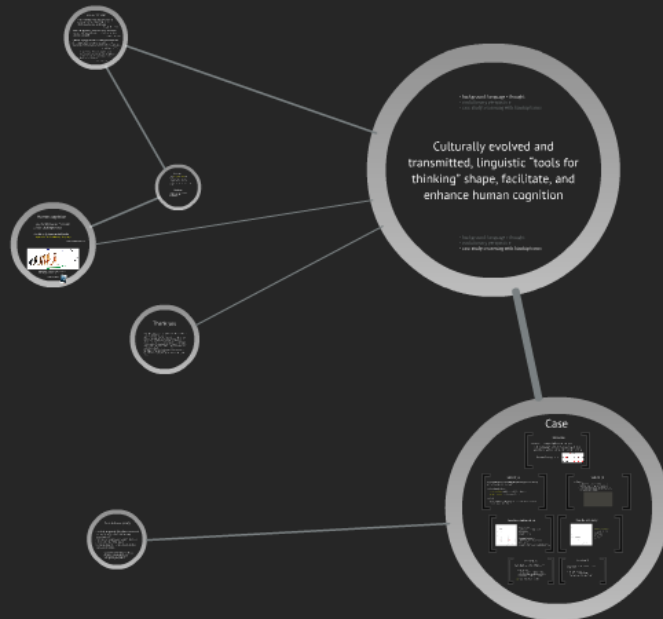


# PACKAGED AND READY-TO-GO

Linguistic Tools for Communication  
and Mental Processing



ICLC 2013

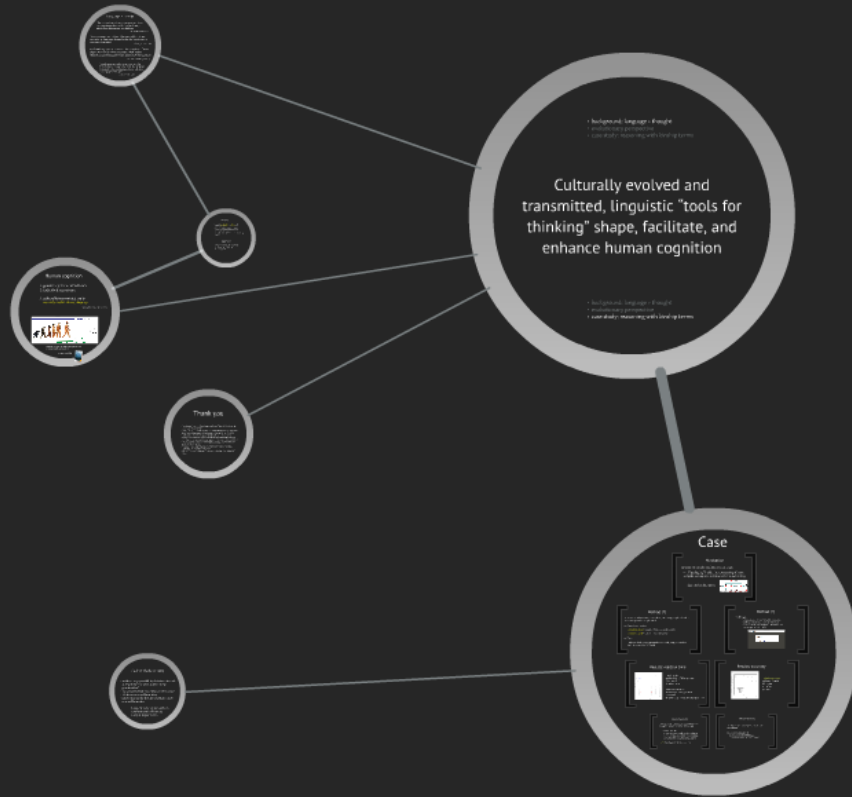
University of Alberta, Edmonton

Barend Beekhuizen  
& Max van Duijn  
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## Linguistic Tools for Communication and Mental Processing



ICLC 2013

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- background: language > thought
- evolutionary perspective
- case study: reasoning with kinship terms

Culturally evolved and transmitted, linguistic “tools for thinking” shape, facilitate, and enhance human cognition

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## Language > thought

‘The conventions of our languages commit us to categorising the world in a specific way, which then determines our thinking’

Benjamin Whorf (1956)

‘Word meanings are not (well) decomposable in atomic concepts, so they must themselves be the born-in atomic concepts of our mind’

cf. Jerry Fodor (1975)

‘Different languages demand from their speakers different observations and thinking processes, which leads to differences in performance on and approach to certain tasks.’

cf. Lera Boroditsky (2011)

‘Word meanings can be decomposed into the born-in atomic concepts that form the “language of thought”. Natural languages hardly influence the language of thought.’

cf. Steven Pinker (2007)

# Premises:

- humans **communicate** and **reason** about complex concepts
- through conventional meanings, lexical units express complex concepts
- there are natural limits to our (brain's) reasoning capacity

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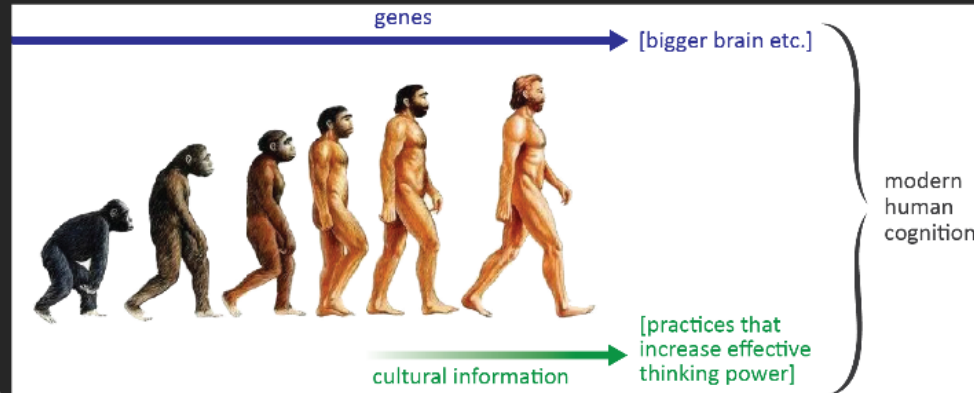
## Hypothesis:

complex concepts are processed as 'conceptual wholes' in reasoning tasks

# Human cognition

1. genetically transmitted traits
2. individual experience
3. culturally transmitted traits  
especially: implicit through language

Michael Tomasello (1999)



Language does not determine thought, but can enhance cognitive processing

cf. apps on an iPad

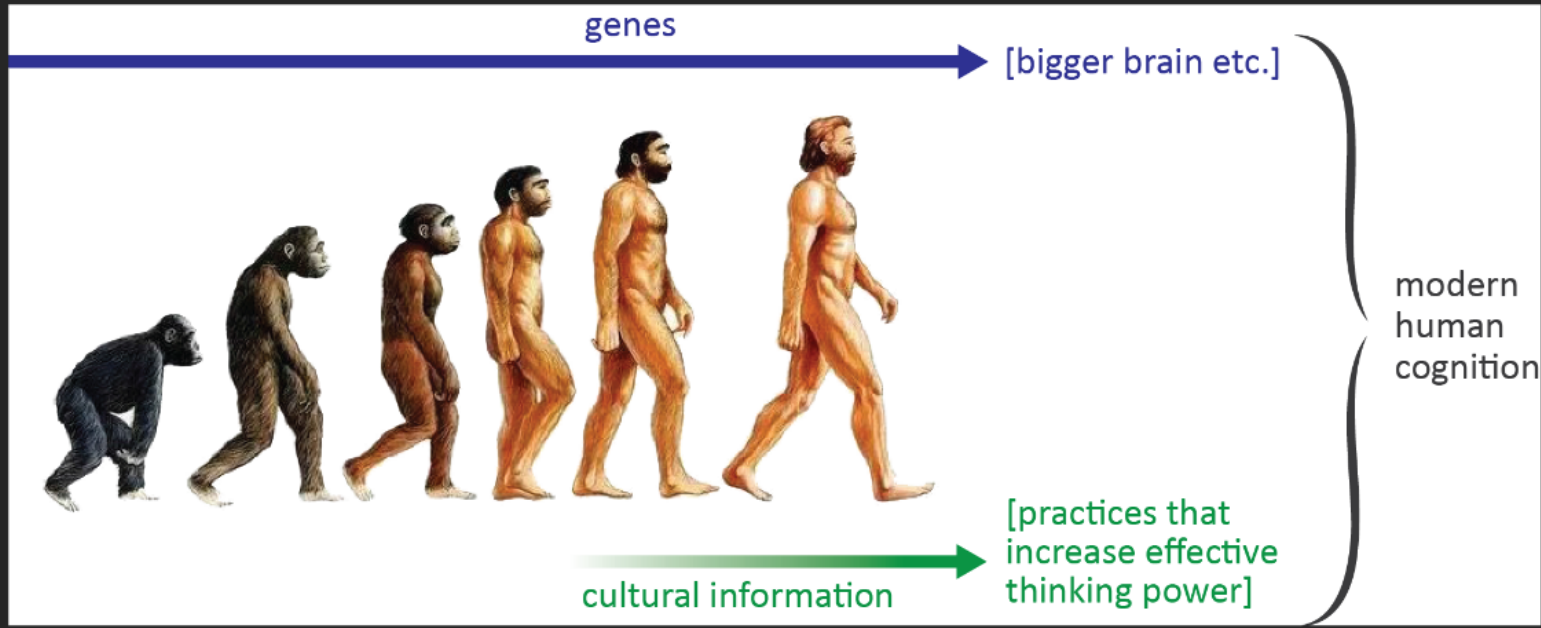




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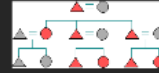
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# Case

## Motivation

variation in complexity between concepts  
=> if "packaging" holds, then processing of more complex concepts is not (much) more demanding

domain: kinship terms



## Method (1)

Do participants have more difficulties processing complex kinship terms as opposed to simple ones?

>> Operationalisation:

**complexity term** = minimal # knots in kinship graph  
**processing costs** = reaction time and accuracy

>> Task:

judge possibility of statements that are equally long (4 terms) but vary in complexity (4-9 knots)

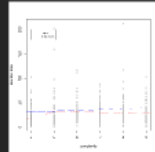
## Method (2)

>> Design:

- 16 statements: 6 'true', 6 'false', 4 controls
- webexperiment in custom environment
- 32 (36) participants acquired via MTurk, USA, native speakers of English



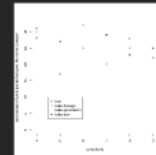
## Results: reaction time



Linear model:  
ANOVA:  $F(1) = (7.931)$ ,  $p < 0.01$   
 $R^2 = 0.013$   
function = +1.6

Breakpoint analysis:  
ANOVA:  $F(1,17.183)$ ,  $p < 0.001$   
 $R^2 = 0.044$   
function [4,5] = +13.8; function [5,9] = -1.1

## Results: accuracy



Logistic regression:  
estimate = -0.048  
SE = 0.066  
 $z = -0.718$   
 $p > 0.05$

## Discussion (1)

participants process more complex terms not slower or less accurate than simple ones

=> consistent with:

1. humans reason with wholes/packages
2. they are no less capable to access/apply contents of these packages accurately

**note:** break point between 4 and 5-9

## Discussion (2)

results provided new insights, but also new complexities

new experiments planned:

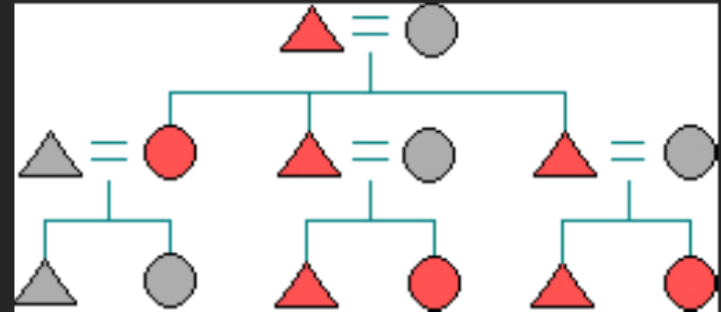
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## Čech & Shoben (1980)

- method: judge possibility of statements such as "my father's uncle's mother is my grandmother"
- H0: componential reasoning with 'features'
- H1: short-cuts and heuristics
- some evidence for the use of certain short-cuts and heuristics

'design' kinship system reflects  
communicative efficiency:  
Kemp & Regier (2012)

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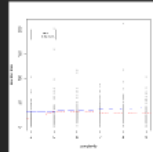
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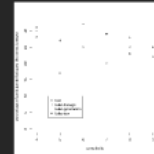
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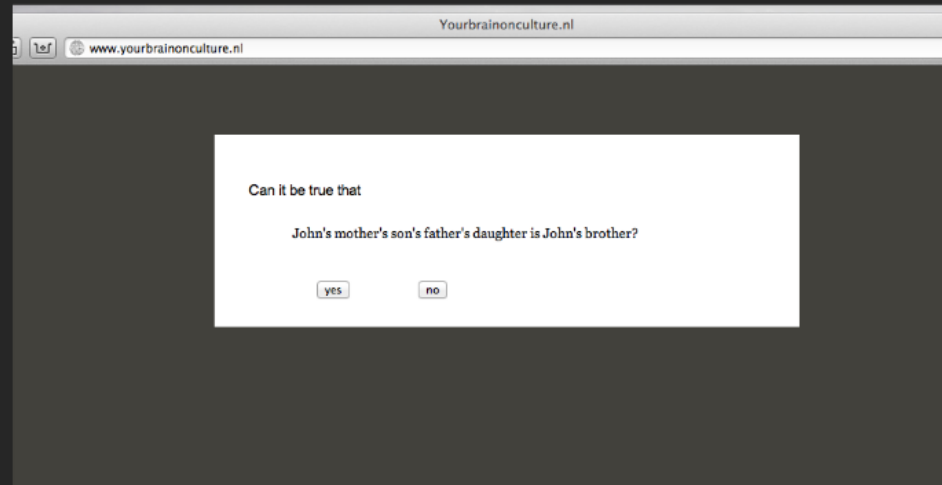
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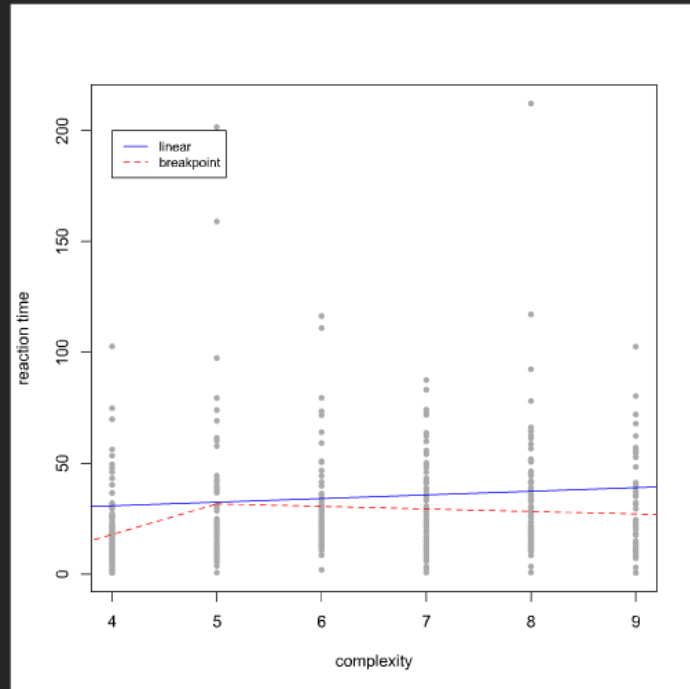
Can it be true that

John's mother's son's father's daughter is John's brother?

yes

no

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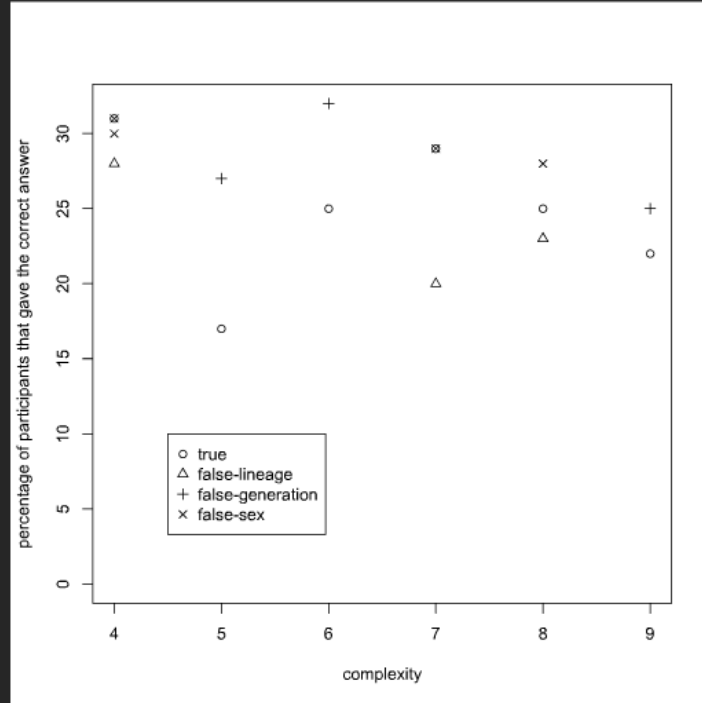
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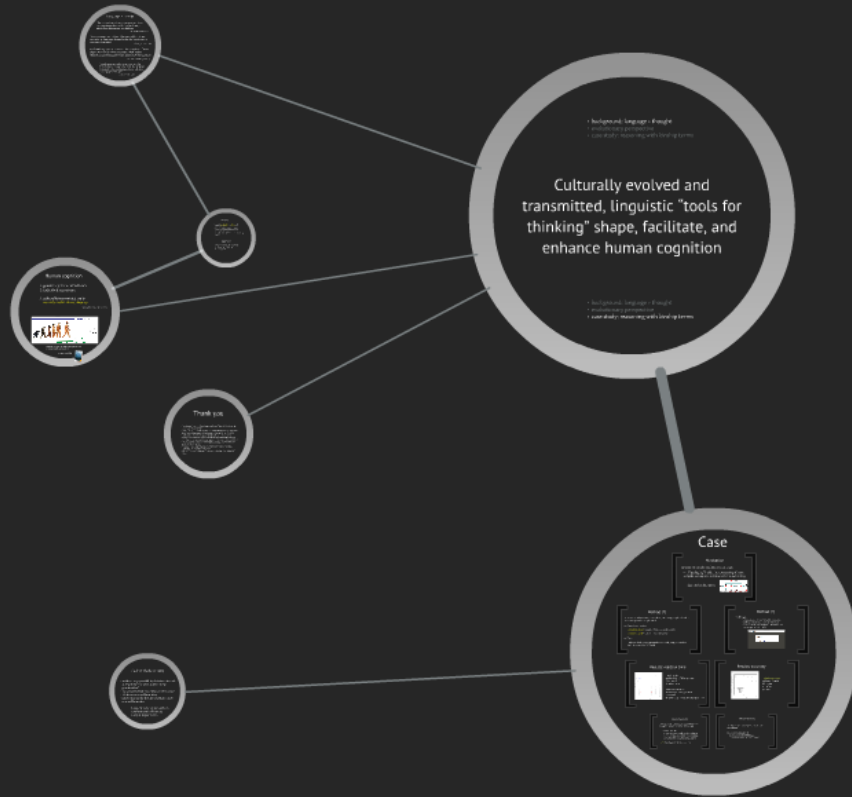
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# Thank you

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