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Convergence and divergence between word learning and pragmatic inferencing

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Word learning & pragmatic inferencing

"If children do in fact use pragmatic reasoning to learn new words, why can't they use that knowledge to compute [Scalar Implicature] inferences?"

(Stiller, Frank & Goodman, 2014; cf Katsos, 2014)

Word learning & pragmatic inferencing

Outline

- Convergence
- Divergence
- Acquisition

Word learning & pragmatic inferencing

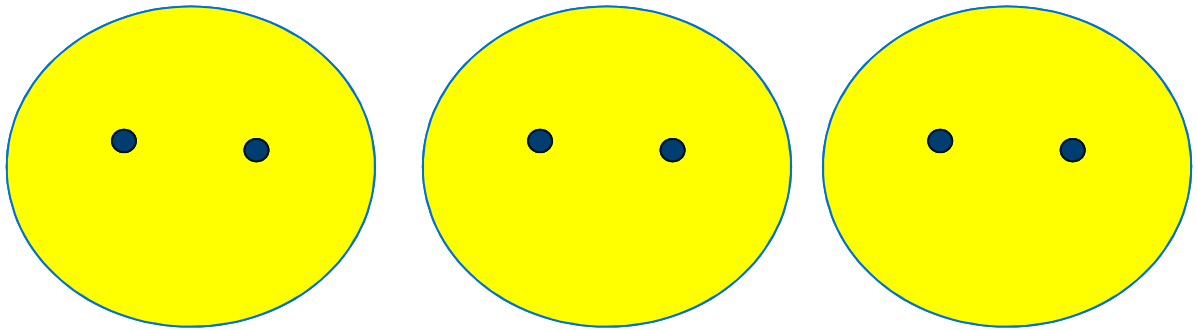
1. No similarity
2. Superficial similarity only
3. Real similarity

1. Implicatures

Scalar quantity implicature

Make some faces happy

+> Make some but not all faces happy



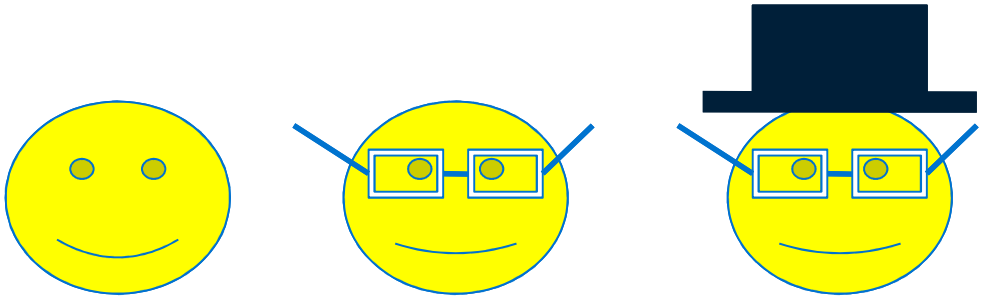
Miller, Schmitt, Chang & Munn, 2004

1. Implicatures

Ad hoc quantity implicature

My friend wears glasses

+> My friend wears glasses *and nothing else*



Stiller, Frank & Goodman, 2014

1. Implicatures

Manner implicature

‘The man made the door open.’

+> The man made the door open *not in the usual way*

Antoniou & Katsos, 2017

1. Implicatures

Relevance implicature

(Given a selection of things to 'buy')

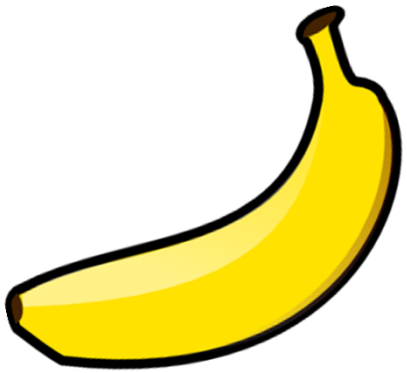
I find this one tasty

+> I want to buy this one

Tribushinina, 2012

Word Learning

Word learning by exclusion



Markman & Wachtel, 1988

Convergence

1. Convergence

Manner

S said ‘p’

1. S said ‘p’ instead of more conventional ‘q’ with meaning *q* similar to *p*

2. If S meant *q*, S would have said ‘q’

co-operativity & conventionality

3. a) S did not say ‘q’ so b) does not mean *q* (in a conventional way)

4. Therefore S means *q in a non-conventional way*

Quantity

S said ‘p’

1. S said ‘p’ instead of more informative ‘q’

2. If S meant *q*, S would have said ‘q’

co-operativity & informativeness

3. S did not say ‘q’ so b) does not mean the more informative *q*

4. Therefore S means *p but not q*

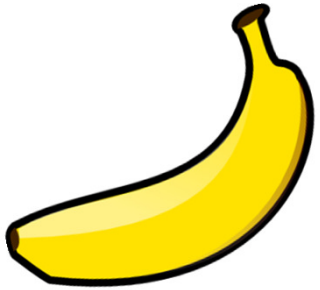
Modus tollens

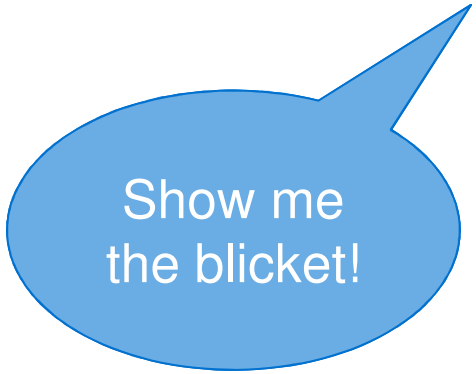
Disjunctive syllogism

1. Implicature & word learning

Clark's Principles of Conventionality & Contrast

For certain meanings, a conventional form is used in the language community





Clark, 2003

1. Convergence

The speaker S said ‘p’, ‘blicket’

1. S could be intending to refer to *p* or *q* *[e.g., banana or unknown object]*
2. If S meant *q*, S would have said ‘q’, ‘banana’
3. a) S said ‘p’, ‘blicket’, so b) S does not mean *q*, *the banana*
4. Therefore, S intends to refer to *p, the unknown object*
5. Therefore ‘blicket’ refers to *p, the unknown object*

(Assuming the speaker is co-operative)

Modus tollens

Disjunctive syllogism

Grassmann, 2013

Conventionality & Contrast and Manner

- Grice's Maxim of manner: be perspicuous
  - Avoid obscurity of expression
  - Avoid ambiguity

Obscure = non-conventional

1. Convergence

Common prerequisites

- Share joint attention
- Read intentions
- Track common ground
- Take in contextual cues
- Be sensitive to co-operativity

Tomasello, 2003, 2008

1. Convergence

Sensitivity to pragmatic manipulations

- **Speaker reliability** Diesendruck et al., 2010; Grodner & Sedivy, 2011
- **Speaker belief** Carpenter, Call, & Tomasello, 2002; Diesendruck, 2005; Goodman & Stuhlmüller, 2013; Breheny, Ferguson, & Katsos, 2013
- **Joint attention** Tribushinina, 2012
- **Common ground** Grassmann et al., 2009
- **Question under discussion** Grosse, Moll, & Tomasello, 2010; Grosse & Tomasello, 2012; Scrafton, 2009; Verbuk, 2012; Tomasello, Strosberg, & Akhtar, 1996
- **Speech-accompanying acts** Grassmann & Tomasello, 2010
- **Preceding discourse** Saylor, Sabbagh & Baldwin, 2002; Skordos & Papafragou, 2014

2. Divergence

2. Divergence

1. Word learning vs implicature inferences

WL by manner	Manner implicature
S said 'p'	S said 'p'
1. S could be intending to refer to *p* or *q* *[known or unknown object]*	1. S said 'p' instead of more conventional 'q' with meaning *q* similar to *p*
2. If S meant *q*, S would have said 'q'	2. If S meant *q*, S would have said 'q'
co-operativity & conventionality	co-operativity & conventionality
3. a) S said 'p', so b) S does not mean *q*, *the known object*	3. a) S did not say 'q' so b) does not mean *q* (in a conventional way)
4. Therefore, S intends to refer to *p, the unknown object*	4. Therefore S means *q in a non-conventional way*
5. Therefore 'blicket' refers to *p, the unknown object*	

2. Divergence

2. What is negated?

Manner

S said ‘p’

1. S said ‘p’ instead of more conventional ‘q’ with meaning *q* similar to *p*

2. If S meant *q*, S would have said ‘q’

co-operativity & conventionality

3. a) S did not say ‘q’ so b) does not mean *q* (in a conventional way)

4. Therefore S means *q in a non-conventional way*

Negation of the implicature of q

Quantity

S said ‘p’

1. S said ‘p’ instead of more informative ‘q’

2. If S meant *q*, S would have said ‘q’

co-operativity & informativeness

3. S did not say ‘q’ so b) does not mean the more informative *q*

4. Therefore S means *p but not q*

Negation of q

Modus tollens

Disjunctive syllogism

2. Divergence

3. Manner, Quantity vs Relevance

Counterfactual vs *bridging inference*

Relevance

S said ‘p’

1. The context is about a topic, *q*
2. If S meant to communicate something relevant in this situation, they would have said something about *q*

co-operativity & relevance

3. ‘p’ must be about *q*
4. Therefore S means *p* about *q*

A: Would you like some soup?

B: I’m not hungry

+> No, I would not like some soup.

(based on the assumption, from world knowledge, that people want to eat when they’re hungry, and not eat when they’re not)

2. Divergence

3. *Form* vs *informational content*

- Manner: *forms* and *informational content*
- Word learning by manner: *forms*
- Quantity: *informational content*
- Relevance: *informational content*

4. Variables

- World knowledge
- Conceptual knowledge
- Context dependency

Perner, Sprung, Zauner & Haider, 2003; van Tiel et al 2013

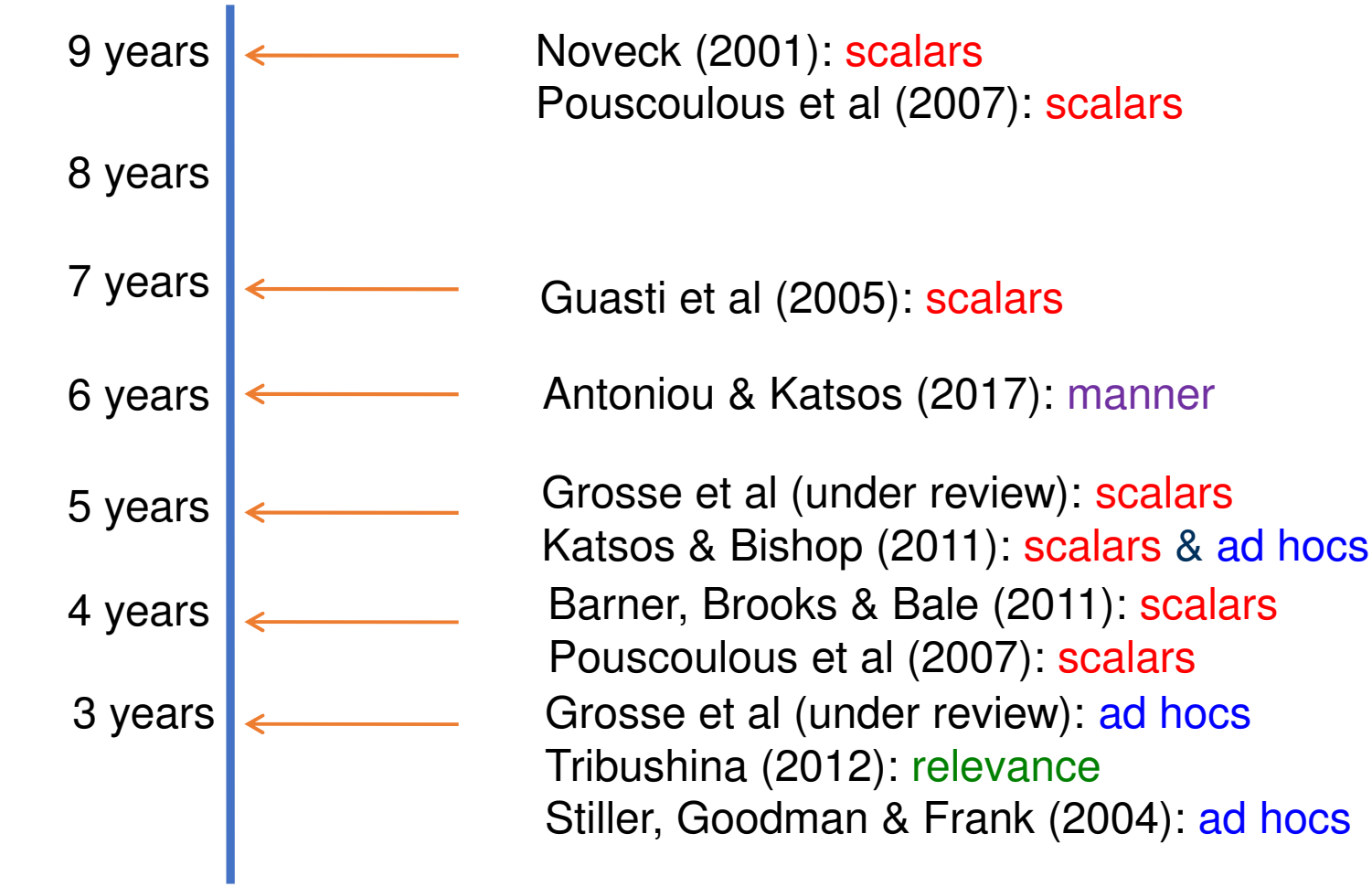
Features of implicature and WL

	Word Learning by Exclusion	Quantity	Relevance	Manner
Elaborative inference		✓	✓	✓
Disjunctive syllogism: Negation of alternative	✓	✓		
Disjunctive syllogism: Negation of alternative's implication				✓
Tracking language use				✓
Tracking QUD		✓	✓	✓
QUD licenses inference[1]		✓		✓

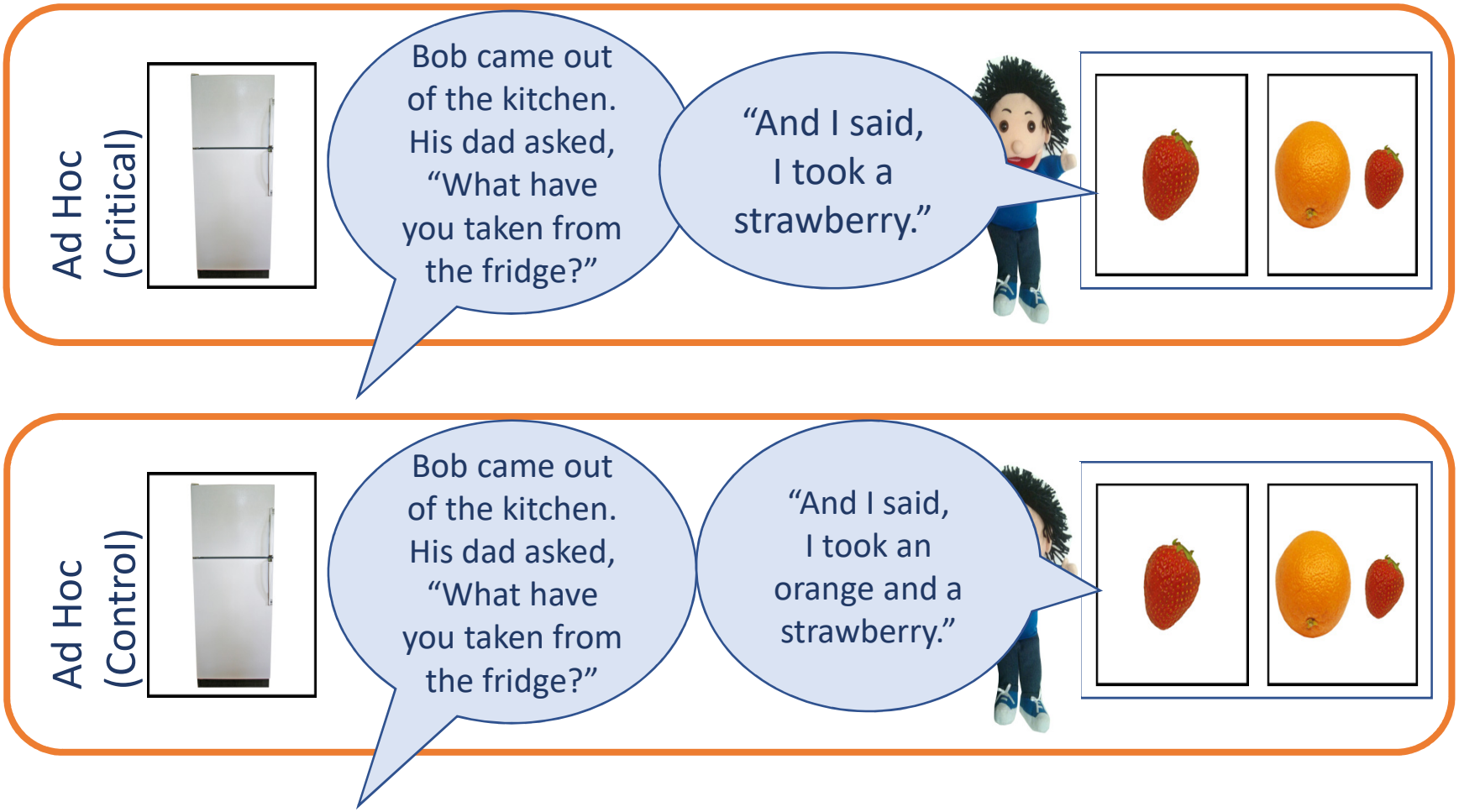
WLE, Quantity, Relevance and Manner inferences

1 For quantity, this could be because tracking the QUD leads to generation of relevant alternatives, or it could be that the QUD constrains selection of alternatives. In contrast, for relevance inferences the QUD plays a different role: the apparent gap between the QUD and the utterance triggers a search for an explanatory link.

3. Acquisition



Story-based picture-matching implicature task



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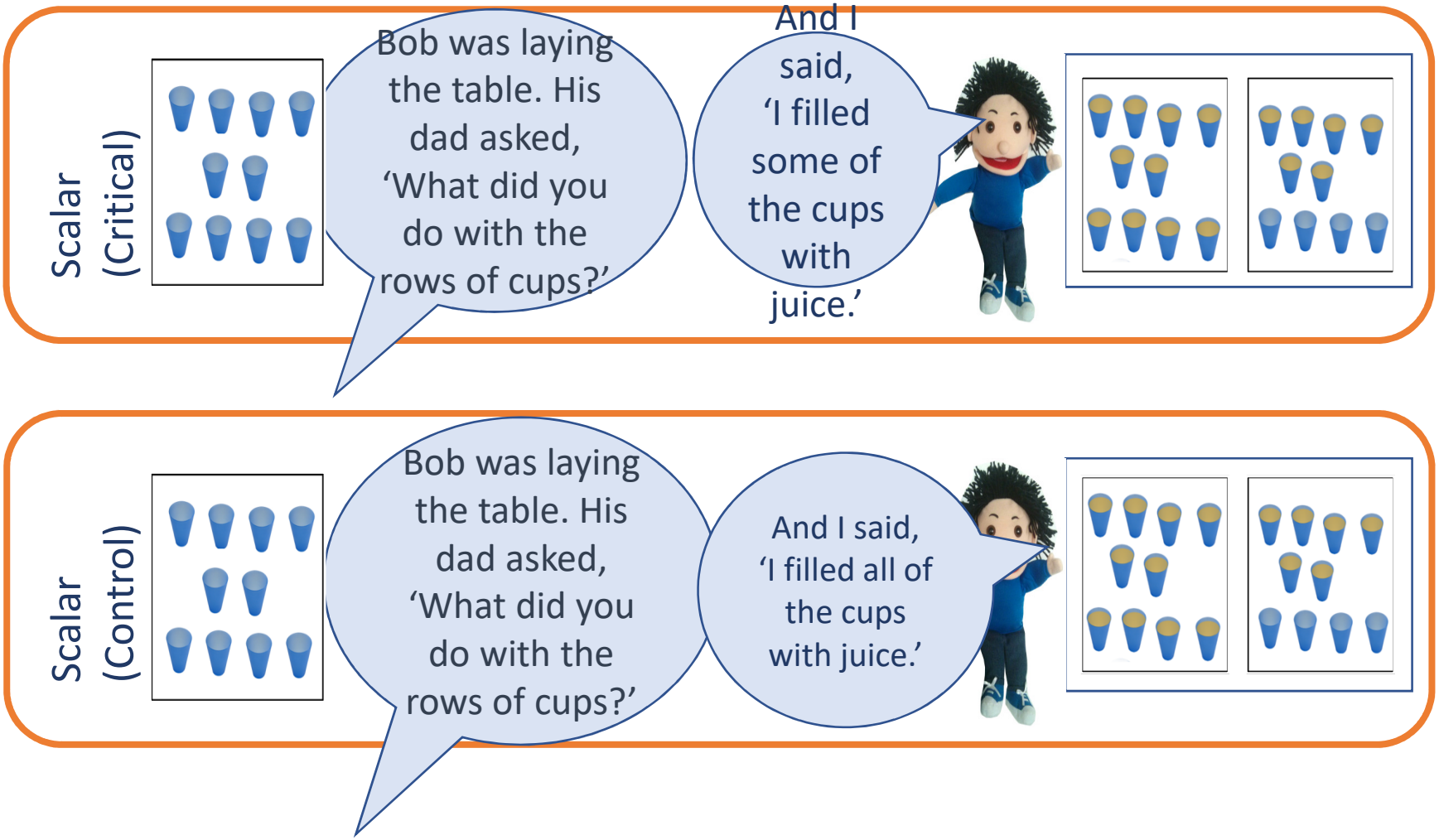
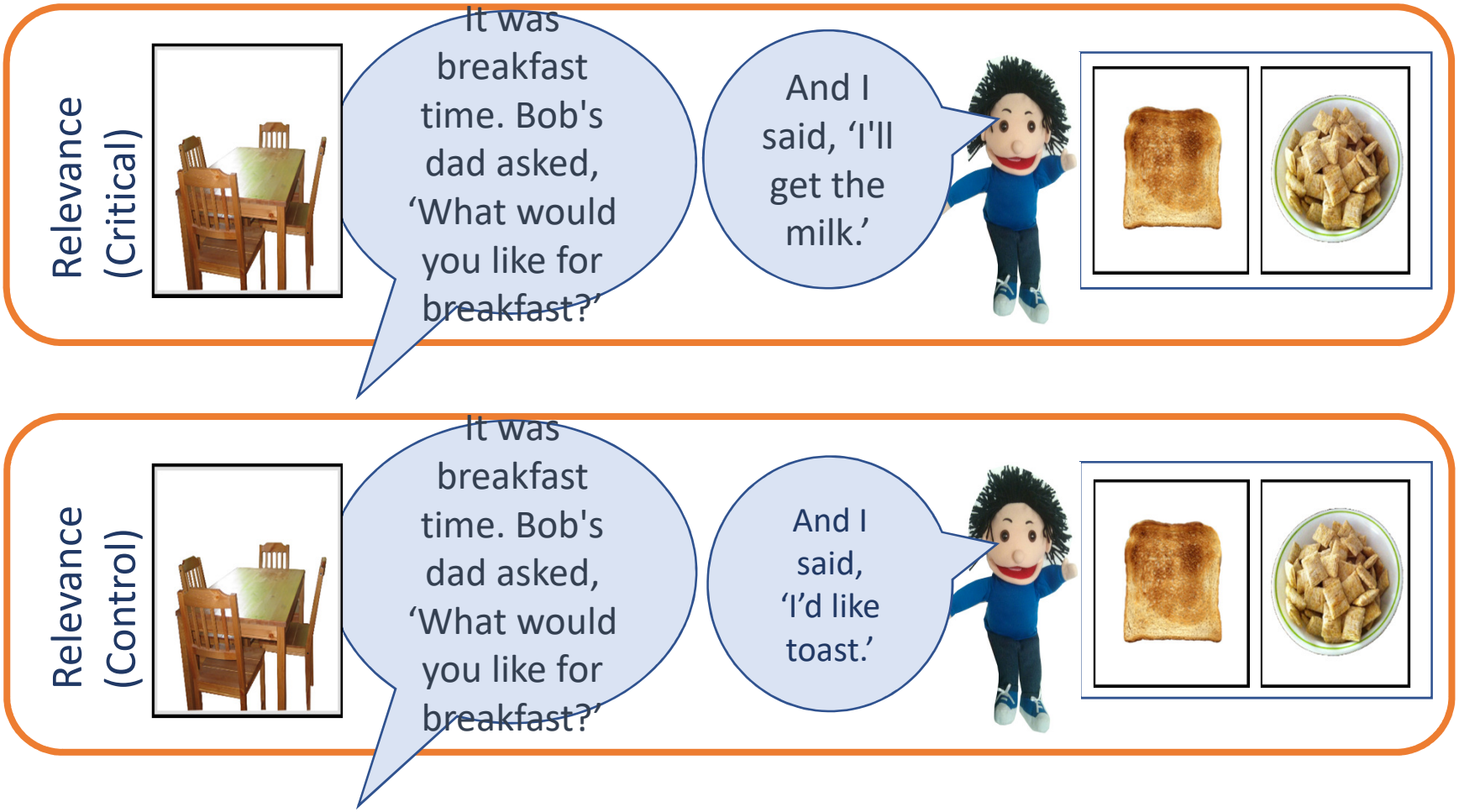


Story-based picture-matching implicature task



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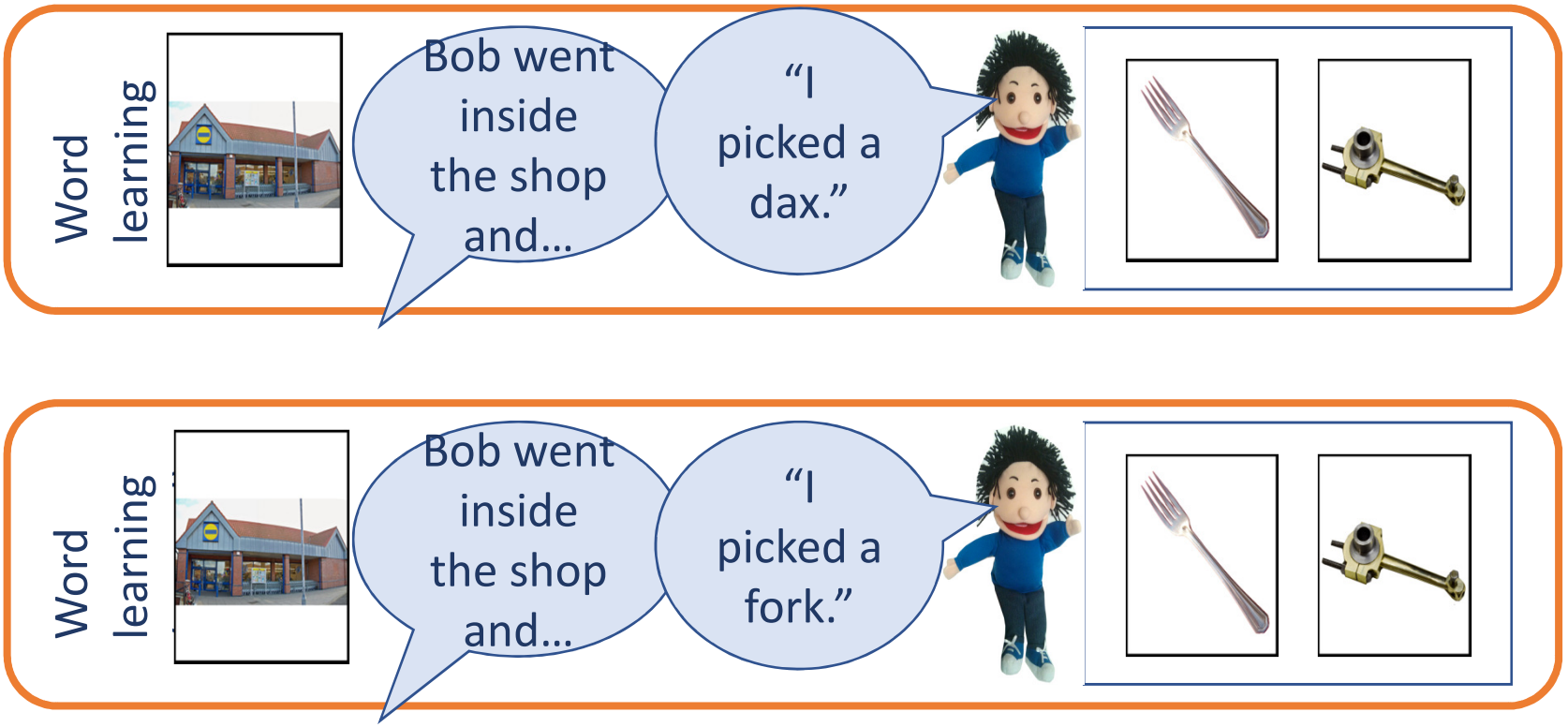


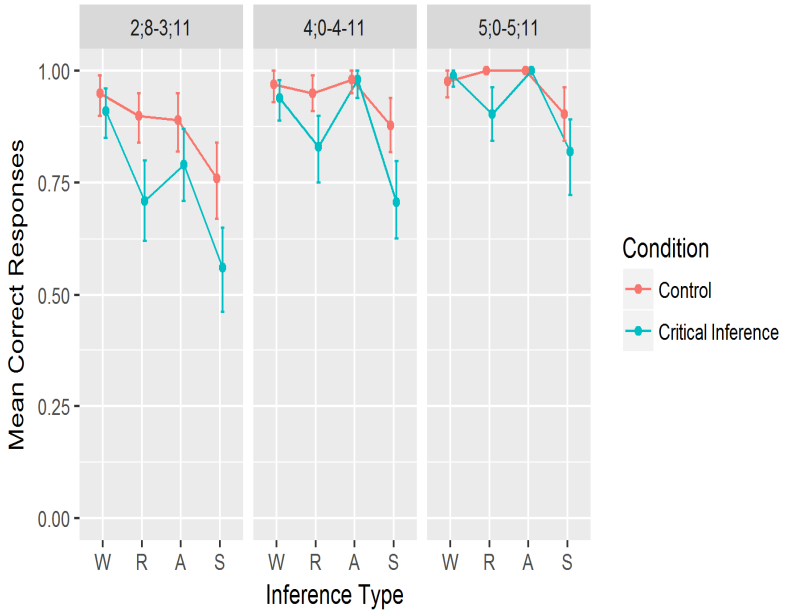
Method

Age group	Monolinguals	Females	Mean age (months)
2;8–3;11	25	13	40.9
4;0–4;11	25	11	54.0
5;0–5;11	21	10	63.8
Total	71	34	

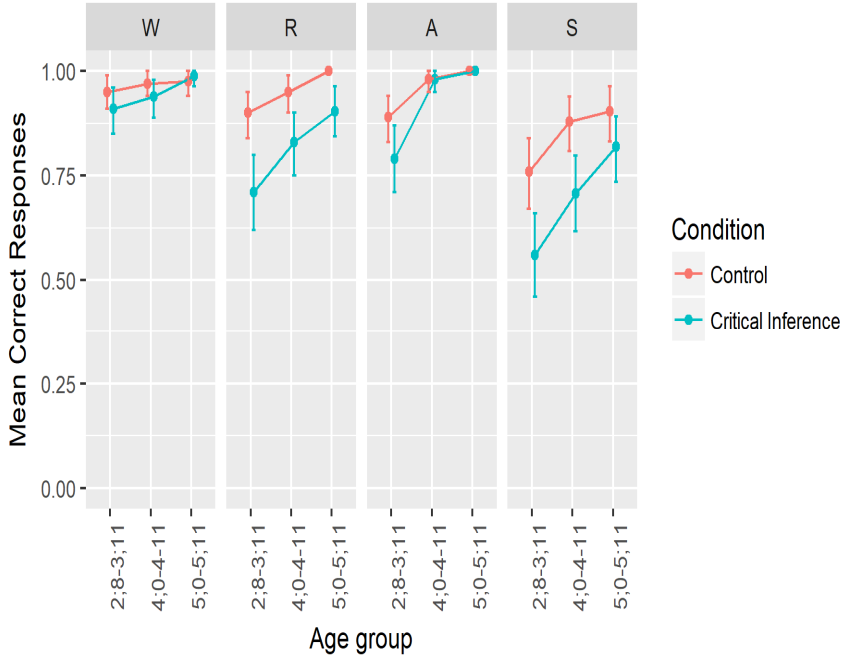
- N = 71 monolinguals
- 4 (WL, AdHoc, Scalar, Relevance) x 2 (critical, control) x 3 (child age-group)
- Adults all at ceiling (N=12)

Results

	2;8–3;11		4;0–4;11		5;0–5;11	
	Critical	Control	Critical	Control	Critical	Control
WLE	.91	.95	.94	.97	.99	.98
Relevance	.71	.90	.83	.95	.90	1.00
Ad hoc	.79	.89	.98	.98	1.00	1.00
Scalar	.56	.76	.71	.88	.82	.90



Mean correct responses by utterance type, condition and age group
W = Word learning by Exclusion;
R = Relevance; A = Ad hoc; S = Scalar;
Error bars show bootstrapped 95% confidence intervals for between-subject comparison



Mean correct responses by age group, condition and utterance type
W = Word learning by Exclusion; R = Relevance; A = Ad hoc; S = Scalar;
Error bars show bootstrapped 95% confidence intervals for between-subject comparison

Results

- a **developmental trend for implicature comprehension and for semantic comprehension**: each age group performs better than the younger preceding one, collapsing over critical/control condition and inference type
- **implicature comprehension in particular is still developing across this age-range**: main effect of condition, with control trials at higher correct rates than critical trials
- difference in age of acquisition between types of pragmatic inference: **WLE < Relevance / Ad hoc < Scalar**
- a positive relationship between **scalar** and **relevance** inferencing abilities, when partialling out age and language (control scores): $\tau = .21$, $z = 2.5$, $p = .012$ (in 4- and 5-year olds; can't do WL or Ad hoc because of ceiling)

Type	Estimate	SE	z	p
Ad hoc	3.04	1.34	2.26	.024
Relevance	1.48	.69	2.16	.031
Scalar	.25	.21	1.16	.25
Word learning	3.8	1.46	2.6	.0094

3-year-olds comparison to chance

Response ~ 1 + (1 | Item.no) + (1|Subject)

Glmer, family = binomial, optimizer = bobyqa, contrast coding, critical trials only

In the **youngest age group** (2;8–3;11), there was no evidence for a relationship between **WLE** and **relevance**, when controlling for language (relevance control scores, $\tau = -0.05$, $z = -0.34$, $p = .73$), but there was a moderate positive relationship between **WLE** and **ad hoc**, when controlling for language (ad hoc control scores, $\tau = .34$, $z = 2.3$, $p = .021$).

Results

	Estimate	SE	z	p
Intercept	2.80	.16	17.1	< .001
Critical – Control	-1.06	.25	-4.20	< .001
R – WLE	-1.18	.39	-3.03	.0024
AH – R	.052	.32	1.64	.10
S - AH	-1.63	.33	-4.89	< .001
4;0–4;11 – 5;0–5;11	-0.99	.33	-3.04	.0024
2;8–3;11 – 4;0–4;11	-1.04	.20	-5.05	< .001

Successive difference comparison for inference type, condition and age group

Response ~ Condition + Type + Age group + (1 + Condition + Age group + Block | Item)
Glmer, family = binomial, optimizer = bobyqa, backward difference coding

Cognitive and environmental factors affecting implicature skills

- Structural language (receptive vocabulary/grammar): BPVS and mini-TROG
- SES (parental education and Family Affluence Scale)
- ToM (Sally-Anne change-of-location and Smarties unexpected-contents)
- Mono- vs multilingualism
- Composite of ad hoc, scalar and relevance critical scores

- Subset of children N = 58 monolinguals, N = 26 multilinguals (range of languages)

Cognitive and environmental factors affecting implicature skills: results

- Main predictor of implicature skill = structural language knowledge, once age, gender and SES are taken into account (NB no evidence for directionality of relationship)
- No evidence for an effect of mono- vs multilingualism on implicature/WL (once age, gender, SES and structural langua are taken into account) (Lower structural language scores f multilinguals)
- A significant positive relationship between WLE and overall vocabulary size in monolinguals
- No effect of ToM

Cognitive and environmental factors affecting implicature skills: results

- Main predictor of implicature skill = structural language knowledge, once age, gender and SES are taken into account (NB no evidence for directionality of relationship)

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- A significant positive relationship between WLE and overall vocabulary size in monolinguals

- **No effect of ToM**

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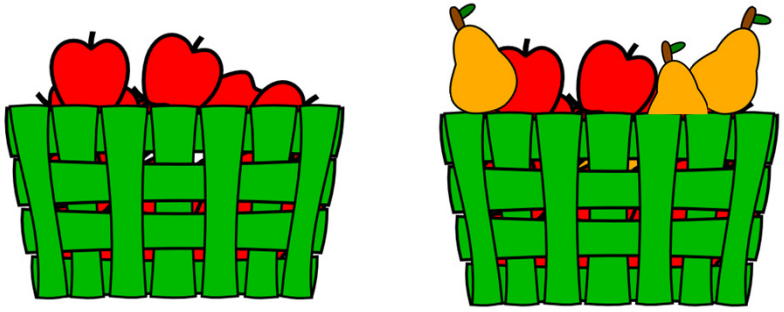
Speaker epistemic state and ad hoc quantity implicatures in children

Background

The boy put apples in the basket



Background

The speaker does not know whether the boy put apples or apples and pears in the basket

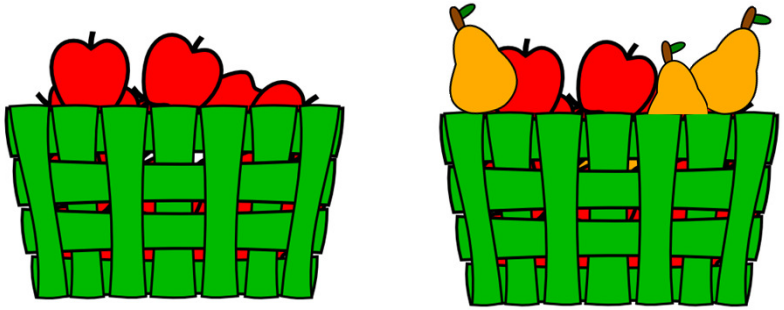
The speaker is informed

The speaker means the boy put only apples in the basket

Competence Assumption

Epistemic step

The boy put apples in the basket



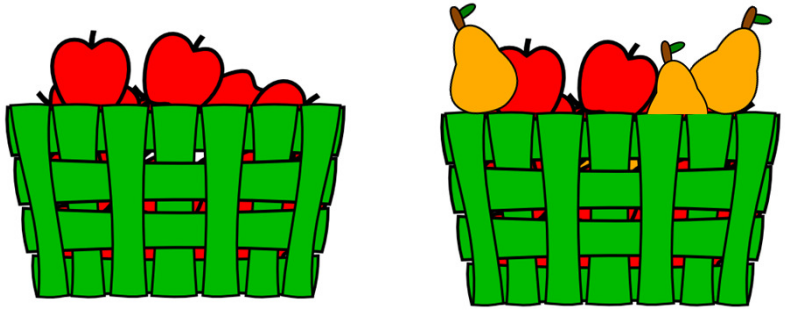
(Geurts, 2010; Sauerland, 2004)

(Bergen & Grodner, 2012; Breheny, Ferguson, Katsos, 2013; Goodman & Stuhlmüller, 2013)

Background

The boy put apples in the basket

✓ ad hoc implicatures
✓ relevance implicatures



(e.g., Stiller, Goodman & Frank, 2015; Schulze & Tomasello, 2013)

Background

Ignorance inferences X 4 year-olds ✓ 5 year-olds

(e.g., Hochstein, Bale, Fox & Barner, 2016; Papafragou, Friedberg & Cohen, 2017)

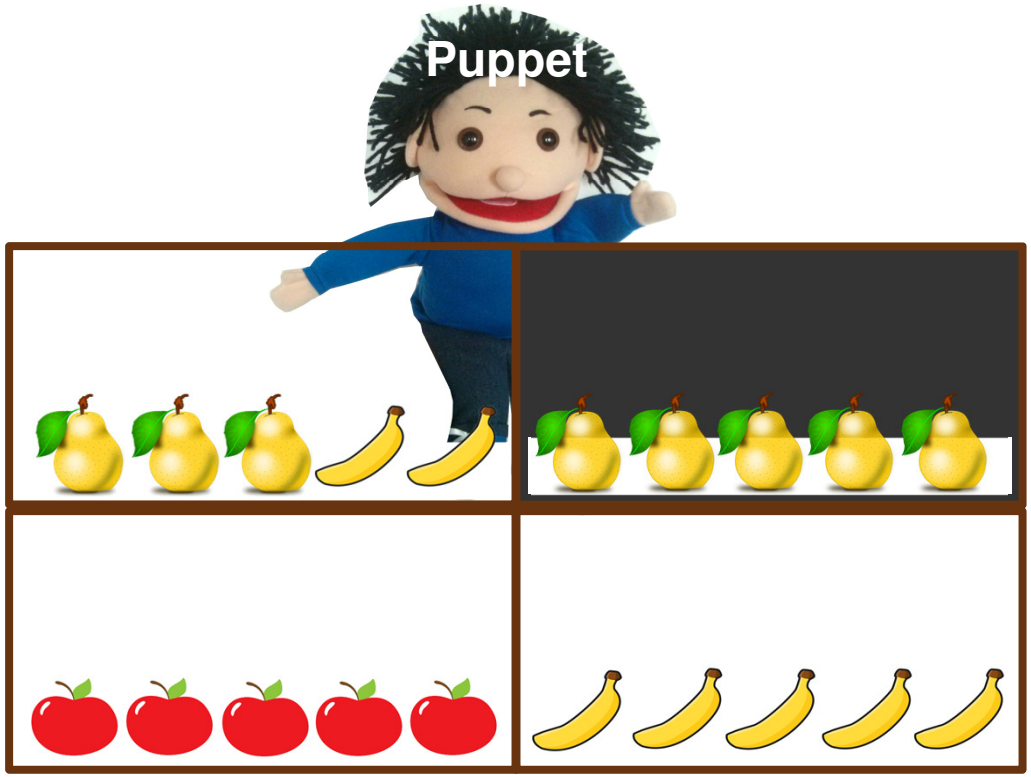
The study

Hypotheses

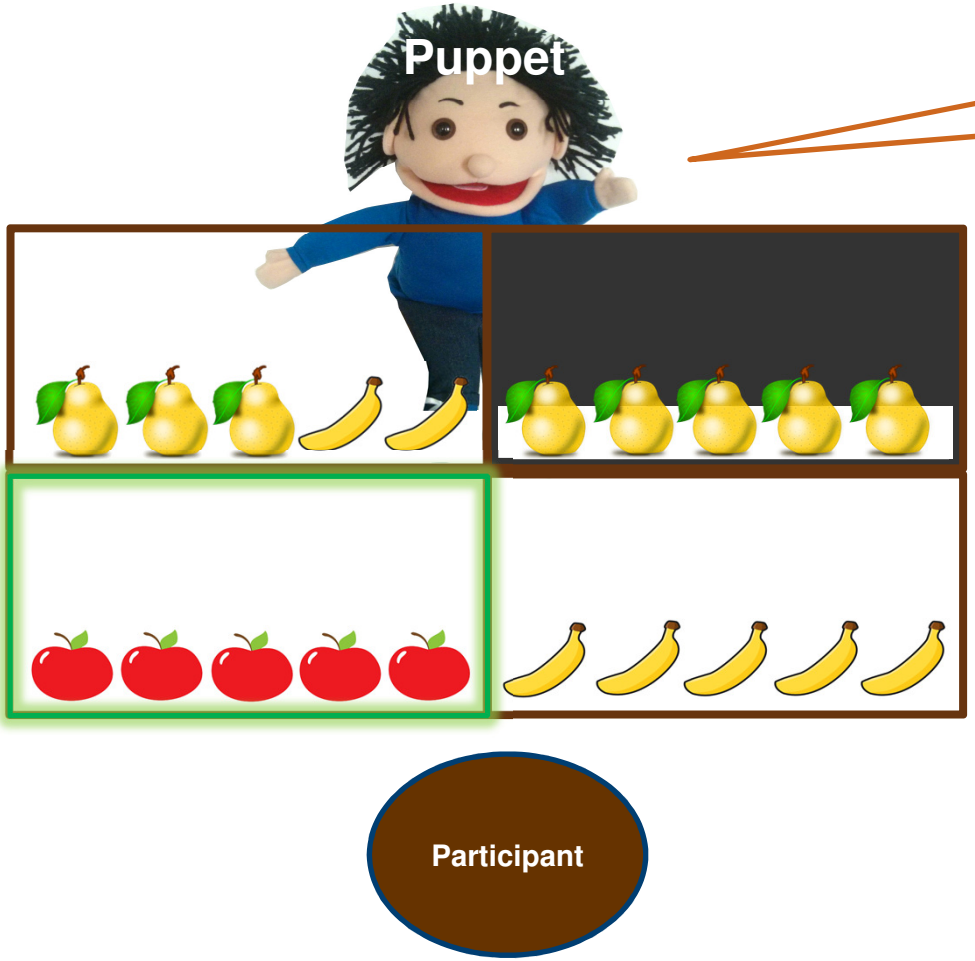
One-step hypothesis
Pragmatic inference + reasoning about epistemic state

Two-step hypothesis
Pragmatic inference, reasoning about epistemic state > integration

The study



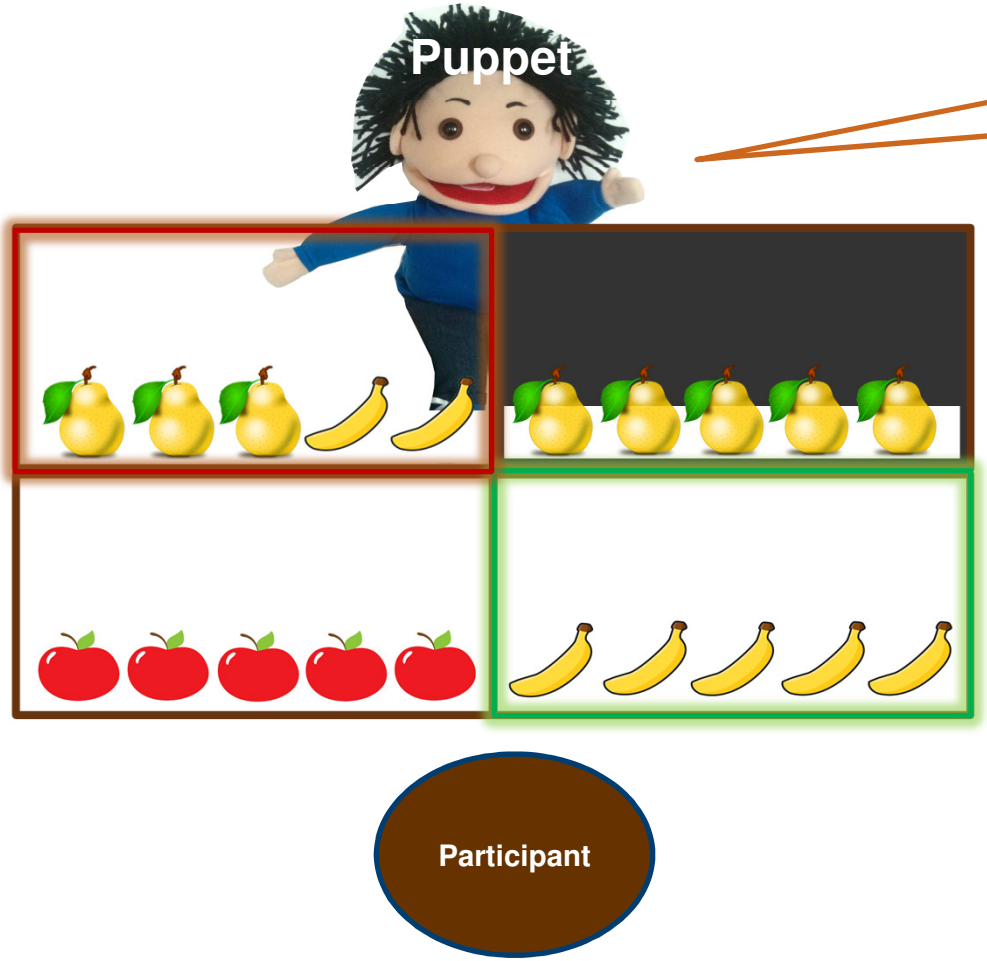
The study



Conditions

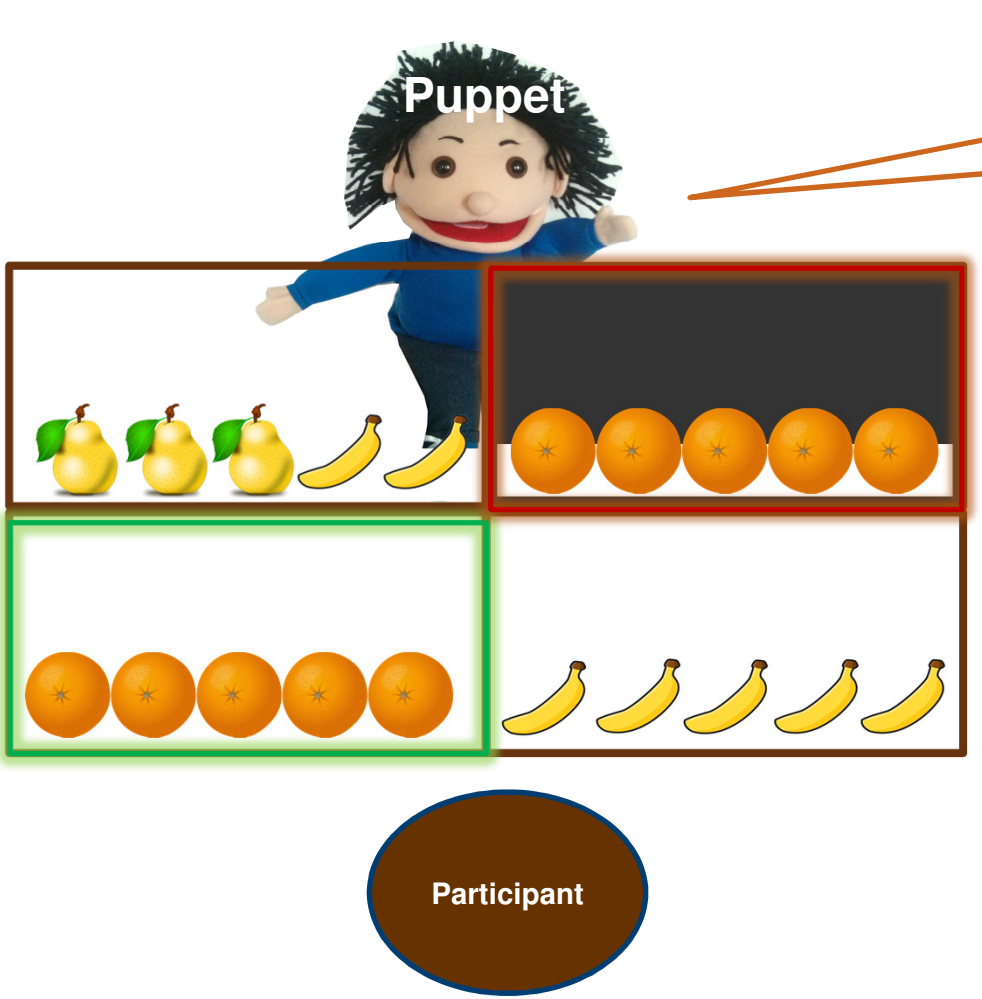
Common ground unambiguous

The study



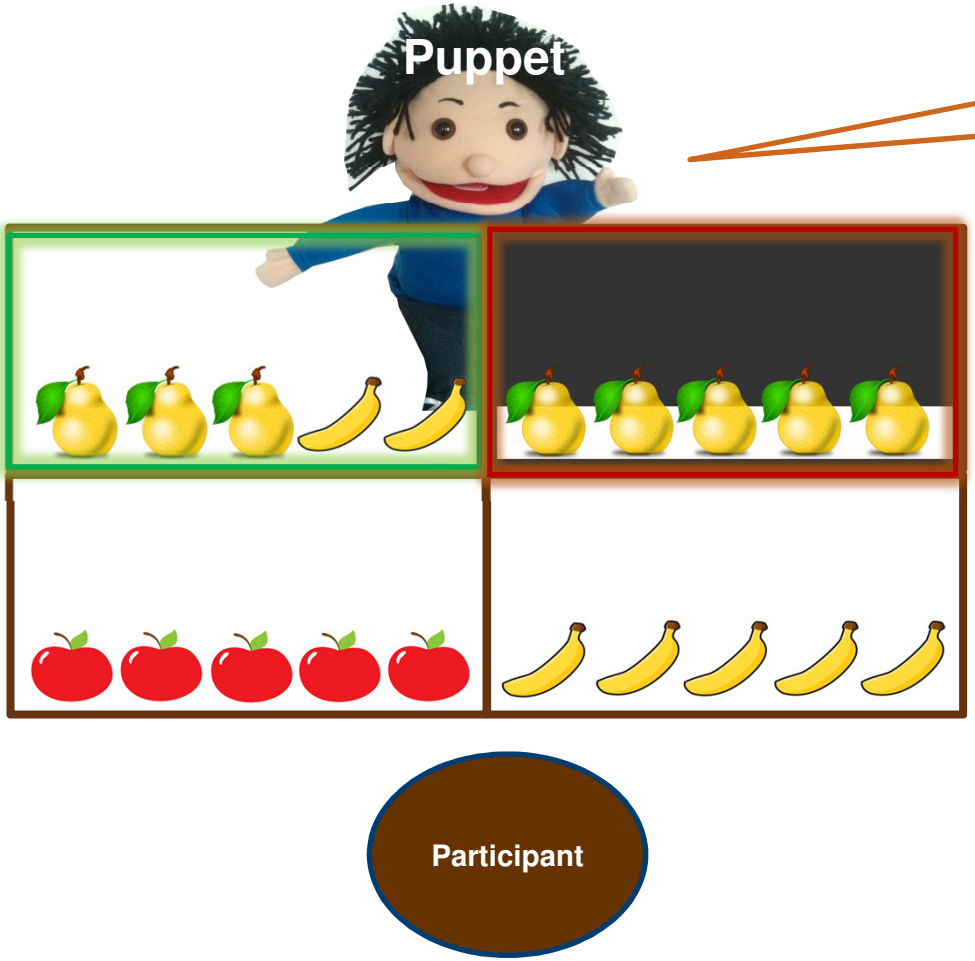
Conditions
Common ground unambiguous
Common ground ad hoc implicature

The study



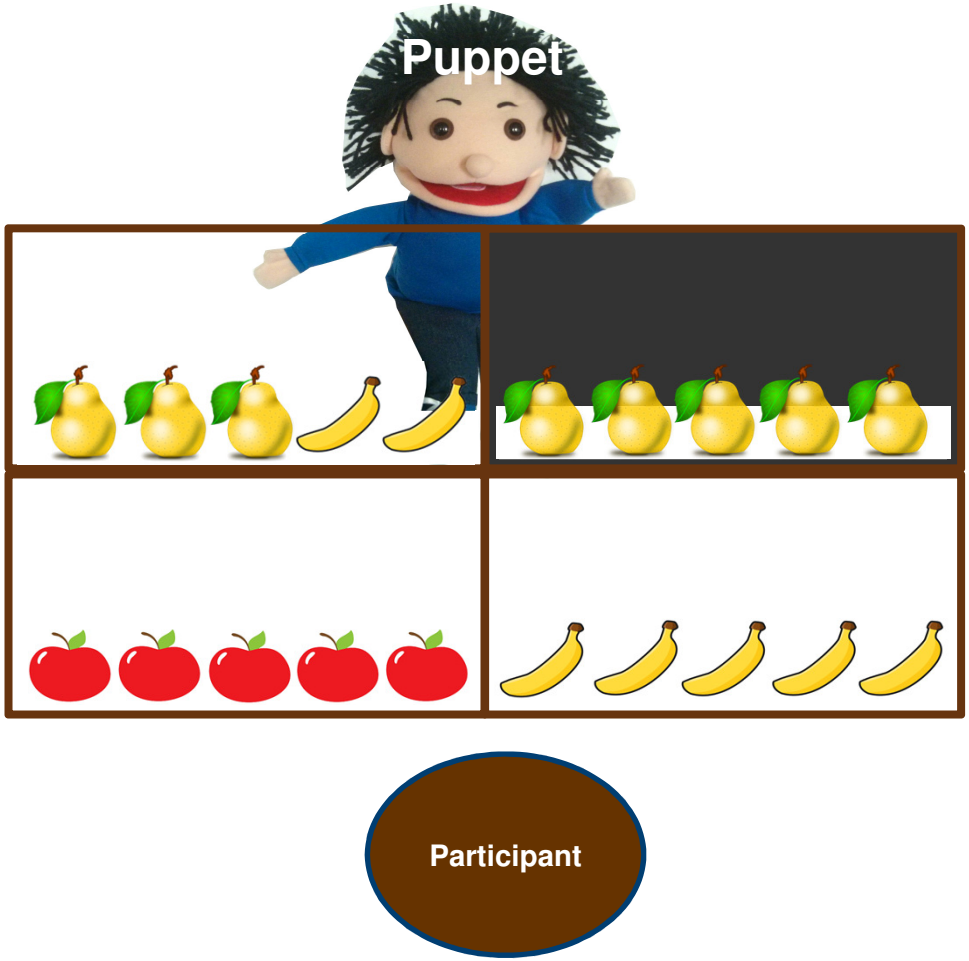
Conditions
Common ground unambiguous
Common ground ad hoc implicature
Privileged ground ambiguous

The study



Conditions
Common ground unambiguous
Common ground ad hoc implicature
Privileged ground ambiguous
Privileged ground ad hoc implicature

The study

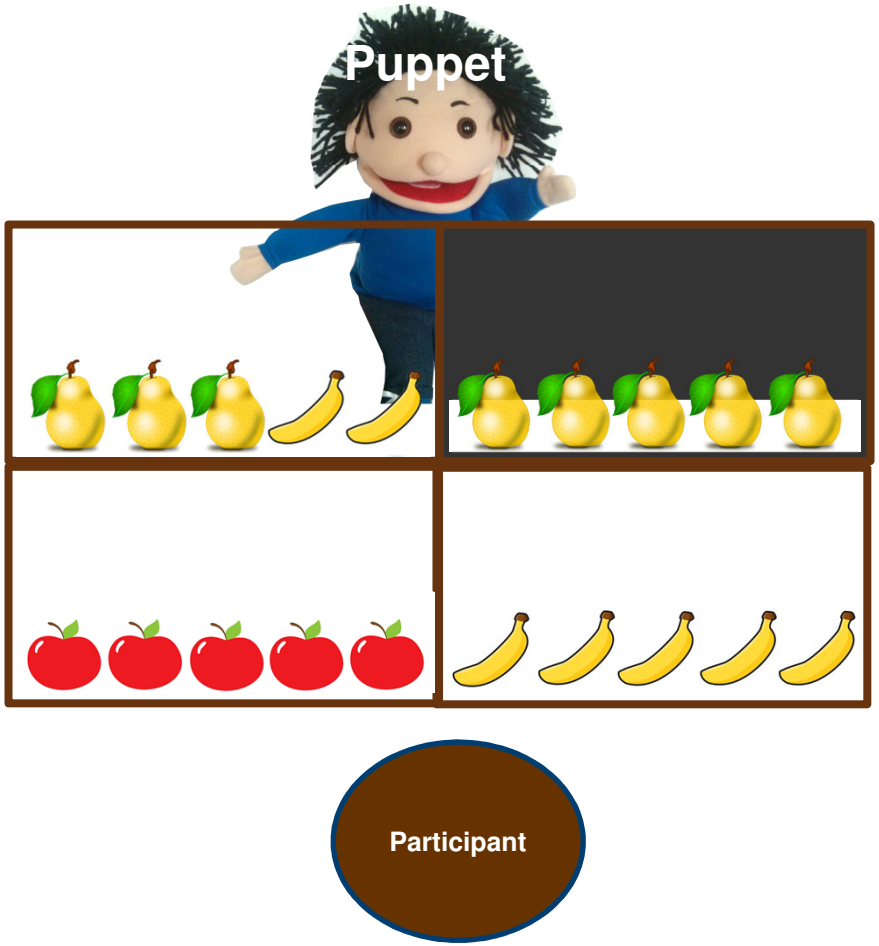


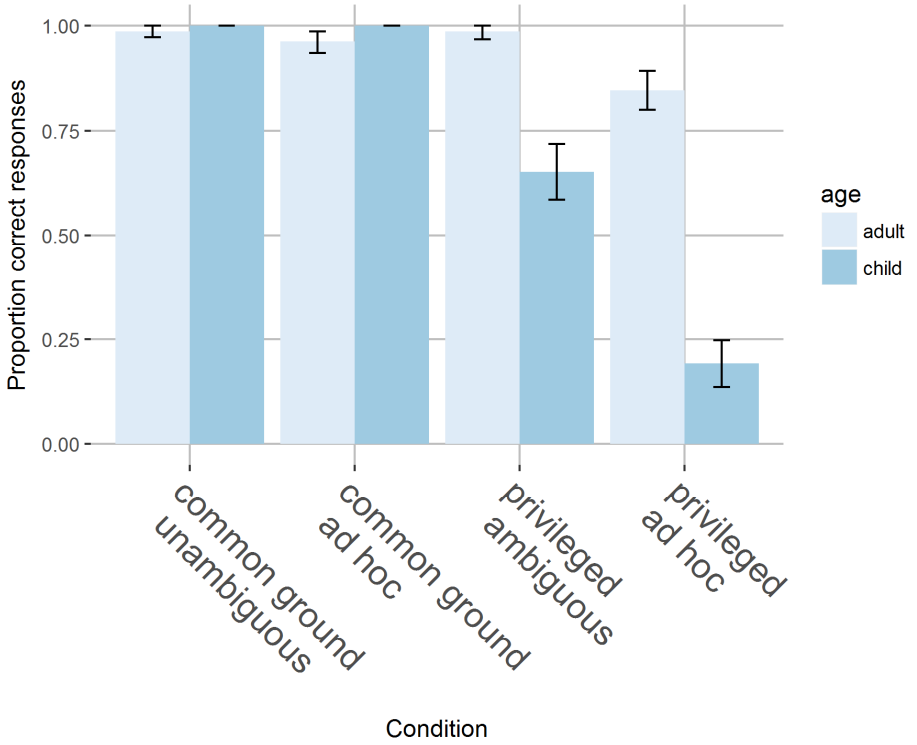
Participants
English-speaking children N = 34
Adults N = 36

At age 5-6 years…

✓ level 1 perspective-taking
✓ seeing leads to knowing
✓ pass more complex false-belief tasks
✓ derive ad hoc implicatures
✓ make ignorance inferences

The study

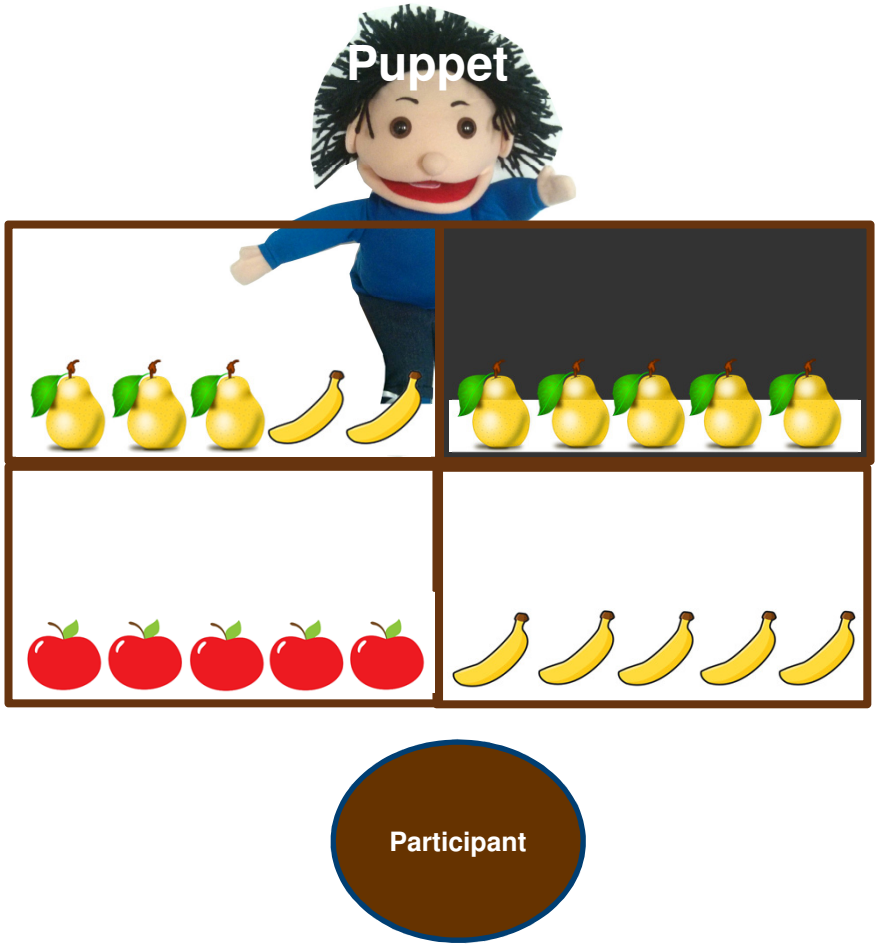


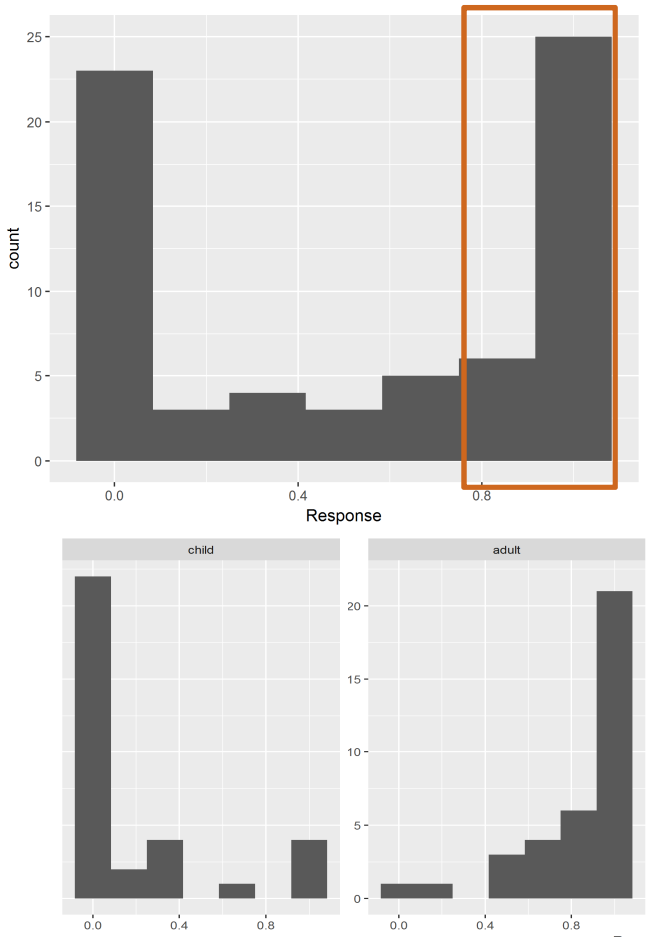


Error bars show bootstrapped 95% confidence intervals for between-subject comparison.

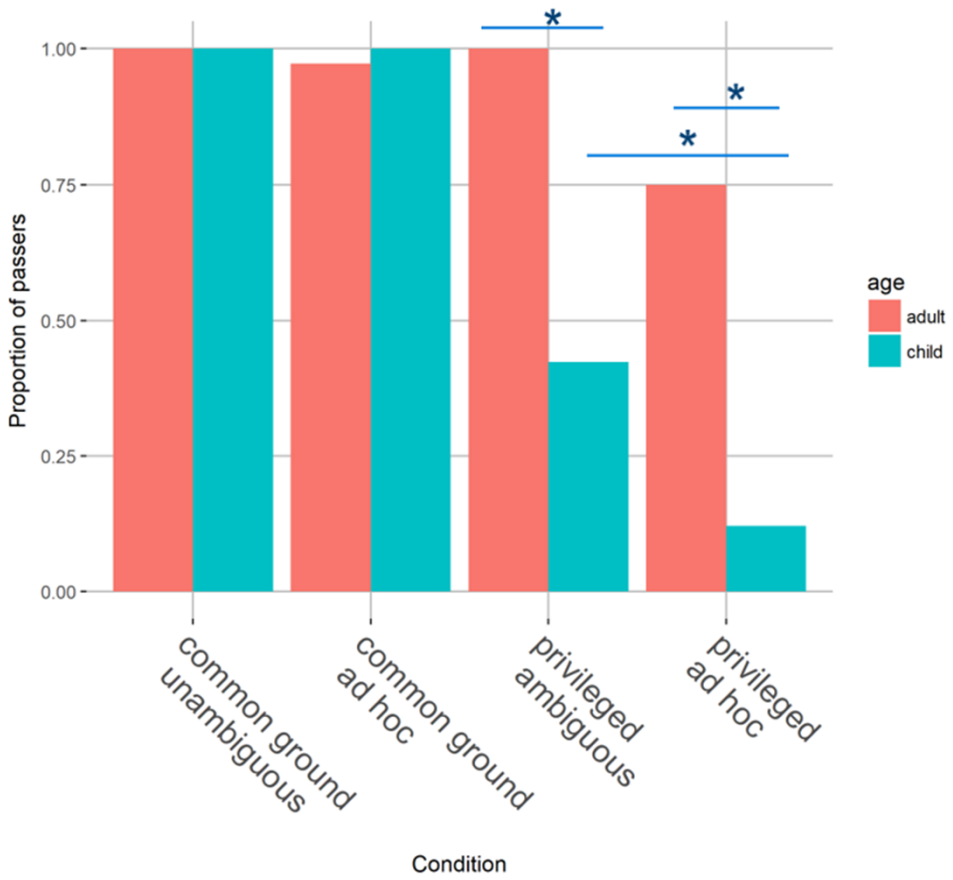
✓ change-of-location false belief task
✓ which cards the puppet can/cannot see

The study


Puppet
Participant


count
25
20
15
10
5
0
0.0
0.4
0.8
Response
child
adult

The study



Children	Privileged ground ad hoc	
Privileged ground ambiguous	Passer	Failer
Passer	4	10
Failer	0	19
(McNemar's $\chi 2 = 8.5$, $p = .003$; $N = 33$)		

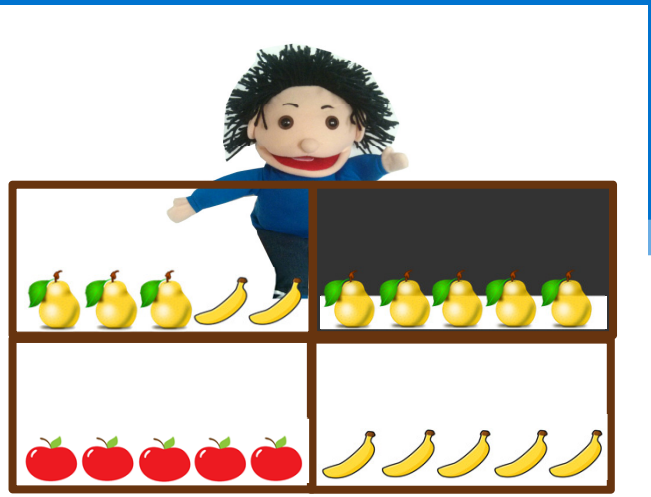
	Privileged ground ad hoc	
	Passer	Failer
Adult	27	9
Child	4	29
(Fisher's exact test, $p < .001$)		

	Privileged ground ambiguous	
	Passer	Failer
Adult	36	0
Child	14	19
(Fisher's exact test, $p < .001$)		

Findings

Child#1	Child#2	Child#3	Adult	
✓	✓	✓	✓	Common ground unambiguous
✓	✓	✓	✓	Common ground ad hoc
-	✓	✓	✓	Privileged ground ambiguous
-	-	✓	✓	Privileged ground ad hoc
19	10	4		= N

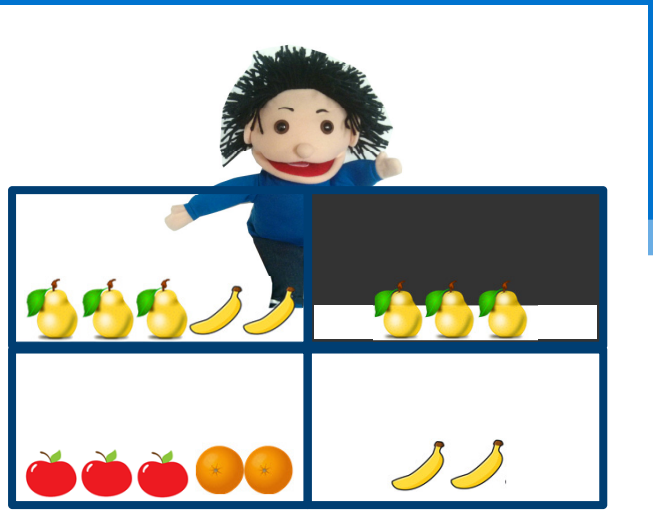
Findings



Experiment design – confounding factors?

This experiment	
Warm-up task > reveal hidden object	
Unequal number of items on target and distractor card	
Privileged ad hoc condition influences ambiguous condition	
Cards with two types unintended?	

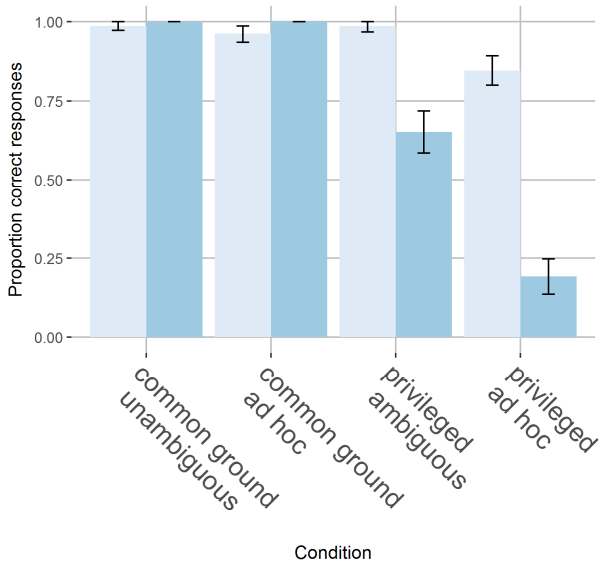
Findings

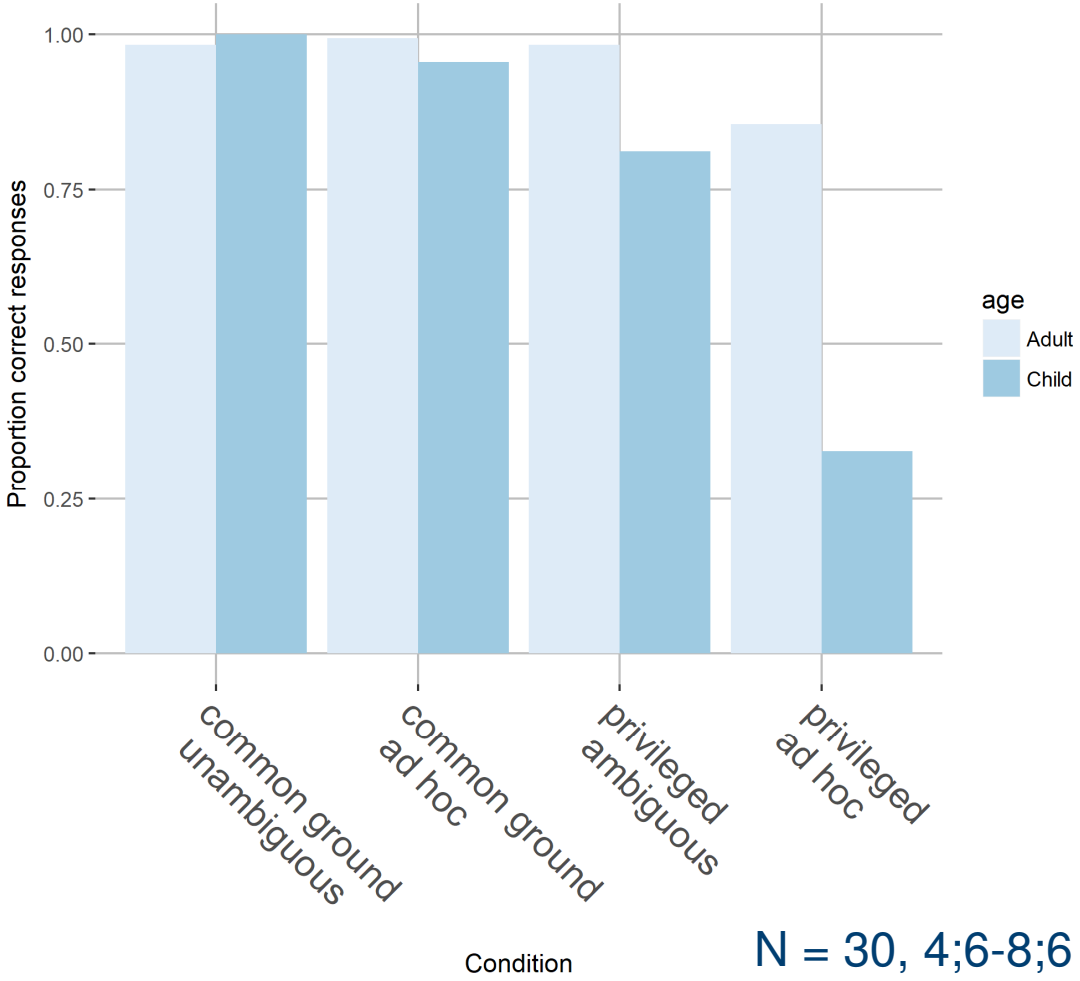


Experiment design – confounding factors?

This experiment	New experiment – Becky Lawrence
Warm-up task > reveal hidden object	Warm-up task is comprehension
Unequal number of items on target and distractor card	Matched number of items
Privileged ad hoc condition influences ambiguous condition	Privileged ground ambiguous always before ad hoc condition
Cards with two types unintended?	Some unambiguous trials with two item types

Findings

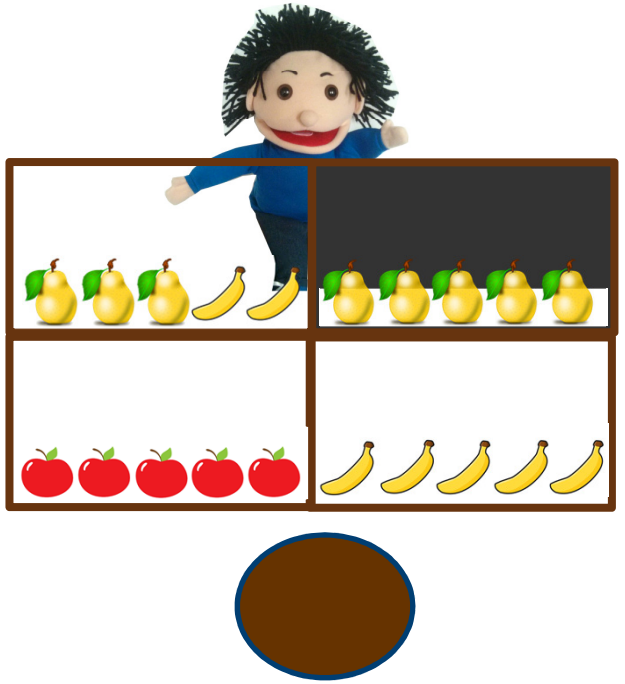




N = 30, 4;6-8;6

Discussion

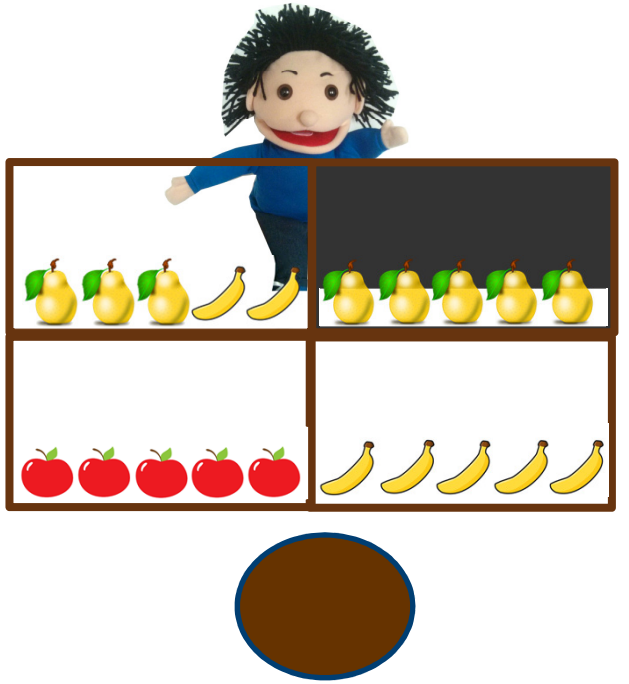
- *Two-step hypothesis*
  Pragmatic inference, reasoning about epistemic state > integration



(Breheny, 2006; Kissine, 2016, Andres-Roqueta and Katsos, 2017)
(Skordos & Papafragou, 2016; Papagragou & Skordos, 2016; Snedeker, 2015)

Discussion

- *Two-step hypothesis*
  Pragmatic inference, reasoning about epistemic state > integration
- Challenge of integrating some contextual information with utterance interpretation
- Not enough cues to monitor common ground?
- Challenge of top-down processing
- Pragmatic processing *without* all contextual information (at least not all the time)?



(Breheny, 2006; Kissine, 2016, Andres-Roqueta and Katsos, 2017)
(Skordos & Papafragou, 2016; Papagragou & Skordos, 2016; Snedeker, 2015)

Thank you!

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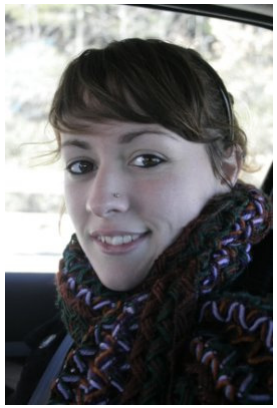
Join work with



Clara Andrés Roqueta

Kyriakos Antoniou

colleagues in Cambridge and Castelló

Chris Cummins, Juan Adrian, Rosa Ana Clemente…

Pragmatics in development

- Development as a natural laboratory for understanding the relations between pragmatics, structural language, ToM…
- Monolingual CwSLI and CwASD, monolingual and bilingual TDs

Specific Language Impairment

- Specific Language Impairment (SLI): affects between 3-7% of pre-school children (Norbury & Paul, 2013; Tomblin, 1997)
- Significant delay in the acquisition of language (syntax, vocabulary, phonology) in the absence of other causes (e.g. deafness, neurological impairments…).
- Language competence below peers while non-verbal IQ on par-*ish* with typically-developing peers.

Autism Spectrum Disorder (ASD)

- Life-long neurodevelopmental disorder, 1:85, 4:1 male/female ratio
- Usually becomes apparent in early childhood around 18-24 months
- Dyad (triad) of impairment: (communication), social interaction, interests
- Deficits with intention-attribution (Theory of Mind)
- Grammar and vocabulary vary widely (from non-verbal to superior)
- Typically delays in language (ASD vs Asperger syndrome)

Development as a natural laboratory

- Children with ASD: typically difficulties with Theory of Mind, but not necessarily with grammar and vocabulary
- Children with SLI: typically difficulties with grammar and/or vocabulary but not with Theory of Mind

Development as a natural laboratory

If we recruit CwSLI and CwASD such that SLI ≈ ASD with grammar and vocabulary but SLI > ASD with ToM:

- We then test them on skill X
  - If SLI ≈ ASD then X is critically related to structural language
  - If SLI > ASD then X is critically related to Theory of Mind

ToM and sensitivity to Gricean maxims
(Surian et al., 1996)

CwSLI, CwASD and LM-TDs: Sensitivity to Gricean maxims of informativeness, relevance, politeness and truthfulness

Lucy: *What would you like to buy in this shoe-shop?*

*Tom: *A pair of shoes. vs* Jane: *A pair of trainers.*

Lucy: *What did you do at school?*

*Tom: *We had a bath. vs* Jane: *We did some writing.*

- Group effect: (LM-TD ≈ SLI) > CwASD
- In CwASD, pragmatics correlated with ToM

But what exactly is this task assessing?

Maxim x Group interaction:

CwSLI ≈ CwASD on ‘real’ pragmatics

For a discussion of this task see
Katsos, Andrés Roqueta, Estevan & Cummins, 2011

CwASD: ToM and Metaphor (Happé, 1993)

CwASD (no-ToM, 1st-ToM, 2nd-ToM), CwModerate Learning Difficulties, Age-matched TDs: simile, metaphor, and irony.

Metaphor:

Ian was very clever and tricky. He really was…

An icicle, a fox, a safe harbour, a hat, a swan, a volcano

- ToM predicted competence with metaphor and irony

CwASD/CwSLI: ToM and Metaphor, Idioms (Norbury, 2004/5)

- Four groups: ASD+LI; ASD-only; LI-only; TDs
- Metaphor is best predicted by structural language (vocabulary and grammar). Not ToM.
- Similar findings for idioms (Norbury, 2004)

- Of course! Metaphor: If you don't have a rich lexical entry for 'fox', the features 'tricky' and 'clever' will not be activated (Gernsbacher & Pripas-Kapit, 2012).
  - Idioms: they are learned as chunks in the lexicon.

CwASD and informativeness

(Pijnacker et al 2009, *JADD*; Chevalier et al 2010, *JADD*)

- Pijnacker et al (2009): 28 adults wASD (11 HFA and 17 Asperger) and AM-TDs

'*Some sparrows are birds*'

TD: Reject 70%, Accept 30%

ASD: Reject 75%, Accept 25%

- Within HFA, correlation with structural language
- Task requires extensive world-knowledge
- No LM-controls; no ToM measures
- Similar findings in children, Chevalier et al., 2010

Interim Summary - I

- Sensitivity to Gricean maxims, Metaphors, are best predicted by structural language, not ToM
- Informativeness is predicted by structural language (but no ToM measures for Informativeness)
- Use of context for disambiguation, idioms is again predicted by structural language

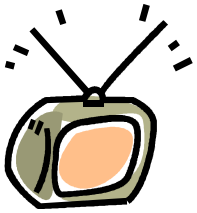
The role of language and ToM in pragmatics

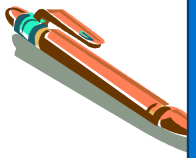
- Is there no role for Theory of Mind in pragmatics at all?

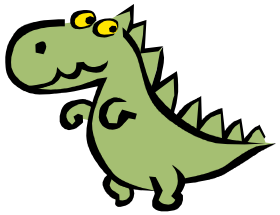
Investigating Informativeness in Spanish SLI

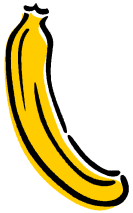
Katsos, Andrés Roqueta, Estevan & Cummins, 2011, *Cognition*

- 27 CwSLI (mean age: 6;6, age range 4;0-6;9; 20 males):
  - 1.25 SD below age-appropriate mean in verbal IQ (Spanish TROG and/or Sentence repetition task)
  - Non-verbal IQ above 80 (Raven's Matrices; Kaufman's Gestaltic Closure)
  - No history of autism, hearing or neurological impairment.
- Two typically-developing (TD) control groups: Aged-matched (AM-TD) and Language-Matched (LM-TD)

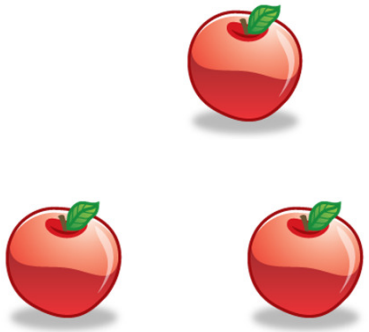








All the Fs are in the boxes
None of the Fs…
Some of the Fs…
Most of the Fs…
Not all the Fs…
Some of the Fs are not…



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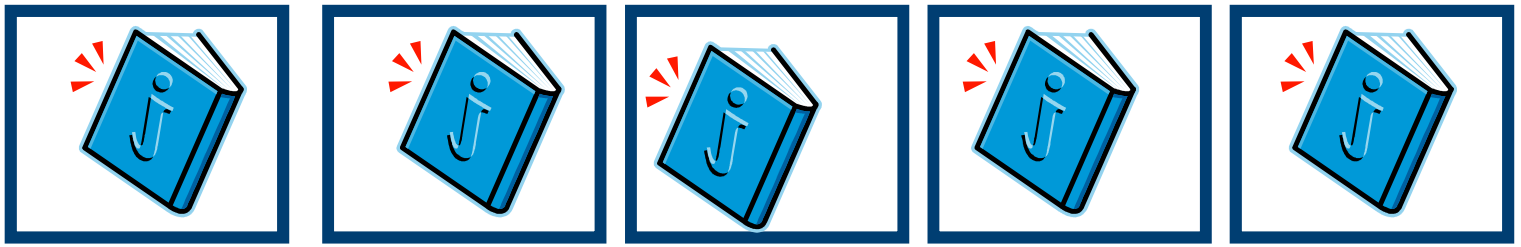
Most of the Fs…
Not all the Fs…
Some of the Fs are not…



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None of the Fs…
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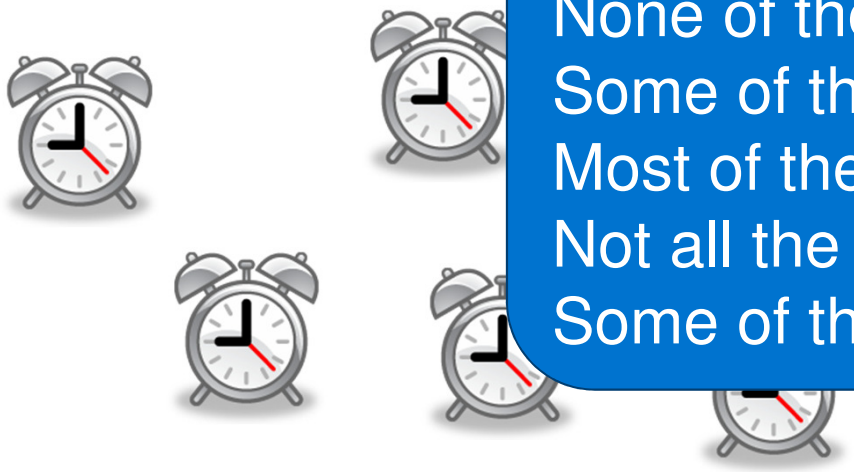


All the Fs are in the boxes
None of the Fs…
Some of the Fs…
Most of the Fs…
Not all the Fs…
Some of the Fs are not…

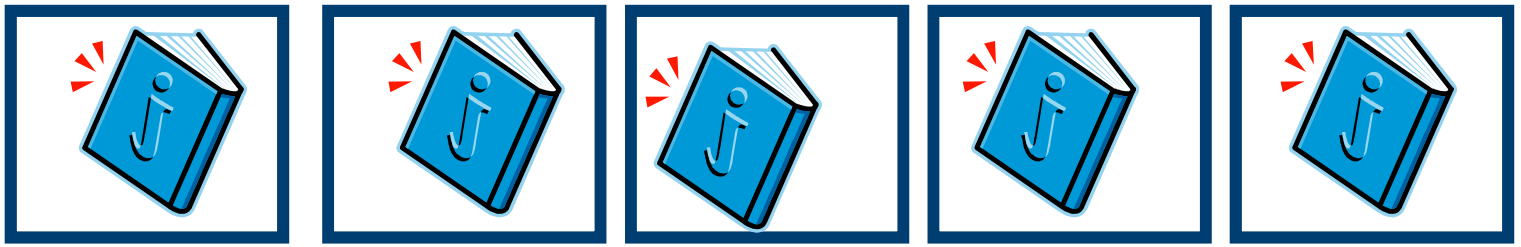
Quantification in Spanish-speaking CwSLI

- Main effect of group: AM-TD > (SLI ≈ LM-TD)
- No group x meaning interaction: pragmatic competence, as well as competence with semantics, is in keeping with children's structural language skils
- Justification patterns are similar in LM-TD and SLI; also the two groups are indistinguishable in qualitative error analysis

CwSLI & ASD on linguistic- and social-pragmatics
(Andrés Roqueta & Katsos, under review)

Spanish-speaking CwASD (diagnosis by psychologists, corroborated by ADI and IDEA)

- 20 CwASD (7;4, range 5;0 – 10;1; 17 males)
- 20 CwSLI (5;7, range 4;1 – 8;2; 15 males), language-matched to CwASD on receptive grammar (TROG)
- 20 LM-TD (4;3, range 3;4 – 6;3; 16 males), language-matched to ASD on receptive grammar (TROG)
- 20 AM-TD (7;2, range 5;1 – 9;8; 17 males)
- The Cavegirl task (Katsos, Andrés Roqueta et al, 2011)
- Strange Stories (Happé, 1994)



Some of the books are in the boxes.

Strange Stories Happé, 1994, JADD

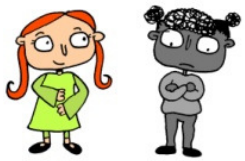
Lie

White Lie

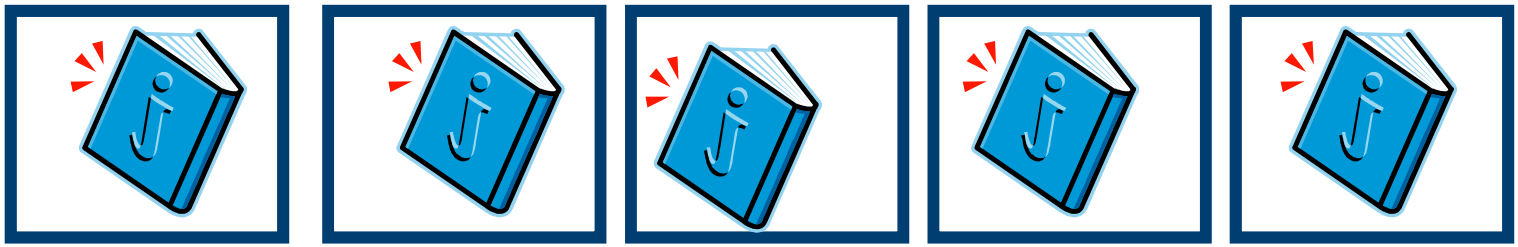
Lie:
"*Sorry… I don't have any more sweets*"

White Lie:
"*Oh thanks, that is exactly what I wanted!*

Pretense

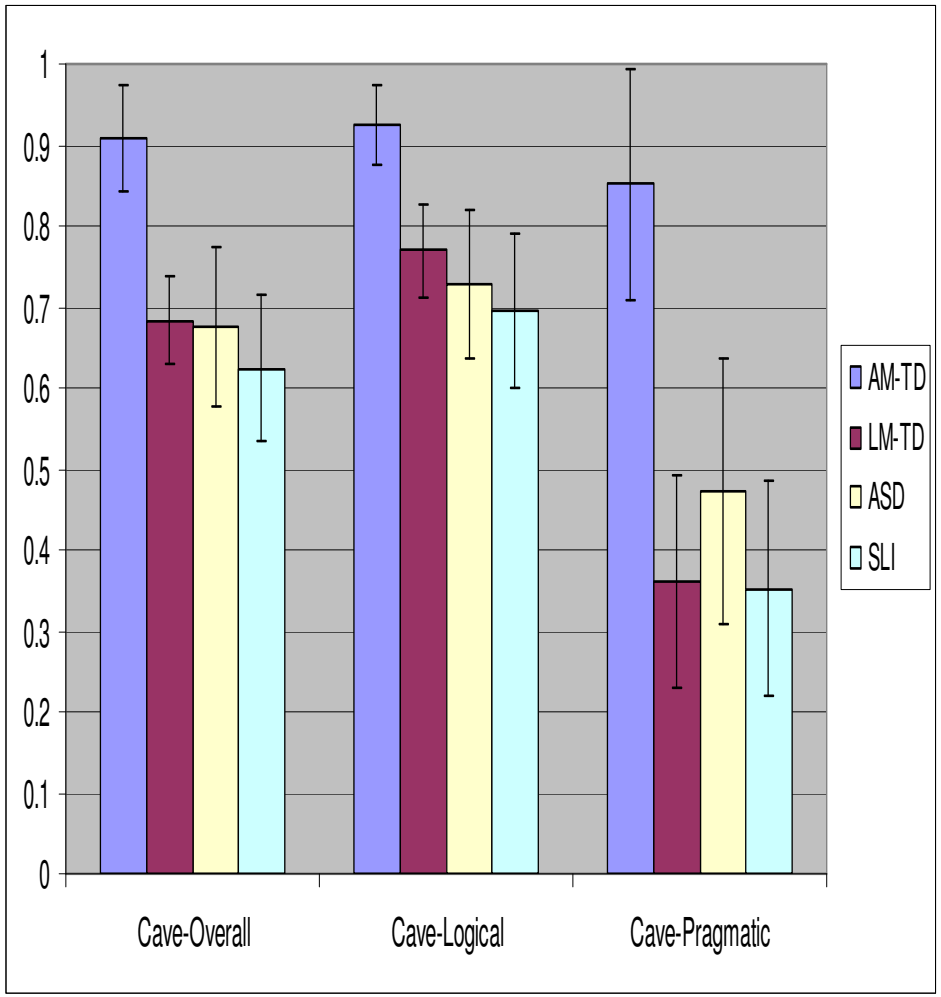


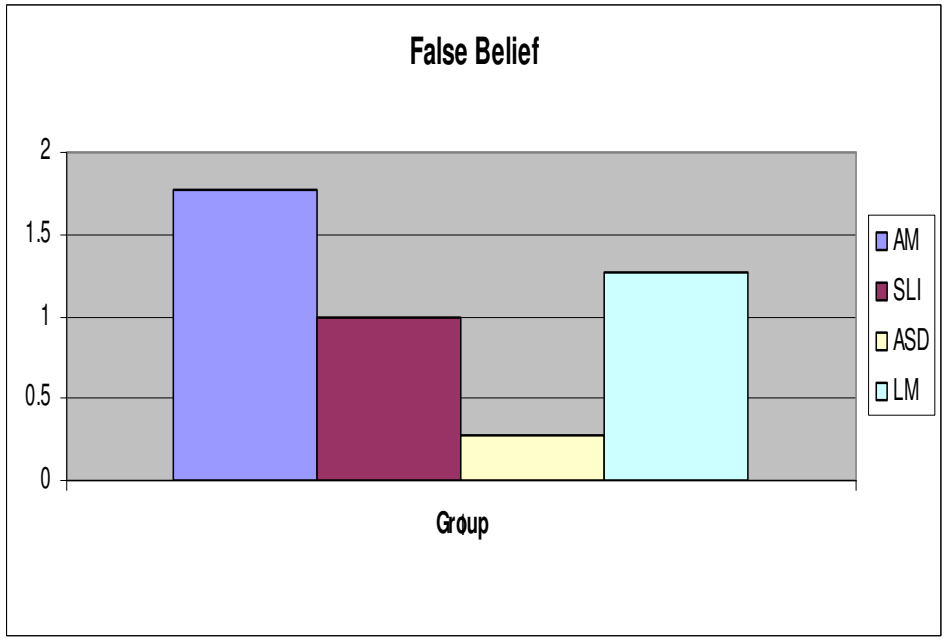
Pretense:
"*Look, I'm speaking on the phone*"



Some of the books are in the boxes.

Results 1: Informativeness





AM-TDs > (ASDs ≈ SLIs ≈ LM-TDs)

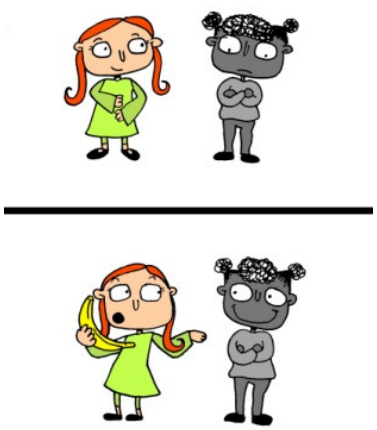
TDs: regressions: Age in Months
CwSLI & CwASD: structural language

Strange Stories Happé, 1994

Lie

White Lie

Pretense

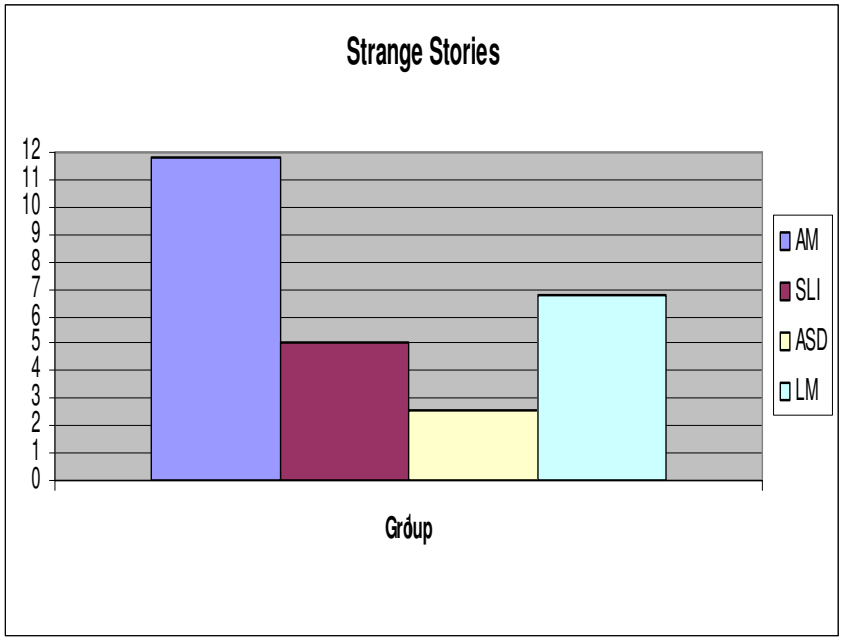


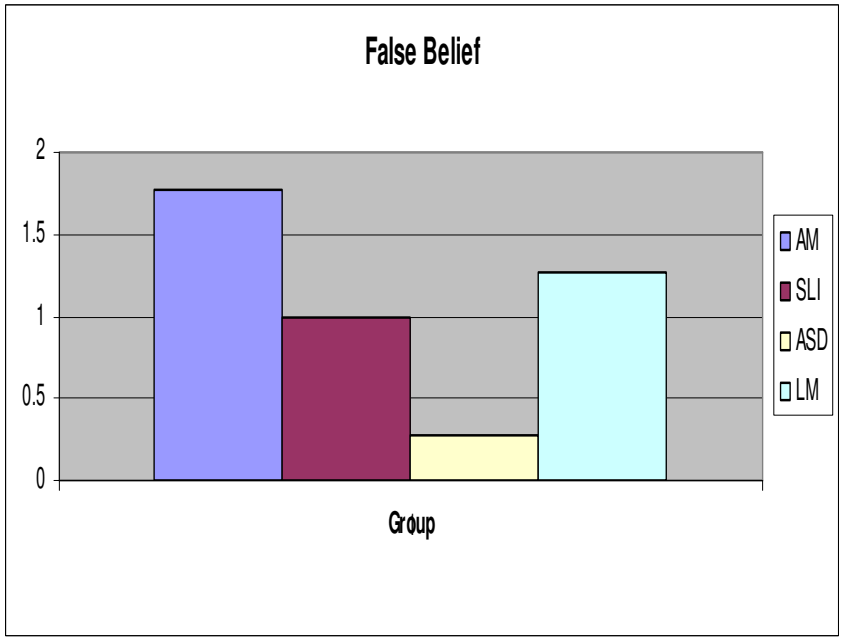
Lie:
"*Sorry… I don't have any more sweets*"

White Lie:
"*Oh thanks, that is exactly what I wanted!*

Pretense:
"*Look, I'm speaking on the phone*"

Results 2: Strange Stories





AM-TD > (LM-TD ≈ SLI >/≈ ASD)

CwSLI & CwASD: language composite, ToM

- Study 1 (4;0-6;9):

  AM-TD > (CwSLI ≈ LM-TDs) on linguistic pragmatics

  Katsos et al 2011,

- Study 2 (4;1-8;0):
  - AM-TD > (LM-TDs ≈ CwSLI ≈ CwASD) on linguistic pragmatics
  - AM-TD > (LM-TDs ≈ CwSLI >/ ≈ CwASD) on social pragmatics
  - AM-TD > (LM-TDs ≈ CwSLI) > CwASD on ToM
  - In CwSLI, ASD structural language critical for linguistic pragmatics, + FB in social-pragmatics

  Andrés Roqueta & Katsos, subm.

A note of caution

- Finding: 1st order ToM does not predict competence with informativeness
- This suggests that in some communicative situations listeners are making pragmatic inferences without engaging in social reasoning
- Linguistic- vs social-pragmatics distinction is based on communicative situation, not pragmatic phenomenon.
- A task measuring sensitivity to Informativeness may well assess social-pragmatics, if, e.g. the Cavegirl or the participant have partial/privileged knowledge, or non-cooperative attitudes (deceitful, antagonistic) = we need to get Bob on board!

Pragmatics in bilingualism

Antoniou & Katsos, 2017, Applied Psycholinguistics

- Participants:
  - 25 monolinguals, speakers of SMG (ages 6-9, mean age 7.4).
  - 62 bidialectals in CG and SMG (ages 5-12, mean age 7.7).
  - 46 multilinguals (ages 5-12, mean age 7.8) in CG, SMG and one or two additional languages.

Kyriakos

- **Pragmatics**: Relevance, manner implicatures, metaphor and scalar implicatures. Multilinguals and bilectals received the test in CG, 17 bilectals took the test in both CG and SMG and monolinguals in SMG.

- Vocabulary: The Word Finding Vocabulary test for expressive vocabulary (Greek version; Vogindroukas et al. 2009).

- Executive control:

  The Simon task (Simon 1969) and a stop-signal task (adapted from Logan 1994) for inhibition.

  The Color-Shape task (Ellefsonet al. 2006) for cognitive flexibility/task-switching.

  The Backward Digit Span Task (BDST) (Wechsler, 1949) and an online version of the Corsi blocks Task (Corsi 1972) for verbal and visuo-spatial working memory.

- Theory of Mind: The triangles task (White et al. 2011; translated in Greek)

- General intelligence: The WASI matrix reasoning test (Wechsler 1999).

- Parents completed: A language background questionnaire.

Version 1: George and his mother were in the sitting room. George asked his mother: “Mom can I buy an ice-cream?”. His mother replied “You are poorly”.

Version 2: George and his mother were in the sitting room. George asked his mother: “Mom can I buy an ice-cream?”. His mother replied “I’ve got money in my wallet”.

Experimenter: What happened?

George bought an ice-cream

George did not buy an ice-cream

Version 1: Today, the favourite football team of George's father was playing a game. George's father went to the stadium to watch the football game. His team did not play well and lost the game. George heard the result from the news. He was thinking of how his father would feel when coming back home. He didn't know whether his father would feel sad because his favourite team lost or whether he would feel angry because the team did not play well. When George's father returned home, he was a thundering cannon (a cannon that was thundering).

Version 2: Today, the favourite football team of George's father was playing a game. George's father went to the stadium to watch the football game. His team did not play well and lost the game. George heard the result from the news. He was thinking of how his father would feel when coming back home. He didn't know whether his father would feel sad because his favourite team lost or whether he would feel angry because the team did not play well. When George's father returned home, he was a melting snowman (a snowman that was melting).

Experimenter: How was George's father feeling?

He was feeling angry.

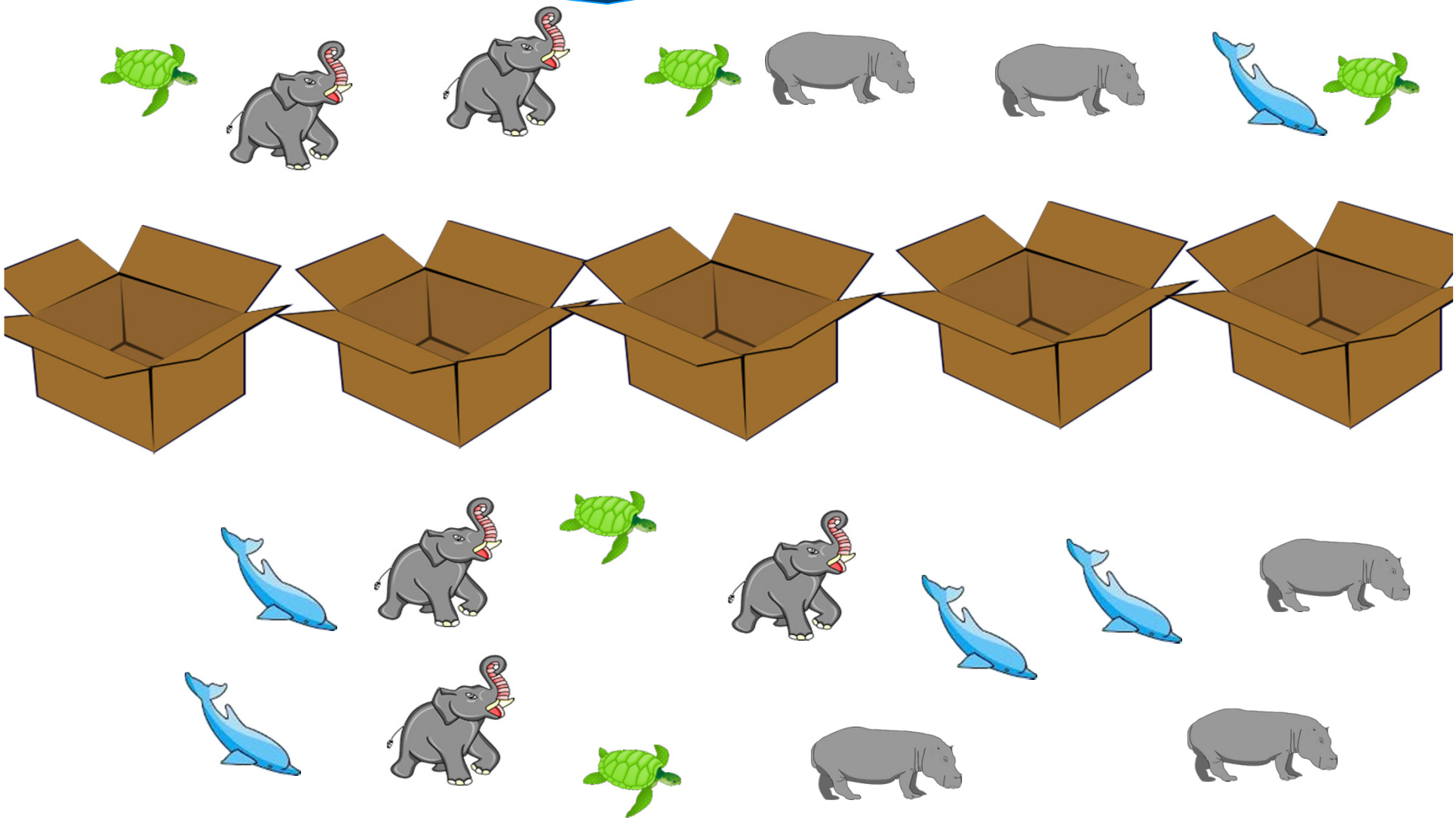
He was feeling sad.

Version 1: In this picture a man made the door open.

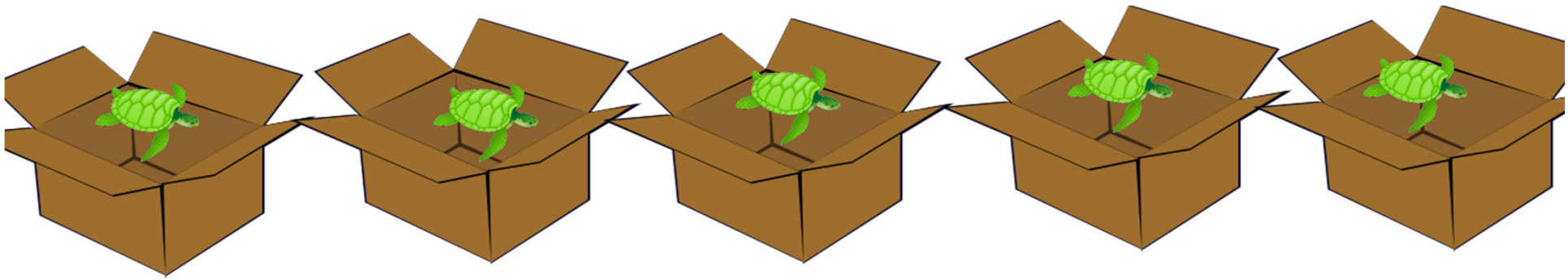
Version 2: In this picture a man opened the door.

Experimenter: Which picture did George describe?

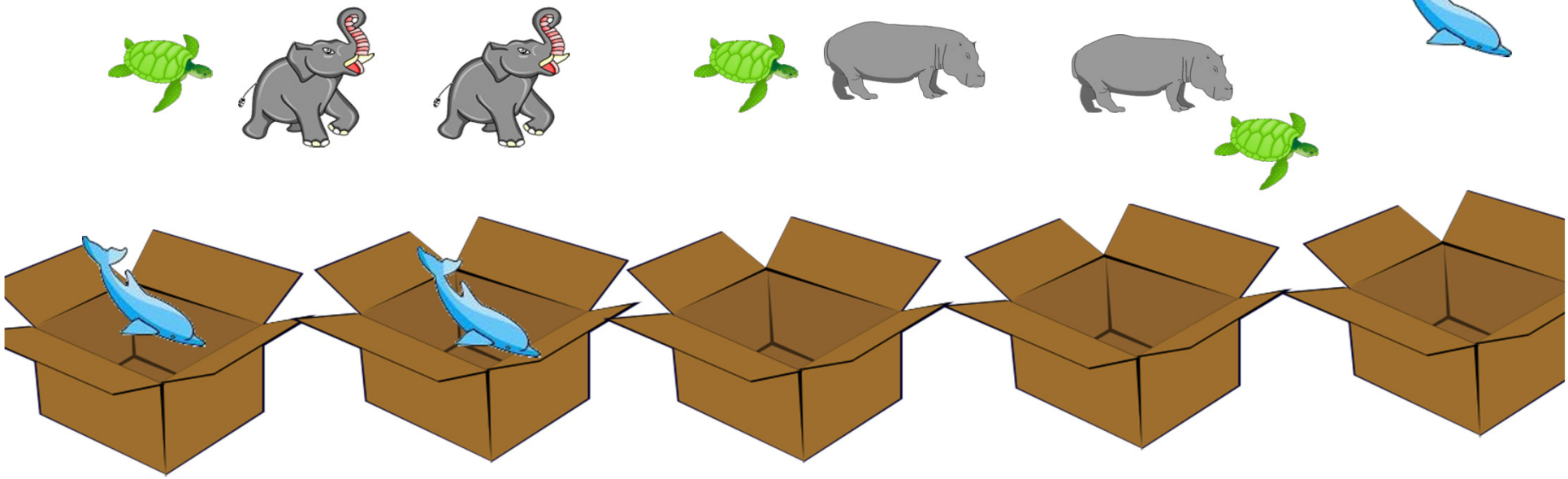
Some of the boxes have elephants



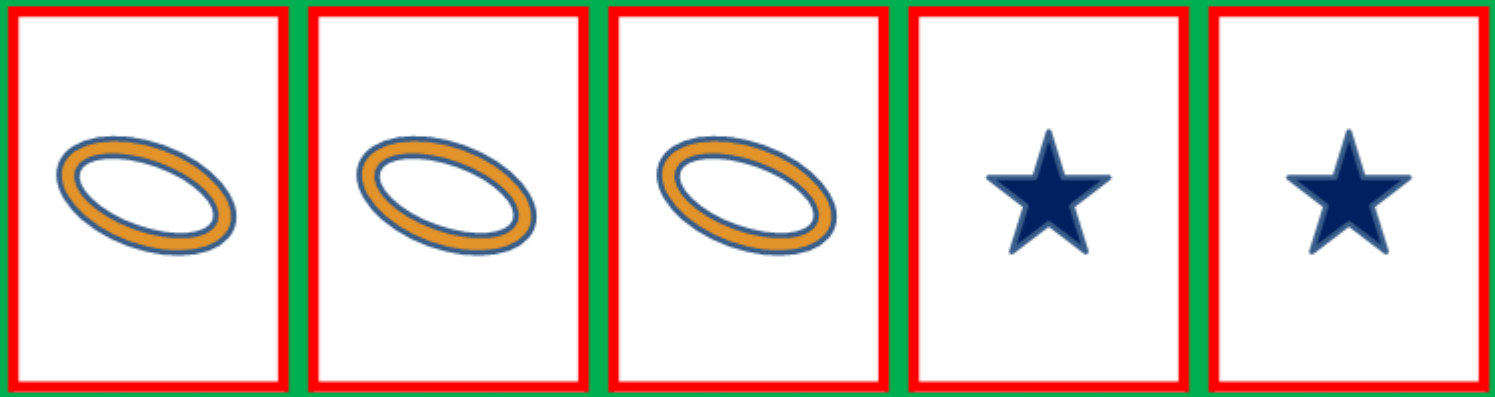
Some of the boxes have turtles.



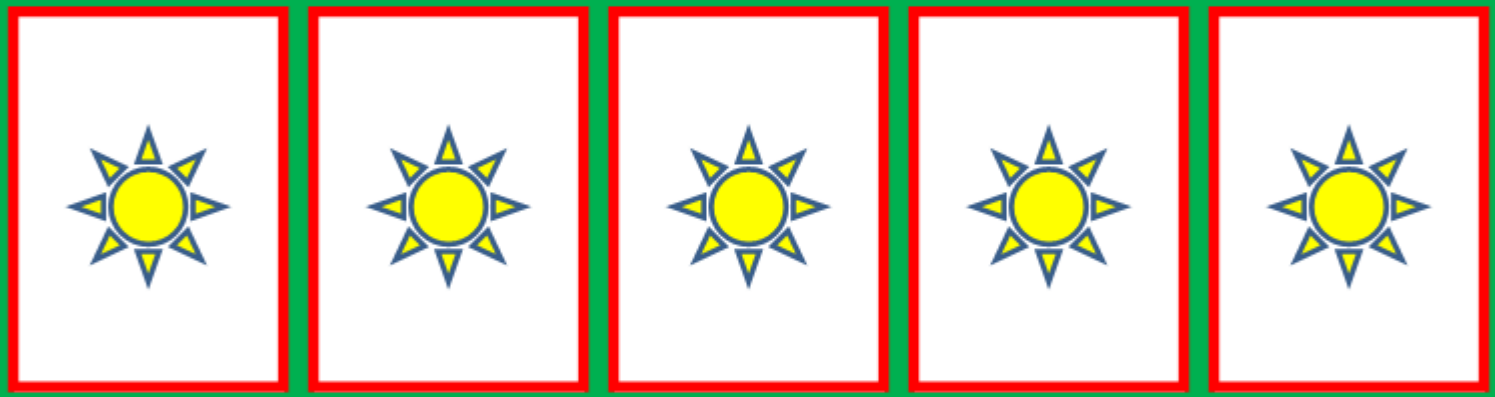
Some of the boxes have dolphins.



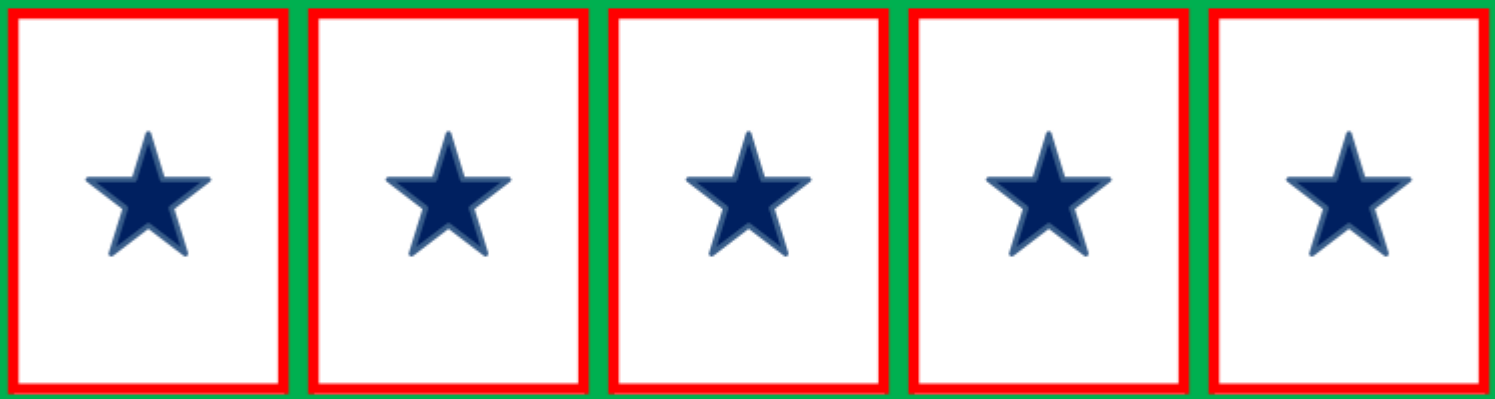
There are rings on some of the cards



There are suns on some of the cards



There are rings on some of the cards



Pragmatics and bilingualism

- No differences in age, gender, non-verbal IQ
- Vocabulary: monolinguals > bi-dialectal > multilingual
- SES: multilinguals > (bi-dialectals = monolinguals)
- EFns: PCA Inhibition and WM: Multilinguals & Bi-dialectals > monolinguals (when vocabulary is covariate)
- Single PCA component for pragmatics (though both GCIs and PCIs)
- EFns do not predict pragmatics in any group
- Vocabulary predicts pragmatics in bi-dialectal and monolinguals but not in multi-linguals
- Different routes into pragmatics for different learners?

Thank you!

Tomorrow's lecture:

Crosslinguistic investigations

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