Human-specific abilities underlying the telling and interpretation of stories, narratives and actions

Lívia Ivaskó – Zsuzsanna Lengyel – Boglárka Komlósi*
University of Szeged, Hungary
Developmental and Neuropragmatic Research Group

*The presentation is supported by the European Union and co-funded by the European Social Fund. Project title: "Broadening the knowledge base and supporting the long term professional sustainability of the Research University Centre of Excellence at the University of Szeged by ensuring the rising generation of excellent scientists." Project number: TÁMOP-4.2.2/B-10/1-2010-0012

1. Abstract: The philosopher Dennett (1987) gives an account of the intentional stance or strategy that humans rely on while interpreting the actions of other human agents or any living organisms, and even the workings of inanimate objects. This general capacity helps us understand, generalize, and predict what the agent intends to do or how the agent attempts to reach its goals. Normally developing children over the age of 4 are considered to have the "mentalistic or intentional stance" described by Dennett. However, the interpretation of goal-directed actions seems to emerge earlier, between the age of 7 and 12 months (Csibra & Gergely, 2005). 116 normally developing Hungarian children aged 3─13 were examined by directed conversation in our study by means of a the test focusing on their understanding of the nonliteral meaning of different idioms, figurative expressions, irony, speech acts and the (intentional) violation of discourse norms in casual speech. The goal of the research is to explore the way normally developing children produce and understand implicatures, metaphors and other figurative uses of language; and describe the developmental properties characterising different age groups. Results indicate that in certain cases three and four-year-olds can infer the nonliteral but not the intended meaning with the help of contextual information, their previous knowledge and the presumption of relevance. Findings suggest that between the age of 3 and 4 huge differences occur in children's pragmatic development. That is why underlying cognitive development and neurological changes must be considered (Mascaro-Sperber, 2009, Leinonen et al., 2003, Loukusa et al., 2007). Our results also show that students above 6 can already comprehend conventional and novel idioms in their intended and nonliteral meaning, but their pragmatic competence becomes stable only much later (Karmiloff & Karmiloff-Smith, 2002). The third part of this poster gives a detailed account of the components necessary for the development of the interpretation of narratives.

Keywords: collaborative learning, epistemic vigilance, frontal lobe, joint attention, narrative mind, pattern recognition, pragmatics, shared intentionality, social biofeedback

2. Introduction:

COMMUNICATION LOOP

According to Frith, (2007, 175) communication is not a one-way process. The way we respond to others alters others' behaviour. He defines this as a *communication loop*. This cognitive neuropsychologist view claims that successful human communication can be reached if there is no discrepancy between patrners' meaning at the same time. As Frith says: there is a mutual agreement between the partners.

„We understand that people's behavior is controlled by beliefs even if these beliefs are false. Without this awareness that behavior can be controlled by beliefs, even when these are false, deliberate deception and lying are impossible." (Frith, 2007, 178)

When we share our models of the physical world with others we are constructing their models in our brain, as well we understand their perspective, and we see the differences between the two. Two brain areas are consistently activated by mind reading: the posterior superior sulcus and medial prefrontal cortex. When we are pretending to do something our partner has a belief what would happen if she/he has a pattern of our behavior in his/her mind (Frith, 2007).

3. Theoretical background:

Various authors of different fields (philosophy, cultural anthropology, cognitive and developmental psychology, neuropsychology) have similar concepts concerning narratives:

PEDAGOGICAL STANCE

Csibra and Gergely (2005) claim that the selective and interpretive nature of imitation specialized for cultural transmission and its role in pedagogy must be human-specific. Cultural transmissions normally happen in pedagogical contexts, and infants have a set of special cognitive mechanisms/resources by means of which they recognize and identify these events. Infants' "pedagogical stance" (cp. "intentional stance") ensures that they learn the new and relevant cultural information. Ostensive and referential cues/stimuli draw their attention to the fact that they are being taught. According to Csibra and Gergely, in a communicative context (pedagogical demonstration context) early imitative learning is much faster and more successful.

Pedagogical communication is defined by Csibra and Gergely in the following way:

„…the selective interpretive nature of early imitative learning can be explained as a result of the implicit assumptions built into the infant's „pedagogical stance" that constrain and guide imitative learning, and that is activated by the ostensive-communicative cues of knowledgeable others who manifest new and relevant cultural information for the infant to learn" (Csibra & Gergely 2005)

MYTHIC CULTUIRE

Systems of pattern recognition, having a crucial role in the the telling of narratives, had already appeared in mythic culture

While mimetic representation was tied to concrete episodes, metaphorical thinking enabled humans to compare events across episodes, make generalizations and highlight thematic content. Separate pieces of information (episodes) that were bound in time became integrated into narratives and stories were told. Myths already contained causal explanation and prediction. They regulated daily life and specified the significance of objects and events in life. Furthermore, language was a social device, rather a tool to create conceptual models of the human universe than a means of communication (Donald 1991).

JOINT ATTENTION

The role of joint attention in narrative interpretation

The ability to identify with others is enabled by the human capacity to attribute intentions and mental states to others, i.e. we treat others as intentional agents. This makes it possible to read their minds and leads to the ability to solve problems together. The communicative use of language is based on the assumption that signals are produced intentionally and the existence of humans' intentional stance, they generally rely on when interpreting the actions of conspecifics. We can see that shared intentionality is seen as a cornerstone in the evolution of human signalling, compared to individual intentionality. Although full-fledged shared intentionality cannot be identified in great apes, they show a certain degree of cooperative motive. Tomasello identifies only one key adaptation throughout human evolution being responsible for the emergence of symbolic language. He puts great emphasis on a novel type of learning which paves the way for collaborative learning.

INTENTIONAL STANCE

What does the agent intend to do?

The philosopher **Dennett** (1987) gives an account of **the intentional stance or strategy** that humans rely on while interpreting the actions of other human agents or any living organisms, and even the workings of inanimate objects. This **general capacity** helps us understand, generalize, and **predict** what the agent intends to do or how the **agent** attempts to reach its goals. In order to be capable of predicting behaviour, it is also important for us to treat the object as a **rational agent**. This powerful tool never ceases to work in humans, and attributing mental states, beliefs, desires etc. to others might as well be an **evolutionary advantage** for humankind, as we are able to consider the **goals** of other rational agents in the light of their beliefs.

FRONTAL LOBE

How does the maturity of the frontal lobe affect narrative-interpretation?

The understanding of ironic criticism and ironic compliment depends on children's neural maturation, mentalizing skill, and social learning (Pexman és Glenwright 2007). Data show that the right hemisphere and frontal lobes are involved in processing the intentional, social and emotional information. Right VM-PFC (ventromedial prefrontal cortex) is involved in the final stage of understanding irony, where a decision is made about the intended meaning (Shamay-Tsoory, Tomer, and Aharon-Peretz 2005). Developmental researches on figurative language (e.g. irony) reveal three component for understanding others' stories. Children have to understand (1) speaker's belief, (2) speaker's intent to tease, and (3) speaker's attitude.

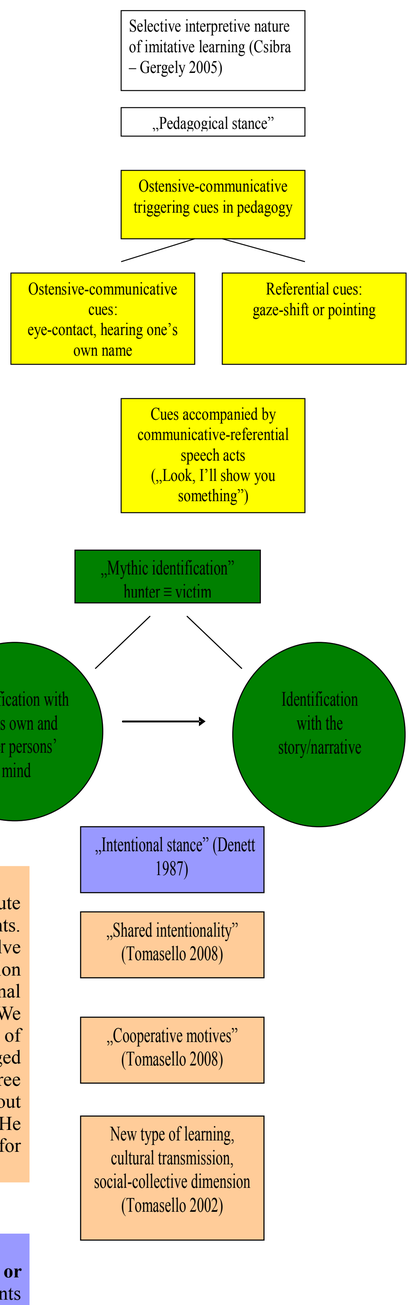
SOCIAL BIOFEEDBACK

Mothers mirror their babies' affective facial behavior to mark them in order to differentiate between their real feeling and these mirrored ones. Mothers give contingent responses to enable their children to interpret social interactions.

1. The infant will come to detect and group together the sets of internal state cues that are indicative of his or her categorically distinct dispositional emotion states.
2. The infant will establish secondary representations associated with his or her primary level procedural affect states providing the cognitive means for accessing and attributing emotion states to the self.
3. The infant will acquire a generalized communicative code of "marked" expressions characterized by the representational functions of referential decoupling, anchoring, and suspension of realistic consequences.

(Gergely & Watson 1999)

Baby-mother interactions: ostensive behaviour
http://www.youtube.com/watch?v=apzXGEbZht0



TELEOLOGICAL STANCE

Csibra and Gergely (2003, 2005, 2011) have demonstrated in their experiments with infants that even one-year-olds are able to interpret and draw inferences about other people's goal-directed actions. According to **Frith anf Wolpert (2003),** the interaction between the „observer" and the „actor" can be divided into three stages. First comes the observation of the actor's beliefs, goals, and feelings. Then the observer responds with a behavioral act to that of the actor. Imitation is the simplest means of response. When the observer succeeds in imitating the other person, it shows that he understood the actor's goal. Finally, the so-called „communication loop" is closed, and the actor considers the behaviour of the observer and responds to it.

Csibra and Gergeyly argues that infants rely on a **non-mentalistic interpretational system,** which later develops into a representational system controlling the inferences of adults about **the mental states (beliefs, desires, intentions) of others**. Children are led by the **principle of rational action**; they focus on **goal-states** and pick out **the most efficient way** available.

Normally developing children over the **age of 4** are considered to have the **"mentalistic or intentional stance"** described by Dennett. However, the **interpretation of goal-directed actions** seems to emerge earlier, between the age of **7 and 12 months**.

This early competence of children has been tested by means of several paradigm, including imitation, joint attention or violation-of-expectation looking time studies. Results of the latter type of tests show that children are surprised if the most efficient way of carrying out an action is avoided by the agent, which means that they have strong expectations concerning the process and the most efficient (rational) alternative of carrying out goal-directed actions. They always suppose that agents act reasonably.

Csibra and Gergely (2003, 2005) argue that children's teleological stance creates an explanatory relation between the action, the goal state and the situational constraints. This "**rationality principle**" is considered by many to be a key component of **the ability to read others' mind**.

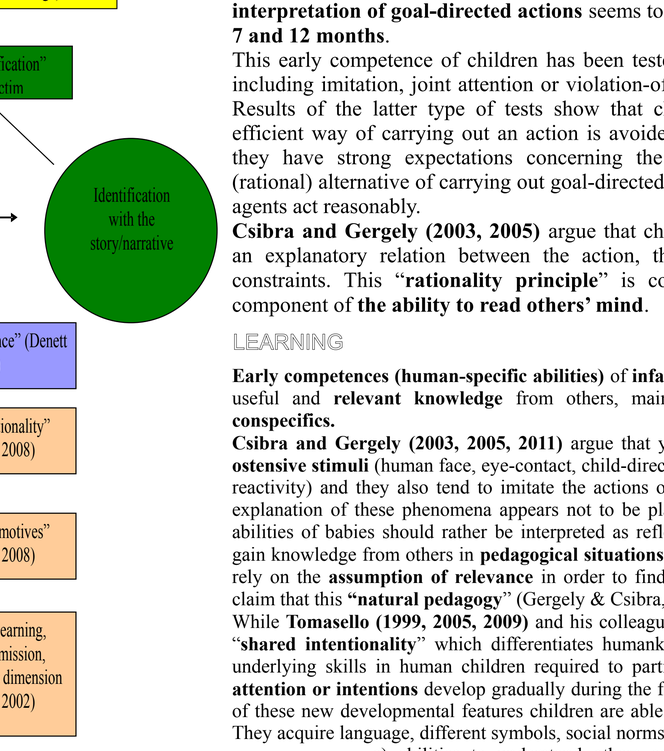
LEARNING

Early competences (human-specific abilities) of **infants** seem to form the basis of receiving useful and **relevant knowledge** from others, mainly from **older and knowledgeable conspecifics.**

Csibra and Gergely (2003, 2005, 2011) argue that young children are sensitive to several **ostensive stimuli** (human face, eye-contact, child-directed speech (motherese), and contingent reactivity) and they also tend to imitate the actions of others, but the traditional functional explanation of these phenomena appears not to be plausible enough. They claim that these abilities of babies should rather be interpreted as reflecting certain **adaptations** required to gain knowledge from others in **pedagogical situations**, where both teachers and students also rely on the **assumption of relevance** in order to find novel information. Furthermore, they claim that this **"natural pedagogy**" (Gergely & Csibra, 2011) is likely to be **human-specific**.

While **Tomasello (1999, 2005, 2009)** and his colleagues claim that it is mainly the so-called "**shared intentionality**" which differentiates humankind from other living organisms. The underlying skills in human children required to participate in activities that involve **joint attention or intentions** develop gradually during the first 14 months of their lives. By means of these new developmental features children are able to learn from their older conspecifics. They acquire language, different symbols, social norms etc. This is based on childrens'

a) abilities to understand others as intentional agents & b) their early collaborative activities, i.e. their human-specific attempts to share feelings, activities or experience with others.



EPISTEMIC VIGILANCE

Mascaro and Sperber (2009) in their study focusing on children's responses to lies and deceit have emphasized the fact that the **developmental change being responsible for the differences between 3- and 4-year-olds "takes place over a period of 6 months to one year that begins before the age of 4"** (Mascaro & Sperber, 2009). These results are in line with research on theory of mind which predicts the children's more developed perspective-taking abilities emerge between their third and fourth years. The notion of "epistemic vigilance" (Sperber et al., 2010) refers to the set of cognitive mechanisms in human beings that is basically responsible for **minimizing misunderstandings and maximizing cooperation and comprehension** while communicating with others. We need to be **vigilant** to avoid being misinformed; however, **we are not equally vigilant in every phase of our lives**. Sperber and his fellow researchers claim that although trustfulness is a fundamental human characteristic ─ this notion is also supported by evolutionary anthropologists (Tomasello, 2009) ─, it must be based on **epistemic vigilance** to work properly in order to gain benefits when we communicate with others. This is explained by the concept which highlights that humans while communicating always make attempts to be understood, or make the hearer act or think in a particular way (Sperber et al., 2010) by means of exploiting the other person's efforts to relevance.

OSTENSIVE BEHAVIOUR

Relevance theory uses the term of ostensive-inferential communication. By this term, it refers to the use of an ostensive stimulus, designed to attract an audience's attention and focus it on the communicator's meaning. Relevance theory claims that the use of this stimulus may create exact and predictable expectations of relevance not raised by other stimuli, so it encourages the addressee to interpret what was communicated. Sperber & Wilson argue that utterances come with the presumptions of their optimal relevance.

During the comprehension of nonliteral meaning in the relevance-theoretical framework, the addressee should take the linguistically encoded sentence meaning; following a path of least effort, he should supplement it at both the explicit level and at the implicit level until the final interpretation meets his expectation of relevance.

4. Research method, data, results:

Intended or not intended, literal or nonliteral meaning ─ the early stages of the development of pragmatic comprehension

The results of the **research conducted by Zsuzsanna Lengyel and Lívia Ivaskó** (SZTE Developmental and Neuropragmatic Research Group) on the development of the pragmatic competence of normally developing Hungarian child *focusing on their understanding of the nonliteral meaning of different idioms, figurative expressions, irony, speech acts and the (intentional) violation of discourse norms (floutings) in casual speech* shows the following:

- **3-year-olds:** children even at the age of 3 can rely on contextual clues, and due to their expectations of relevance they are sometimes able to infer the meaning of certain unknown figures of speech and implicatures. They do not react to the intentional violations of forms, probably due to the fact that they are in a developmental period when their first motivation is to learn from adults, acquire language and novel expressions. **Very young children are likely to interpret unknown utterances literally**. But sometimes they simply ignore the expressions being irrelevant for them in pragmatically demanding tasks, and they respond to an element of the situation that contains a **goal, action or any other direct outcome** of the given action. In these situations they can only rely on their first-order representational abilities that do not facilitate inferential interpretation.
- **4-year-olds:** Children start to use their **early inferential abilities** at this very young age. As typically functioning children make attempts to understand what they are told, the first clue they seem to consider is the context of the utterance, and by doing so they often succeed in interpreting figurative language over 3, while 4- and 5-year-olds do increasingly well in utterance interpretation in various tasks. 4-year-olds rarely react to the intentional violations of norms.
- **5-year-olds:** Both reaction and verbal correction concerning the intentional violations of forms emerge **at the age of 5**. The production of the **speech acts** is increasingly explicit with the advancement of age, and later as children's abilities to understand pragmatically more complex utterances is sophisticated enough, they start to rely on pragmatic inferences to interpret and produce **indirect speech acts**. 5-year-olds are often **able to infer the meanings of novel metaphors, or figurative elements** embedded into **pragmatically less demanding** contexts.

Fundamental components of our experimental work

Intentional violations/"floutings" of discourse norms have also been used in the present study to investigate when normally developing Hungarian children become aware of these elements or whether they accept them from the communicator (the adult conducting the experiment) without any response. On the basis of previous research, 4-year-old children seem to be ready to interpret nonliteral meanings; they normally understand the intended meaning of the speaker, as they are able to take the perspective of others due to fundamental cognitive and neurological development taking place at this early age.

5. Summary: our results integrated into the theoretical basis of the research

PRAGMATIC COMPETENCE

The study is based on the concept that **pragmatic competence** is responsible for the appropriateness of our utterance in various communicative situations.

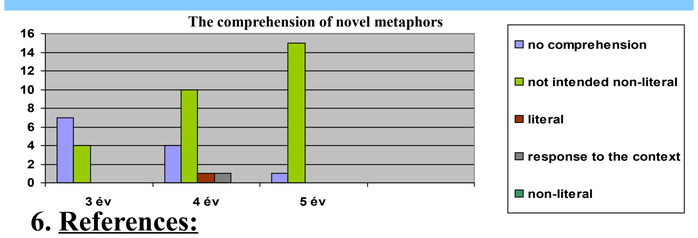
During the comprehension of nonliteral meaning in the relevance-theoretical framework, the addressee considers the sentence meaning coded linguistically, and he also takes contextual clues into account in order to work out the speaker's meaning. When the utterance is not explicit enough, the addressee with the help of his assumptions based on the context enriches what he has heard at the explicit level and the utterance is also complemented at the implicit level. Meanwhile the hearer makes the least possible effort to understand the **speaker's intended meaning** which really meets his "**expectation of relevance**" (Sperber & Wilson, 1986/1995, 2004).

Sperber and his colleagues also agree with the idea that without our human-specific cognitive abilities, i.e. the **use of language and sophisticated mindreading** we would not be able to comprehend what is communicated and all the subtle meanings that we normally decode in everyday situations. Additionally, they underline the importance of other fundamental cognitive skills and also **prior knowledge** humans gain in a wide array of interactions with others (Sperber et al., 2010). Furthermore, one must also be able to **understand his own, as well as other people's thoughts, ideas, believes, desires** etc. (Happé, 2003; Ifantidou, 2011; Leslie 1987; Loukusa et al., 2011) in order to do well in pragmatically demanding tasks.

METAREPRESENTATIONAL ABILITIES AS ATTRIBUTING INFORMATIVE AND COMMUNICATIVE INTENTIONS TO OTHERS

In the case of the comprehension and interpretation of nonliteral meanings in communication, it is essential to have a set of mental and social mechanisms that help us understand **the perspectives of other people.**

Children develop their **theory of mind gradually**, but on the basis of several experiments and research, scientists claim that children at 4 are able to attribute beliefs and false beliefs to others ─ most commonly literature refers to this ability as **"mentalization", "theory of mind" or "mindreading"** ─ (Baron-Cohen, 1985, 1995, 2000; Győri, 2002, 2005; Happé, 2003). Sperber and Wilson agree that the comprehension of utterances depends on different types of **metarepresentational abilities**, **as attributing informative and communicative intentions** to other speakers is the basis of the interpretation process (Sperber & Wilson, 2004). **First-order representational abilities**, being able to describe what is happening in reality around us, are not enough to interpret **certain implicatures or irony**, in these cases, one needs to rely on his **second-order metarepresentational abilities**, enabling the person to understand and consider the mental states of others (Happé, 2003).



6. References:

Frith, Ch. D. & Wolpert, D. M. (2003). *The Neuroscience of Social Interaction: Decoding, imitating, and influencing the actions of others*. Oxford University Press.
Sperber, D. & Wilson, D. (1986/1995). *Relevance: Communication and Cognition*. Oxford: Blackwell.
Tomasello, M. (1999). *The Cultural Origins of Human Cognition*. Harvard University Press.