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Communication Repair and its Role in ToM Development

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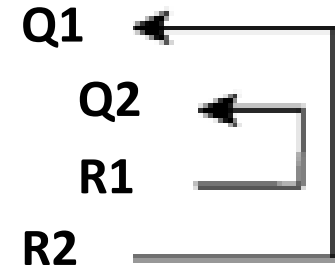
child lab

Introduction

- Conversation:
 - primary, basic environment for language use
 - ***turn-taking organization***
 - next *turn as a manifestation of* (in)**comprehension** of previous utterance
 - > addressee can respond, fulfill a request, continue the topic of conversation; and – in case of **problems with understanding** – try to **repair it**
 - *other-initiated repair* (OIR)
- > conversation organization provides an infrastructure which allows to: achieve comprehension, identify incomprehension and undertake efforts leading to repair

OIR as conversational recursion

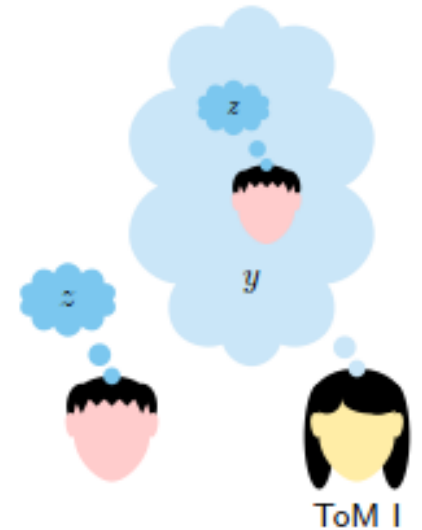
- **Client:** can I have one Okocim?
- **Sprzedawca:** in bottle or draught?
- **K:** in bottle
- **S:** here You are (handing a bottle of beer)



- the structure of OIR is: $Q_1 [Q_2 R_1] R_2$ – i.e. *center-embedded recursion* (Levinson, 2013)
- recursion (def.) – an element containing an element of the same sort; capacity to embed a phrase in another phrase

Recursion and ToM

- distinctive property of language (Hauser et al., 2002)
- syntax and ToM development (de Villiers, 2014; 2017; Roeper & Speas, 2014)
- Corbalis (2003): recursion in language (syntax) and ToM
- BUT: recursion in conversation as primary/more basic (Levinson, 2013)
- > research question: recursion in conversation and ToM?



Conversation as collaboration

- Collaborative Model of Dialog (Clark, 1996; Levinson, 2006; Tomasello, 2008)
 - interlocutors build reciprocal understanding using *intention(mind)-reading* (i.e. *recipient-design*) and inferences about sender's intentions („what are you doing in the evening?“)
 - *common-ground, intersubjectivity*
 - *sensitivity to breakdown in the intersubjectivity*
- > communication development is *interwoven* with ToM (*mindreading*) development (Carpendale i Lewis, 2015)

Extreme case of communication as collaboration

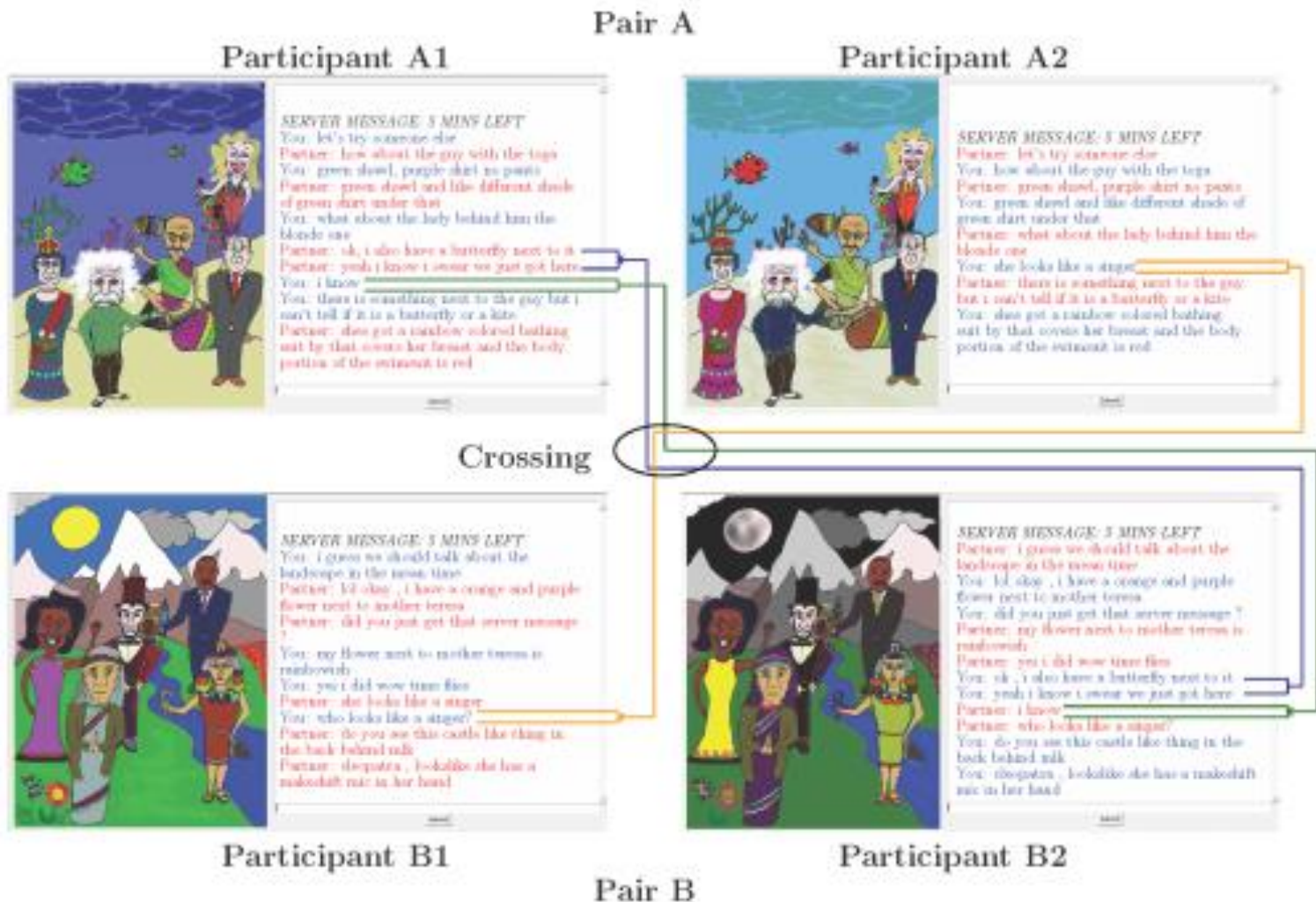
Aircraft: Los Angeles Tower, three seven charlie (37C), holding short of two three right.

Tower: Three seven charlie, Los Angeles Tower, runway two three right, cleared for immediate takeoff.

Aircraft: Roger, three seven charlie, cleared for immediate takeoff, two three right.

Do people really converse like that?

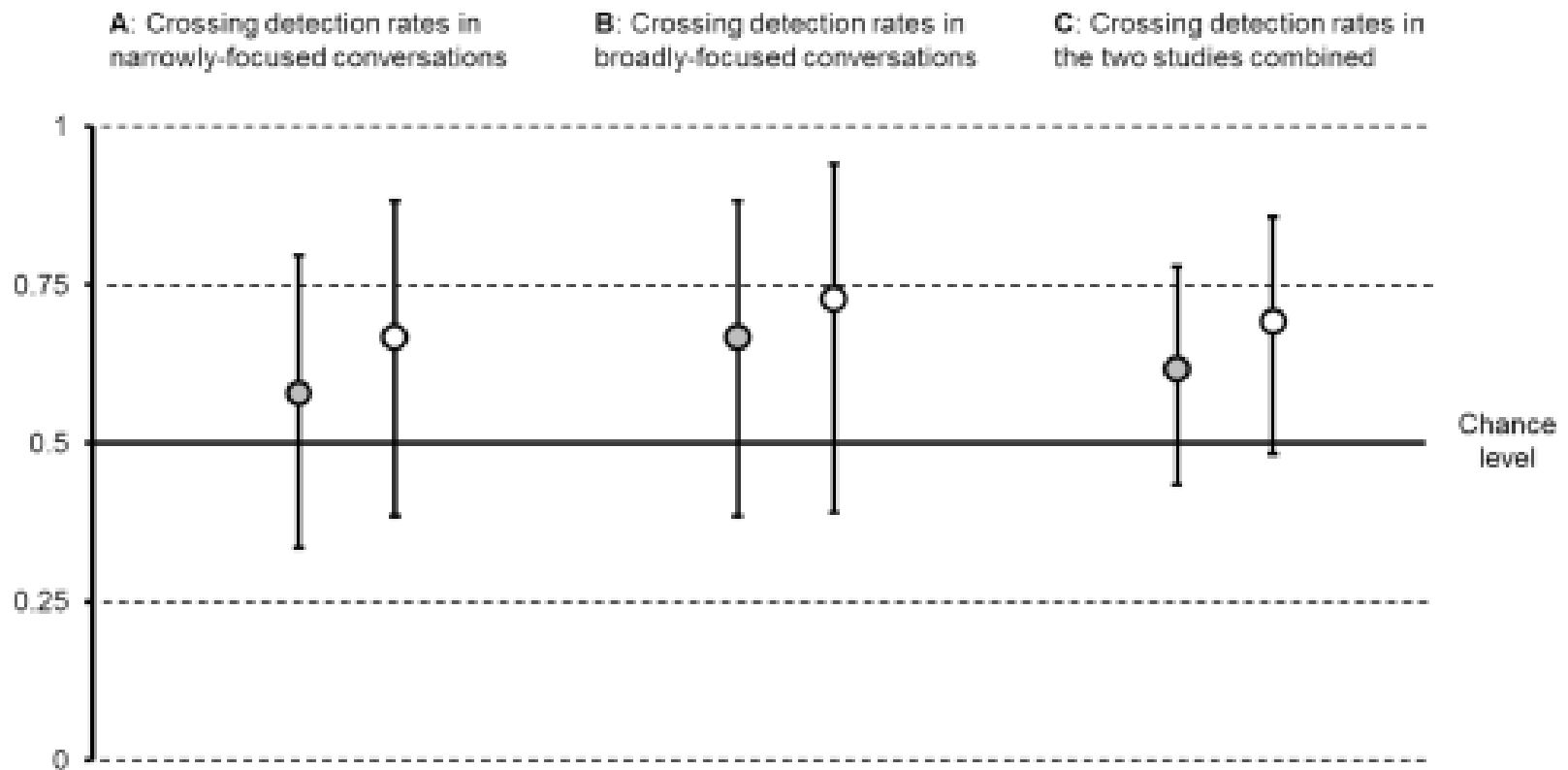
Galantucci, Roberts (2014):



Do people really converse like that?

(Galantucci, Roberts, 2014):

- Did you notice anything unusual in the conversation?
- Which group do you think you were in?



Do people really converse like that?

(Galantucci, Roberts & Langstein, 2018):

- spontaneous face-to-face conversation
- confederate utters the nonsensical sentence “colorless green ideas sleep furiously”
- Did you notice anything unusual in the conversation?
- Which group do you think you were in?
- only 10 (33%) participants noticed that they were in nonsensical sentence group
- only one recognized the sentence in the list of 20 nonsensical sentences
- > people are insensitive to conversational incoherence: content deafness
- > phatic function of communication?

Research questions:

- Do children engage in OIR and if so – is it related to ToM development?
- Does the relation exist if language comprehension and production are being controlled?

Our research

- I order ToM (42 m.; N = 281-290)
 - tasks: Deceptive box task, Knowledge Access, False Belief Task, Belief-Emotion Task, Explicite False Belief
- II order ToM (66 m.; N = 174-179)
 - tasks: „ice-cream truck” and „birthday present” stories
- OIR – „shop” task (42 m.; N = 283-285)
- language production (24 m.; N = 341)
 - no of uttered words, sentencest and questions
- language comprehension (24 m.; N = 264; 36 m.; N = 275)
 - OTSR (Haman i Fronczyk, 2012) summary score

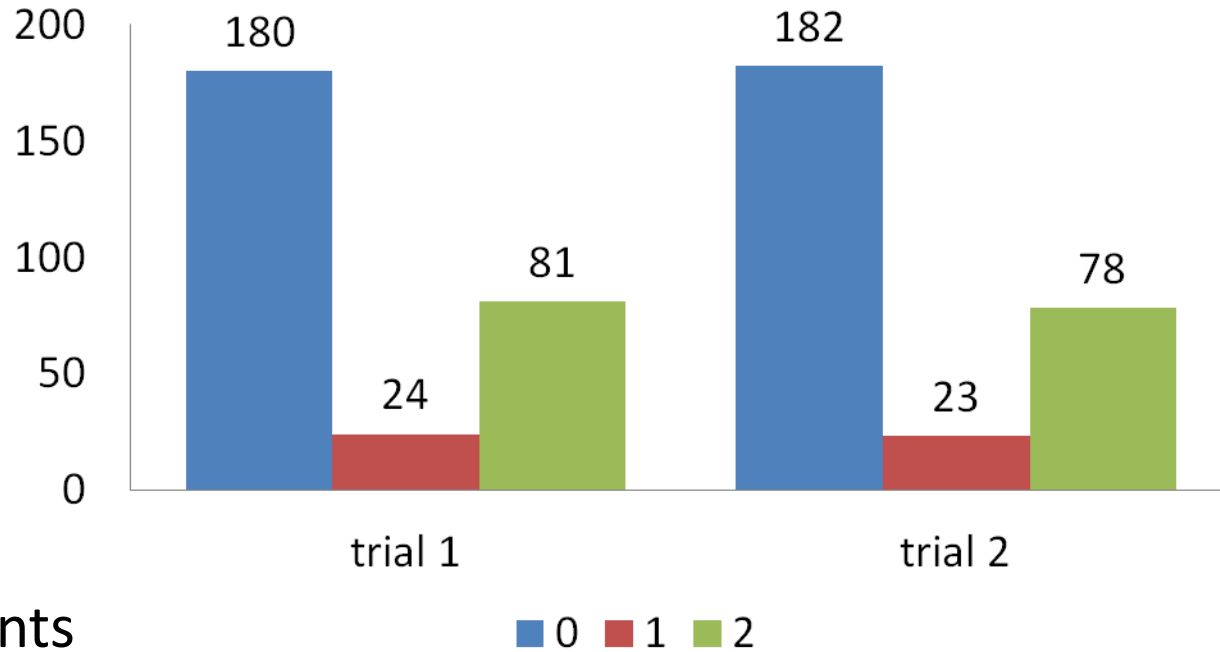
The „Shop” task

- child and Experimenter (E) put 8 objects on „shop shelves”, matching their colours
- i.a.: 2 apples and 2 mugs of different colours
- E’s indefinite utterance: „Give me an apple”
- Child’s responses:
 - „which one?” – 2 points
 - gives one; E points „we have two ...” and again asks to give her the object; if now child asks „which one?” – 1 point



Results: descriptive statistics OIR

- Frequency



- 64% - 0 points
- 8% - 1 point
- 28% - 2 points

In two trials 46% of children get at least 1 point (37% at least once get 2 points)

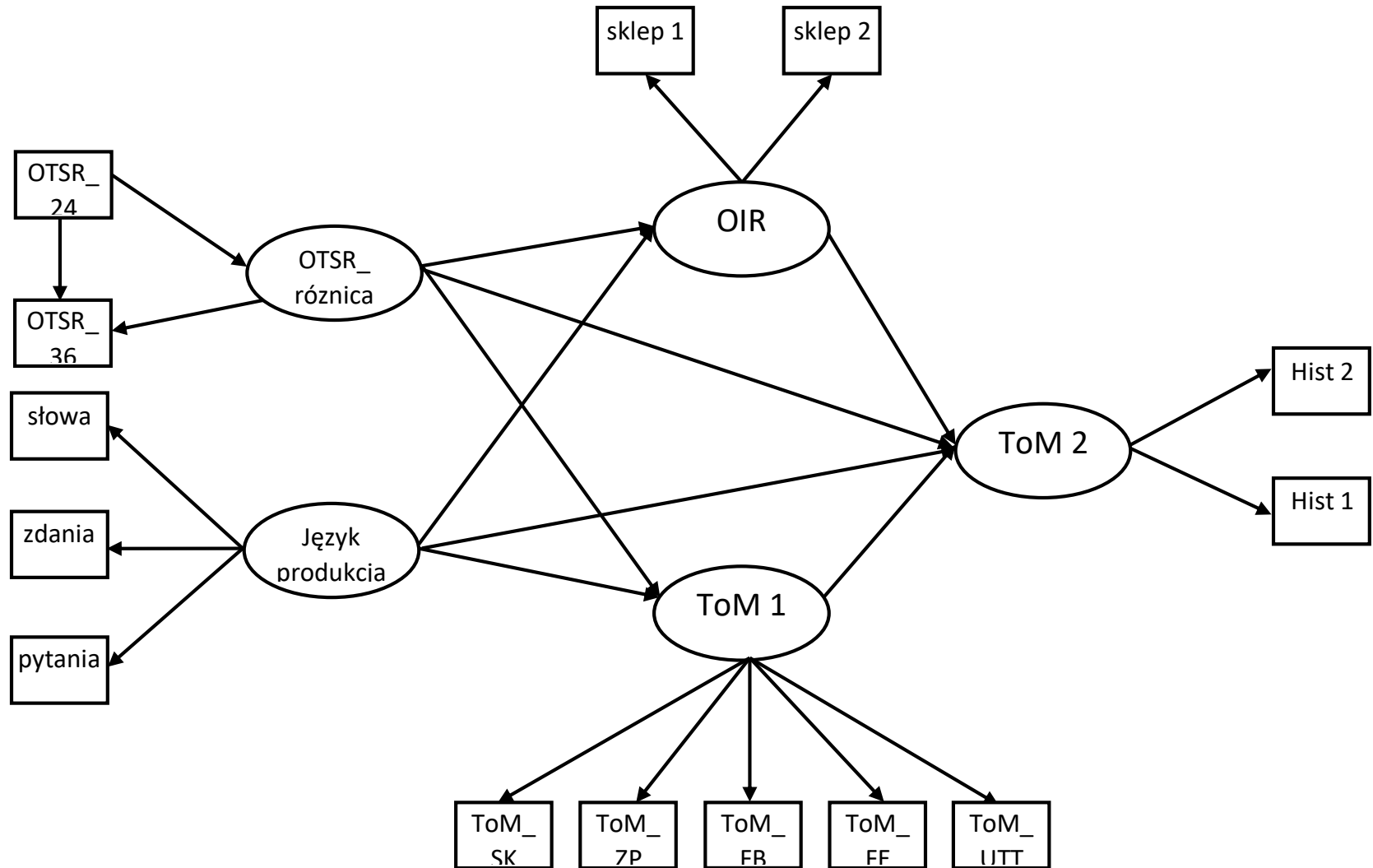
Results: data reduction

- Model:
- latent variables:
 - **language production**: no of words, sentences and questions
 - **OIR**: sum of points in 2 tasks
 - **ToM1**: sum of points in 5 tasks
 - **ToM2**: sum of points in 2 tasks
 - **difference in language comprehension level** (between 24 and 36 months)

Results: intercorrelations between latent variables

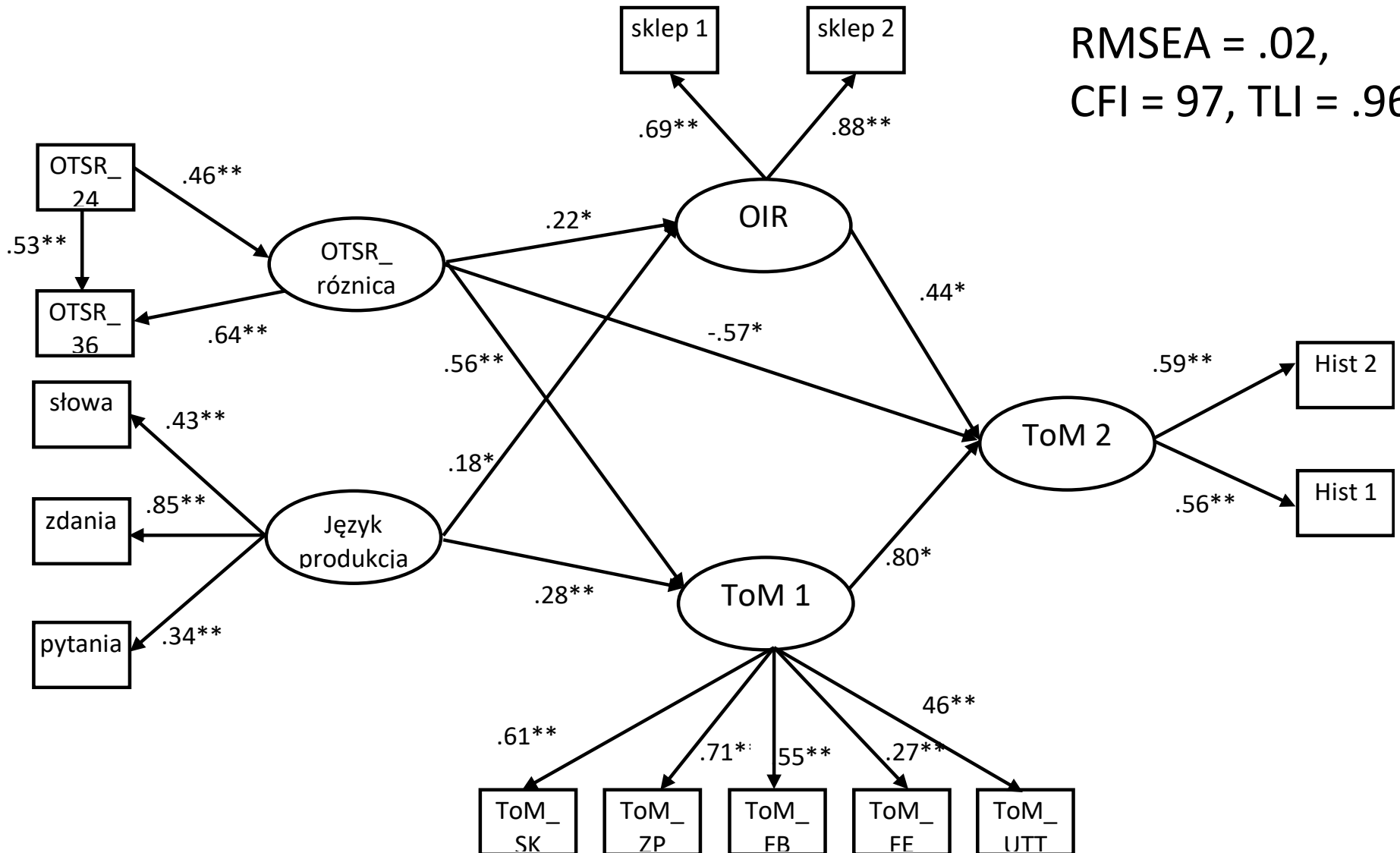
variable	1. language production	2. language comprehension – difference	3. OIR	4. ToM1
1. Language production				
2. Language comprehension – difference	.130*			
3. OIR	.193*	.162*		
4. ToM1	.285**	.191*	.166	
5. ToM2	.313**	.137	.544 **	.434 * *

SEM – model of direct and indirect prediction – language, OIR and ToM1 -> ToM2



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RMSEA = .02,
CFI = 97, TLI = .96



Results: model of direct and indirect prediction – language, OIR and ToM1 -> ToM2

Most important:

- OIR and ToM1 – insignificant ($r = -.03, p = .799$)
- OIR ($\beta = .44, p = .013$) and ToM1 ($\beta = .81, p = .015$) explain ToM2 variance

Indirect relations (mediation)

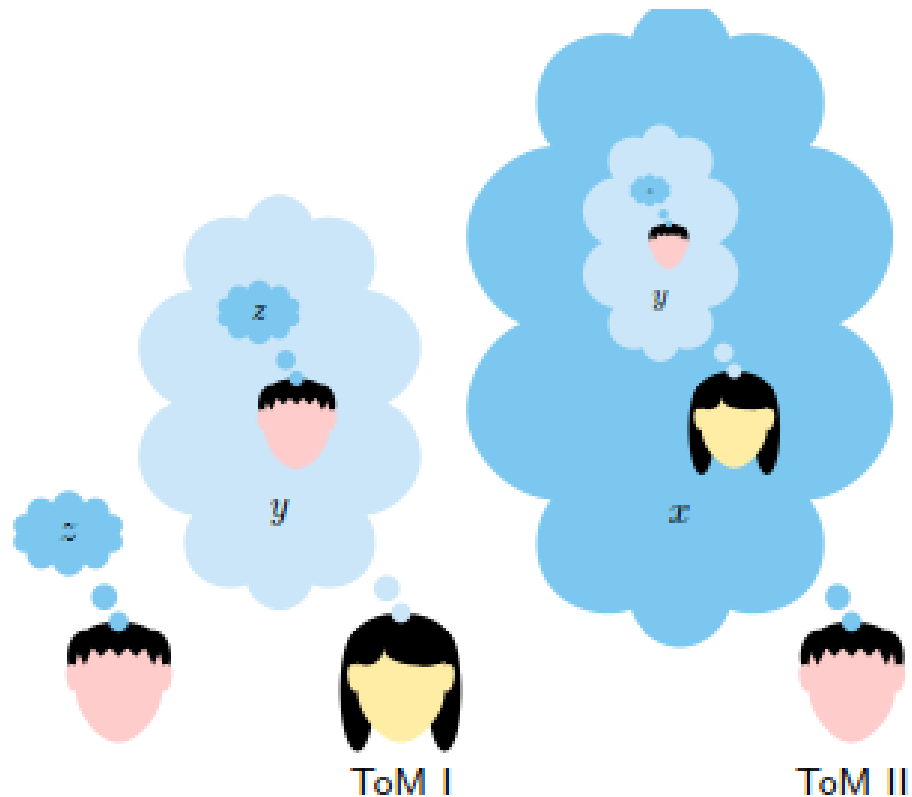
- speech \rightarrow ToM2 ($\beta_{\text{ind}} = .31, p = .042$)
 - speech \rightarrow OIR \rightarrow ToM2 ($\beta_{\text{ind}} = .08, p = .086$)
 - speech \rightarrow ToM1 \rightarrow ToM2 ($\beta_{\text{ind}} = .23, p = .081$)
- OTSR_diff \rightarrow ToM2 ($\beta_{\text{ind}} = .55, p = .030$)
 - OTSR_diff \rightarrow OIR \rightarrow ToM2 ($\beta_{\text{ind}} = .10, p = .123$)
 - OTSR_diff \rightarrow ToM1 \rightarrow ToM2 ($\beta_{\text{ind}} = .45, p = .047$)

Discussion

- almost half of the children (42 months) engage in OIR (more than 1/3 does it at least once spontaneously)
 - some children recognize incomprehension and seek to repair it
- lack of cross-sectional covariance?? between OIR and ToM1
 - unexpected result
 - comprehension in conversation and *mindreading* not related?
- longitudinal relation OIR and ToM1 with ToM2
 - ToM1 and ToM2 – expected result
 - OIR predicts ToM2 scores (at the age of 5,5 years)
- negative relation between language comprehension difference and ToM2

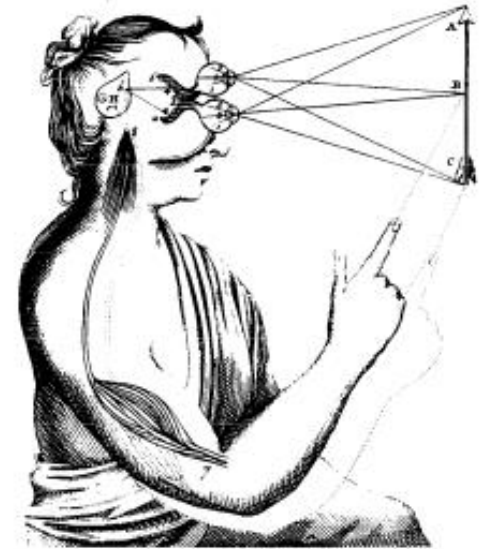
Summary: ToM and recursion

- how do our results fit in with the traditional ToM (*mindreading*) research?
- and: with research on the relation between ToM and recursion?



Sandwich model of mind

(Hurley, 1998)



- sandwich model of *mindreading*

Summary: ToM and recursion

- ToM1 is not recursive (?)
 - not a representation of relation of representation (?)
- BUT: if ToM1 and OIR are non-mentalistic, why aren't they related?
- role of 'failures' (incomprehension) in communication and interaction (Pierce, Dewey, Piaget, Perner, Harris, Gallagher)
 - incomprehension causes consideration of (reflection on?) other's behavior, communicate or intention
 - might stimulate the development of fully recursive ToM, i.e. ToM2

Summary

- engaging in repair and ToM1 in a relatively independent way let us predict ToM2 scores
- interpretation concentrated on recursion and its role: if OIR has a structure of conversational recursion, the results can suggest that only ToM2 is recursive