

Variation in First Language Development

Stoll & Lieven

Lecture 6: Using experiments

Methods

- Comprehension
 - Intermodal preferential looking (IPL):
 - Hear and look
 - Pointing
 - Act-out
- Production
 - Imitation/Repetition
 - Priming
 - Full production with novel items

Case study 1: Verbs of motion in typological perspective Slobin (1996, 2002)

■ Elements of motion events (Talmy 1991, 2000)

- *Motion*: displacement in space (different location at time₁ and time₂)
- *Path*: direction of motion (into, upwards, etc.)
- *Figure*: the entity that is moving (person, animal, etc.)
- *Ground*: landmarks that define the path (source, goal, medium, etc.)
- *Manner*: the way in which motion is carried out (rate, motor pattern, etc.)

(Slobin 2002)

Case study 1: Verbs of motion in typological perspective Slobin (1996, 2002)

- Satellite-framed vs. Verb framed (Talmy)
- 1. Verb framed (e.g. Spanish)
 - *La botella salió flotando.*
- 2. Satellite framed languages (e.g. English)
 - *The bottle floated **out**.*

Verbs of motion in typological perspective

[Slobin 1996, 2002]

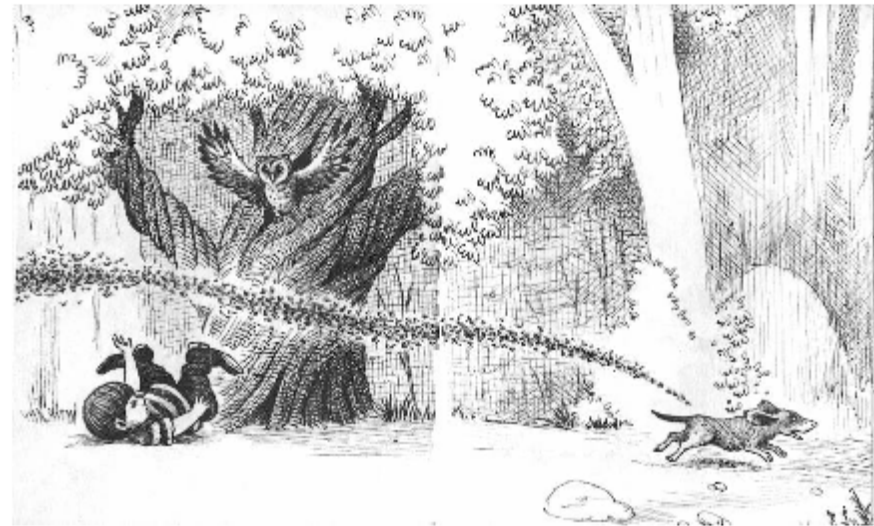
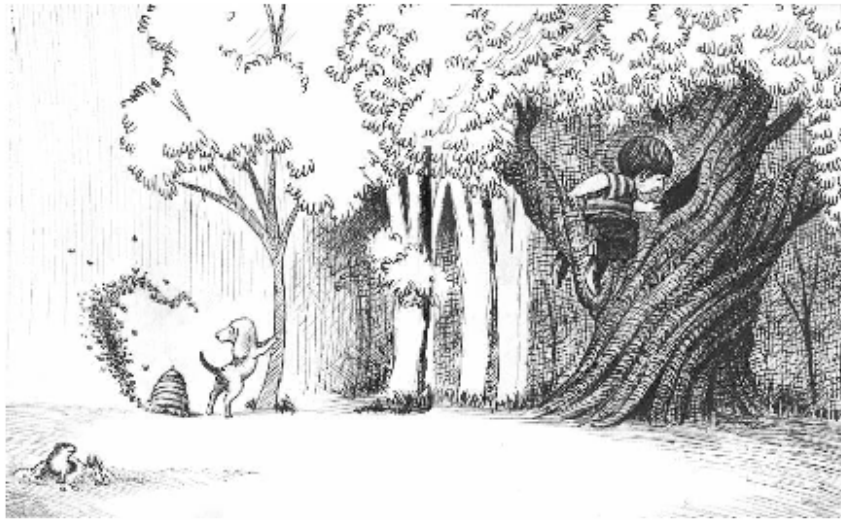
- Consequences for the expression of manner

- *Ella entró a la casa corriendo.*
'She *entered* the house *running*.'
- *She ran into the house.*

(Slobin 2002: 2)

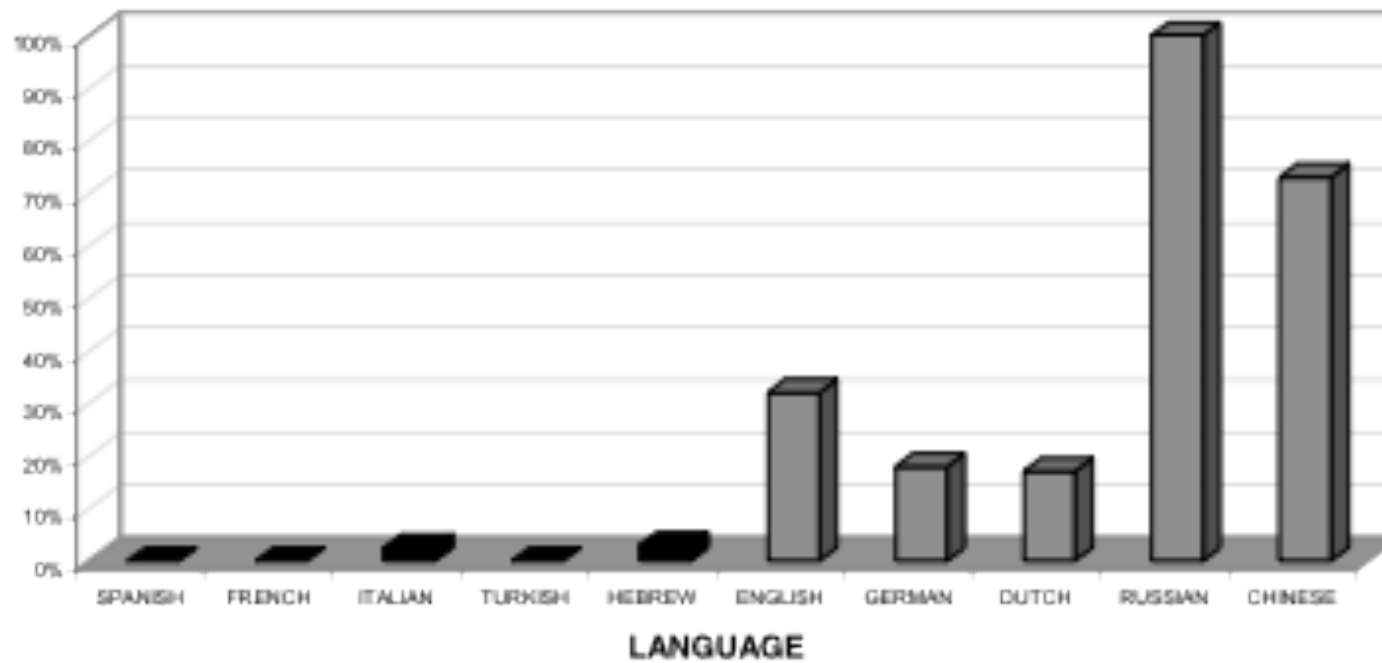
- Verb-framed languages (e.g. Spanish): verb expresses path and manner is expressed by the adverbial expression
- Satellite-framed languages (e.g.. English): verb expresses the manner

- **Method: Narrative task (*Frog where are you?*) (Berman & Slobin, 1994)**
- **Languages:**
 - **Verb-framed:**
 - **Romance: French, Galician, Italian, Portuguese, Spanish:**
 - **Semitic: Marrocan Arabic, Hebrew**
 - **Turkic: Turkish**
 - **Japanese**
 - **Satellite-framed languages:**
 - **Germanic: Dutch, English, German, Icelandic, Swedish, Yiddish**
 - **Slavic: Polish, Russian, Serbo-Croatian**
 - **Finno-Ugric: Finnish**
 - **Sino-Tibetan: Mandarin Chinese**
- **5 age groups 3, 4, 5, 9, adults with 12 subjects per group**

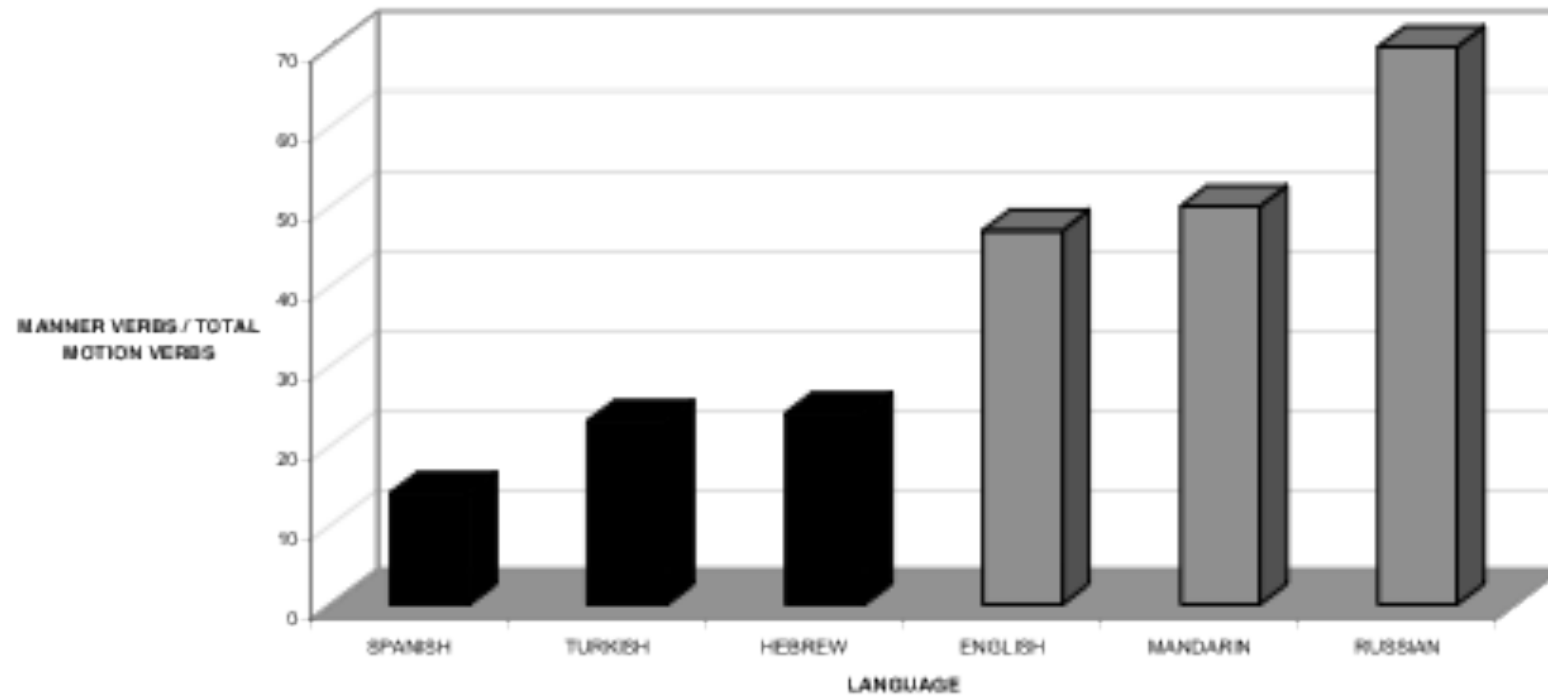


- In verb-framed languages (e.g. Spanish) nearly all narrators described the appearance of the owl with a single path verb meaning 'exit'.

**OWL'S EXIT: PERCENTAGE OF NARRATORS USING
A MANNER-OF-MOTION VERB**



**"THE FROG STORY":
PERCENTAGE OF MANNER VERB USE BY 3-YEAR-OLDS**



How early are language-specific spatial semantic categories acquired? [Choi & Bowerman 1991]

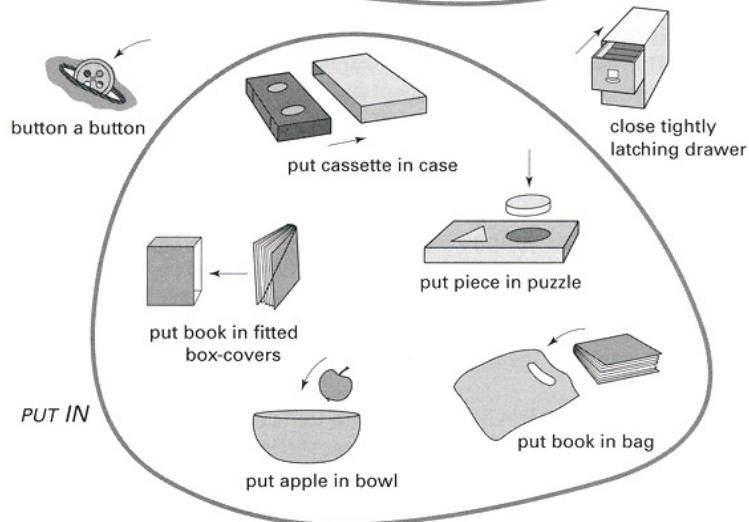
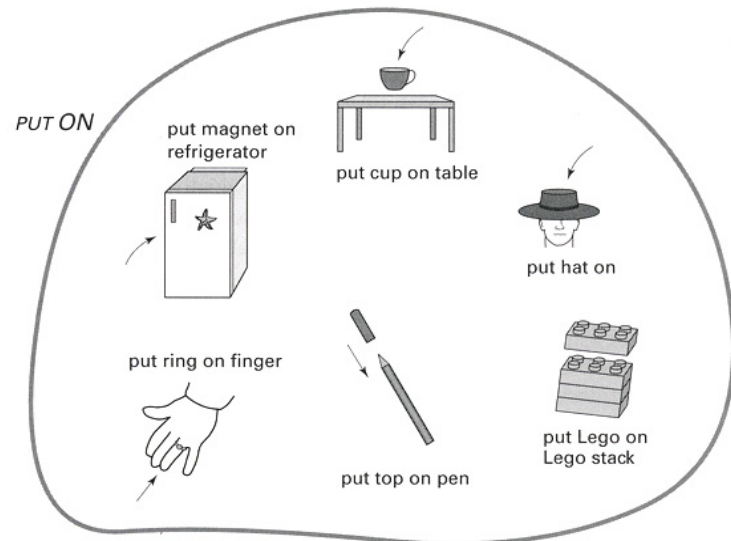
1. Analysis of longitudinal data

- age 1-3 years)

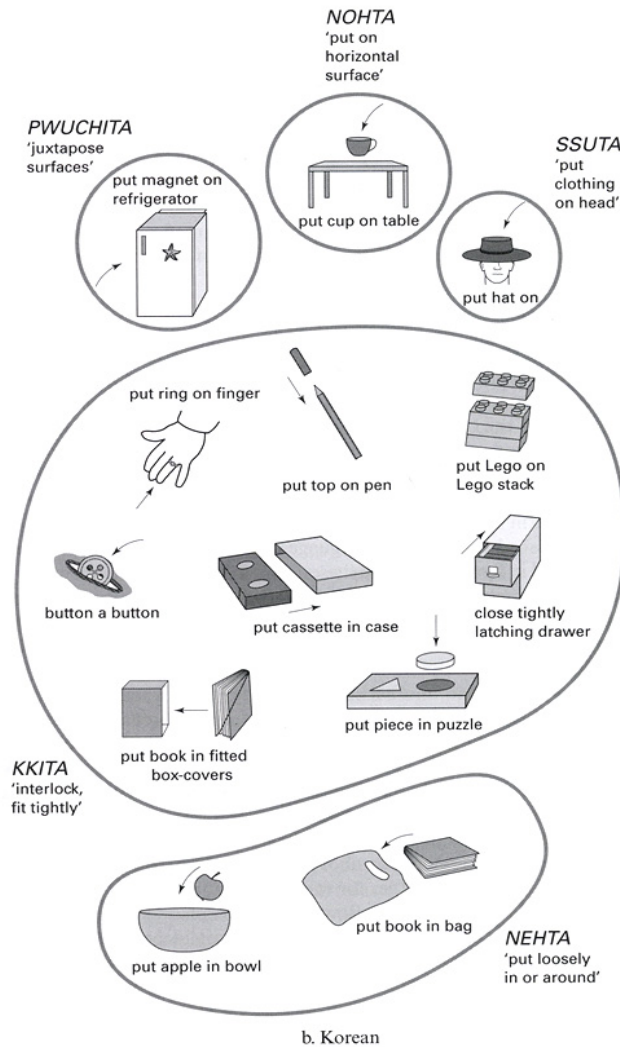
2. Elicited Production

- age 2;0, 2;5, 2;6-2;11, 3;0-3;6
- 10 speakers per age group.

Spatial expressions in English and Korean



a. English



b. Korean

(Choi & Bowerman 1991)

Conclusions

- Extreme variation within and across languages both in structure and in development.
- Children behaved more similarly to the adults of their own language than to children of other languages
 - Children began to talk about space around 14 months of age, productively around 16-20 months.
 - They used spatial words in a language specific way from the beginning.

Morphological productivity

- Elicitation task
- Nonce words (Berko, 1958)
- The ability to inflect novel words
- Ongoing debate:
 - rules (e.g. Clahsen, 1999; Marcus et al., 1995; Pinker, 1999)
 - schemas (e.g. Bybee, 1995; Dąbrowska, 2004; Köpcke, 1998)
 - wash* → *washed*
 - begin* → *began*
- Effects of:
 - frequency
 - similarity

Case-marking in Polish

Noun inflection in Polish

- Dąbrowska (e.g. 2004, 2005):
 - Experimental studies on children and adults
 - Gradual process
 - Even adults are sometimes not fully productive
 - Key factors: type frequency, phonological similarity
- Krajewski et al. (submitted):
 - Naturalistic study (a girl 2;0.3 - 2;1.12)
 - An average number of inflections per noun compared to an adult
 - Controlling additional factors: vocabulary size, knowledge of inflections, sample size etc.
 - Limited productivity

Noun inflection in Polish

		Masculine	Neuter	Feminine
S i n g	N O M	0, -'o, -ę	-o, -e, -ę	-a, -ia, 0
	G E N	-a / -u	-a	-y (-i)
	D A T	-o w i / -u	-u	-ie / -y (-i)
	A C C	-a / = N O M	= N O M	-ę / = N O M
	I N S T	-e m		-a
	L O C	-e / -u		-ie / -y (-i)
P l	N O M	-o w i e / -i (-y) / -y (-i) / -e	-a	-y (-i) / -e
	G E N	-ó w / -y (-i)	0	0 / -y (-i)
	D A T	-o m		
	A C C	-ó w / -y (-i) / -e	-a	-y (-i) / -e
	I N S T	-a m i		
	L O C	-a c h		

Noun inflection in Polish

- Smoczyńska (1985):
 - Bare stems are rare (a stem is an abstraction).
 - A given inflectional form occurs in opposition to the whole inflectional pattern (rather than to the basic form).
 - Acquisition of the ability to replace endings rather than add them to the basic form when required.
- Nonce word production tasks so far:
 1. introduce nouns in nominative
 2. test and compare production of other forms
- Oversimplification
- The form in which children learn a novel noun may matter.

The effect of a **source form** on the production of a **target form**.

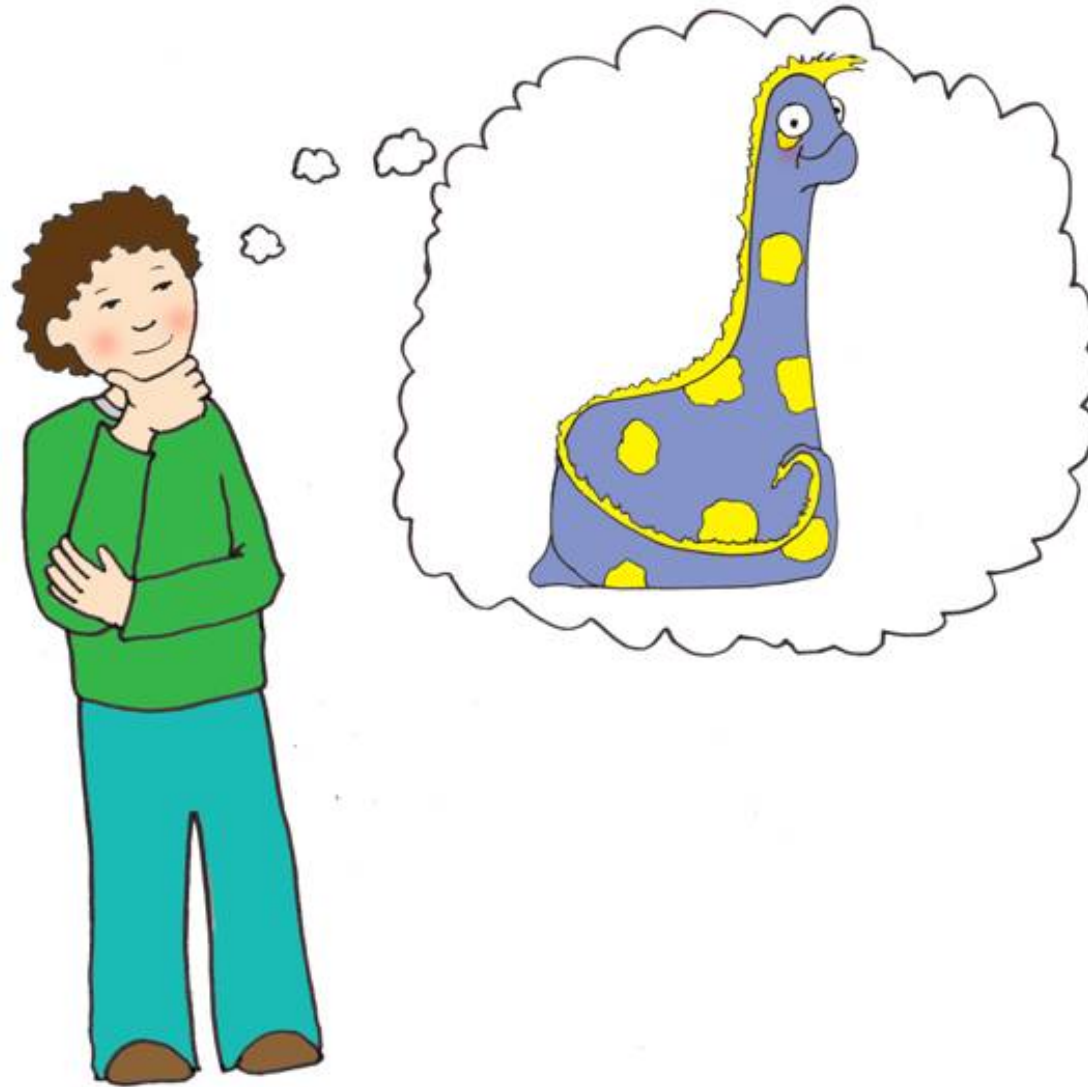
Six source-target pairs (conditions):

DAT MASC <i>-owi</i>	→	GEN MASC <i>-a</i>
LOC MASC <i>-u</i>	→	GEN MASC <i>-a</i>
INSTR MASC <i>-em</i>	→	GEN MASC <i>-a</i>
DAT FEM <i>-i</i>	→	GEN FEM <i>-i</i>
LOC FEM <i>-i</i>	→	GEN FEM <i>-i</i>
INSTR FEM <i>-ą</i>	→	GEN FEM <i>-i</i>

Krajewski et al., 2007
Krajewski, PhD

Method

- Two age groups:
 - younger (N = 24, mean = 2;8, median = 2;8)
 - older (N = 31, mean = 3;6, median = 3;6)
- 4 items in each condition
- Within-subject design: each child gets all 24 items
- Each item: 3 drawings featuring a funny creature, two drawings to model a source form of its name, the last drawing to test the target form



The boy is thinking about X-loc.
(e.g. '*Doc*i**')



The boy is riding X-loc.
(e.g. '*Doc*i**')



The boy is cuddling up to _____ [X-gen].
(e.g. '*Doc*i')



The doctor takes X's temperature [X-dat].
(e.g. '*Puniow*o*wi*')

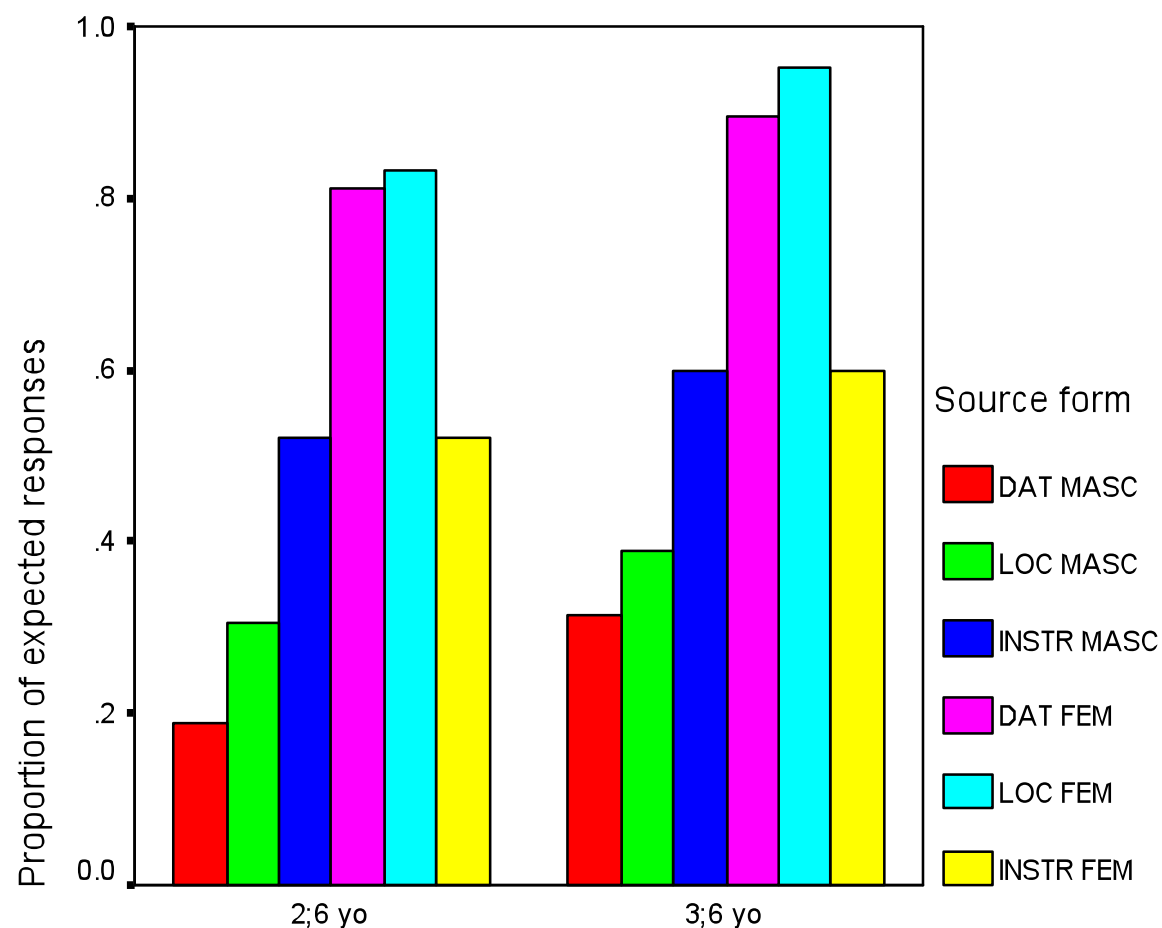


The doctor gives an injection to X-dat.
(e.g. '*Puniow*i')



The doctor is cuddling up to _____ [X-gen].
(e.g. '*Punia*')

Study 1: Results



- Small but significant effect of age

$F(1, 53)=4.109$,
 $p=.048$, partial $\eta^2=.072$

- The same pattern of results in both age groups
- Main effect of source form

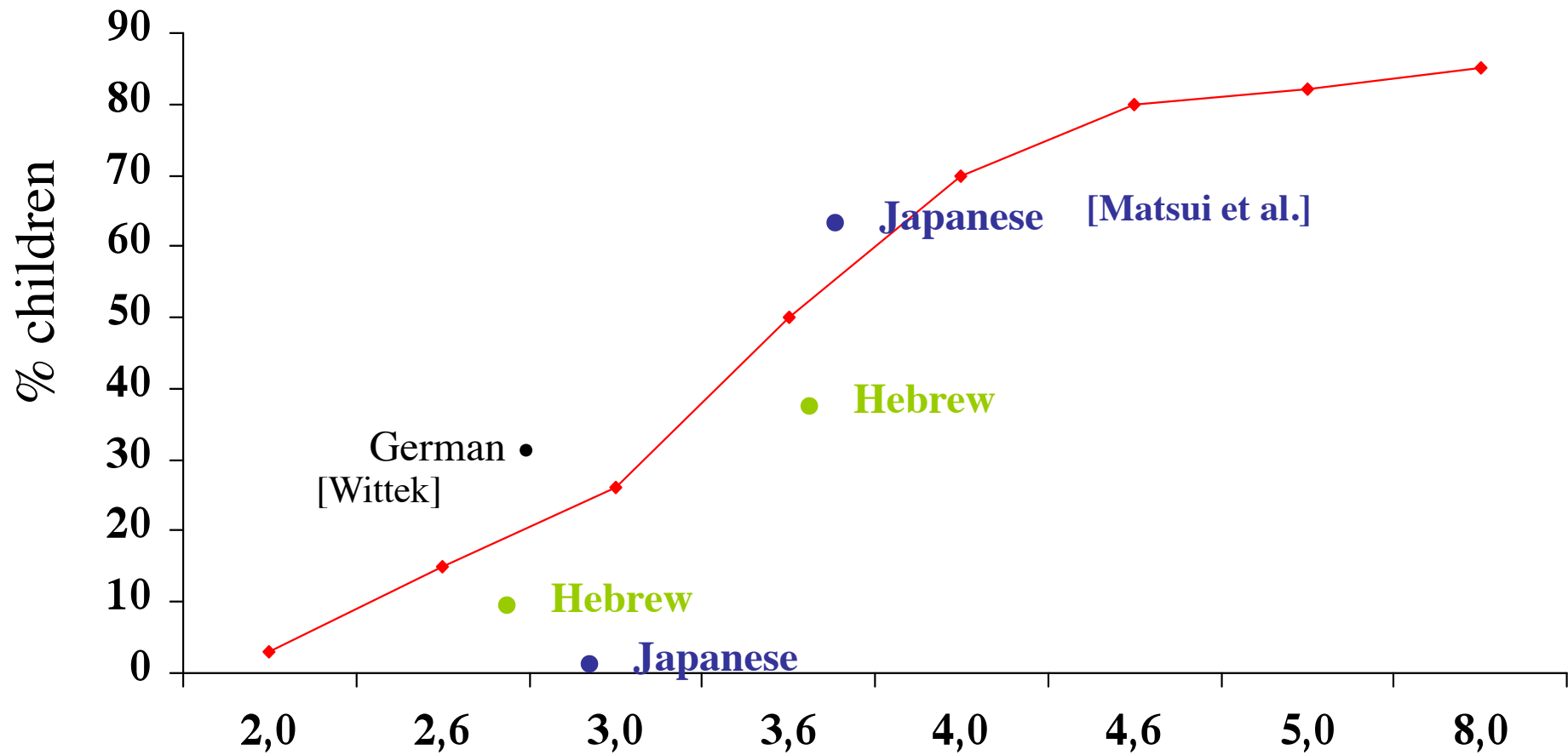
$F(3.83, 203.008)$
 $=60.184$, $p<.001$,
partial $\eta^2=.532$

Conclusions

- Full system builds up, not all there from the outset – even some adults may not be fully productive
- Movement from one form to another may differ for both source and target
- Nominative not necessarily the ‘base’
- Frequency is important but so are other factors e.g. ‘phonological neighbourhoods’

Learning an abstract transitive construction

Novel verb studies of Syntax

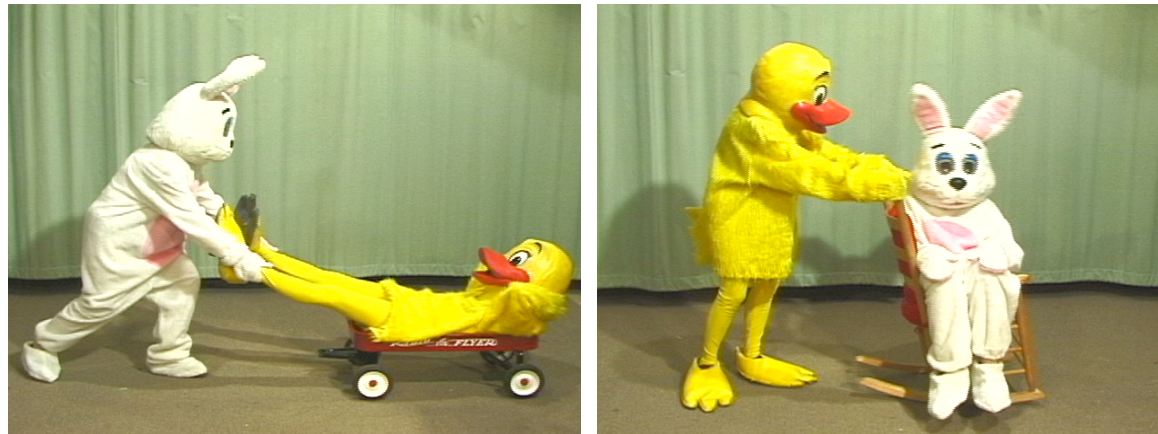


Tomasello, 2000

Early abstract syntax?

Gertner, Fisher & Eisengart, 2006 (Study 1):

Preferential looking paradigm



"The duck is gorpings the bunny. Find gorpings!"

→ 25-month-olds show looking preference to the target scene

Early abstract syntax?

Gertner, Fisher & Eisengart, 2006 (Study 3):

Preferential looking paradigm



"The boy is gorpung the girl. Find gorpung!"

- 21-month-olds show looking preference to the target scene
- use word order to learn meaning of novel verbs

Alternative approaches

- Weak or partial representations

- Representations build up in strength
- Different tasks can be solved with different levels of representational strength

- Performance limitations

- Abstract knowledge is there from the start
- Task demands external to language affect success

Tomasello (2000)

Fisher (2002)

Tomasello, M. & Abbot-Smith (2002)

Chang, Dell & Bock (2006)

Abbot-Smith, Lieven & Tomasello (2008)

Weird word order

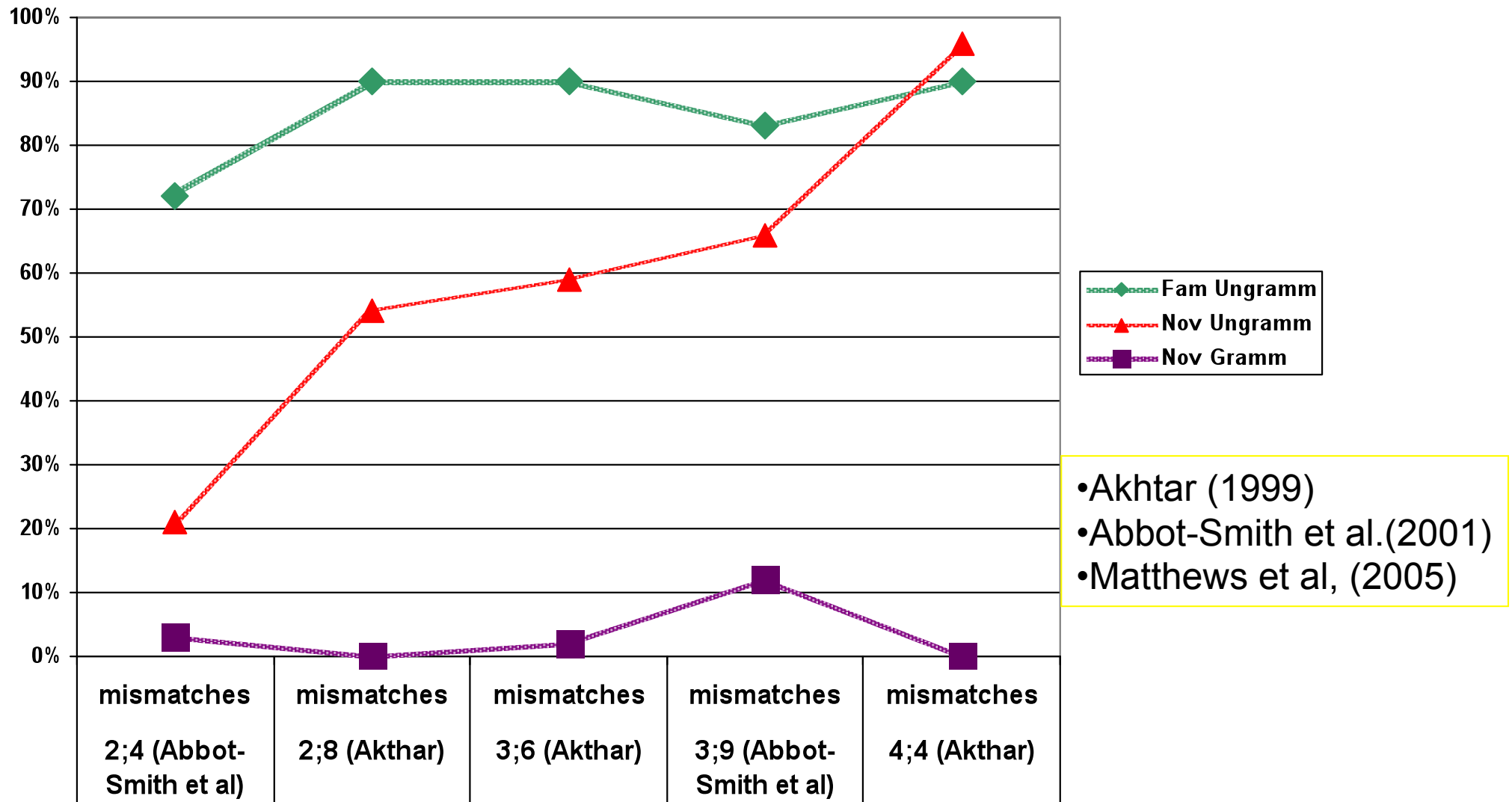
Pull

Watch what Bear is going to do to Duck!

Bear Duck pulling!
Look! Bear Duck pulling
Oh, Bear Duck pulled
Did you see what happened?
Bear Duck pulled!



% Mismatches as a function of condition and age group



Weird word order in French and English

- John pushes **Mary** John pousse **Mary**
- He pushes **her** Il **la** pousse

Matthews et al, 2007]

SOV

Oh! Regarde ce que fait Renard à Canard

[Oh! Look what Fox is doing to Duck]

Renard Canard pousse

[Fox Duck pushes/is pushing]

Oh la la, Renard Canard pousse!

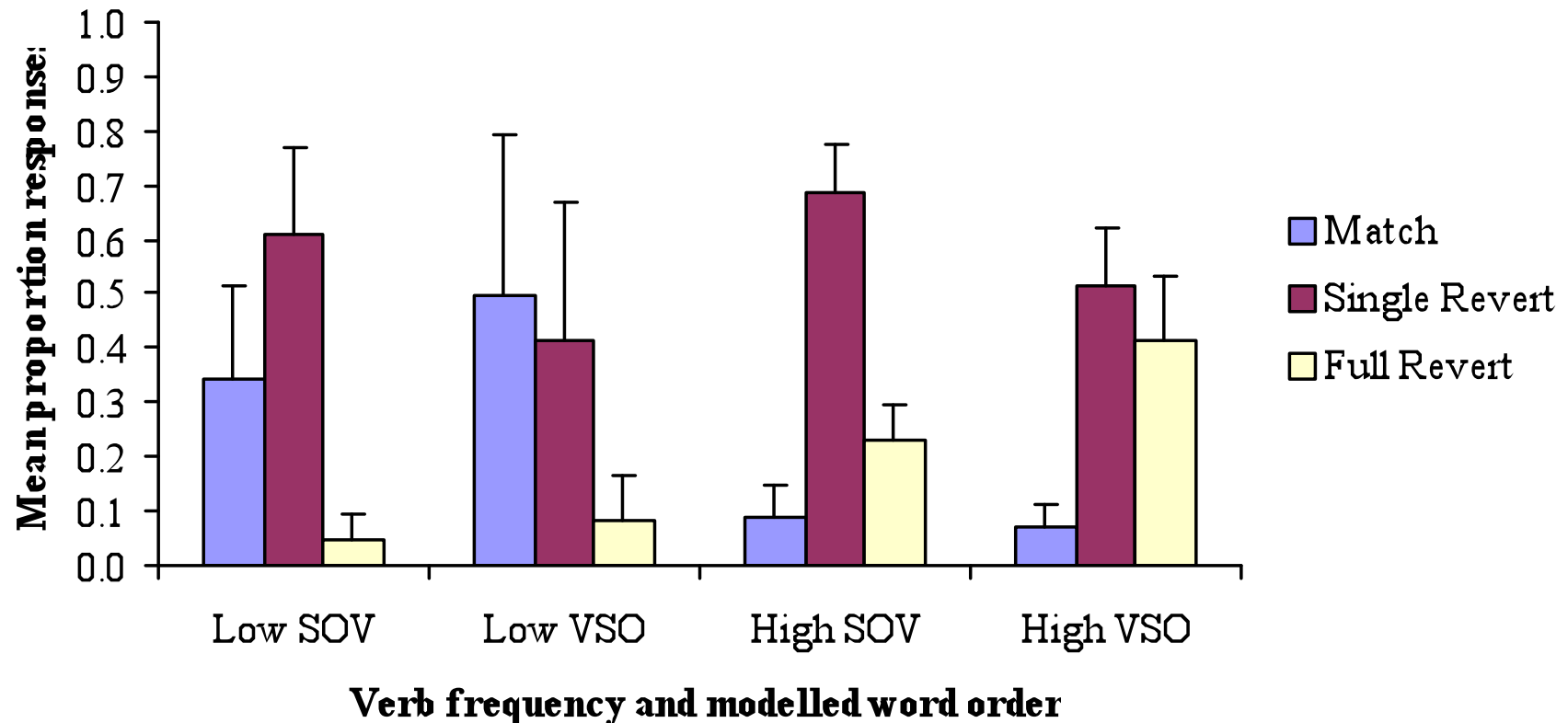
or

VSO

Pousse Renard Canard

Etc....

Weird word order in French



Mean proportion of Matches, Single Argument Reversions and Full Reversions as a function of verb frequency and modelled word order (mean age 2;10).

Learning the active transitive

Cues to argument structure

- Who does what to whom?

The fox ate the chicken

- Cues:
 - Animacy
 - Word order
 - Case marking
 - Agreement

Chan, Lieven & Tomasello (2009) *Cognitive Linguistics*

- Comprehension: **Act-out**
- Age: **2;6, 3;6, 4;6**
- Language: **German, English, Cantonese**
- Cues tested: **Animacy; Word order**

Dittmar, Abbot-Smith, Lieven & Tomasello (2008) *Child Development*

- Comprehension: **Pointing**
- Age: **2;7, 5;0, 7;0**
- Language: **German**
- Cues tested: **Word order; Case marking**

Measuring cues: the Competition Model

Cue availability: the number of sentences in which a cue is present, divided by the total number of transitive sentences

Cue reliability: number of times a cue marks the function divided by the number of sentences in which the cue was present

Cue validity = availability x reliability

The animacy contrast cue

- Cue Availability

- + The dog chases the ball

- The dog chases the cat

- Cue Reliability

- + The man opens the door

- The ball hits the man

The word order cue

- Cue Availability

- + The dog chases the ball

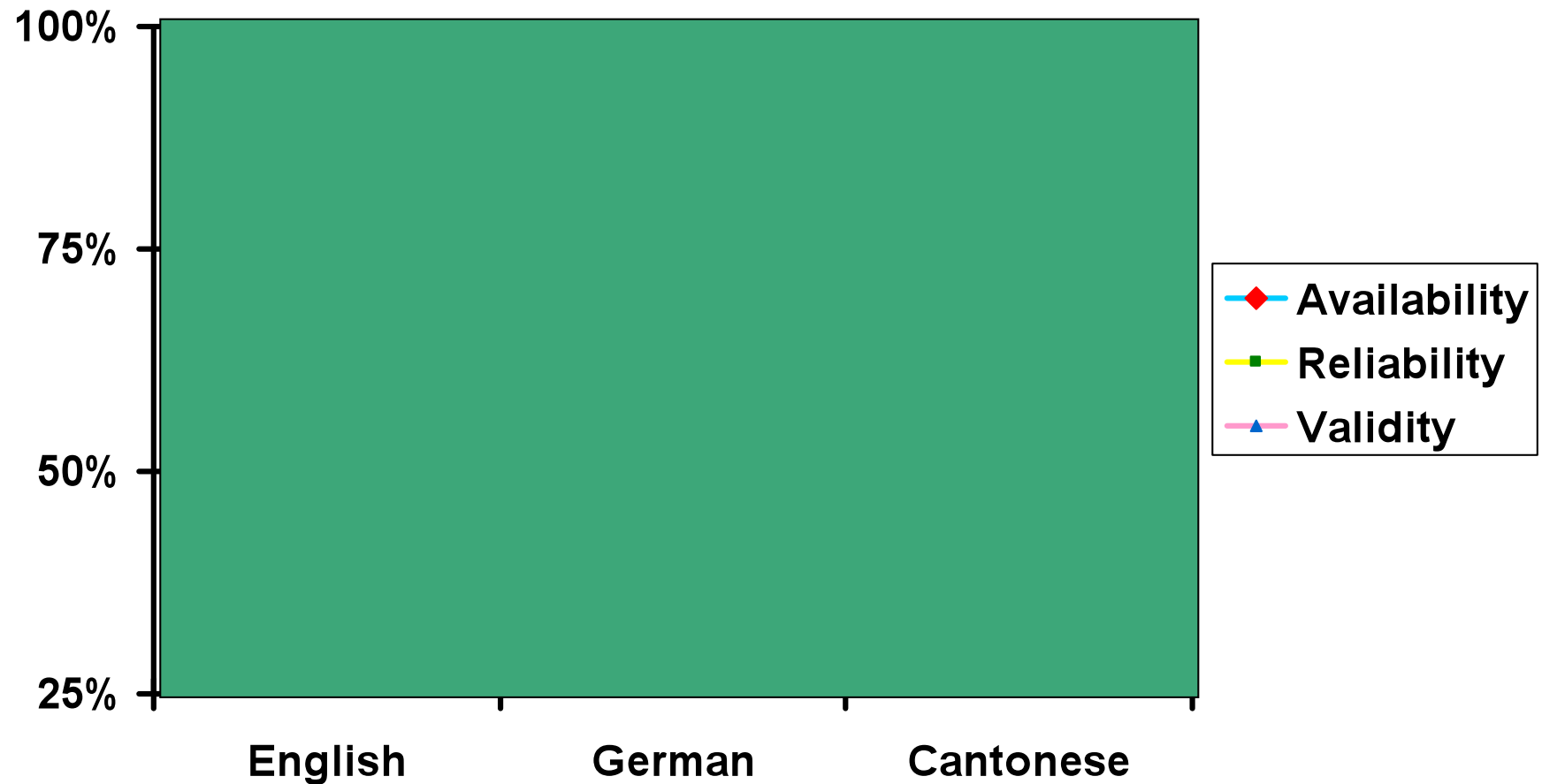
- chases

- Cue Reliability

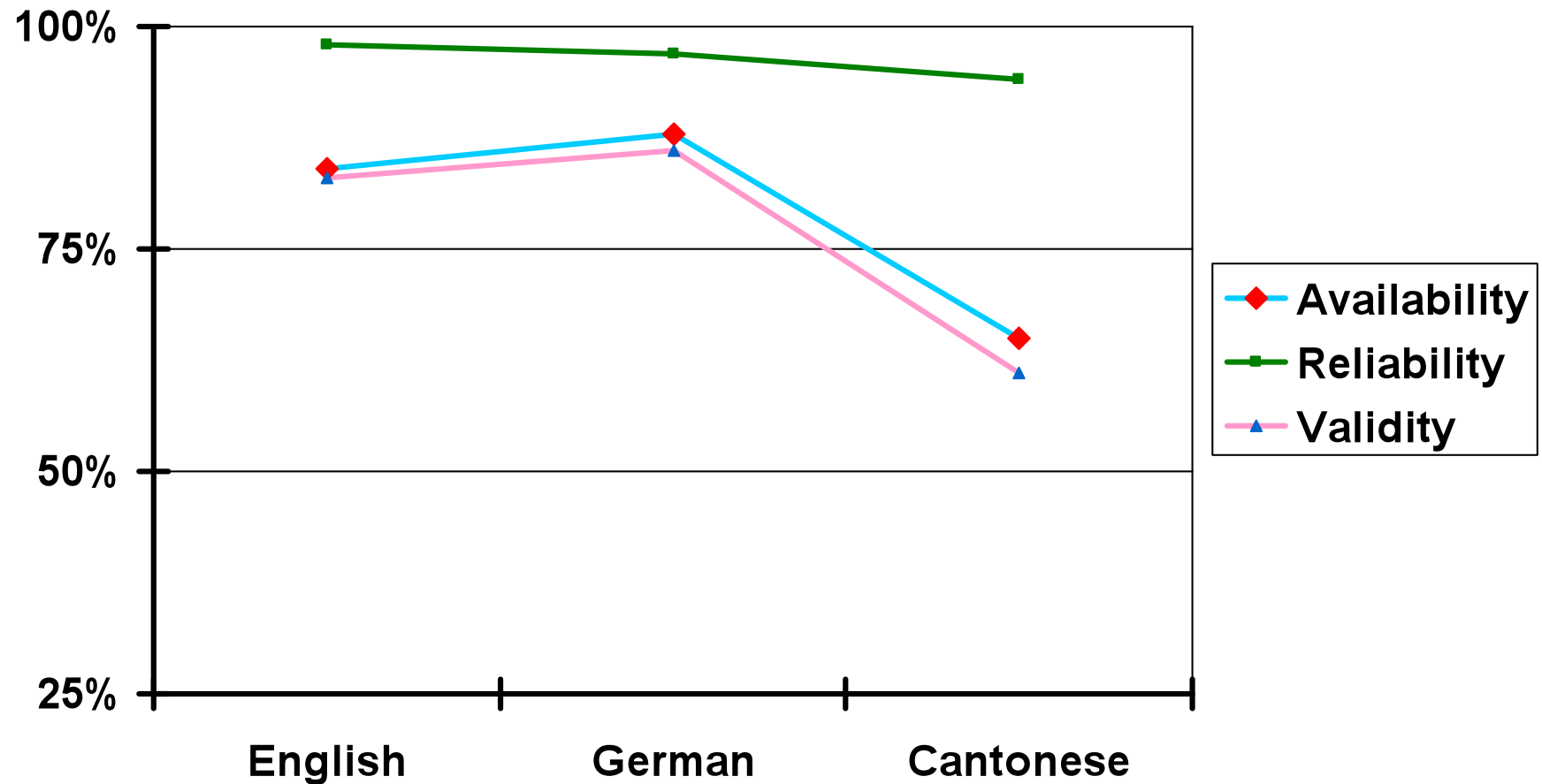
- + The man opens the door

- Den_{ACC} Hund schubst der_{NOM} Löwe

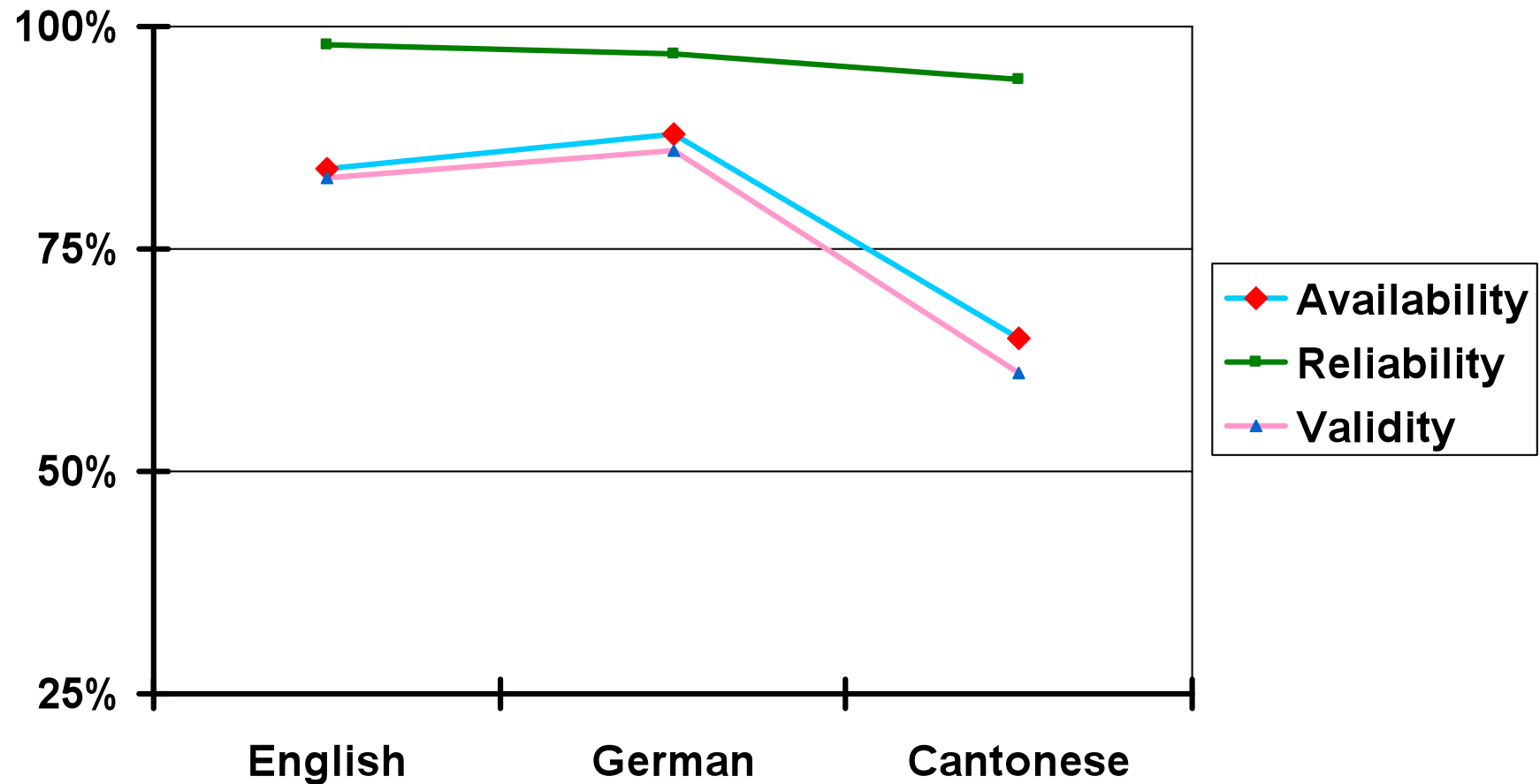
The animacy contrast cue: CDS



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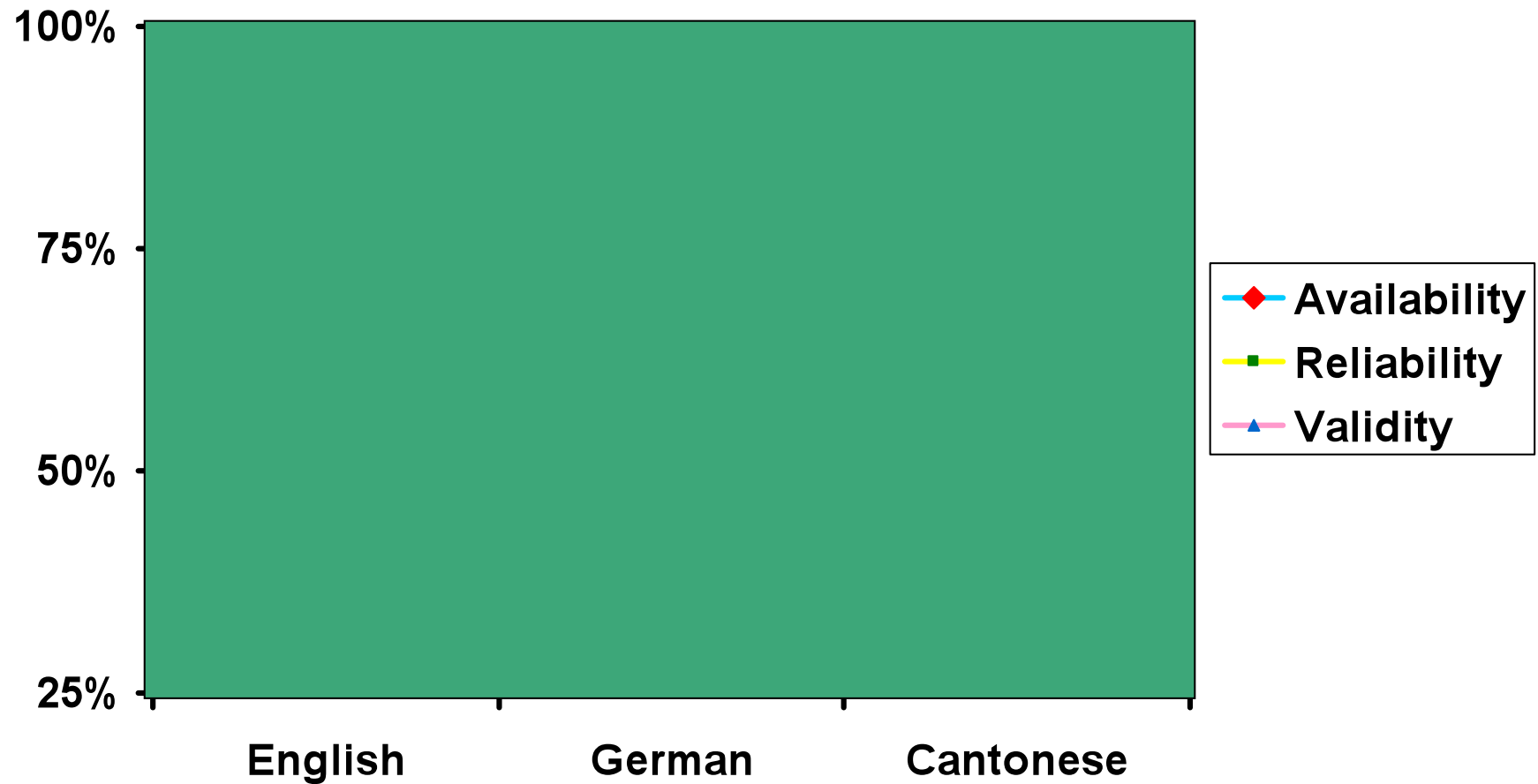


The animacy contrast cue: CDS

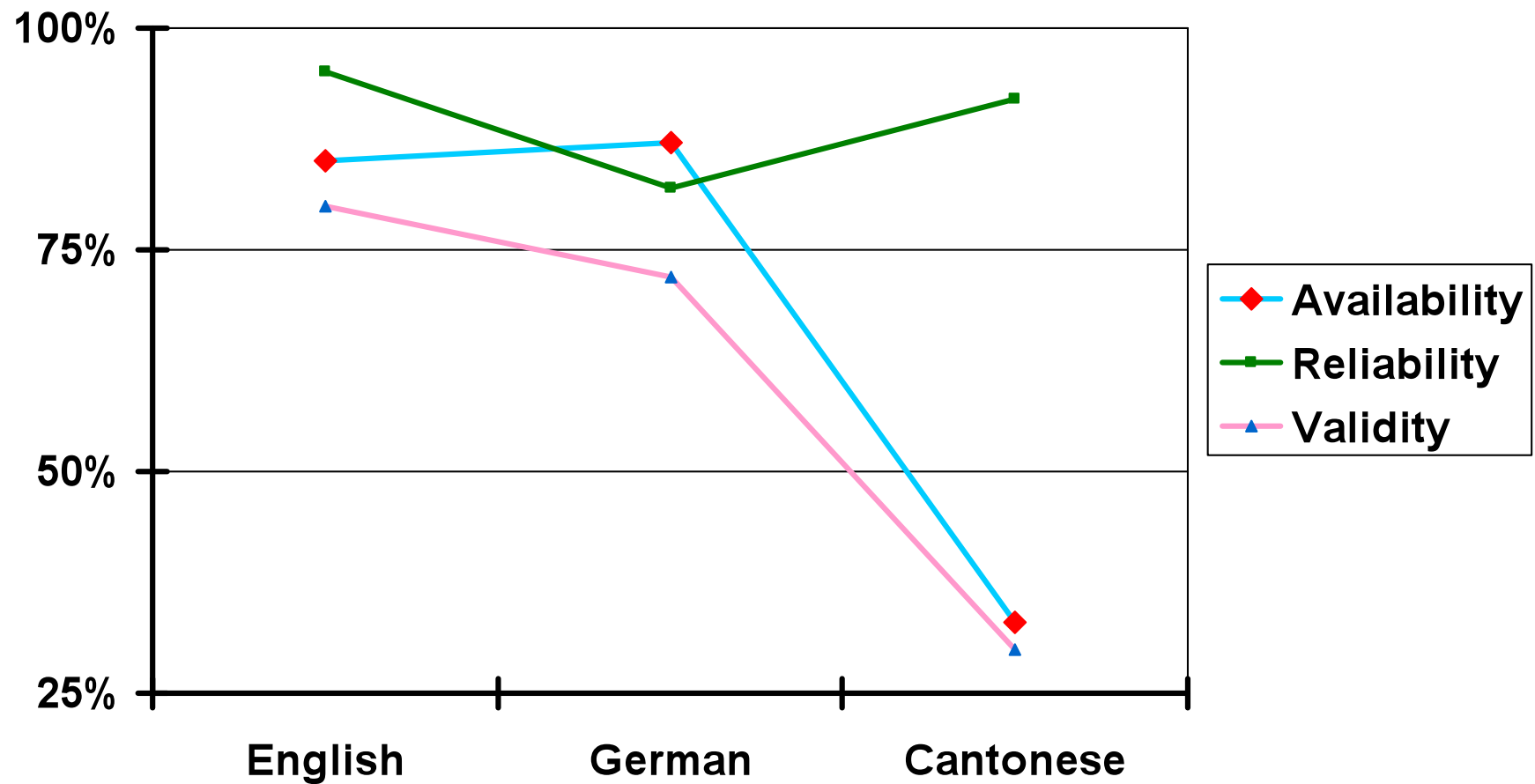


- highly **reliable** across languages

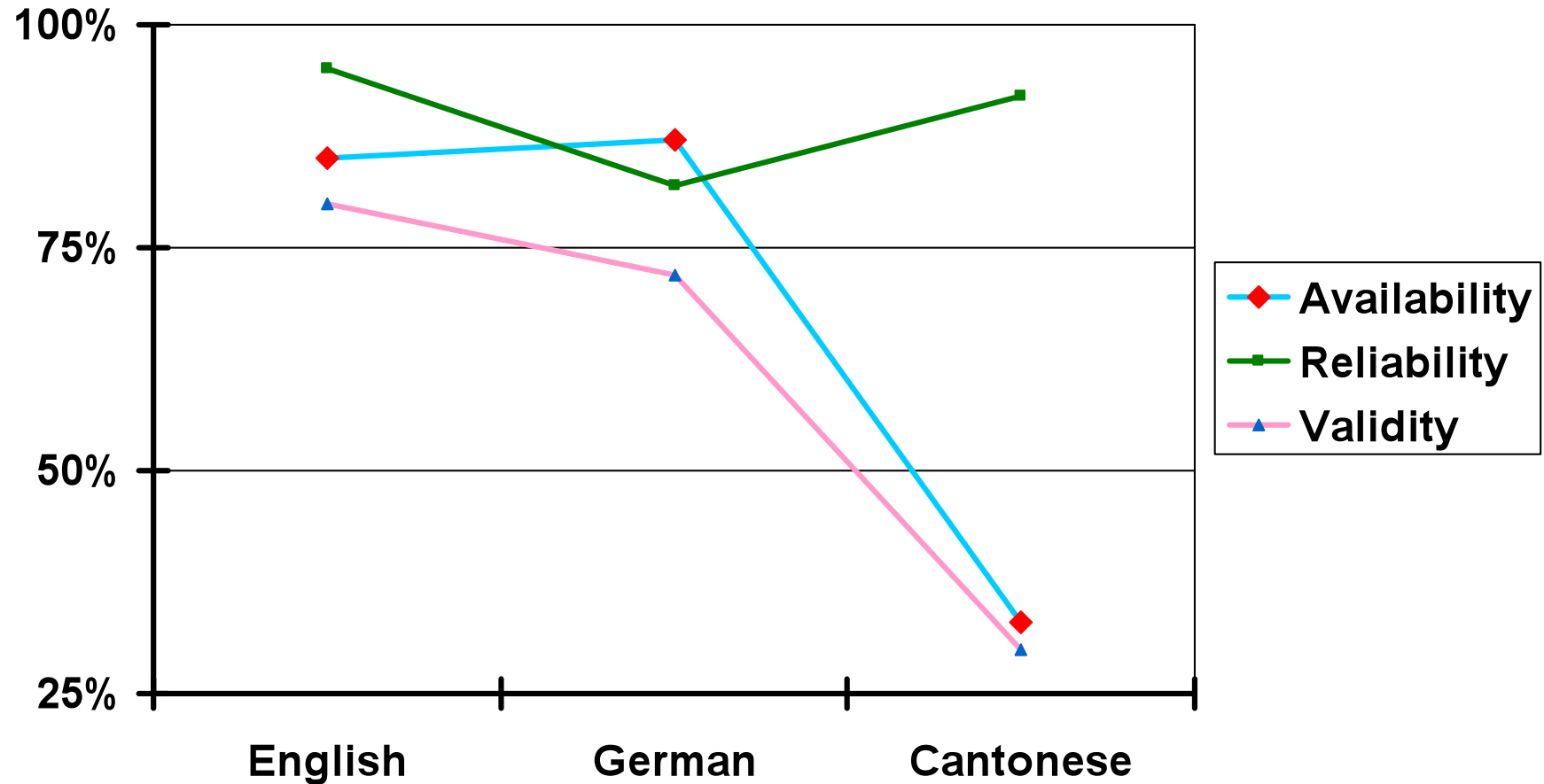
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The word order cue: CDS



cue validity: English > German > Cantonese

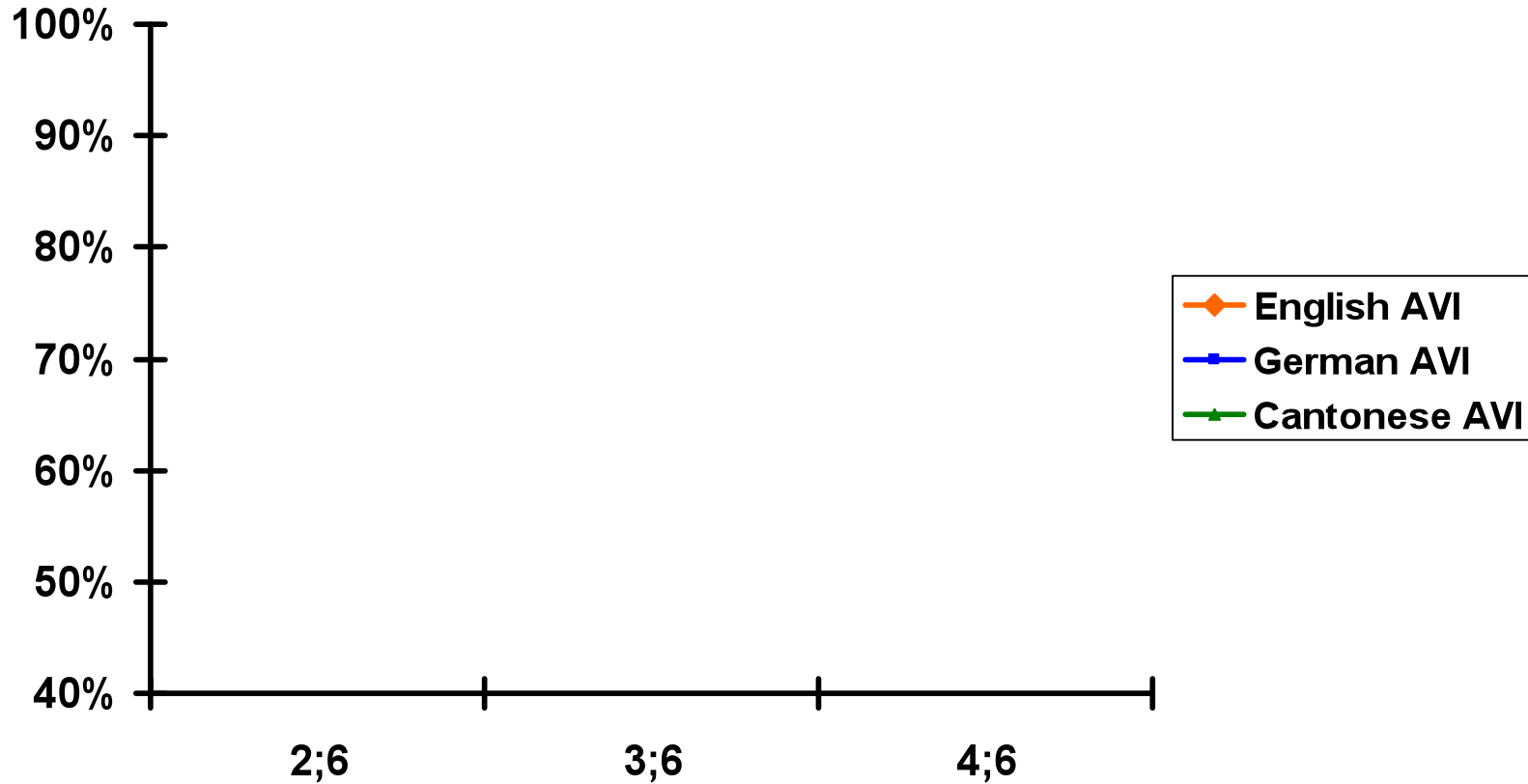
Conditions – within subjects

- (i) Animate Noun - Verb - Inanimate Noun **(AVI)**
 - (ii) Inanimate Noun - Verb - Animate Noun **(IVA)**
 - (iii) Animate Noun - Verb - Animate Noun **(AVA)**
- Experiments with Novel verbs: Act-out



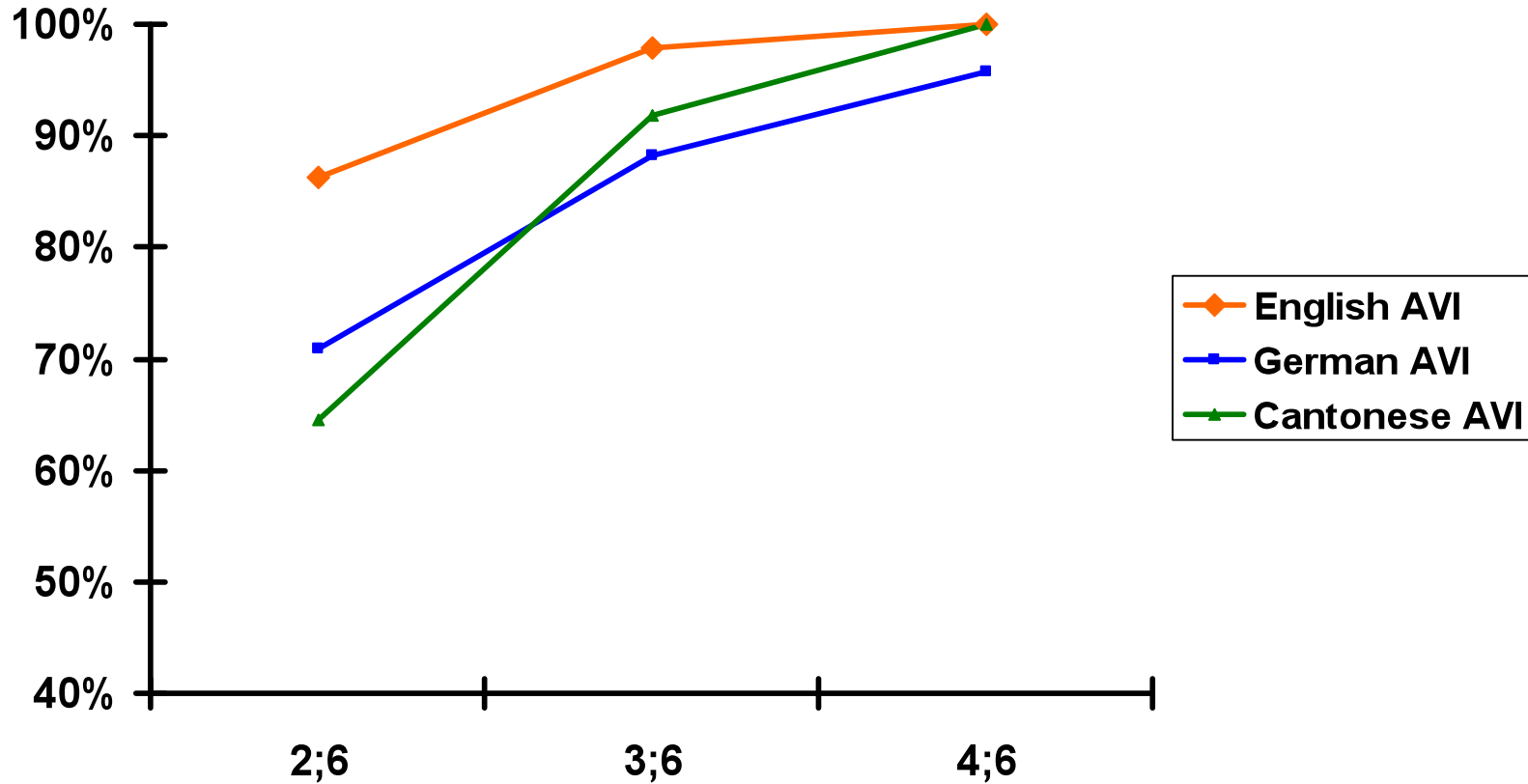
AVI: *The horse tams the telephone*

% choice of
1st N as agent



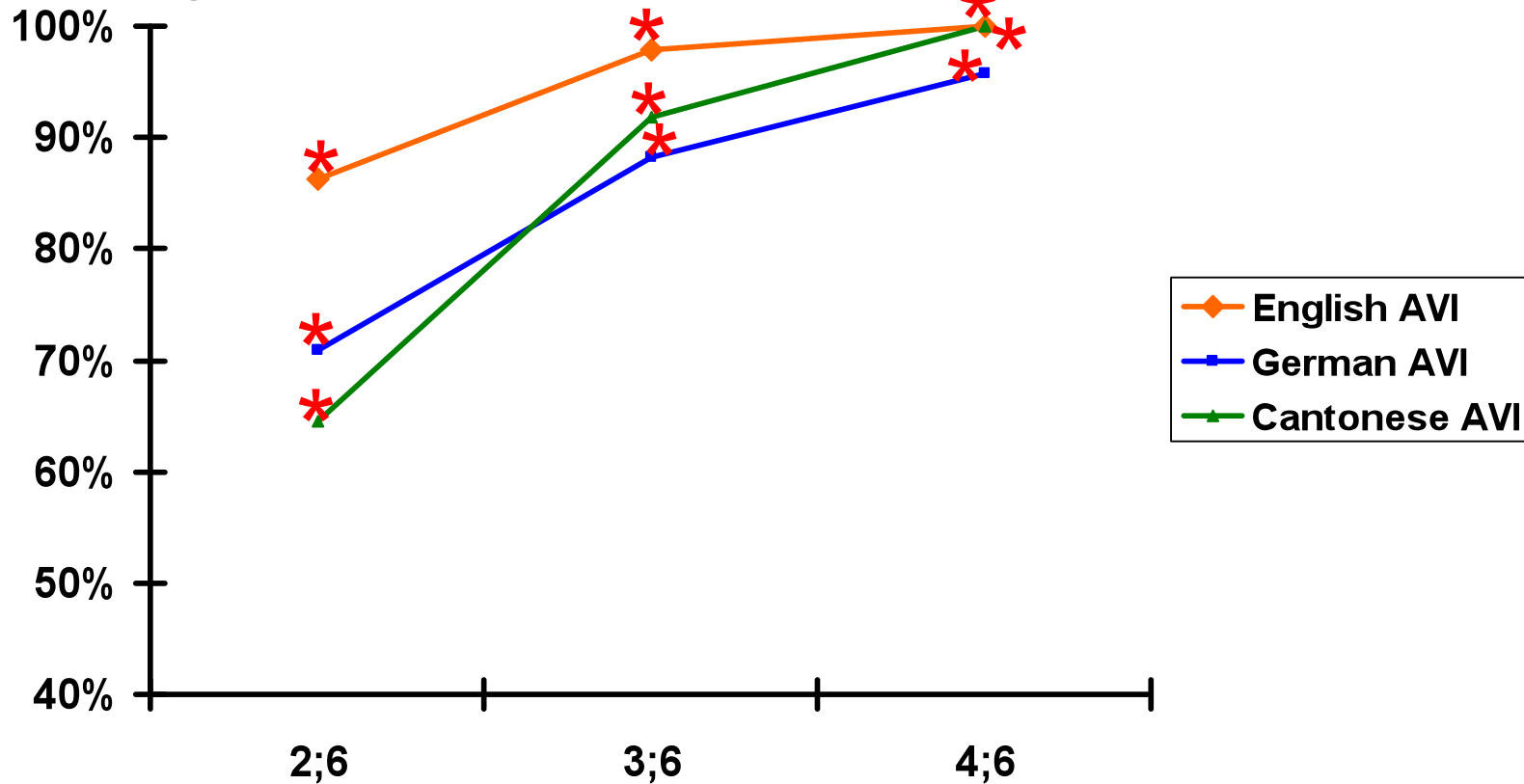
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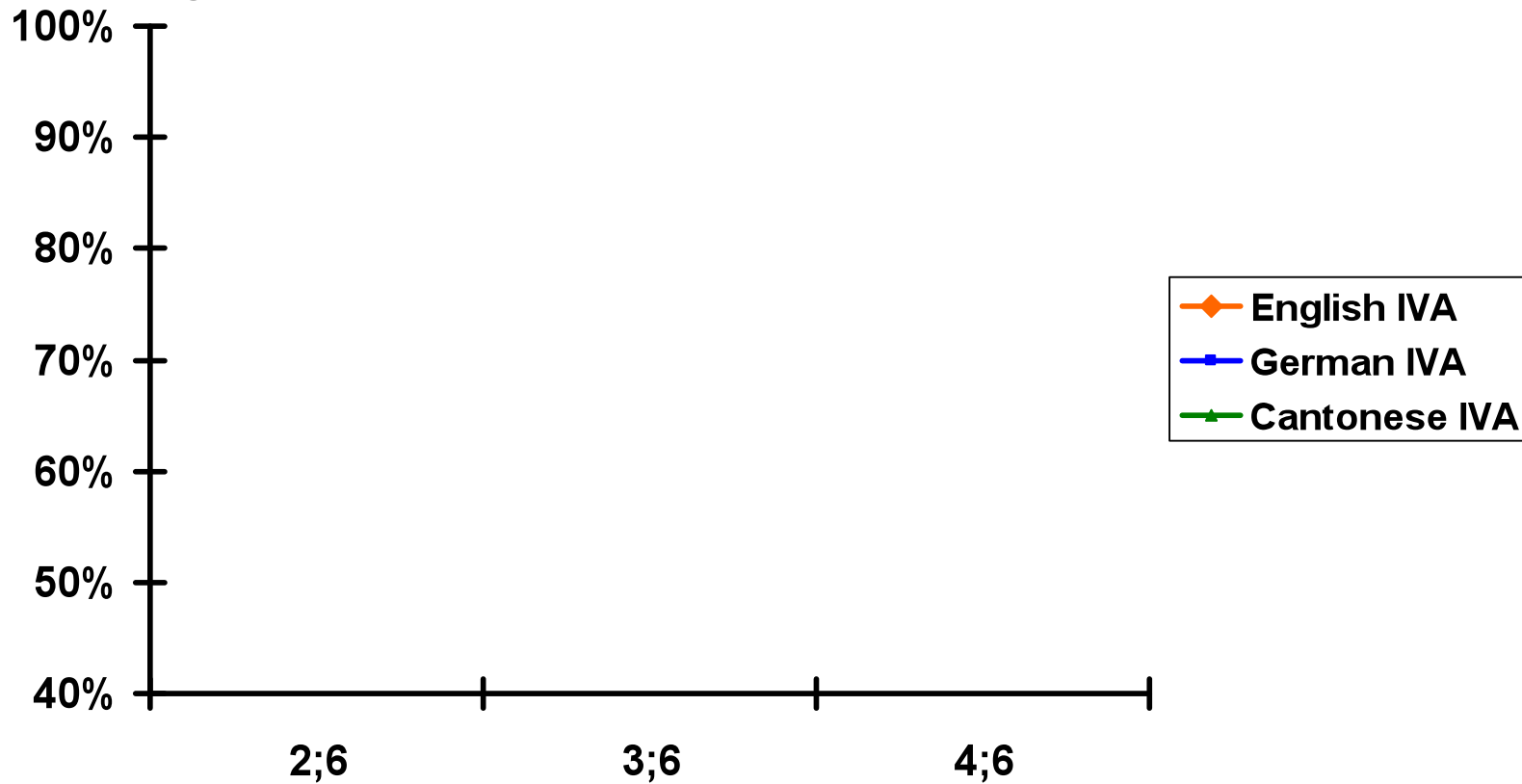
% choice of
1st N as agent



Across language groups, even the youngest 2-year-olds were above chance in choosing the 1st Animate Noun as the agent

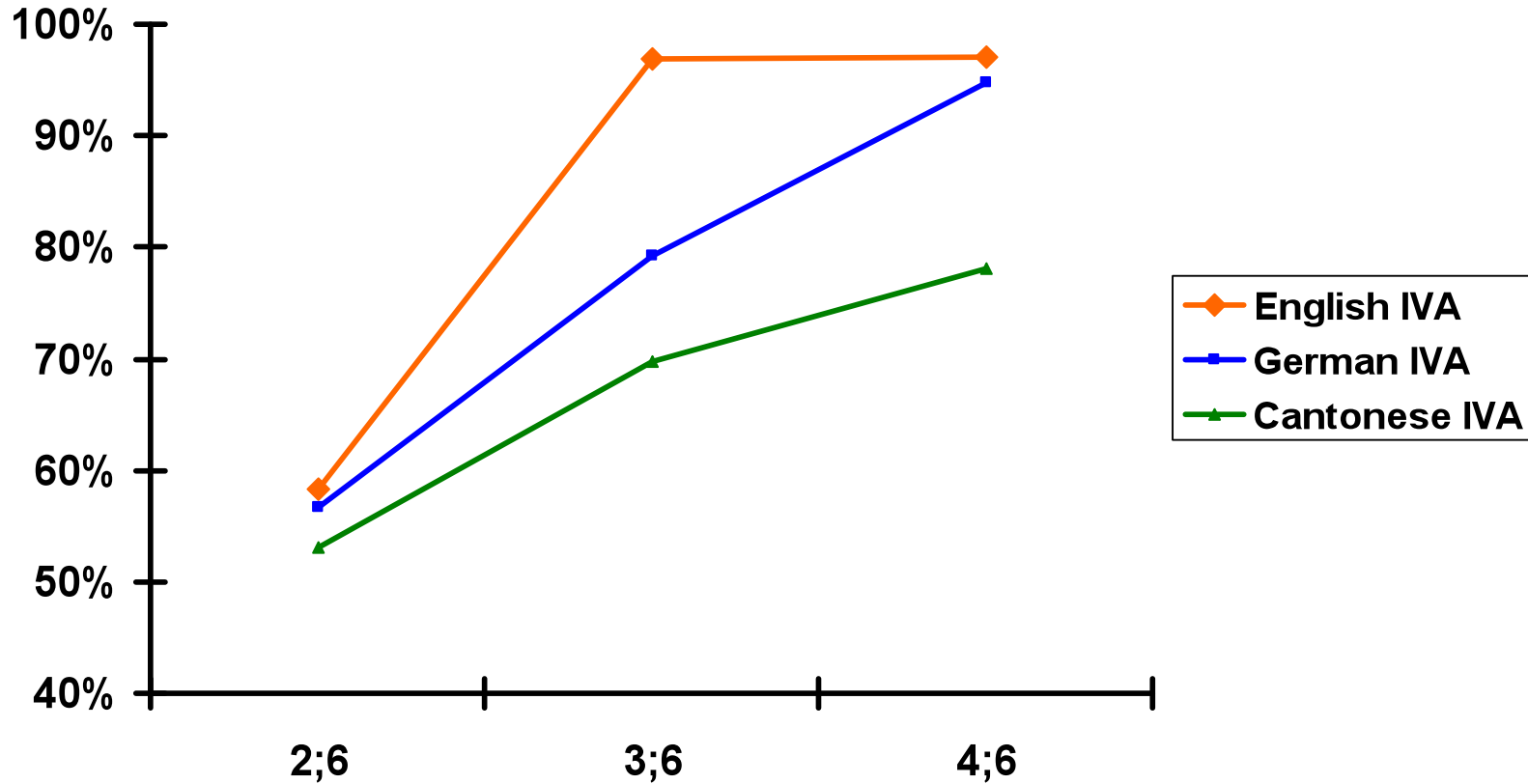
IVA: *The present meeks the chicken*

% choice of
1st N as agent



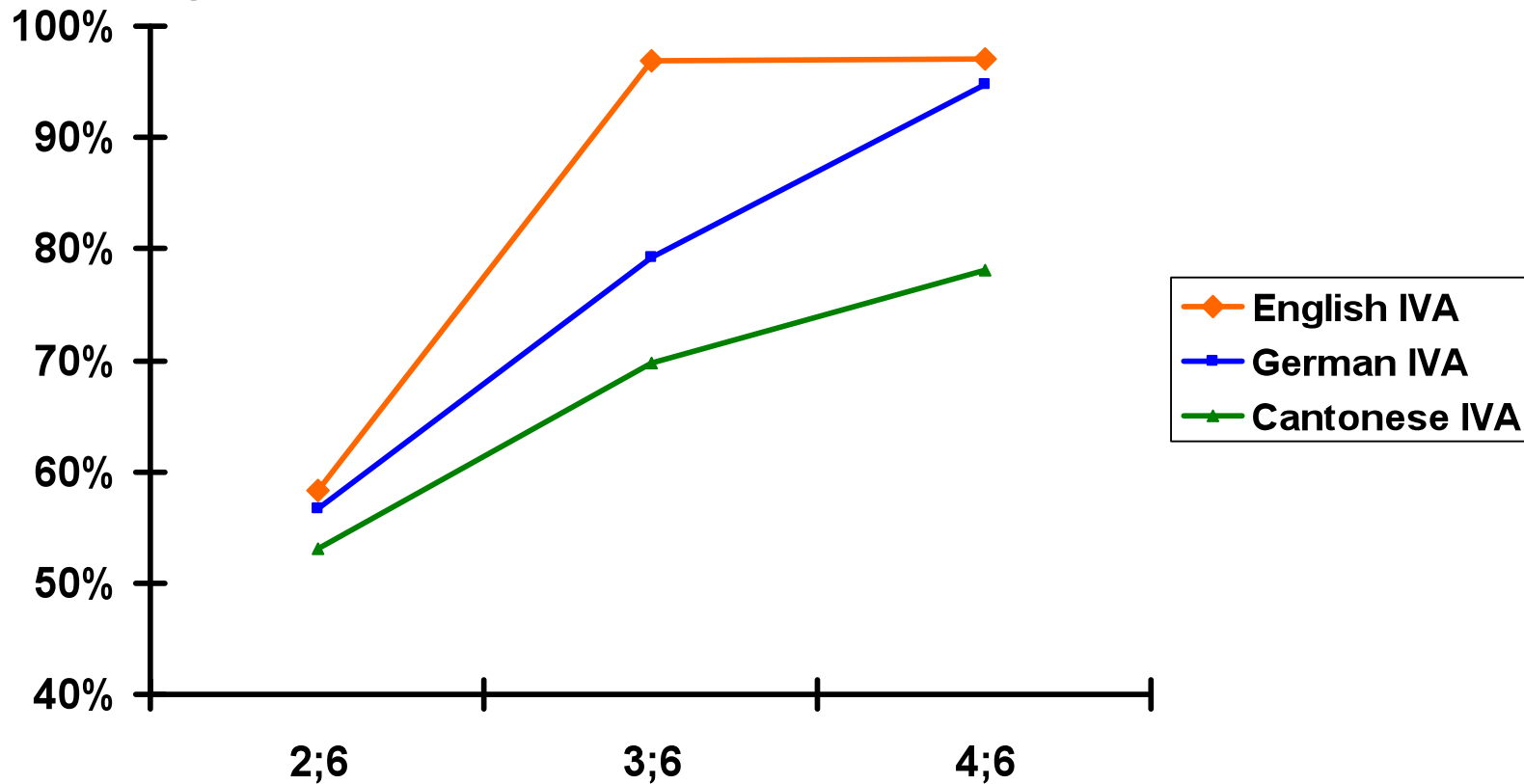
IVA: *The present meeks the chicken*

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IVA: *The present meeks the chicken*

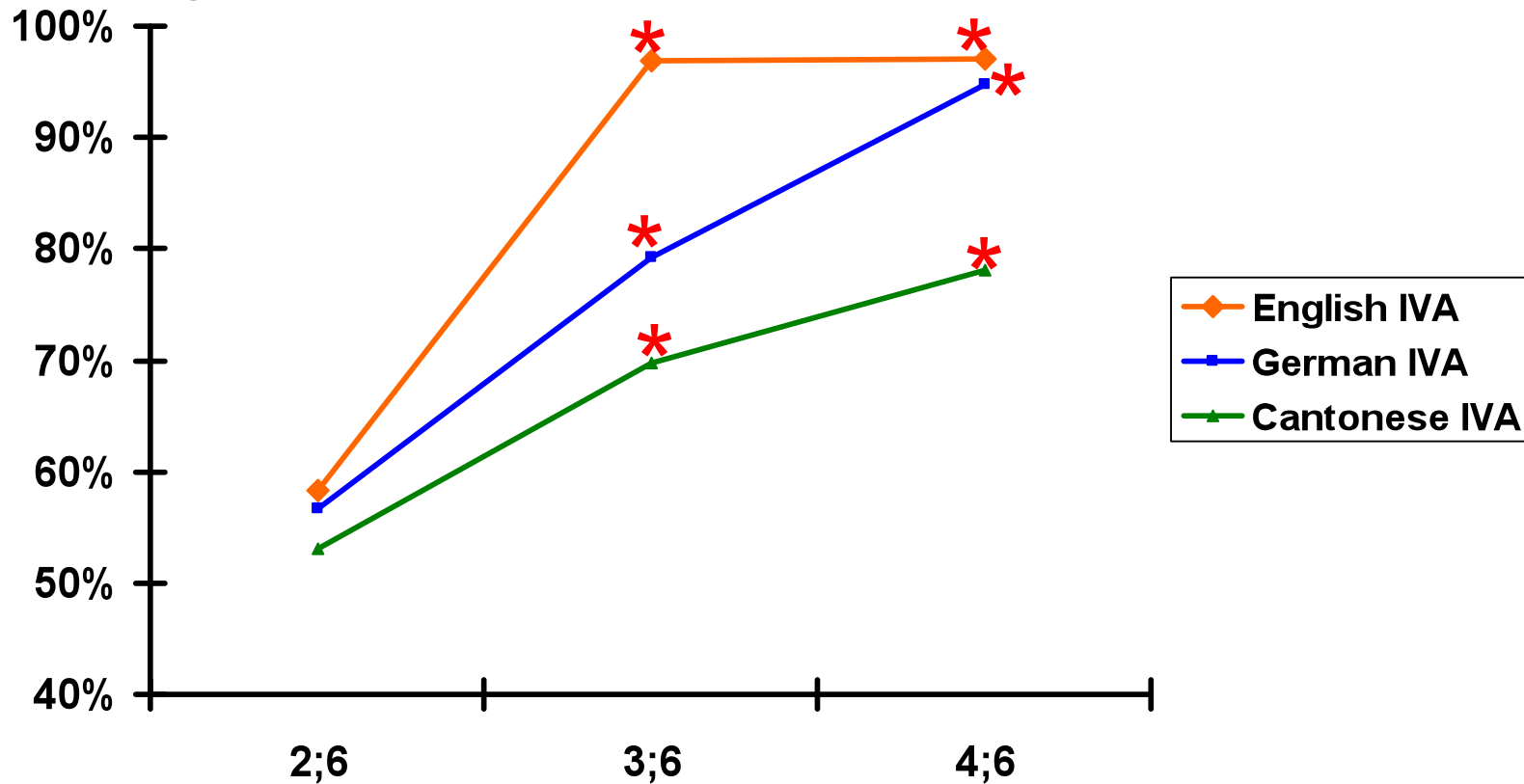
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- Across language groups, 2-year-olds were at chance group performance

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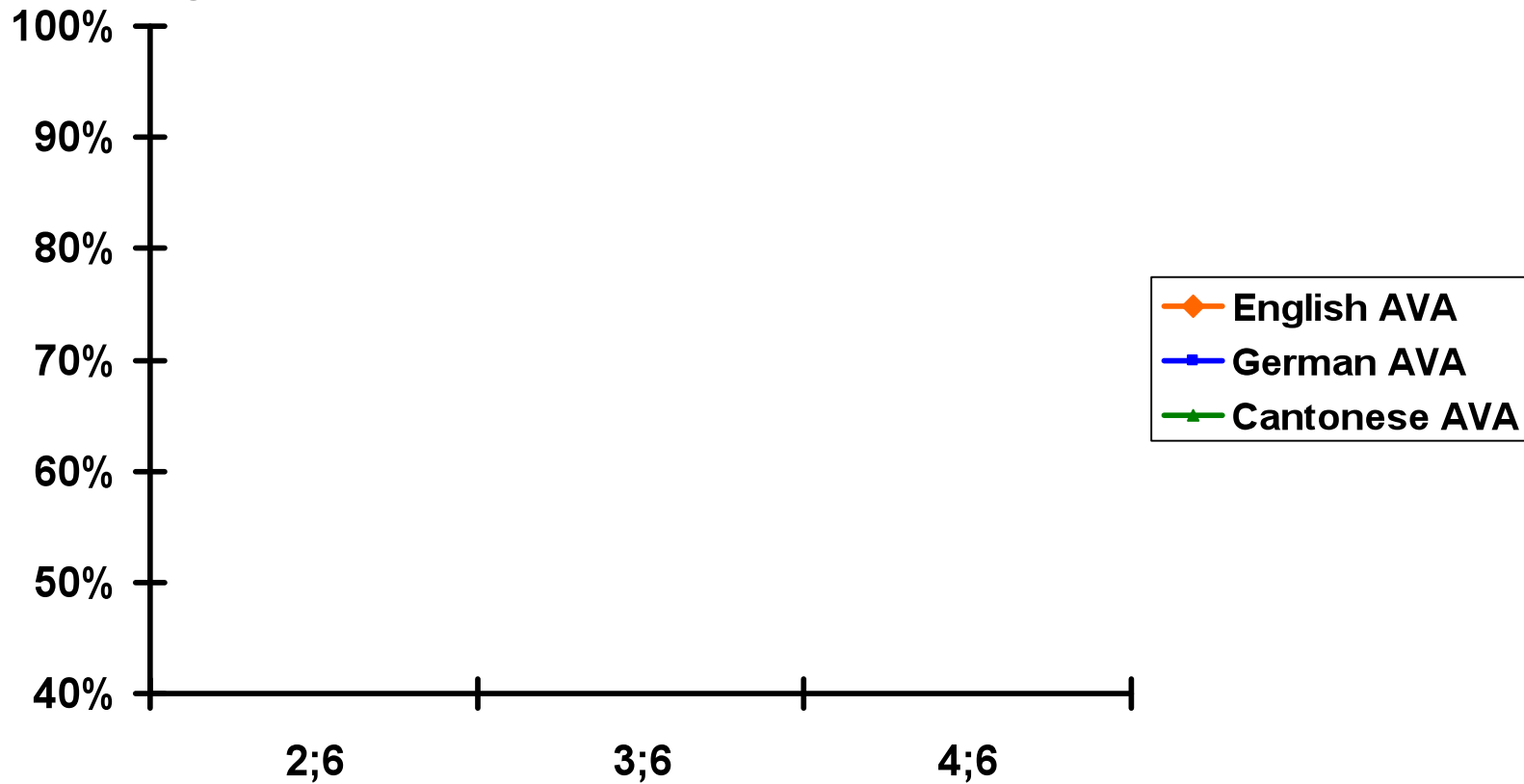
% choice of
1st N as agent



- Across language groups, 2-year-olds were at chance group performance
- Older children at 3;6 and 4;6 preferred word order over animacy

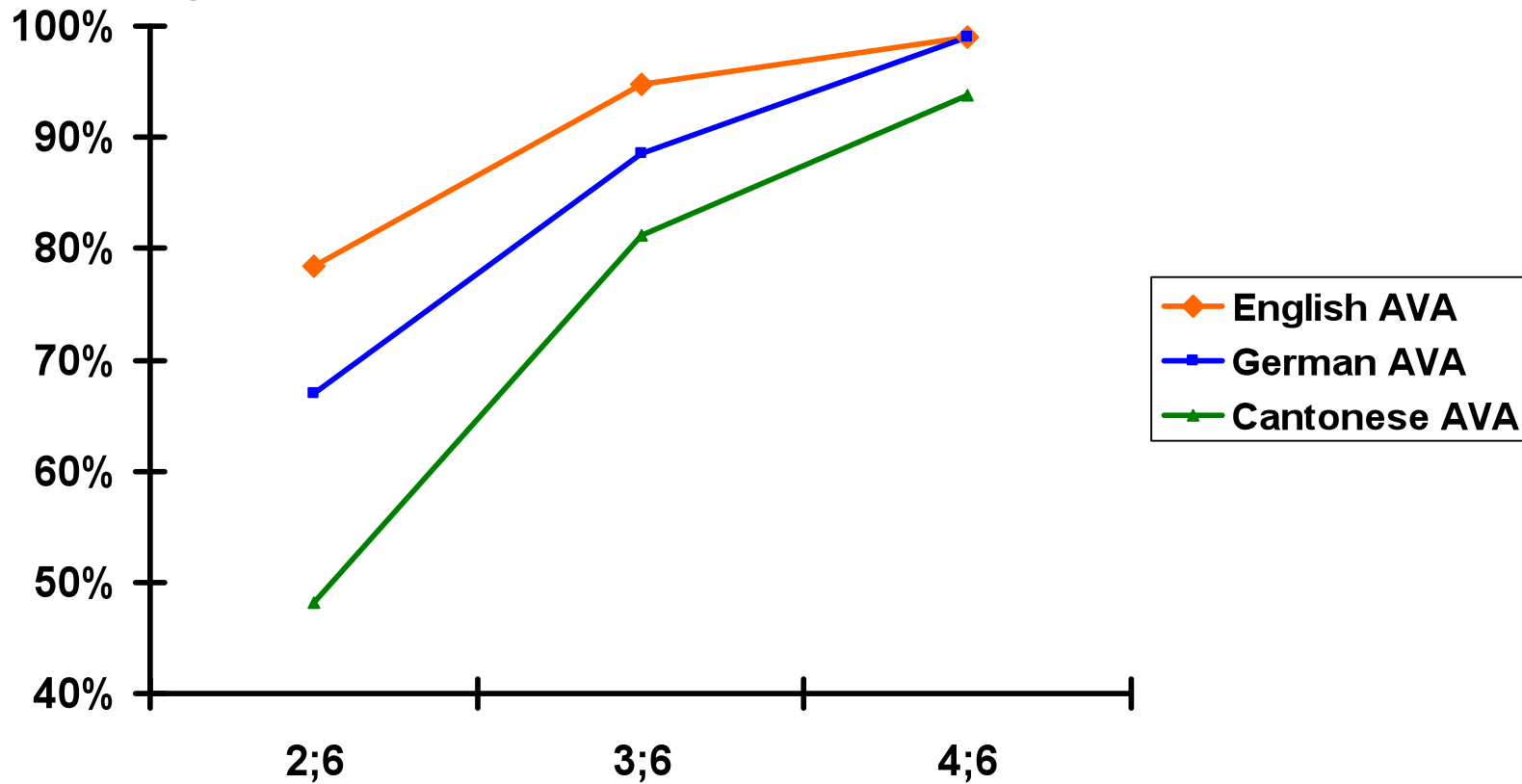
AVA: *The cow tams the giraffe*

% choice of
1st N as agent



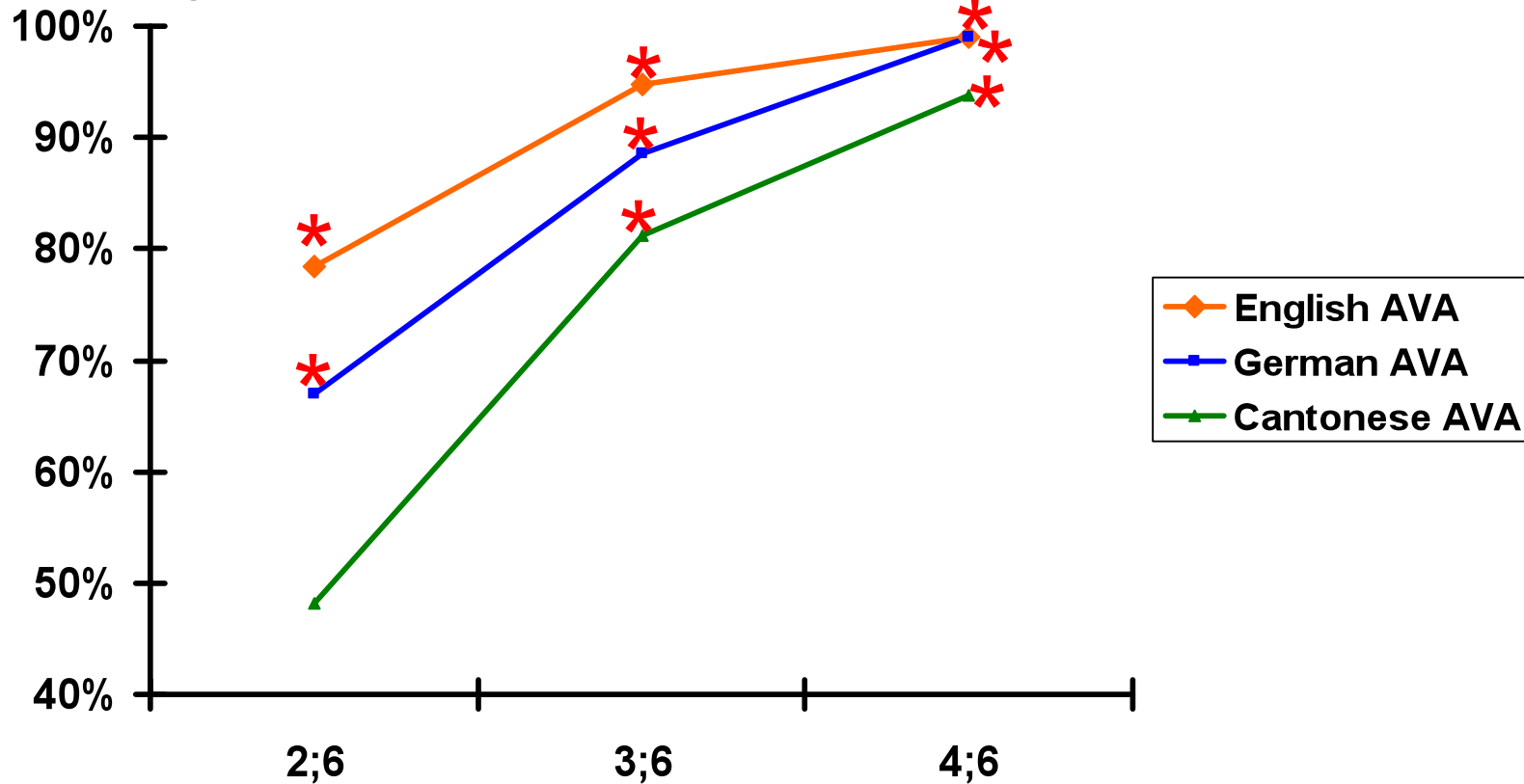
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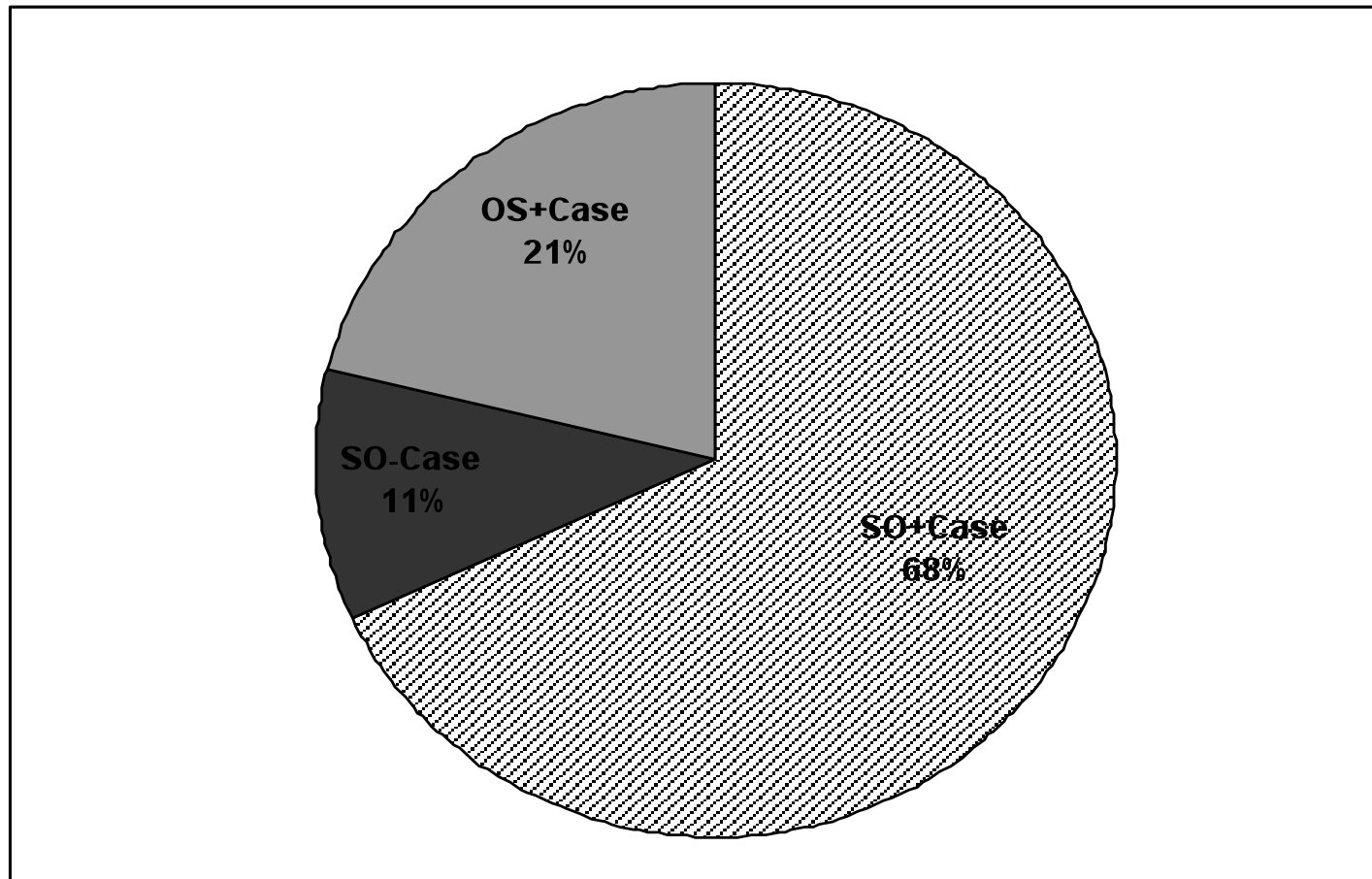
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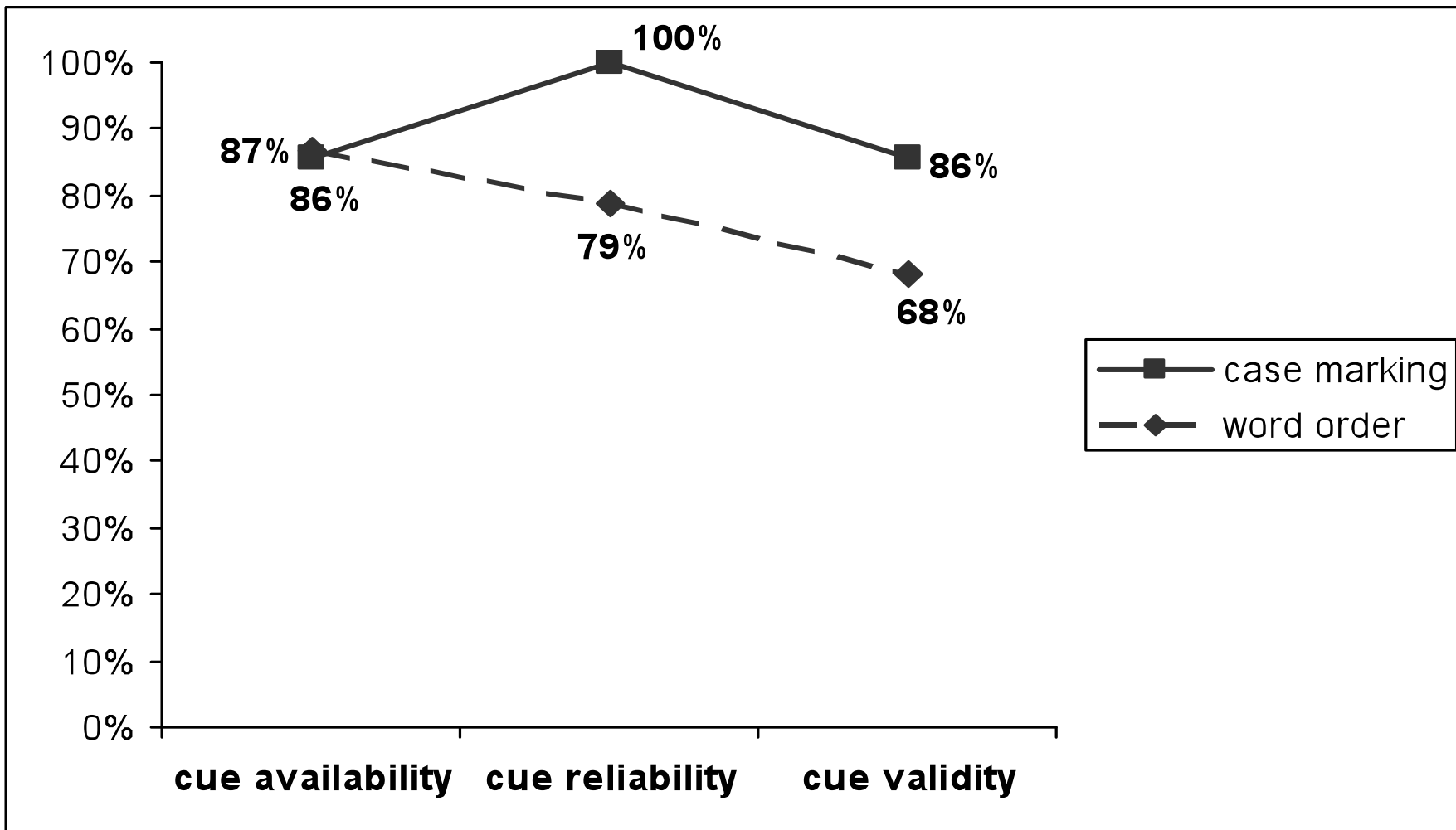


Reliance on word order (as a marker of the agent-patient relations):
English > German > Cantonese children

German CDS



Distribution of SO- and OS-order with unambiguous and ambiguous case marking for German transitive sentences in the input



Availability, reliability and validity for the grammatical cues word order and case marking for German transitive sentences in the input

All children heard the test sentences in 3 conditions:

Der Hund wieft den Loewen

SO +cm

[The_{+NOM} dog wiefs the_{+ACC} Lion_{+ACC}]

Die Katze wieft die Ziege

SO –cm

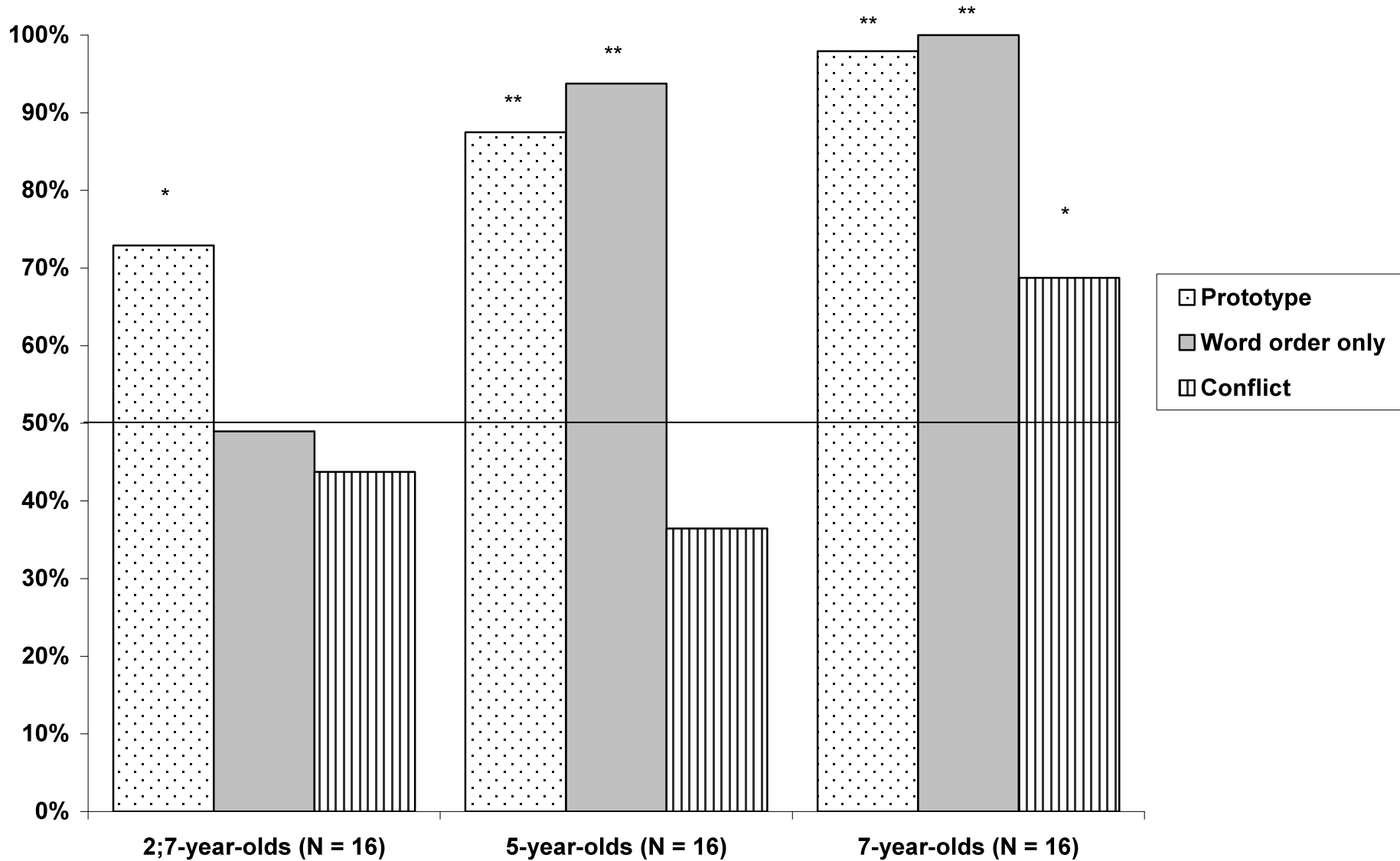
[The cat wiefs the goat]

Den Bären wieft der Tiger

OS +cm

[The_{+ACC} bear_{+ACC} wiefs the_{+NOM} tiger]

Experiments with Novel verbs: Pointing



Mean proportion of correct pointing

Dittmar et al., 2008

- 2;7s can only do the prototype – they point at chance in the other two conditions
- 5;0s rely on word order and ignore case in conflict sentences
- 7;0s can use case in conflict sentences

Why is case so late if it is the more reliable and valid cue?

When we count case-marked sentences,
we assume that case is a unitary category
But this may not be true at the outset

- **Case**

- *Ich, mich, du, dich, er, ihn, wir, uns, der, den*
 - But *der, den* only appear marking case in 21% of transitive sentences
 - In conflict sentences (21%), 76% contain either 1st or 2nd person pronouns
 - 4% of the remaining object-first sentences without pronouns have an animate agent and inanimate patient
- 1% of all object-first sentences were based solely on pure competition between case-marking and word order

- Young children show differential and restricted competence in comprehension early on
- The acquisition of the transitive construction is
 - protracted rather than instantaneous
- Children's linguistic productivity is
 - tied closely to their linguistic experience
- Children seem to learn a 'gestalt' first
 - then have to break it down into the different cues

Methods

- Comprehension
 - Intermodal preferential looking (IPL): ✓
 - Hear and look
 - Pointing ✓
 - Act-out ✓
- Production
 - Imitation/Repetition ✓
 - Full production with novel items ✓
 - Priming

An example: Priming of passives

- English to Spanish
- Spanish to English
 - Children aged 5;5-6;4
 - Spanish at home, English at school
- Listen to prime
- Produce target
 - 10 descriptions
 - Spoken sentences
- Spanish primes English passive
- English passive doesn't prime Spanish passive

Vasilyeva, 2009

Conclusions: the use of experiments

- A wide variety of experimental methods
- Each one has advantages and disadvantages
- Most useful crosslinguistically when
 - The cultural context is appropriate
 - Clear similarities and differences in semantic, morphological and/or syntactic structure can be identified
- Should always follow corpus studies of the input and children's own usage