

Acquisition of quantity, relevance and word learning inferences, and their relationship with Theory of Mind

Elspeth Wilson & Napoleon Katsos, Department of Theoretical and Applied Linguistics

Aims

What is the relationship between different types of implicature inferences in development?
 How do these relate to word learning by exclusion, claimed to be a similar pragmatic inference?
 How are pragmatic inferences dependent on Theory of Mind development?

- Recent studies have found younger age of development for pragmatic inferences than previously thought
- They investigate only one type of inference, with different methodologies and languages across studies
- This study has a single method for testing implicature comprehension and word learning by exclusion in different age-groups

Method

- 5 stories, binary picture-selection task, narrated by experimenter and puppet (recorded), 32 items
- Inference type (Scalar, Ad hoc, Relevance, Word Learning) x Critical/Control x Age-group
- Counterbalanced order of presentation
- Theory of Mind tests: Sally-Anne and unexpected contents tasks
- To date: N = 66 monolingual children; N = 15 adult controls

Control	Bob came out of the kitchen. His dad asked, "What have you taken from the fridge?"	"And I said, I took an orange and a strawberry"
Relevance	It was breakfast time. Bob's dad asked, "What would you like for breakfast?"	"And I said, I'll get the milk"
Scalar quantity	Bob made a crash in the kitchen. His mum asked, "What did you do with the pile of plates?"	"And I said, I broke some of the plates"
Word Learning	Bob went inside the shop and...	"I picked a dax."

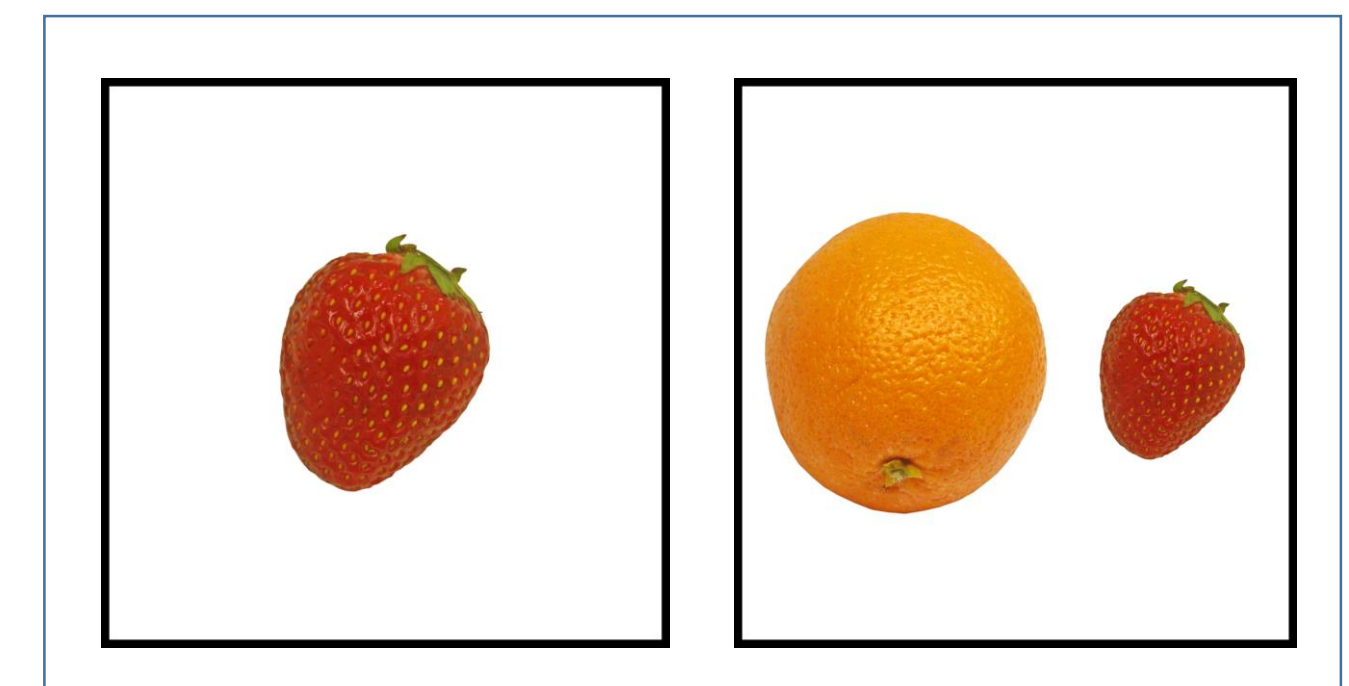
Ad Hoc



Bob came out of the kitchen. His dad asked, "What have you taken from the fridge?"

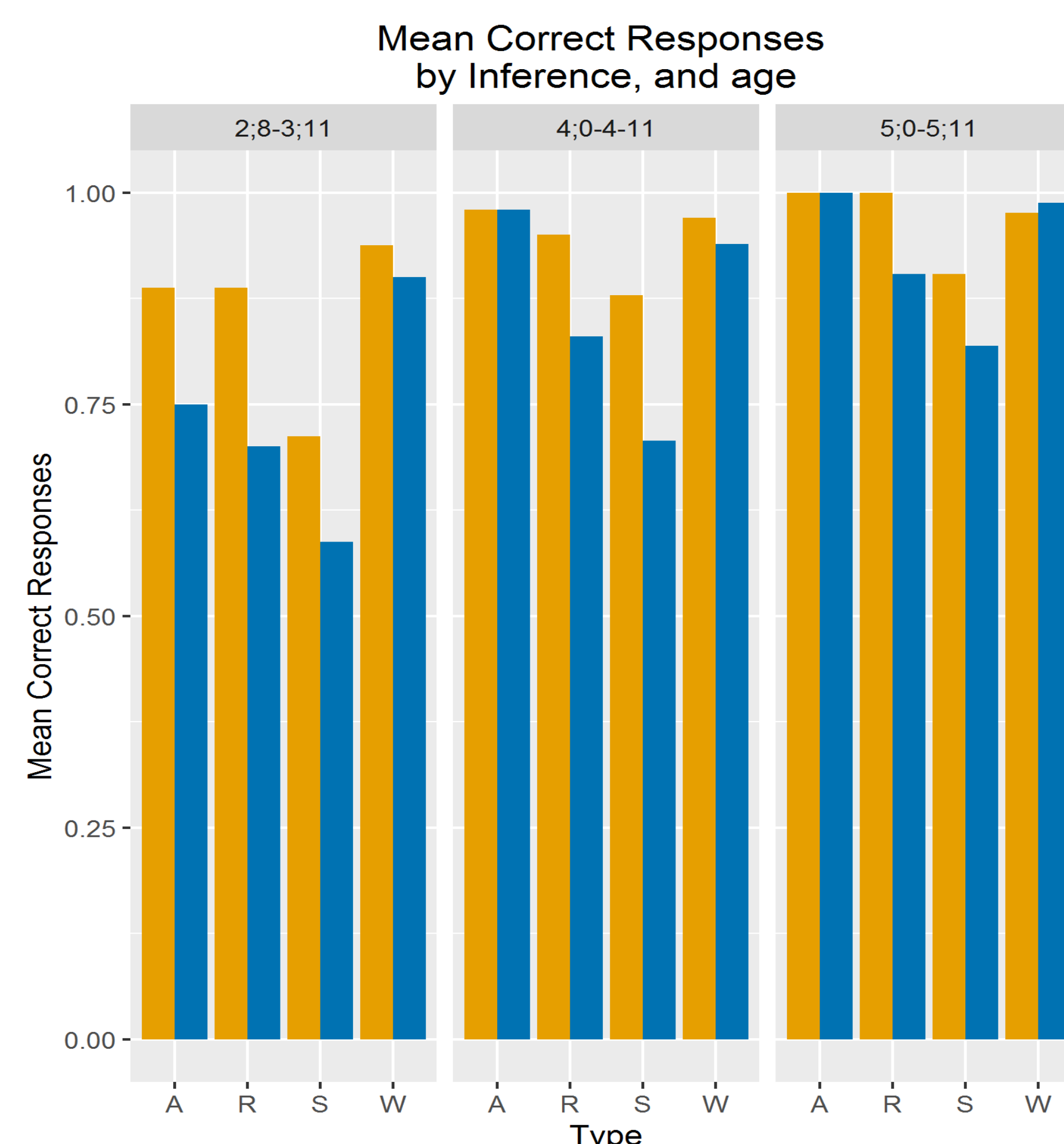


"And I said, I took a strawberry."



Results

- Fitted generalised linear models
- Model comparison with chi-squared tests: Age-group, Condition and Inference Type are significant predictors ($\chi^2(2) = 78.4, p < .01$; $\chi^2(1) = 35.9, p < .01$; $\chi^2(2) = 106.8, p < .01$).
- GLM of 3-year-old responses with Critical/Control and Type and their interaction: significant effect of Critical vs Control ($\beta = .97, p = .027$); no difference in performance in critical trials between Ad Hocs and Relevance; Scalars are significantly lower than Ad Hocs ($\beta = -.75, p = .030$); Word Learning by Exclusion significantly higher ($\beta = 1.1, p = .015$).
- In 3-year-olds, no correlation between ToM and implicature score (Kendall's tau = 0.12, $p = .5$) or Ad Hoc and Relevance implicatures (tau = .19, $p = .3$).
- Adults at ceiling for all types in Critical and Control



		Critical		Control	
		% Correct	sd	% Correct	sd
2;8-3;11 N = 20	A	0.75	0.33	0.89	0.19
	R	0.70	0.31	0.89	0.19
	S	0.59	0.28	0.71	0.28
	W	0.90	0.21	0.94	0.11
4;0-4;11 N = 25	A	0.98	0.07	0.98	0.10
	R	0.83	0.23	0.95	0.13
	S	0.70	0.30	0.88	0.19
	W	0.94	0.17	0.97	0.08
5;0-5;11 N = 21	A	1.00	0.00	1.00	0.00
	R	0.90	0.15	1.00	0.00
	S	0.82	0.26	0.90	0.15
	W	0.99	0.05	0.98	0.08

A = Ad Hoc quantity; R = Relevance; S = Scalar quantity; W = Word Learning by Exclusion inference

Discussion

- Results confirm previous findings of acquisition order in single task: WL before Ad Hocs / Relevance before Scalars
- 3-year-olds in this study can do 'condition fulfilled' Relevance implicatures, previously not found
- So far, no association in performance between ToM and implicatures, or implicature types
- Generally high scores likely due to child-friendly methods
- Gricean view of pragmatic inferences requires ToM: does this need revising? Is it possible to do a picture-selection task without reference to speaker beliefs? Or are more sensitive, less language-based ToM measures required?

References

- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, 21(1), 37–46.
- Breheny, R (2006). Communication and Folk Psychology. *Mind & Language*, 21(1), 74–107.
- Papafragou, A., & Skordos, D. (2016). Scalar Implicature. In J. Lidz et al (Eds.), *Oxford Handbook of Developmental Linguistics*. Oxford: OUP. 611–631.
- Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology*, 5(2), 125–137.
- Schulze, C., Grassmann, S., & Tomasello, M. (2013). 3-Year-Old Children Make Relevance Inferences in Indirect Verbal Communication. *Child Development*, 84(6), 2079–2093.

With thanks to the schools, nurseries, parents and children who took part, and Becky Brooks who helped with data collection.
ep321@cam.ac.uk / www.elspethwilson.uk