EXCEPTIONALITY AND STRIKINGNESS AND THE ACQUISITION OF GENERICITY

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The Generic Notebook: Current Approaches to Genericity
HU-Berlin 2 June 2017

This work was supported by a British Academy/Leverhulme Trust SRG (SG-132271) and its continuation is currently supported by AL 554/8-1 (DFG Gottfried Wilhelm Leibniz Preis 2014 to Artemis Alexiadou)

Structure of the talk

- Section 1: introduction & background
- Section 2: experiments
- Section 3: implications and future work

Section 1

Introduction

Background

Generics in acquisition

- All cats like milk.
- Most cats like milk.
- Some cats like milk.
- Two cats like milk.
- **Cats** like milk.
- **A/The cat** likes milk.

- How do children acquire generics without a dedicated marker and with varied dimensions of meaning?

Three interesting questions

- Do children know three critical dimensions of generic meaning:

a) that a property introduced with a generic is likely to extend to new instances of the kind
b) that generics tolerate exceptions
c) that generics can be used even in the absence of strong statistical prevalence in case the property is noteworthy or striking in some way

Do children know the meaning of generics?

- Some studies suggest 2 year olds produce generics
  - Hollander et al. 2002: both 3- and 4-year olds were adult-like in their responses to generic questions, only the 4-year olds were adult-like with *all* and *some*
  - Leslie and Gelman 2012: both 3- and 4-year old children and adults reliably recalled generic facts as generic, but recalled many quantified facts as generic

- Children know that generics lie somewhere between *all* and *some* and they learn this before they learn the meaning of *all* and *some*

Do children know that properties introduced with generics are likely to extend to new instances of the kind?

- Graham, Neyer &Gelman (2011) 24- and 30-months olds

- Heard: '**Blicks** drink milk' OR '**This blick** drinks milk' paired with an action modeled on an object
- Task: Imitate the target action (using the model object or a new one)

- After specific nominal
  - 30-month olds imitated more often with the model than with the nonmodel object
- After generic nominal
  - 30-month olds imitated equally often with both objects

CLAIM: 30-month-olds use the generic/specific distinction to guide their inferences about the extendability of properties

Tolerance to exceptions

1) Tigers have stripes.

TRUE, even in the face of exceptions, such as albino tigers.

2) All/Every/Each tiger(s) has stripes.

TRUE only if no tigers lack stripes, FALSE otherwise.

Exceptions: how many?

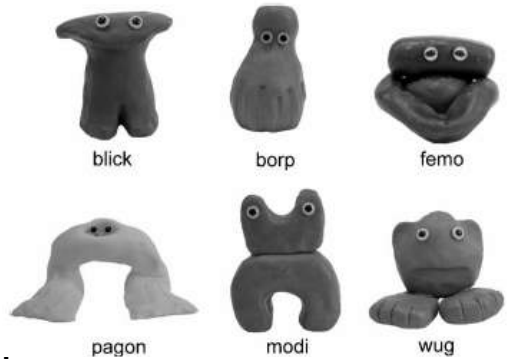
- How many exceptions can a generic tolerate and still be true? (Pelletier 2010)

1) Snakes are reptiles: 0%
2) Tigers have stripes: 3-4%
3) Ducks lay eggs: around 50%
4) Lions have manes: around 50%
5) Italians are good skiers: 70%
6) Turtles live to an old age: 90%
7) Mosquitoes carry the West Nile virus: 99%

Do children know that generics tolerate exceptions?

- Yes! (Gelman & Raman 2003, Gelman&Bloom 2007, Chambers et al. 2008)
- We focus here on Chambers et al. 2008 who measured 4-year olds' willingness to extend a property to a new exemplar of a novel kind

- Experiment 2 (n=24)
- 2 conditions (generic/specific)
- 2 exemplars with the property
  (*shy, gentle, mean, strong, fast, friendly*)+ 1 exception



- These are pagons. {Pagons/These pagons} are friend.
- Except this pagon, this pagon isn't friendly.
- Is this pagon friendly?

% of property extension	Description	
	Generic	Specific
Experiment 2	65%	26%

Chambers et al. discussion

- Children extended the property more often when they heard a generic than when they heard a specific, even when exceptions were presented.

Striking generics

- Low prevalence generics are licensed just in case the property is noteworthy or striking in some way:

(1) Sharks attack people
(2) Mosquitoes carry the West Nile virus
(3) Lead toys poison children

- People accept *sharks attack people* as true even though a tiny minority of sharks do so. (Prasada et al. 2013)

- NB: Sharks attack and kill 10 humans per year, on average. Humans, in contrast, annually kill about 20 to 30 million sharks according to the Florida Museum of Natural History's Department of Ichthyology

Leslie on striking generics

- Leslie (2008): “These are the sorts of properties that one would like to know about—if there is a nontrivial chance that one will encounter something with these traits, one would be well served to have some prior warning.”

- Leslie (forthcoming): “The disposition to generalize strikingly negative information on the basis of even a single event thus appears to be a pervasive aspect of our thinking.”

Section 2

The experiments

Results and discussion

Research questions

- How many exceptions will children tolerate for generics?
- We do not know whether young children are sensitive to *strikingness* with respect to generics
- Will children acquire aspects of meaning that are related to statistical prevalence/likelihood at the same time as aspects of meaning that are related to affect?

Assumptions

☞ we’re taking it for granted that children will extend properties introduced with a generic nominal more so than if they are introduced with a specific one and that generics tolerate some exceptions

Experiments 1 and 2

- Experiment 1 had the following manipulations (between-subjects design):
  - nominal type: generic vs. specific
    - *borps*
    - *these borps*
  - property type: neutral vs. striking
    - *borps love to talk to their mothers*
    - *borps love to scare their mothers*

- Experiment 2 included a third manipulation:
  - exception type: minimal vs. maximal
    - minimal (1 exception)
    - maximal (3 exceptions)

Materials: new kinds

8 novel creatures were created using modelling clay and six instances (that differed in colour) were created for each kind.

Striking generics for children: affective ratings

- Warriner et al. database (2013) adult ratings on 3 dimensions (valence, arousal, and dominance) using a 9-point scale

- valence: the pleasantness of the stimulus
- arousal: the intensity of emotion provoked by the stimulus
- dominance: the degree of control exerted by the stimulus

examples at the extreme ends:

- lowest valence: pedophile 1.26 – highest valence: vacation 8.53
- lowest arousal: grain 1.6 – highest arousal: insanity 7.79
- lowest dominance: dementia 1.68 – highest dominance: paradise 7.9

Ratings of materials

- **Neutral items**
  - average arousal (range 3.14-5.24, *mean* 3.99)
  - high valence (range 6.09-7.5, *mean* 6.85)

- **Striking items**
  - high arousal (range 4.91-7.24, *mean* 6.08)
  - average valence (range 2.53-4.68, *mean* 3.68)

Striking generics for children: AoA

We also cross-checked these against the Kuperman et al. (2012) database for AoA (Age of Acquisition) of 30,000 English words in order to make sure children in the age-band of interest would know the words we would use.

Materials: properties

Neutral properties	Striking properties
Ackles love to play with toys.	Ackles love to play with fire.
Borps love to talk to their mothers.	Borps love to scare their mothers.
Glippets love to run through parks.	Glippets love to smash through walls.
Murbs love to draw their names.	Murbs love to shout their names.
Pagons love to feel safe.	Pagons love to feel afraid.
Scobbits love to make new games.	Scobbits love to cheat at games.
Vardies love to play with cats.	Vardies love to play with snakes.
Zorbs love to make people sing.	Zorbs love to make people angry.

Experiment 1

- 64 English-speaking 4-5 year old children (51-70 months), school in London
- nominal type: generic/specific
- property type: neutral/striking

Procedure

- Individual testing in a quiet space
- “A puppet called Sarah visited a far away plan[illegible], where she saw some new animals and today she will tell you what she knows about them.”
- Listen carefully, as Sarah will also be asking questions.

Procedure: test phase

- Step 1: Introduce 2 instances of a novel creature

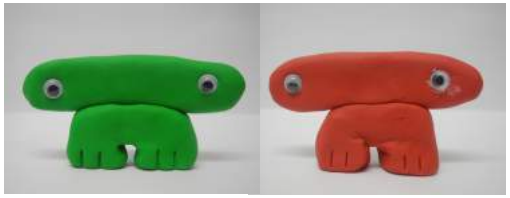
generic neutral: “These are borps. Borps love to talk to their mothers.”
specific neutral: “These are borps. These borps love to talk to their mothers”
generic striking: These are borps. Borps love to scare their mothers.”
specific striking: “These are borps. These borps love to scare their mothers”

Step 2: Present a new instance and pose a question about it

neutral: ‘Does this borp love to talk to its mother?
striking: ‘Does this borp love to scare its mother?

Sample: Generic neutral condition

- Step 1: These are borps. Borps love to talk to their mothers.



- Step 2: Does this borp love to talk to its mother?

Exp 1 (n=64, 16/condition)

% of property extension	Nominal	
	Generic	Specific
Experiment 1		
Neutral	89%	79%
Striking	63%	52%

- numerical trend, but no main effect of nominal
- main effect of property
- no interaction

Consistent Extender (yes to ≥7/8)	Nominal	
	Generic	Specific
Neutral	14/16	11/16
Striking	8/16	7/16

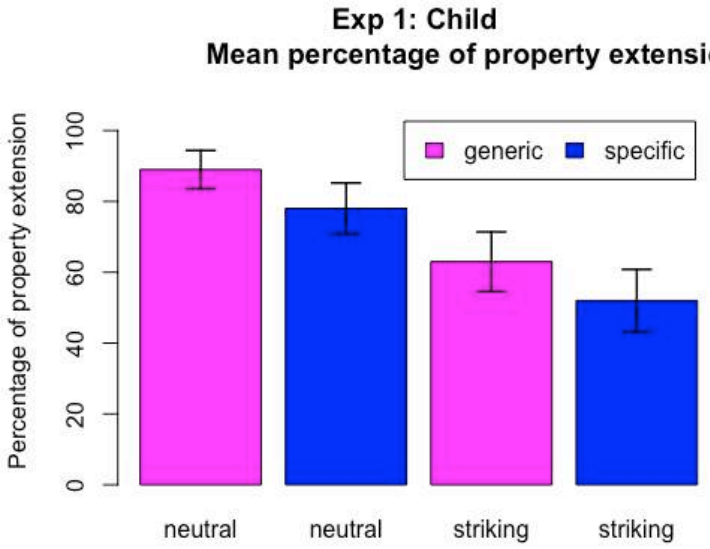
Results Exp 1 adults-children

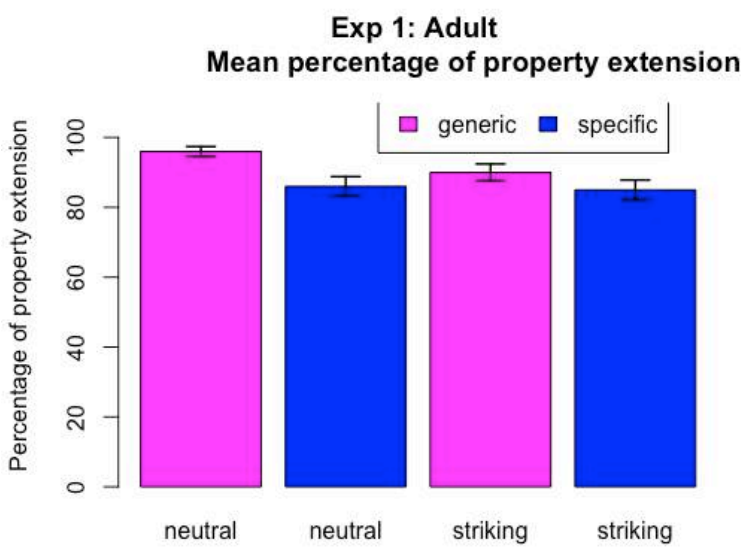
Experiment 1

	Generic	Specific
Exp 1 Adults (n=140)		
Neutral	96%	90%
Striking	86%	85%
Exp 1 Children (n=64)		
Neutral	89%	79%
Striking	63%	52%

- **Adults**
  - main effect of nominal
  - main effect of property
  - no interaction
- **Children**
  - numerical trend, but no main effect of nominal
  - main effect of property
  - no interaction

Results Exp 1 adults-children





Note that extension rates are high

Experiment 2

- 64 English-speaking 4-5 year old children (49-70 months), school in London
- Nominal type: generic/specific
- Property type: neutral/striking
- Exception type: minimal/maximal

NB: we changed slightly the wording we used to introduce exceptions, because Chambers' wording was infelicitous in the specific condition

Procedure: test phase

- Step 1: Introduce 2 instances of a novel creature

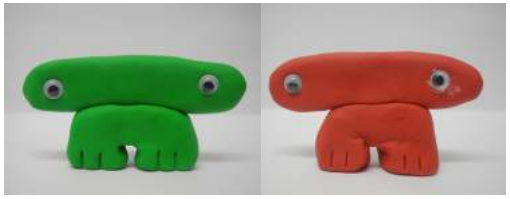
generic neutral: "These are borps. Borps love to talk to their mothers."
specific neutral: "These are borps. These borps love to talk to their mothers"
generic striking: These are borps. Borps love to scare their mothers."
specific striking: "These are borps. These borps love to scare their mothers"

Step 2: Introduce 1 (minimal) or 3 (maximal) exceptions
minimal neutral: "But not this one, this borp doesn't love to talk to its mother"
minimal striking: "But not this one, this borp doesn't love to scare its mother"
maximal neutral: "But not these ones, these borps don't love to talk to their mothers"
maximal striking: "But not these ones, these borps don't love to scare their mothers"

Step 3: Present a new instance and pose a question about it
neutral: 'Does this borp love to talk to its mother?
striking: 'Does this borp love to scare its mother?

Sample: Generic neutral minimal condition

- Step 1: These are borps. Borps love to talk to their mothers.

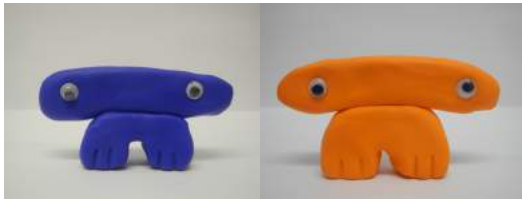


- Step 2: But not this one. This borp doesn't love to talk to its mother.

- Step 3: Does this borp love to talk to its mother?

Sample: Generic striking maximal condition

- Step 1: These are borps. Borps love to scare their mothers.



- Step 2: But not these ones. These borps don't love to scare their mothers.

- Step 3: Does this borp love to scare its mother?

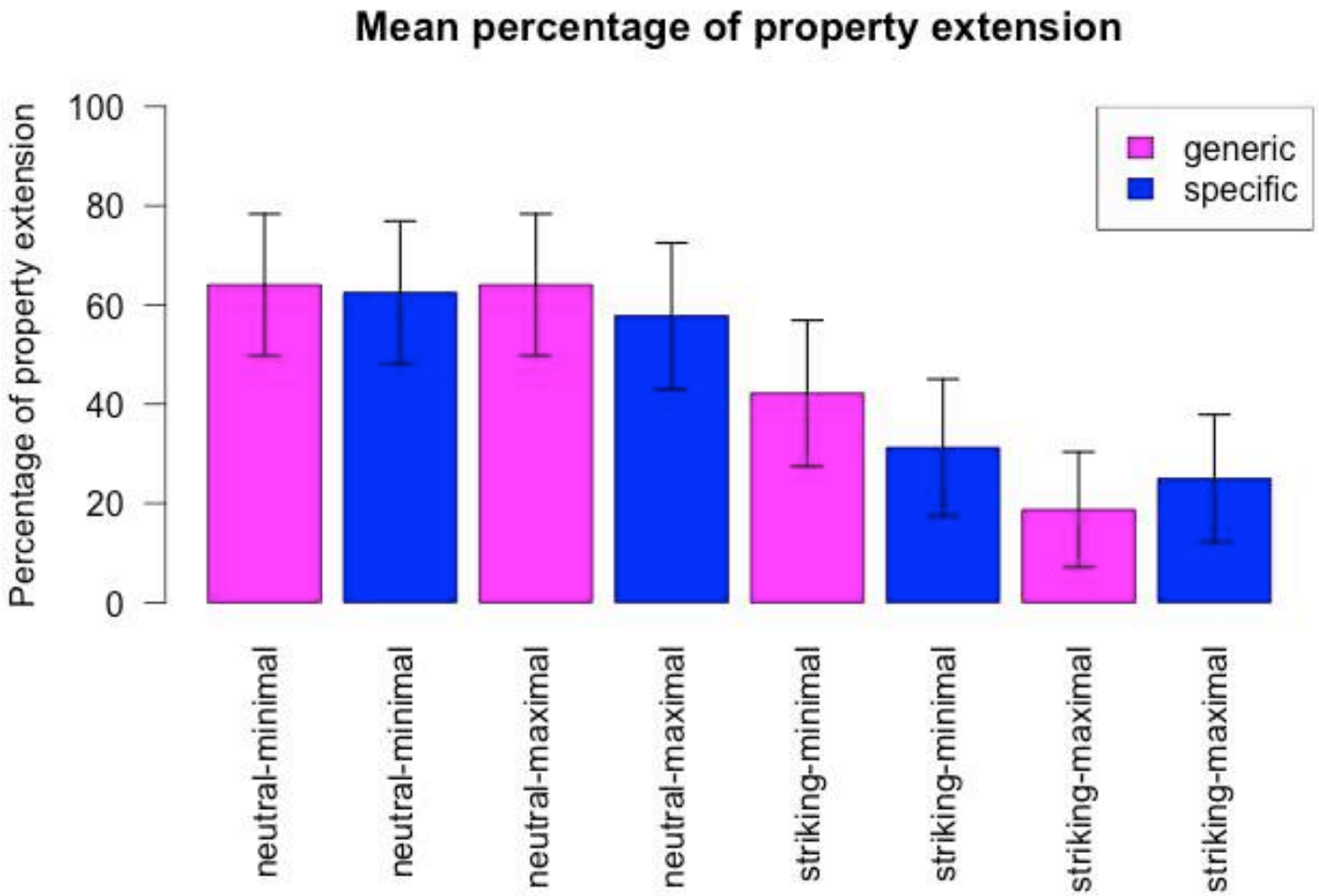
Hypotheses

- Following Chambers et al. 2008, children will extend the property more in the generic condition than in the specific condition
- The number of exceptions should not affect rates of extension for generics
- If children understand that striking generics can be licensed under very low prevalence, they should extend the property even when the exceptions are more than the positive instances

Exp 2 (n=64, 8/condition)

% of property extension		Nominal	
		Generic	Specific
Experiment 2			
Neutral	Minimal	64%	63%
	Maximal	64%	58%
	Mean	*64%*	*60%*
Striking	Minimal	42%	31%
	Maximal	19%	25%
	Mean	*30%*	*28%*

Exp 2 results



Exp 2: Extender analysis

Consistent Extender (yes to ≥7/8)		**Nominal**	
		Generic	Specific
Experiment 2			
Neutral	Minimal	3/8	2/8
	Maximal	2/8	3/8
Striking	Minimal	2/8	1/8
	Maximal	0/8	1/8

Results discussion

- We found a main effect of **property**
  - Striking properties triggered **fewer** extensions than neutral overall (29% vs. 62%)

- We found no main effects of nominal type and no property x nominal interaction

- We found no main effects of number of exceptions
  - Exceptions lowered extension rates overall (~20/30% compared to Exp 1)

Some tendencies

- Numerically, in the neutral condition, children seem to know that generics allow for both minimal and maximal exceptions
- They are at least numerically sensitive to the introduction of maximal exceptions for specifics (lower rates by ~5%)
- In the striking condition, there was a trend for specifics to trigger fewer extensions than generics but only in the minimal exception condition (31% vs. 42%)

Results discussion

- Overall, no reliable evidence that 4-5 year-old children know that generics tolerate exceptions more than specifics (even in the neutral property condition).

- Strikingness seems to reduce children's willingness to make exception-tolerant generalisations rather than increase it. Numerically, generics do seem to extend more than specifics in this condition.

- We found no reliable evidence that children straightforwardly know some of the key aspects of the meaning of generics by age 4.

What next? A replication study

- Our experiment 3 was a replication of Chambers et al. exp. 2 (using exact same stimuli and procedure)
- 32 4-5 year olds, school in London

	Nominal	
	Generic	Specific
Chambers' Exp 2	65%	26%
Our Exp. 3	50%	42%

- No reliable replication, though the numbers are in the right direction

Consistent Extender (yes to ≥5/6)	Nominal	
	Generic	Specific
Extension	4/16	2/16

Section 3

Implications of our results

Conclusions

- We do not have reliable evidence that children know key aspects of meaning of generics by age 4
  - Extension
  - Tolerance to exceptions
  - Use with low prevalence striking properties
- Hints that different aspects of the generic meaning such as exceptionality and strikingness might be acquired at different ages
- There is still a lot to be done

THE END – THANK YOU!

Any questions: dl518@cam.ac.uk

Thank you to Faidra Faitaki and Valentina Hu (interns at QMUL)