a female voice saying “Hi baby, hi!” in infant-directed speech (marked ostensive cue). One of the objects was then pulled out from behind the screen by a hand, it was moved away from the screen and then it stopped. While the object stayed stationary two function demonstrations were presented. This involved a hand operating the protruding part of the object (manipulandum: circular switch or extending handle) as a result of which a salient effect was

produced (turning the green circular switch causing a melodic sound effect, or pulling the handle causing the lights to flash). Following the second function demonstration, the hand pulled the object back behind the screen. When both objects were occluded behind the screen, the same female voice was heard saying in motherese “Look at this!”. Then the second object was brought out from behind the screen to the other side of the stage. Two function demonstrations were then performed by the hand exactly as on the other side before. Finally the object was pulled back by the hand to its starting position behind the screen. This marked the end of the first familiarization trial.

Each infant received two familiarizations followed by two test trials. The first phase of the test trial was identical to the familiarization trials. The second phase (object presentation) started after the second object was placed behind the occlusion screen again and the same female voice was heard saying in motherese “Hi baby, hi!”. Then the hand appeared from above and removed the occluder revealing either one or two objects behind it. Infants’ looking times were recorded.

#### Baseline Condition

Infants were presented with two object presentation trials (identical to the second phase of the test trials in the Communicative Function Demonstration Condition) that revealed either one or two objects behind a screen. Infants’ looking times were recorded.

### ***Experiment 2***

#### Non-Ostensive Presentation (NOP) Condition

The materials and the procedure was identical to that of the CFD condition in Experiment 1 except that the infant-directed greeting that preceded the manual function demonstrations in Experiment 1 were replaced by a non-human melodic sound generated to match the surface acoustic parameters of the original ostensive stimulus.

#### No Causal Intervention (NCI) Condition

The materials and the procedure was identical to that of the CFD condition in Experiment 1 except that the manual intervention was removed from the demonstration. Infants observed the protruding parts of the objects to be moving by themselves contingently with the display of the behaviors that served as ‘effects’ in Experiment 1.

### ***Experiment 3***

#### Double-Function Demonstration (DFD) Condition

This condition was identical to the CFD Condition of Experiment 1 except that the same object emerged from both sides of the screen during familiarization and the first phase of the test trials. However, different manipulandum was operated and different effect ensued at the two sides of the occluder screen. During the second phase of the test trial, when the occluder was lifted up, infants either saw one object, identical to the one used in the familiarization and the first phase of the test trial, or two objects: the pink bell-shaped box with three lights and a long handle but without the dial, or the pink bell-shaped box without the lights and the handle, but with the dial the middle of the object.

#### Double-Function Baseline Condition

Infants were presented with two object presentation trials corresponding to the second phase of the test trials in the DFD condition.

## **STUDY 2**

Marked referential knowledge manifestations during contingent affect-mirroring interactions were measured at 12 months in the so-called three-phase Mirror Interaction Situation (MIS) that is a modified version of the standard Still-face paradigm.

A sub-sample (those, who could be contacted) of the infants who participated in the MIS were followed up at 2,5 years of age. Children were administered a modified and enriched version of the Kavanagh and Harris pretence tasks in order to investigate children's representational competence and to access their ability to use pretence for emotion-regulative purposes.

The methods mothers used to calm their babies were accessed by a questionnaire. Mind-Mindedness scores were based on the Mind-Mindedness Interview.

## **Participants**

Children participated in a longitudinal research project. In all cases, studies were conducted in the following order:

Session 1: Mirror Interaction Situation;

105 infants (mean age: 12,2 months; 57 boys and 48 girls).

Session 2: Pretend Play Task, maternal 'Mind-Mindedness' interview, questionnaire

68 children (mean age: 30,6 months; 40 boys, 28 girls).

Subjects were recruited via newspaper advertisements. Children came from mixed socio-economic backgrounds and were all native Hungarian speakers.

## **Procedure**

### ***Mirror Interaction Situation (MIS)***

The mother and the infant were seated 2 meters apart, next to each other, both facing a one-way mirror. They were separated by an occlusion screen which made it impossible for them to touch or see each other directly, but they could interact by facial and vocal gestures with each other using the mirror. The situation consisted of 2 two-min interaction phases separated by a two-min stressor phase. In the initial phase, the mother was instructed to freely interact with the baby through the one-way mirror. In the second phase, the “Still-face period”, the mother was instructed to put on a motionless neutral ‘still-face’ while fixating the infant’s face in the mirror. In the final phase, the mother was instructed to become ’normal’ again and interact freely with the infant.

The coding system focused on instances of four types of contingent responsiveness by the mother:

- (a) contingent verbal reference to the infant’s state or activity
- (b) vocal reaction to the infant’s activity or state expression, involving a high pitch contour and exaggerated vocal intonation pattern — characteristic of strong motherese or infant-directed-speech
- (c) imitative vocal reaction to infant’s vocal behavior;
- (d) facial imitative reaction that reflects the infant’s facial expressions back to the infant

On theoretical grounds the first measure was taken to represent the factor of ‘unmarked maternal responsiveness’ that consists of primary default forms of maternal displays expressing or deriving from the mother’s present dispositional states or reactions. In contrast, measures b, c and d were combined to represent the factor of ‘marked maternal responsiveness’.

### ***Pretend Play Task***

A modified and enriched battery of the Kavanaugh & Harris pretence tasks was administered to the subjects to measure:

1. overall representational pretence competence
2. ‘pretence fluency’  
(spontaneous, adequate and creative extension of pretence)
1. ‘pretence stability’  
(disruption of pretence activity, fluctuation between pretence and reality)
2. affect-regulative use of pretence

### ***‘Mind-Mindedness’***

The experimenter asked the mother to describe her child to her: ‘Can you describe [child’s name] for me?’ Answers were categorized as ‘mental’ if they mentioned something about the child’s will, mind, imagination, interest, intellect, metacognition, desires (not only likes, dislikes), emotions etc. Mothers were divided into a high and a low ‘Mind-Mindedness’ group based on their ‘Mind- Mindedness’ scores.

### ***Questionnaire***

Following the ‘Mind-Mindedness Interview’, a questionnaire was administered to the mothers. It contained questions about the child’s temperament, play habits, mother-child interactional characteristics including the way the mother usually calms the child.

Here we shall focus only on the measures that were used in the final analysis, namely: the calming strategy of the mothers. Mothers were asked the following question: ‘Is there a specific method that usually helps calm your child?’ The calming strategies were divided into a mentalistic and a non-mentalistic group.

### ***‘Affect-Regulative Mentalization’***

Subject who were in the high mind-mindedness group AND who used mentalistic calming strategies for soothing their child as revealed by the questionnaire described below were said to be characterized by ‘Affect-Regulative Mentalization’.

### **3. SUMMARY OF THE MAIN RESULTS**

#### **STUDY 1**

1. Demonstration of artifact function using marked ostensive cues (infant-directed speech) led to object individuation in 10-month-olds.

- These findings indicate that even without verbal labeling of the objects, function demonstration using marked ostensive cues can induce kind-based artifact representation in preverbal infants.

2. No object individuation was observable either in the NOP or in the NCI Conditions.

- Thus, both the presence of ostensive communicative signals (which induces an expectation of kind-relevant information to be demonstrated) and the presence of manual causal intervention are necessary prerequisites of object individuation based on artifact function at 10 months of age.

3. Infants expected to see two objects (object individuation occurred) in the DFD Condition despite the fact that only one object was present during the familiarization and the first phase of the test trials.

- Object individuation was based on the demonstrated functional information about artifact kinds, rather than on the visual properties of the object.
- Infants expect one specific function to define one specific artifact kind.
- The effect of the demonstration (using marked ostensive cues) of functional information on artifact representation is so strong that it even overrides perceptual information.

#### **STUDY 2**

1. Results indicate that children of mothers who were observed to use marked referential knowledge manifestations during early contingent affect-mirroring interactions develop a better overall representational pretence competence than children of non-marking mothers as indicated by their

- higher overall pretend play scores

- better performance in ‘pretence fluency’ (the spontaneous, adequate and creative extension of pretence)
- higher scores on ‘pretence stability’(less disruption in their pretence activity)

2. The children of mothers characterized by ‘Affect-Regulative Mentalization’ have better emotion-regulative abilities than children of mothers not characterized by ‘Affect-Regulative Mentalization’ as indicated by their

- higher ’emotion-regulative use of pretence’ scores
- better frustration tolerance in emotionally stressful situations (indicated by the longer total duration of the Still Face episode of the MIS)
- fewer disruptive behaviors in emotionally stressful pretence scenarios

## 4. PUBLICATIONS

### **Publications related to the topic of the dissertation**

Futó, J. (2005). Az emlék fenomenológiai minősége - mitől élénk az emlék? *Tudomány és Lélek*, Vol.7, 3-16.

Futó, J., Kónya, A. (2008). A gyermekkor emlékek természete: halványodás és kiemelkedés. *Alkalmazott Pszichológia*, Vol.10, 53-67.

Futó, J. (2009a). A gyermekkor emlékek jelentősége és változása a pszichoterápiában. *Pszichoterápia*, Vol.18, 28-40.

Futó, J. (2009b). Korai önéletrajzi emlékeink a pszichoterápiában; a kapcsolati kontextus jelentősége. *Lélekelemzés*, Vol.4, 18-30.

Watson J., Futó, J., Fonagy, P., Gergely, Gy. (in press). Gender and Relational Differences in Sensitivity to Internal and External Cues at 12 Months. *Bulletin of the Menninger Clinic*, Vol.74.