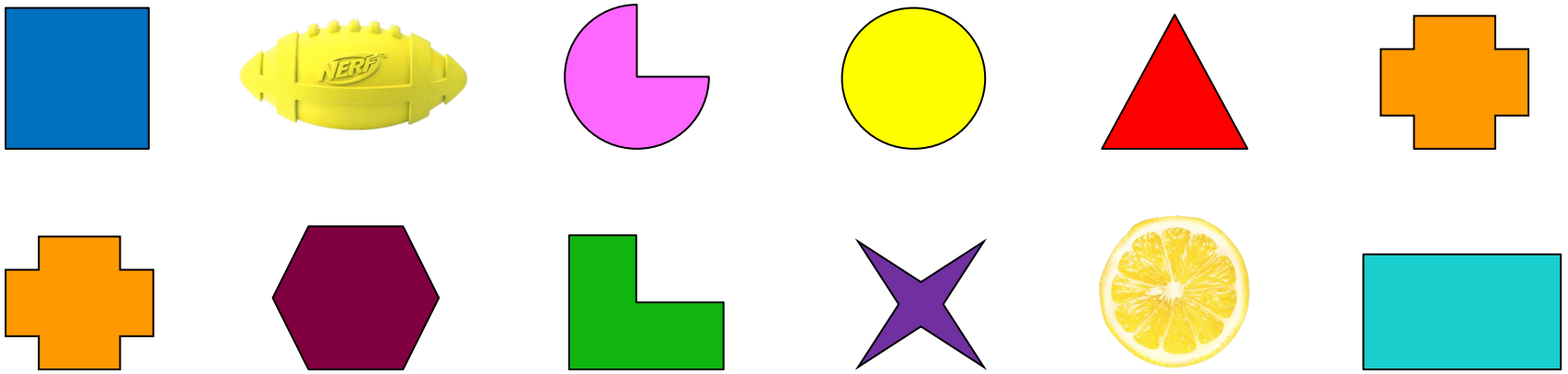
Cognitive diversity in context: Cross-cultural differences in the development of relational reasoning



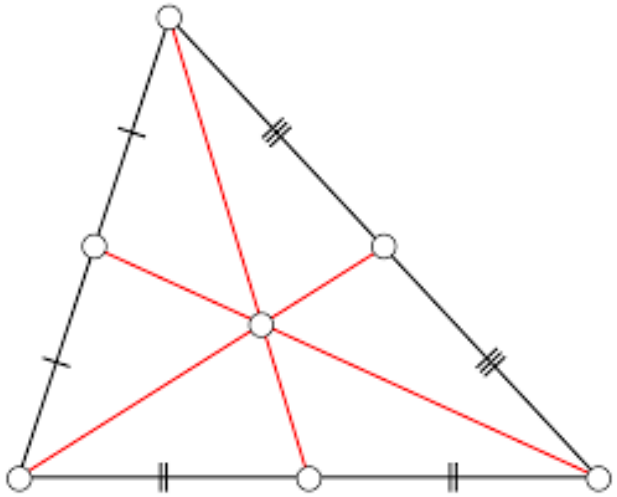
Alex Carstensen | TALC Lab

Thinking Across Languages and Contexts

Arizona State University

Why are we so smart?

Why are we so smart?

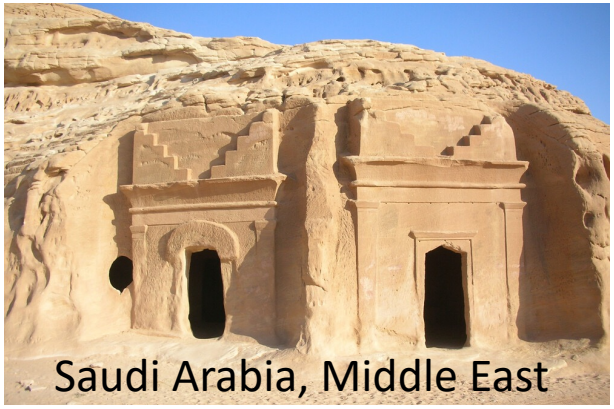



Kyrgyzstan, Central Asia


Wales, Western Europe


Korea, East Asia


Plains, N. America


Saudi Arabia, Middle East


Ecuador, S. America


Indonesia, Oceania


Malawi, East Africa


Germany, Central Europe


Kyrgyzstan, Central Asia


Wales, Western Europe


Korea, East Asia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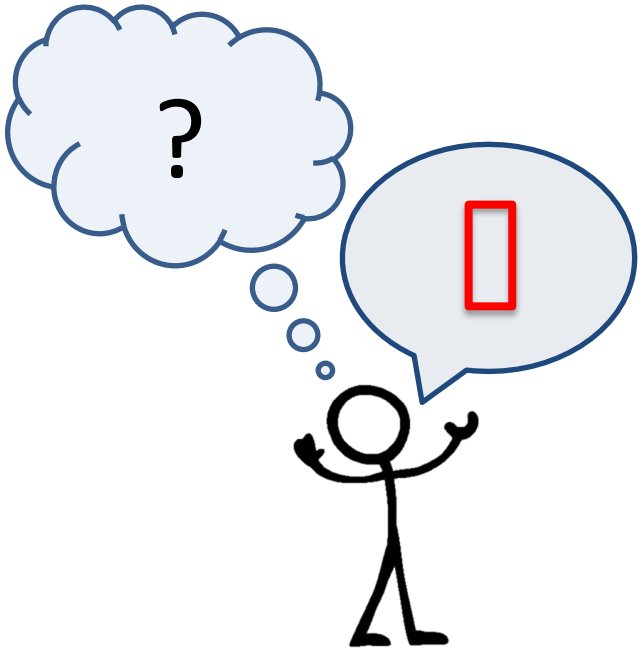
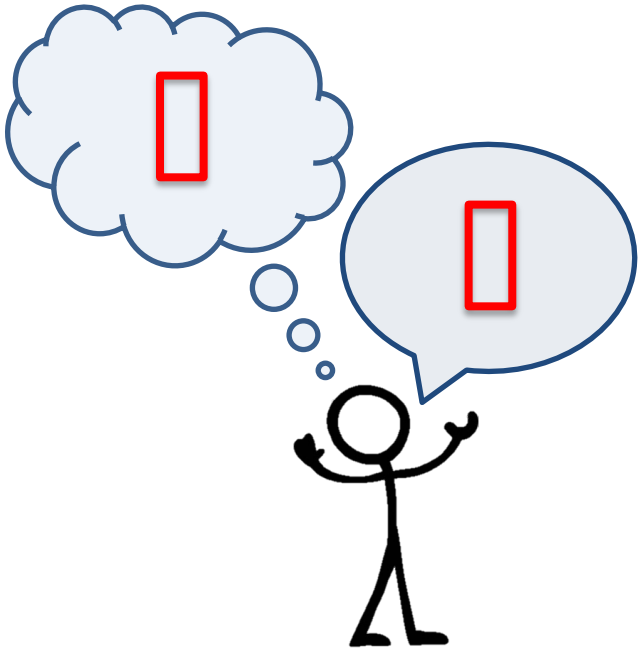
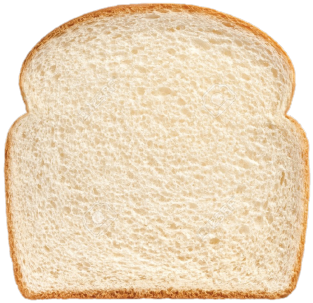


Language as a window into abstract thought



Language as a window into abstract thought

Relational reasoning

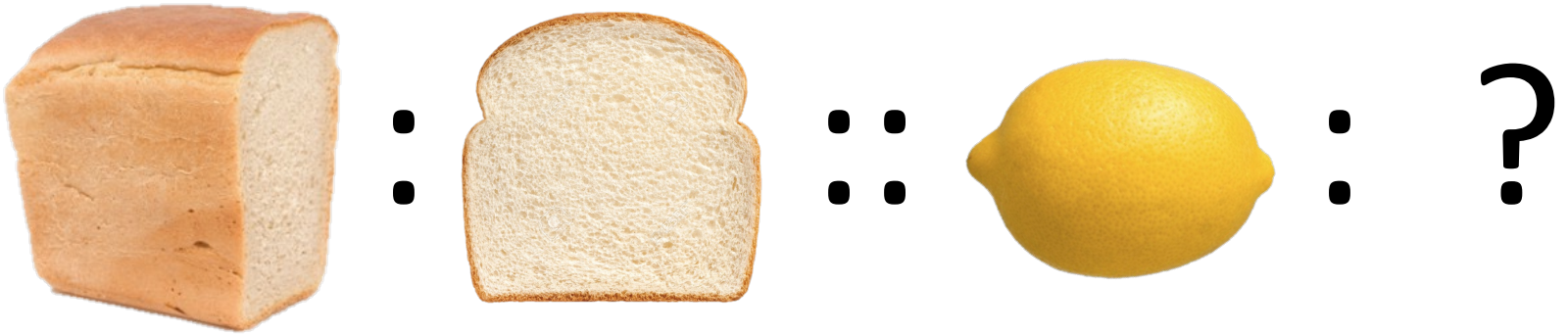



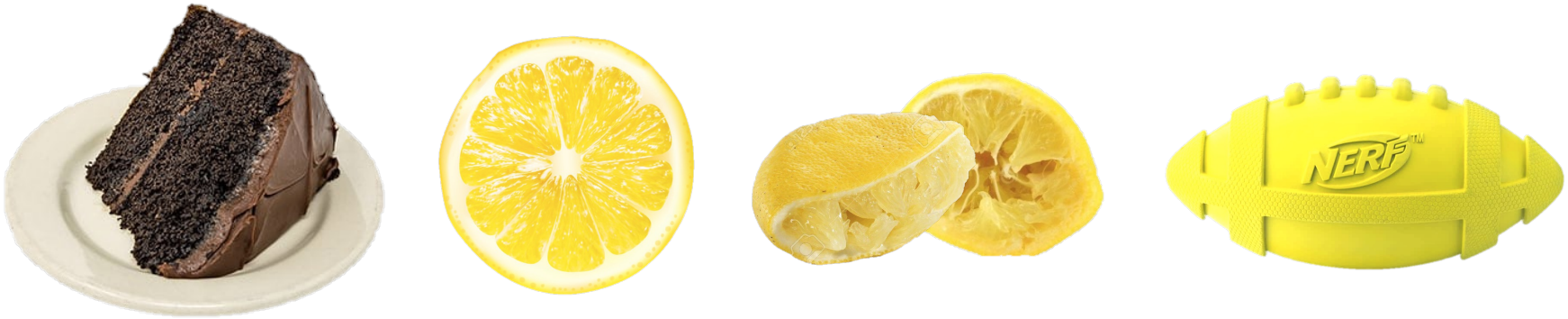



Rattermann & Gentner (1998)

Relational reasoning

- Kids are not great at relations





Rattermann & Gentner (1998)

Relational reasoning

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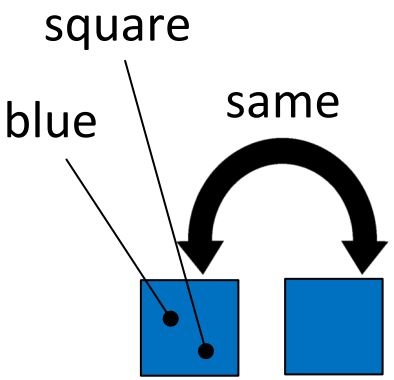


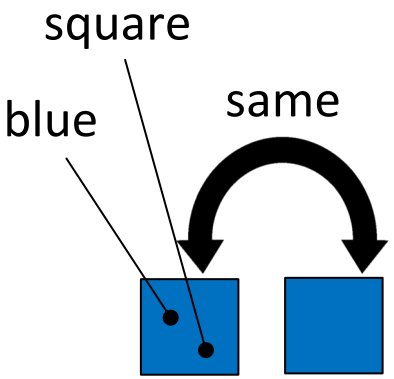
Recent challenges:

- Infants are good at relations…?

Hochmann, Carey, & Mehler (2018)

Relational reasoning

- Kids are not great at relations



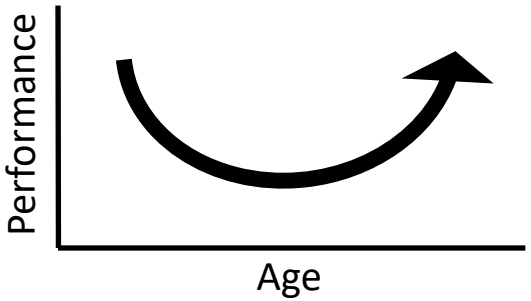
Recent challenges:

- Infants are good at relations…?

Hochmann, Carey, & Mehler (2018)

- Toddlers are good at relations, and get worse…?

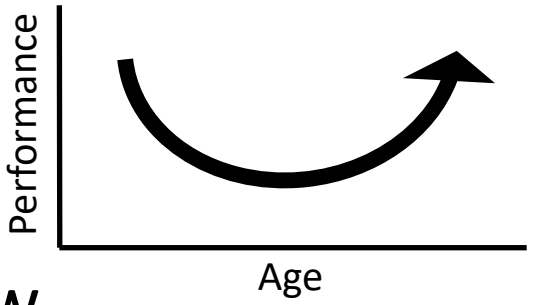
Walker, Bridgers, & Gopnik (2016)



An alternative perspective

The relational shift "paradox" view (Hoyos et al., 2016)

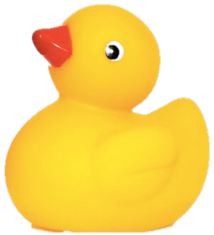
Single trajectory



The rational learner "paradigm" view

Multiple trajectories?

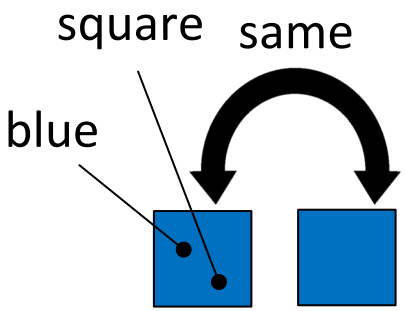
giraffe



duck

eat

paint



Study 1: Reasoning in a relation-centric environment

English learners in the US experience:

- a linguistic focus on learning nouns (Waxman et al., 2013)
- a cultural focus on objects (Kuwabara & Smith, 2012)

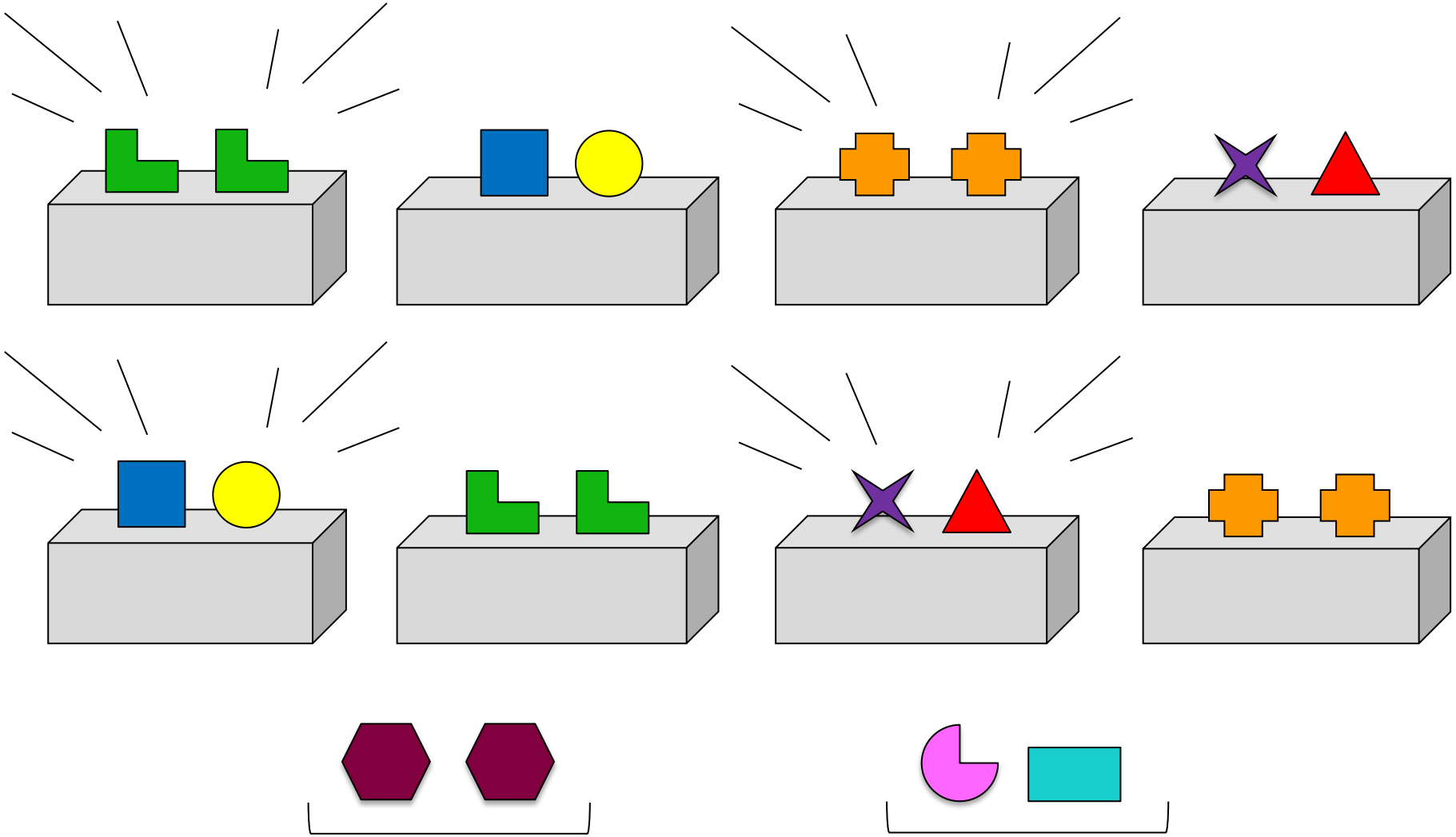
which could direct attention to objects and object properties

Mandarin learners in China experience:

- a linguistic bias toward verbs (Chan et al., 2011)
- a cultural emphasis on relations (Richland et al., 2010)

which could direct attention toward relations

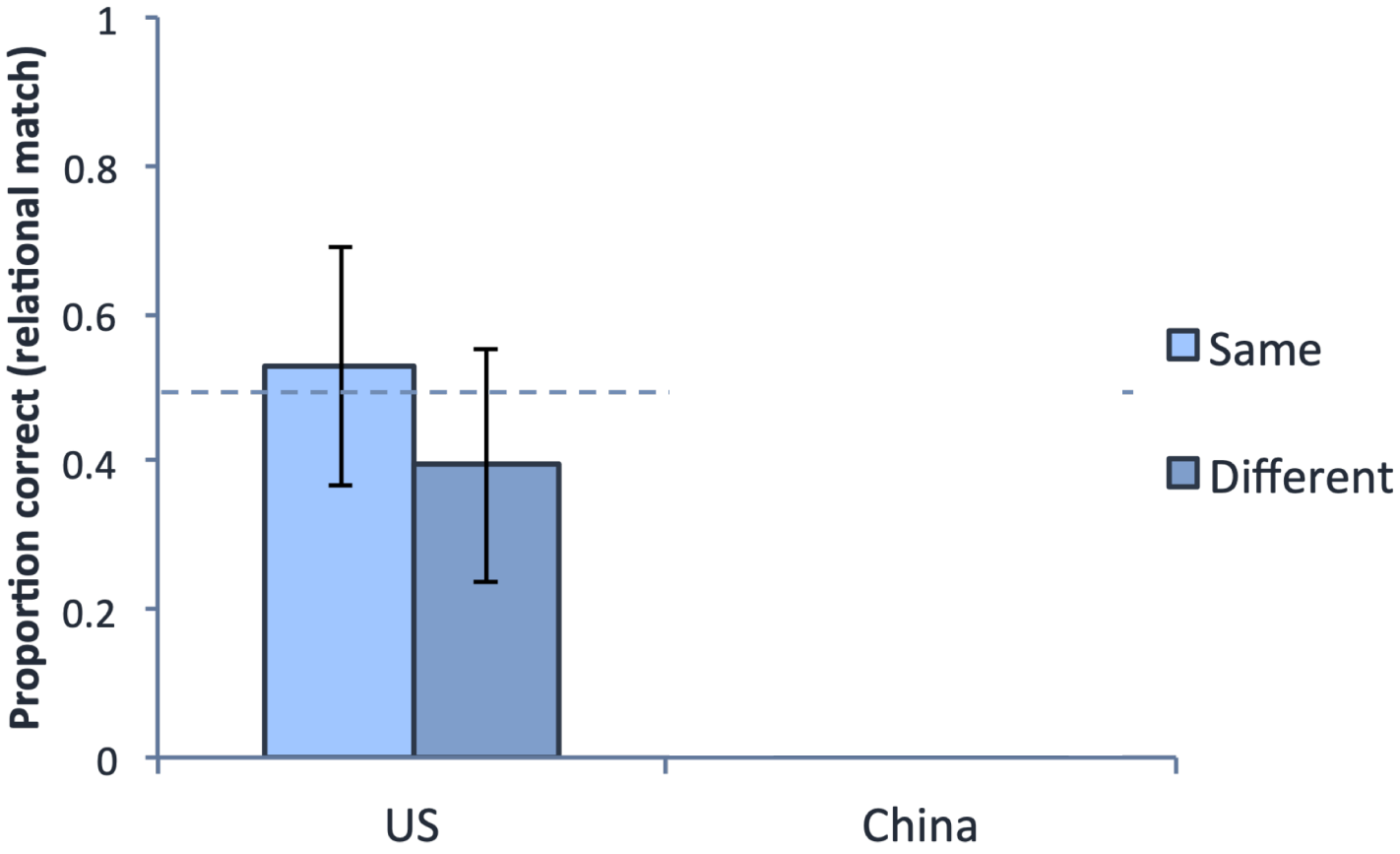
Study 1: Reasoning in a relation-centric environment



Carstensen et al. (2019)

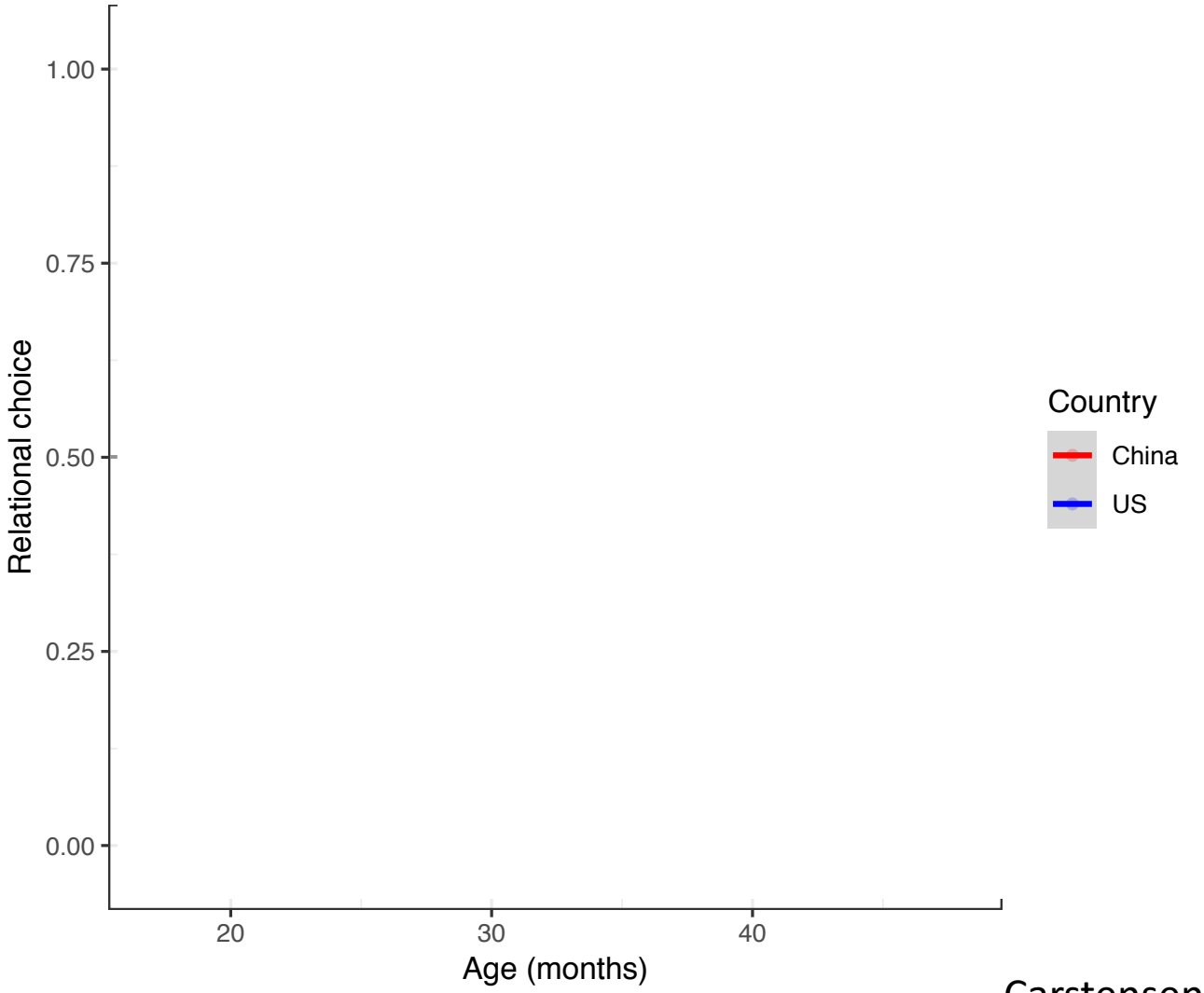
Carstensen et al. (2019)

Study 1: Reasoning in a relation-centric environment



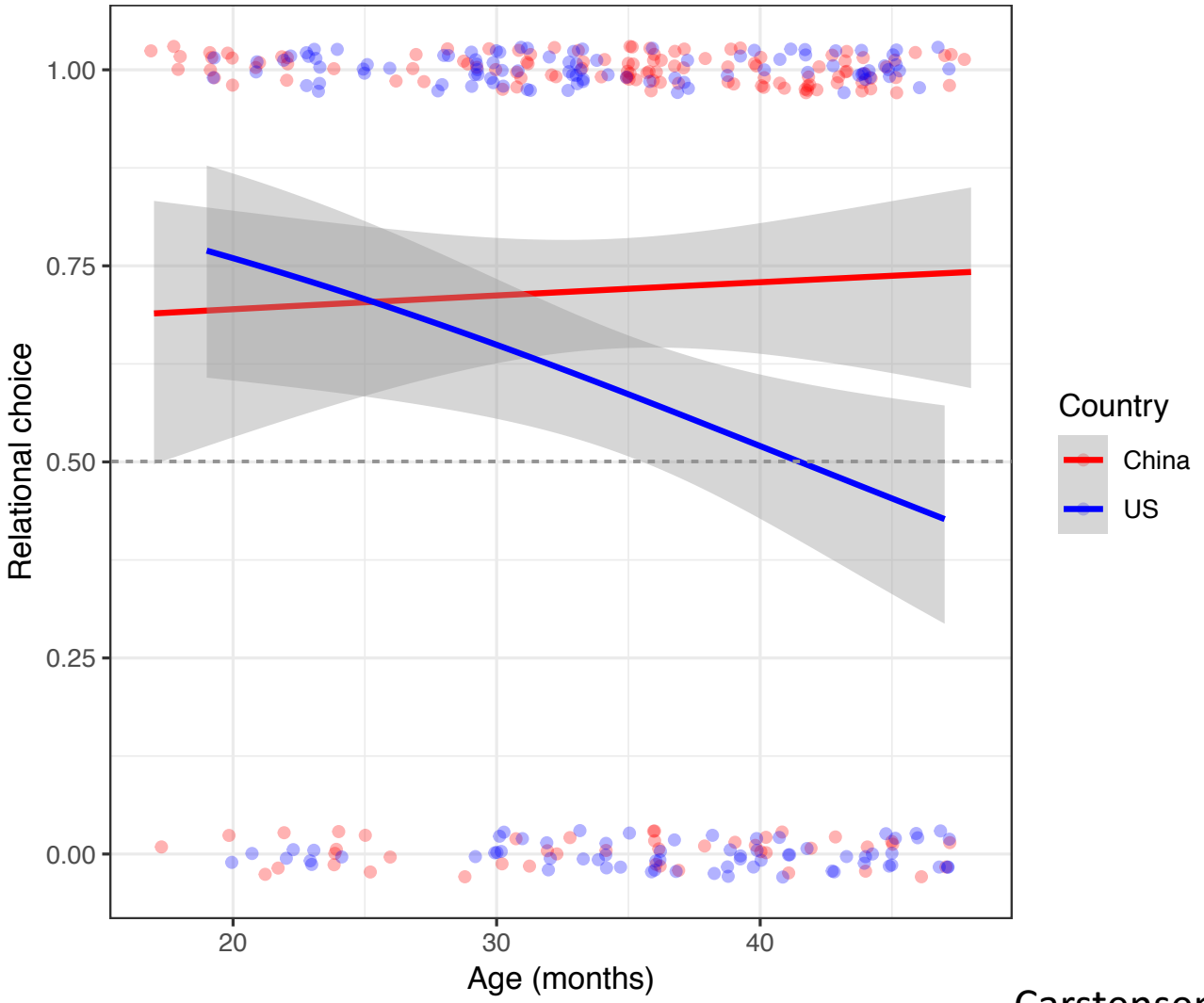
Carstensen et al. (2019)

Study 2: Trajectories of relational reasoning



Carstensen et al. (2019)

Study 2: Trajectories of relational reasoning



Carstensen et al. (2019)

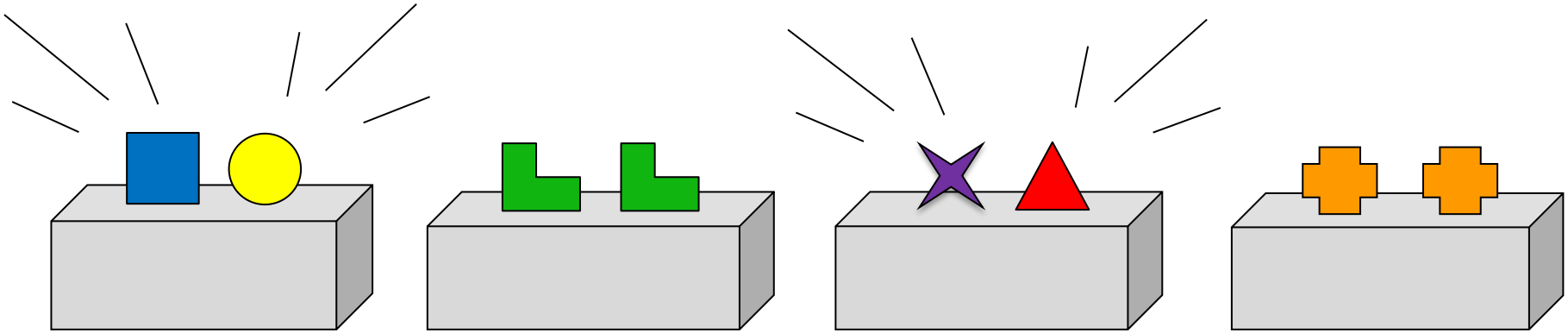
Perspectives on relational reasoning

The rational learner "paradigm" view

Children have and retain genuine relational concepts from an early age, but experience with language and the environment creates **learned biases** and preferences for relational or object-based reasoning

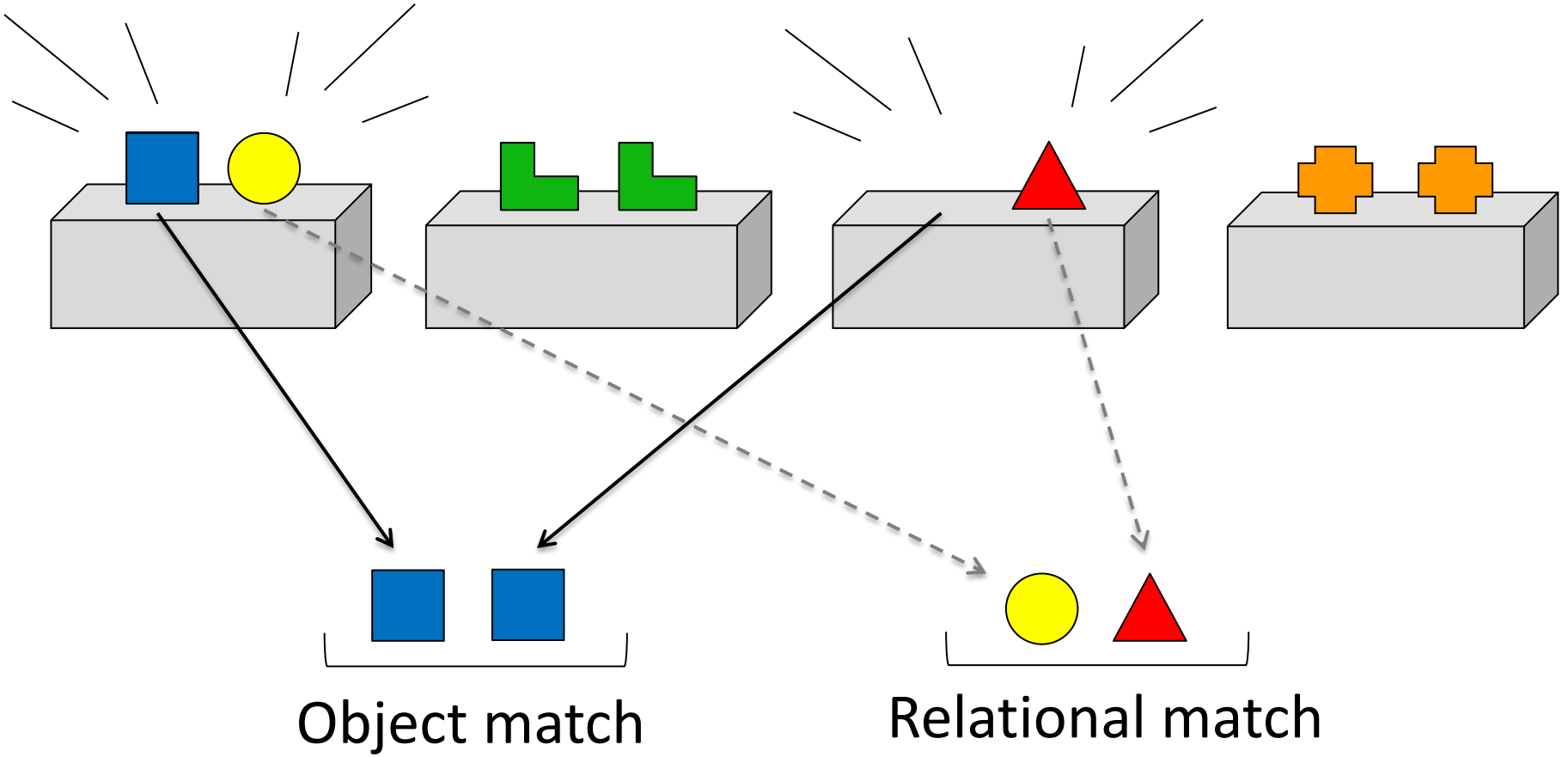
Carstensen et al. (2019)

Study 3: Relational focus across contexts



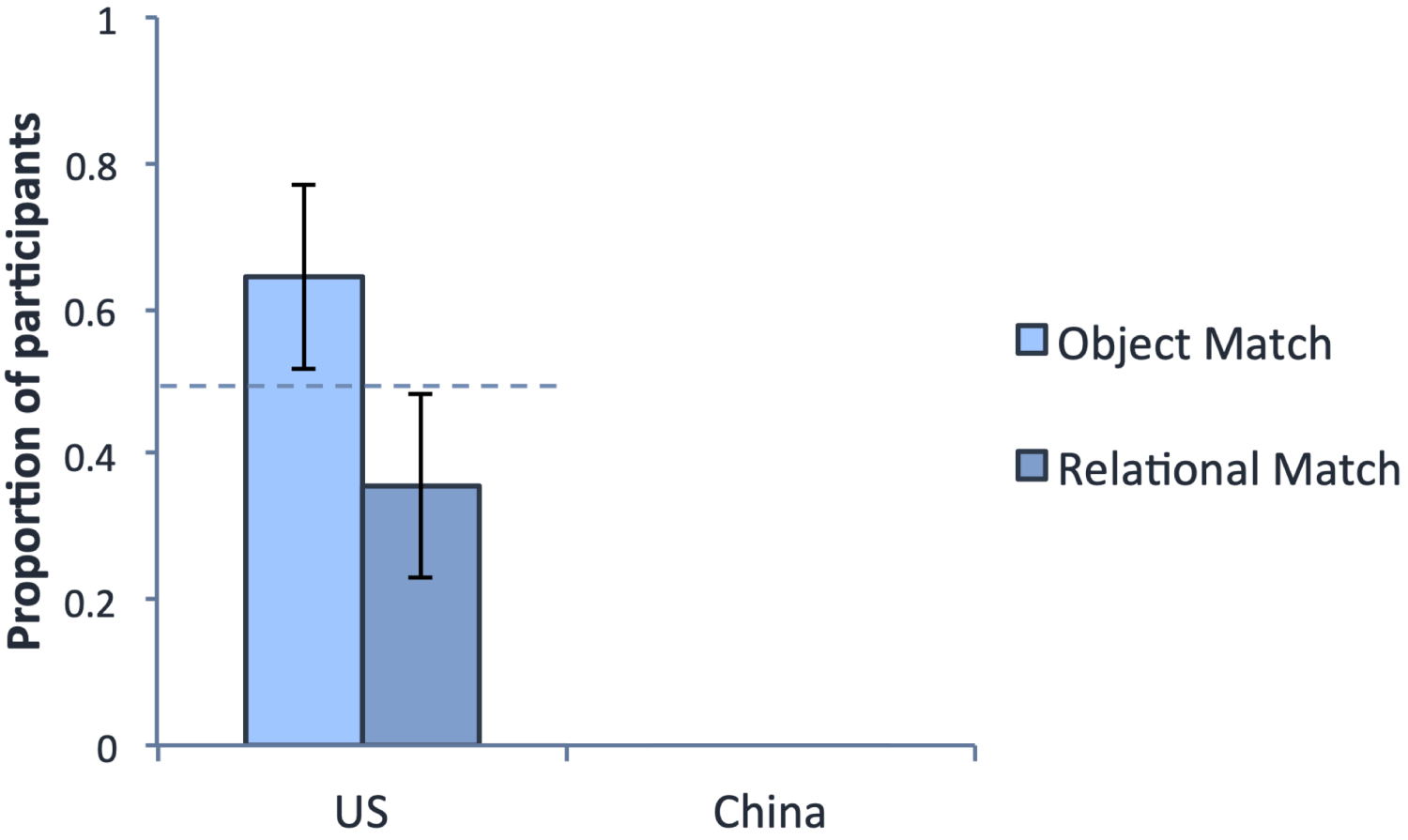
Carstensen et al. (2019)

Study 3: Relational focus across contexts



Carstensen et al. (2019)

Study 3: Relational focus across contexts



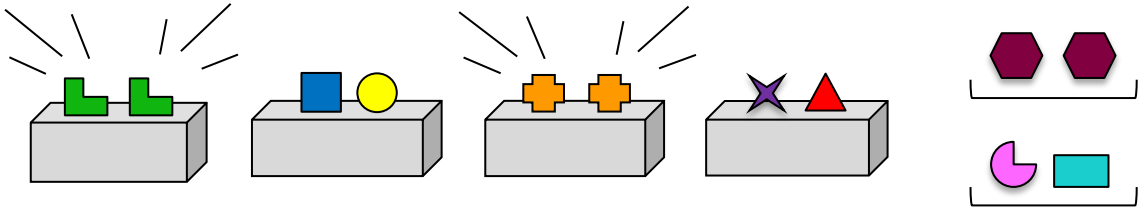
Carstensen et al. (2019)

Development of abstract reasoning

Context shapes diversity in early abstract thought

There are naturally-occurring, population-level differences in relational focus that appear early in development and predict qualitative differences in the trajectory of relational reasoning

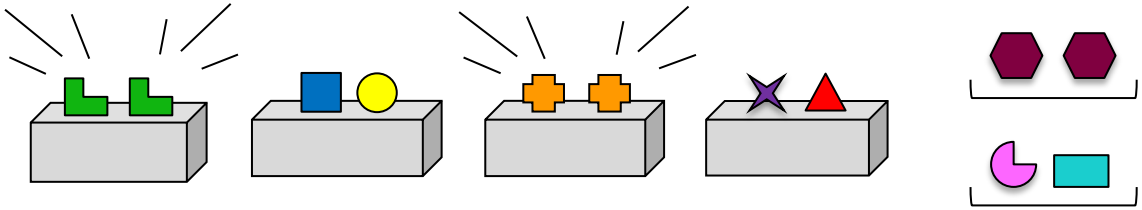
Context shapes the developmental trajectory of relational reasoning

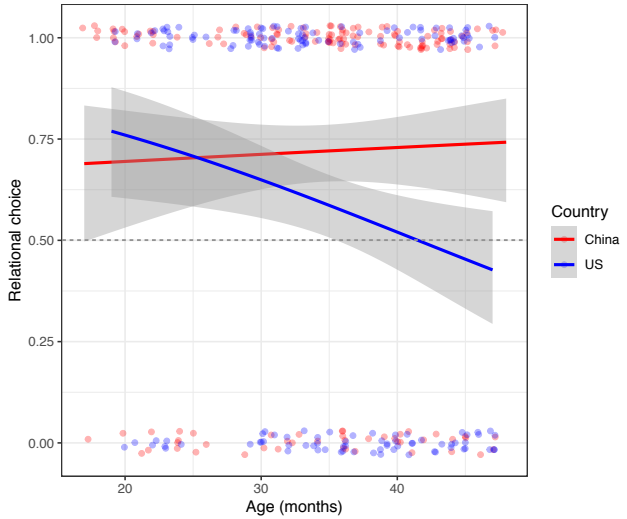


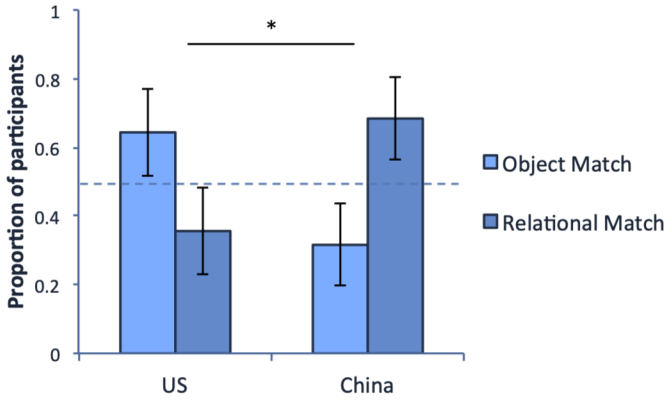
Carstensen et al. (2019)

Richland, Morrison, & Holyoak (2006); Richland et al. (2010); Kuwabara & Smith (2012)

Context shapes the developmental trajectory of relational reasoning







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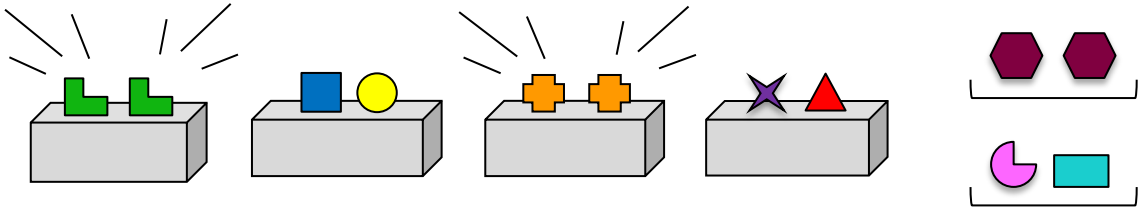
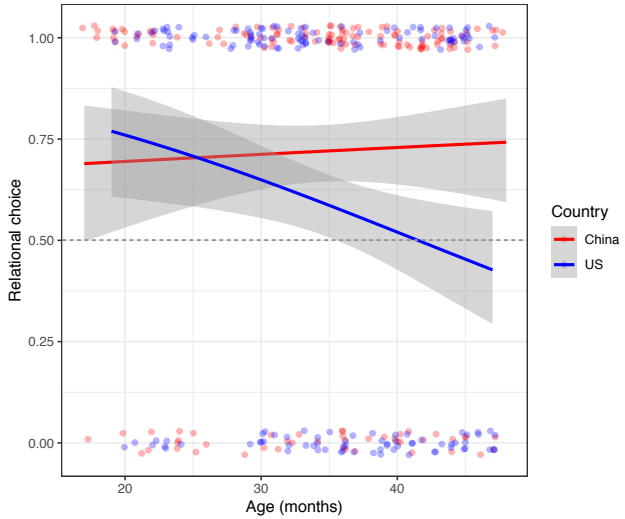
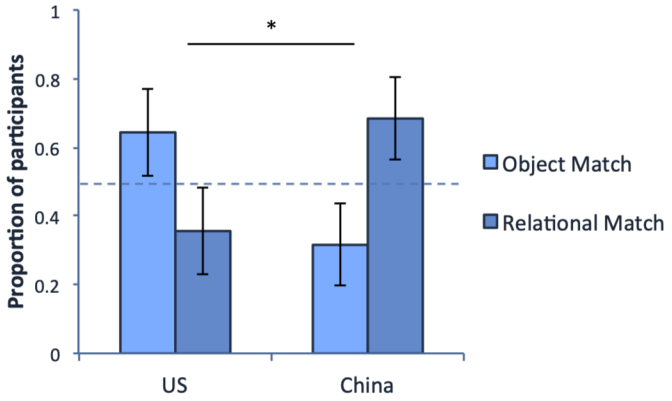






Carstensen et al. (2019)

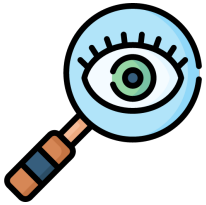
Richland, Morrison, & Holyoak (2006); Richland et al. (2010); Kuwabara & Smith (2012)

Cross-cultural differences between the US & China

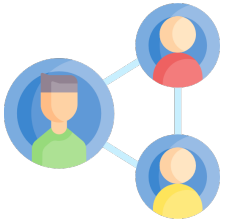
- visual attention (Ji, Peng, & Nisbett, 2000)
- language learning (Chan et al., 2011)
- executive function (Tan, 2020)
- similarity judgments (Ji, Zhang, & Nisbett, 2004)
- values (Spencer-Rodgers, Williams, Hamilton, Peng, & Wang, 2007)
- preferences (Corriveau et al., 2017)
- self-concepts (Spencer-Rodgers, Boucher, Mori, Wang, & Peng, 2009)

What varies across cultures that may influence relational reasoning?

Visual attention



Social cognition



Obstacles to cross-cultural comparison

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- Little consensus on how to map between constructs and measurements

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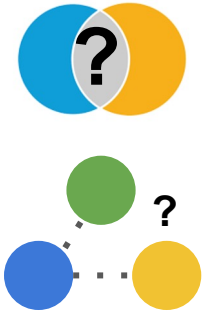

Obstacles to cross-cultural comparison

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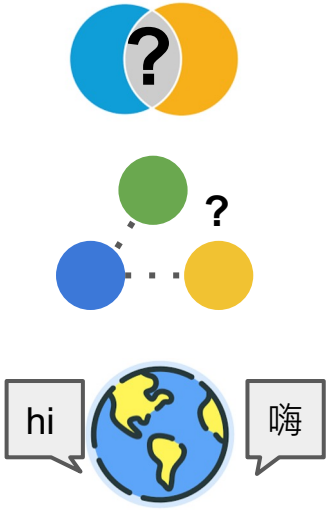
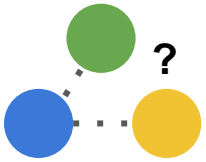
- Difficult to aggregate and compare data across customized methods, languages, and populations



Obstacles to cross-cultural comparison

- Little consensus on how to map between constructs and measurements
- Research linking tasks is correlational, and often does not control for other factors
- Difficult to aggregate and compare data across customized methods, languages, and populations
- Much of the literature predates recently raised methodological issues (e.g. limiting analytic flexibility)



Cross-cultural differences between the US & China

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Beyond Western, Educated, Industrial, Rich, and Democratic (WEIRD) Psychology: Measuring and Mapping Scales of Cultural and Psychological Distance

Psychological Science
2020, Vol. 31(6) 678–701


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Michael Muthukrishna[1], Adrian V. Bell[2], Joseph Henrich[3], Cameron M. Curtin[3], Alexander Gedranovich[1], Jason McInerney[4], and Braden Thue[3]

[1]Department of Psychological and Behavioural Science, London School of Economics and Political Science; [2]Department of Anthropology, The University of Utah; [3]Department of Human Evolutionary Biology, Harvard University; and [4]Department of Computer Science, Iowa State University

Measuring cross-cultural differences

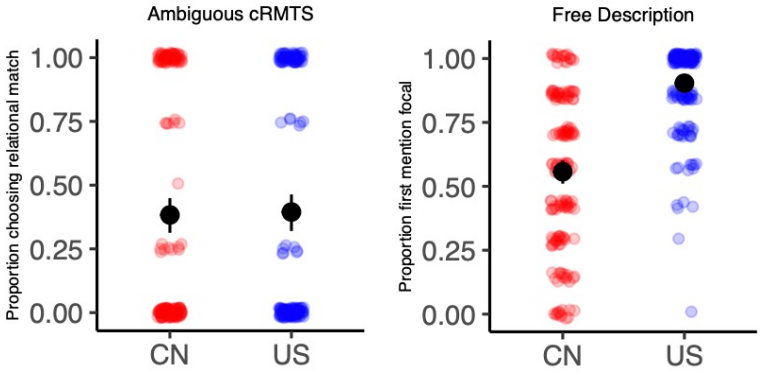
Anjie Cao

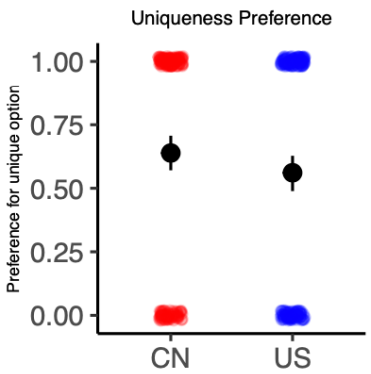
Shan Gao

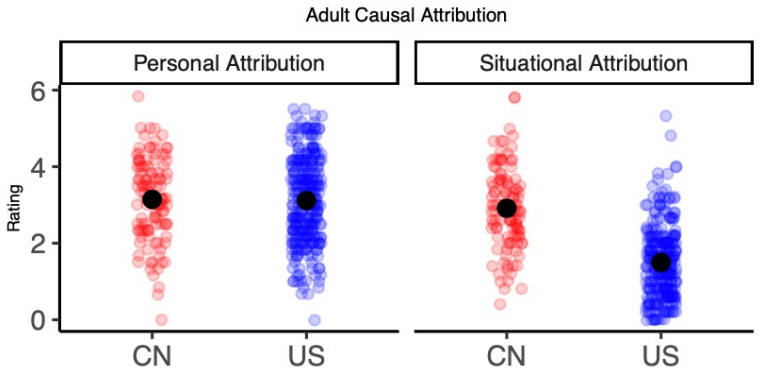
Michael Frank

Carstensen, Cao, Gao, & Frank (in press) JEP: General

Measuring cross-cultural differences

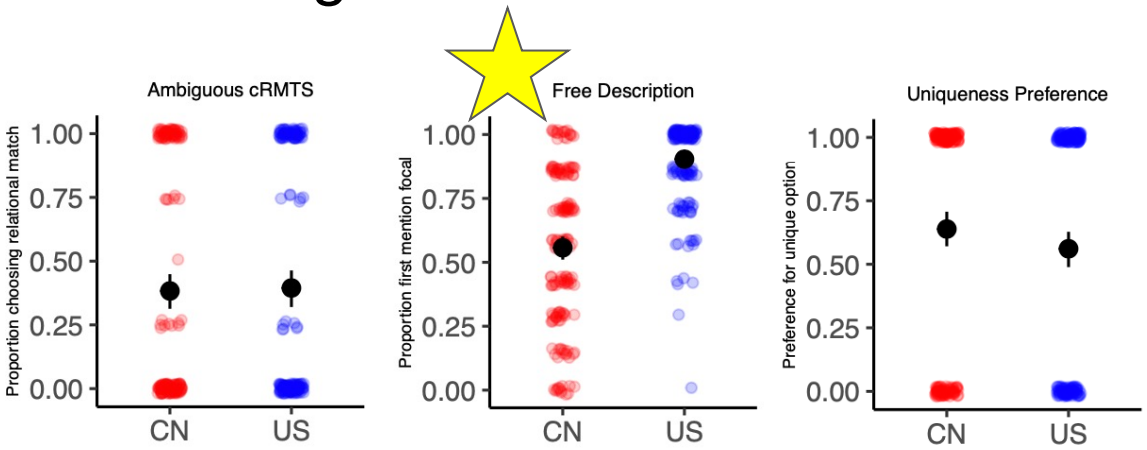


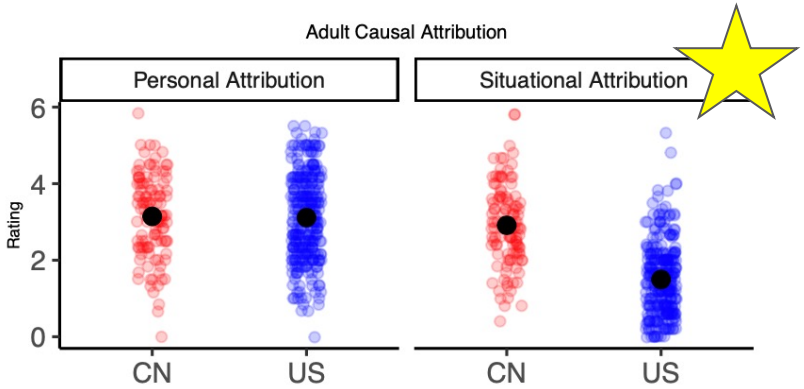




Carstensen, Cao, Gao, & Frank (in press) JEP: General

Measuring cross-cultural differences





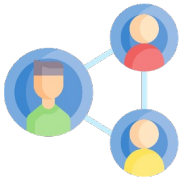
Carstensen, Cao, Gao, & Frank (in press) JEP: General

Measuring cross-cultural differences over development

We selected a group of tasks that meet following criteria:

Relevant to relational reasoning





We selected a group of tasks that meet following criteria:

Relevant to relational reasoning

Appropriate for all ages

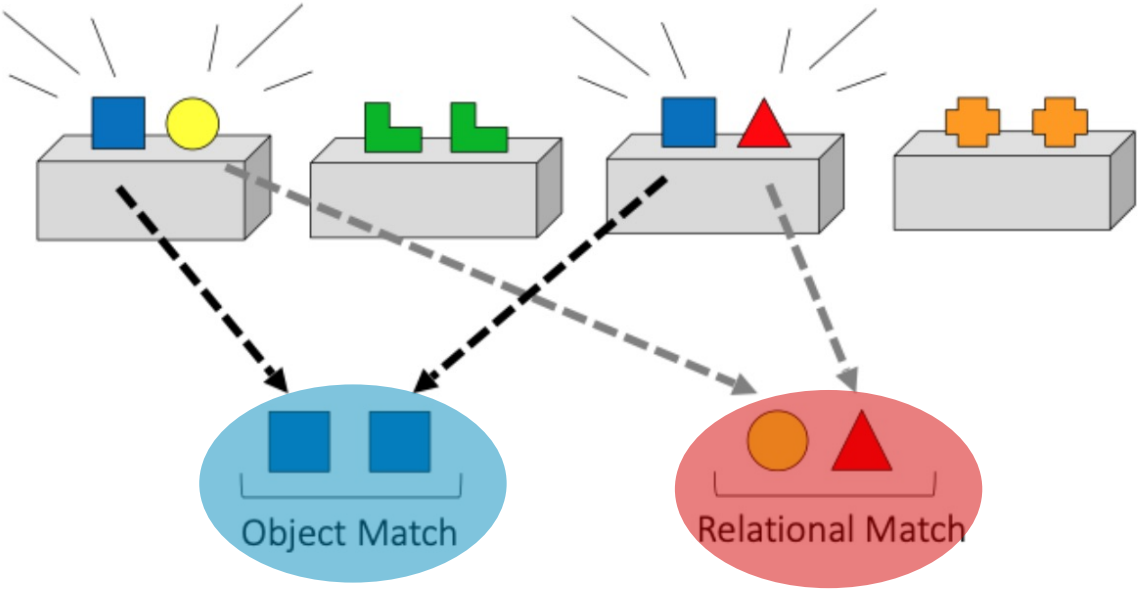
We selected a group of tasks that meet following criteria:

- **Relevant to relational reasoning**
- **Appropriate for all ages**
- **Implicit** 

<u>Participant recruitment:</u>
Convenience sample from schools, social media, lab databases, university listservs.
Final sample size:
US: 108, CN: 117.

Carstensen et al. (in press) CogSci Proc.

Relational Preference (Ambiguous Causal RMTS)

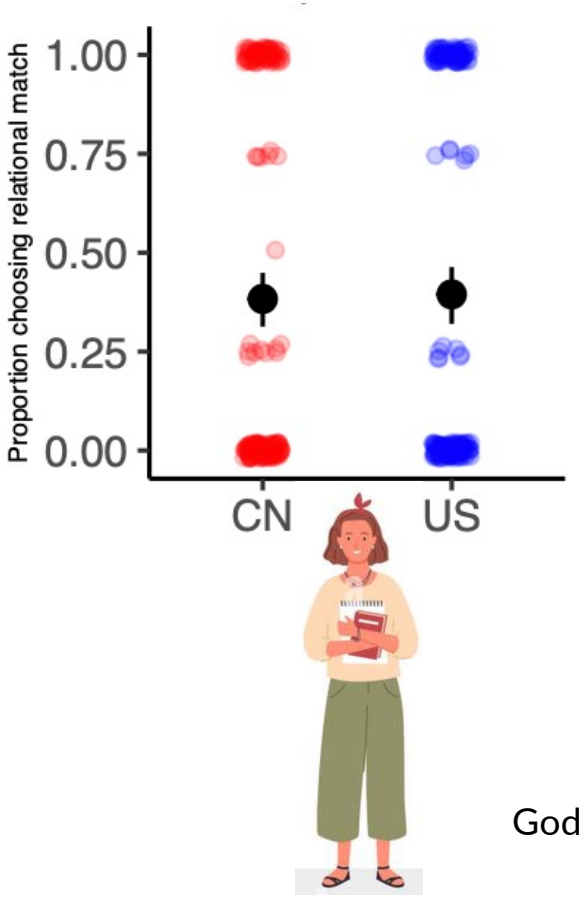


Pick the tray that has the things that will make my toy play music.

请选择装着能让我的玩具播音乐的东西的托盘。

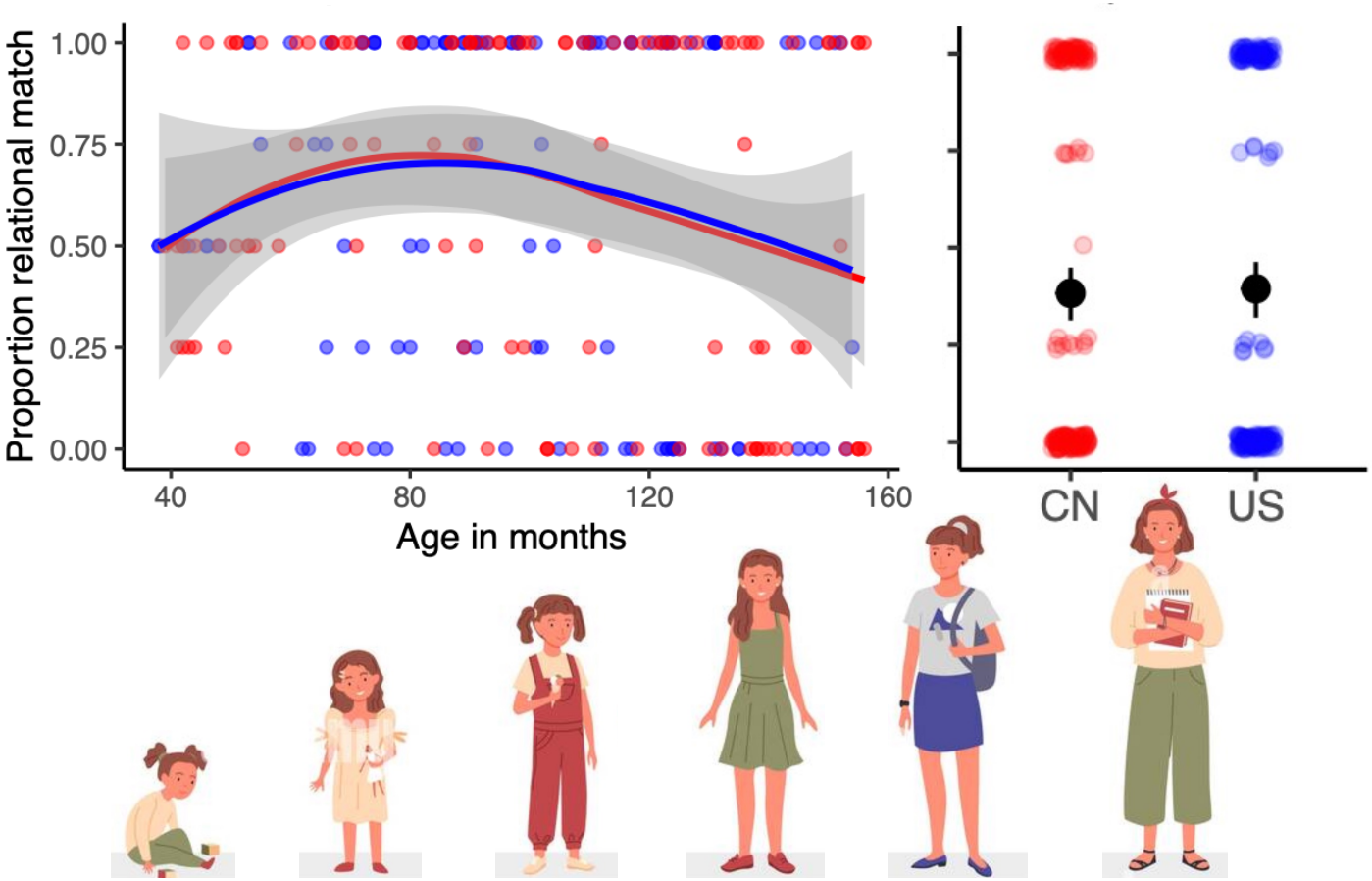
Carstensen et al. (2019)

Relational Preference (Ambiguous Causal RMTS)



Goddu & Walker (2018)

Relational Preference (Ambiguous Causal RMTS)

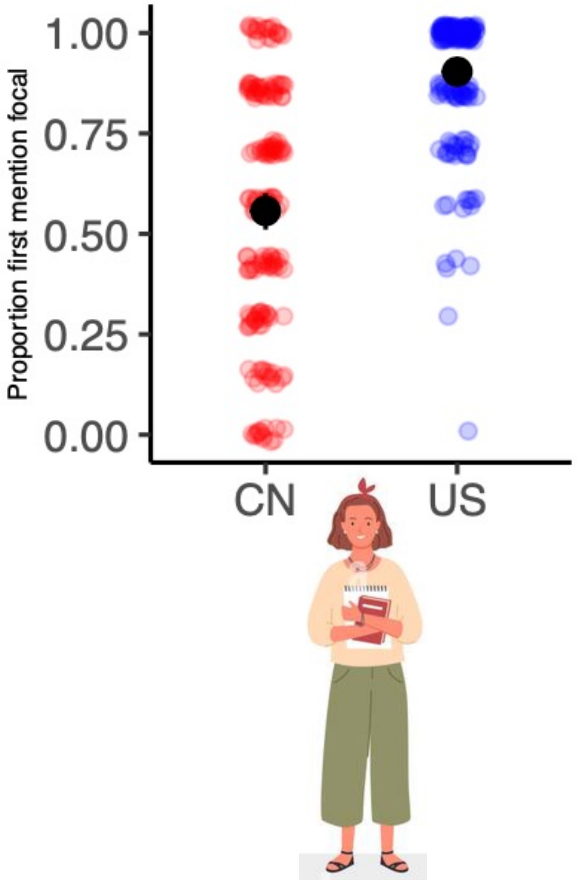


Visual Attention (Free Description)

What did you see?
你看到了什么？

Imada, Carlson, & Itakura (2013)

Visual Attention (Free Description)



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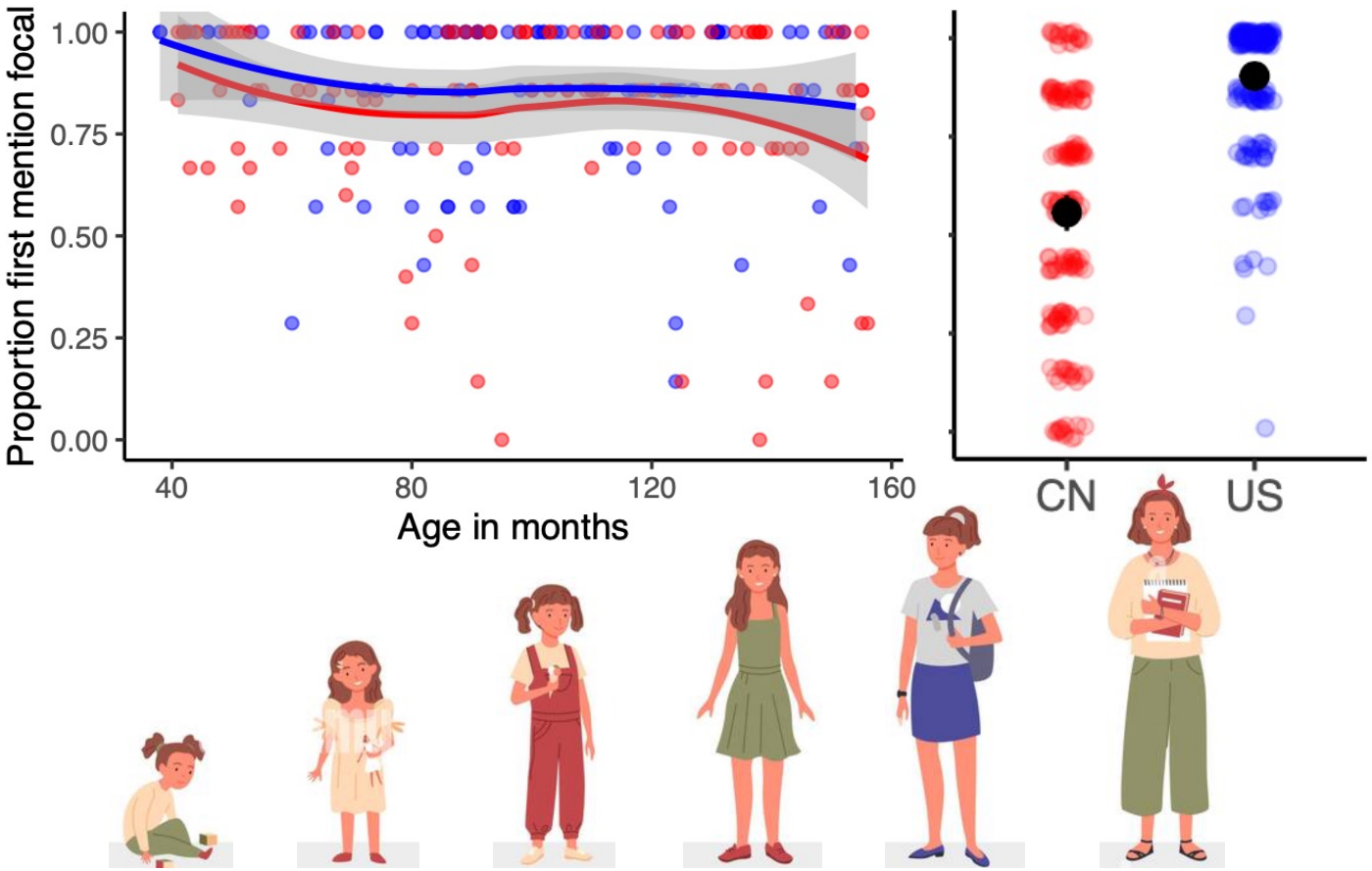


Social Reasoning (Causal Attribution)

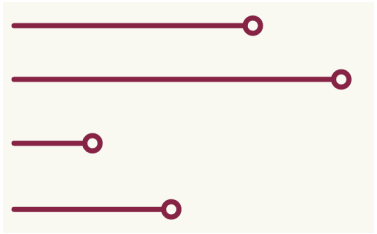
Why didn't Lucy play on the bicycle? Is it because she is the kind of person who gets scared, or because the bicycle is dangerous to play on?

璐茜为什么不骑自行车？是因为她是那种会怕怕的人，还是因为这辆自行车骑起来很危险？

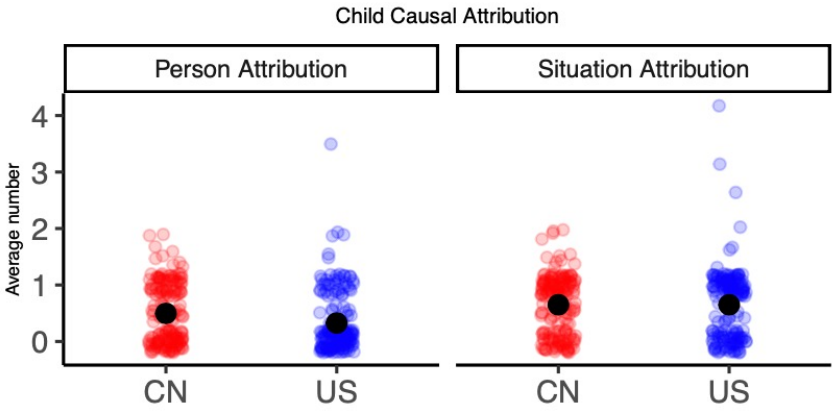
Seiver, Gopnik, & Goodman (2013)

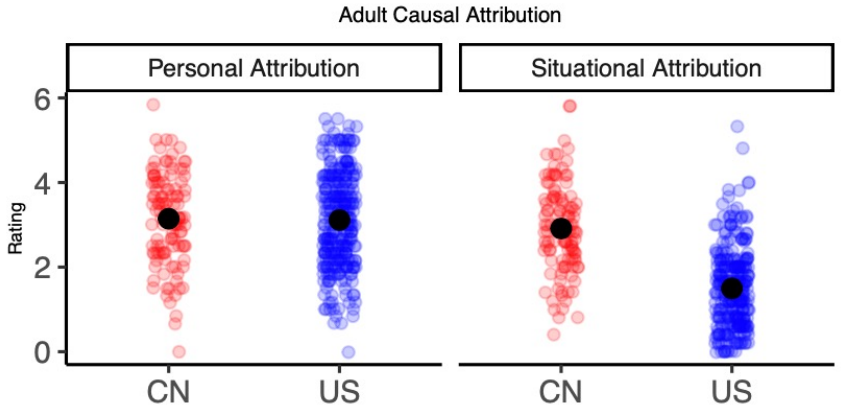
Social Reasoning (Causal Attribution)

Seiver, Gopnik, & Goodman (2013)

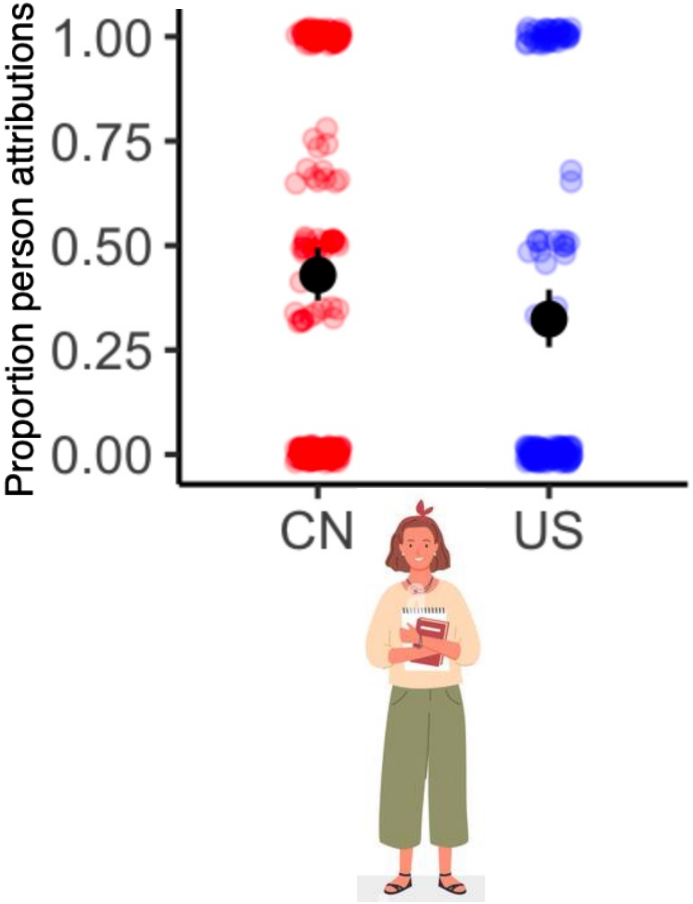


Morris & Peng (1994)

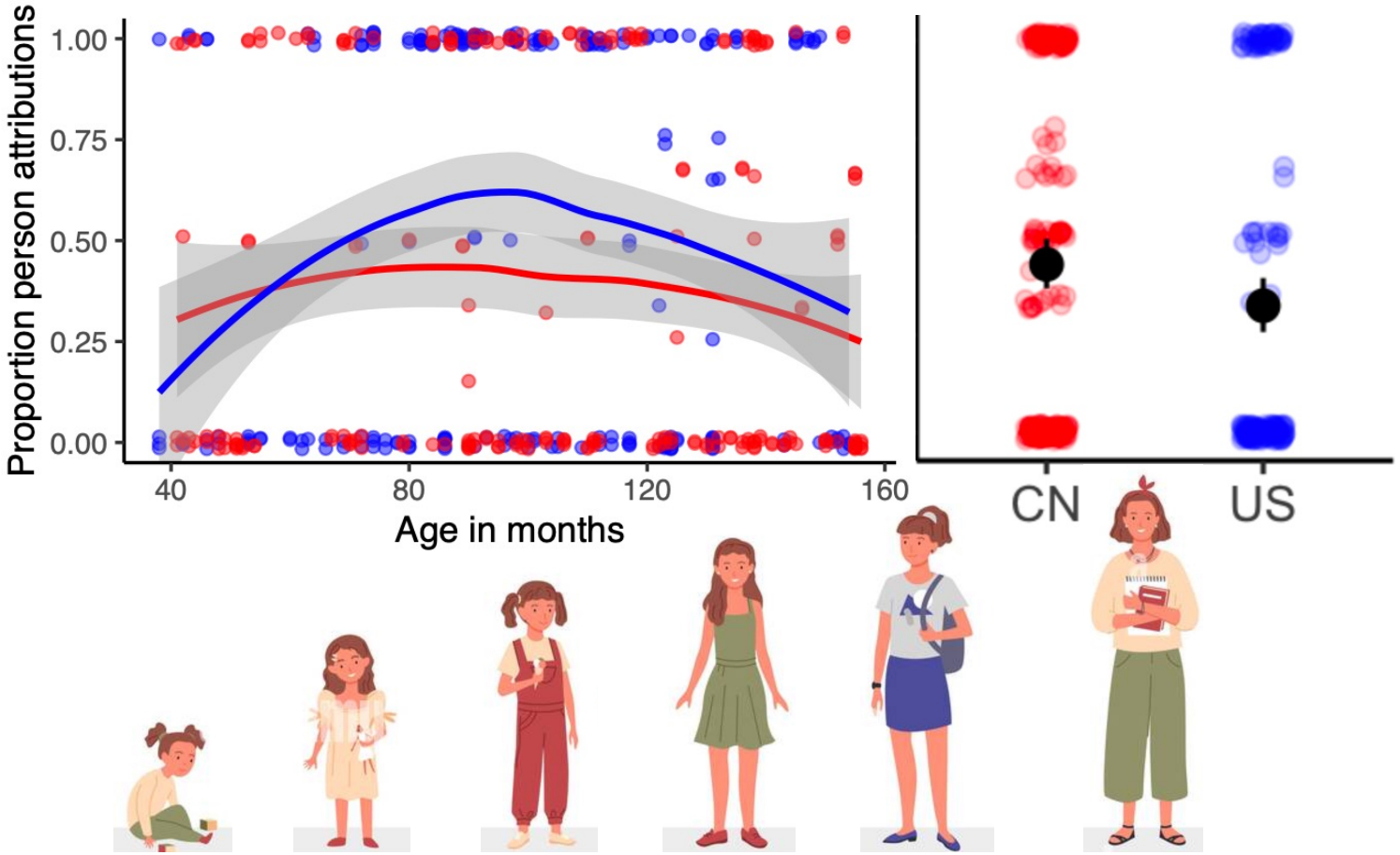




Social Reasoning (Causal Attribution)



Social Reasoning (Causal Attribution)

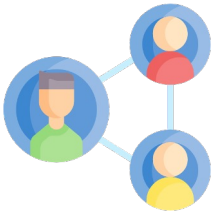


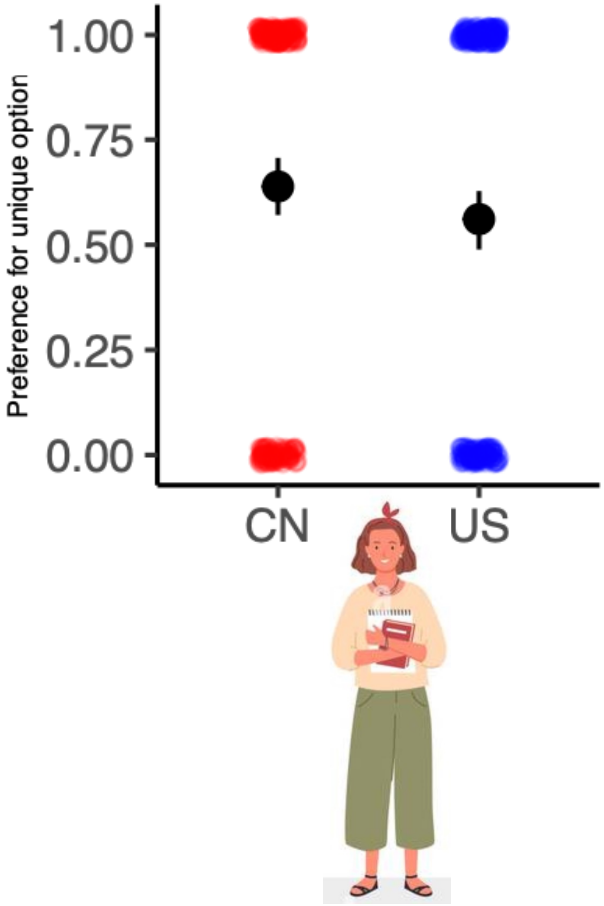
Social Values (Uniqueness Preference)

You can only pick one sticker.
Which one do you want to pick?
你只能选一个小贴纸。
你想选哪一个呢？

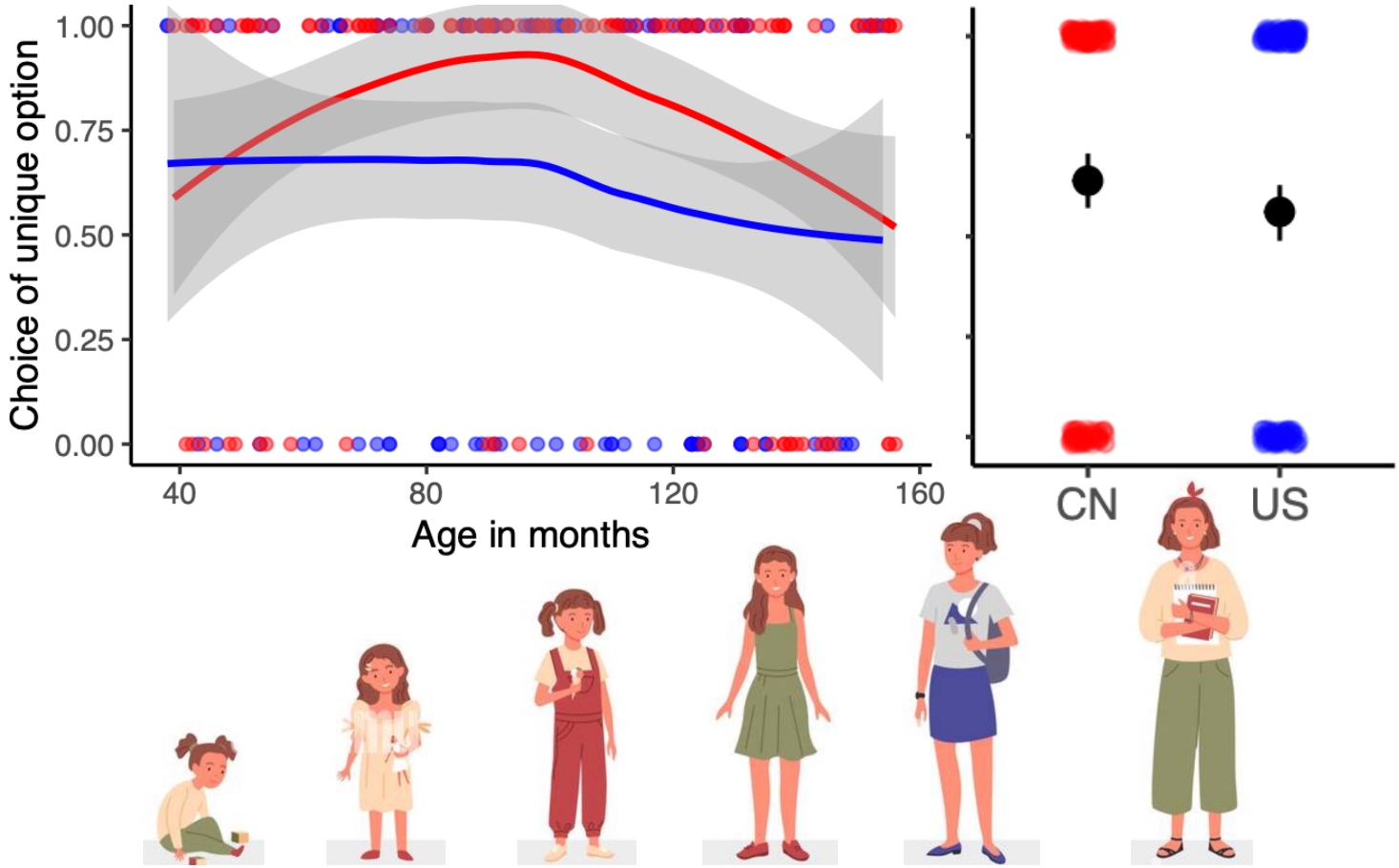
Kim & Markus (1999)

Social Values (Uniqueness Preference)



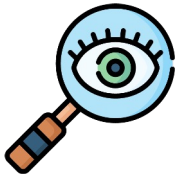


Social Values (Uniqueness Preference)

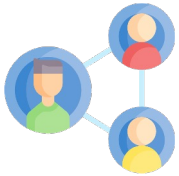


Conclusions

We observe changes in relational preference over development but this progression is comparable in the US and China



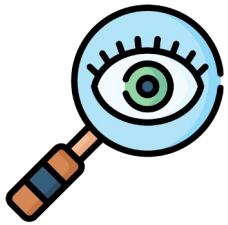
Differences in visual attention appear early and maintain over middle childhood, but are not as pronounced as in adulthood



Cross-cultural variation in the social tasks is most pronounced during middle childhood, in keeping with previous findings suggesting that children may be especially sensitive to social learning and norms at this time

Future Directions

Visual Attention



What is the developmental trajectory of culture-specific visual attention?

Relational Reasoning

Does visual attention play a causal role in relational reasoning?

Thanks!!

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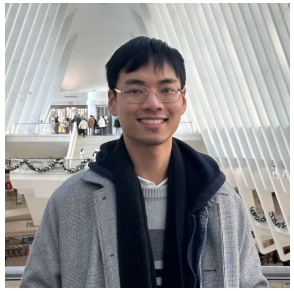

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Thank you!

Questions / collaborations?

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Language as a window into abstract thought

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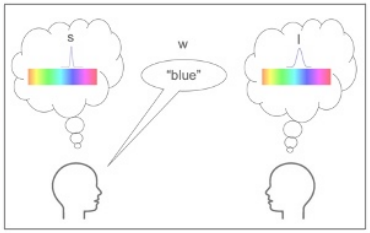

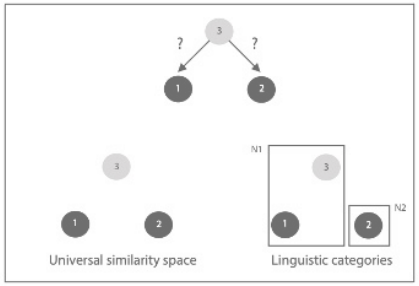

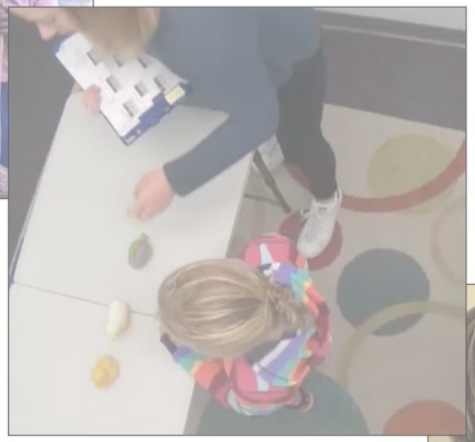

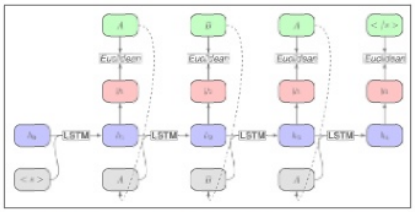

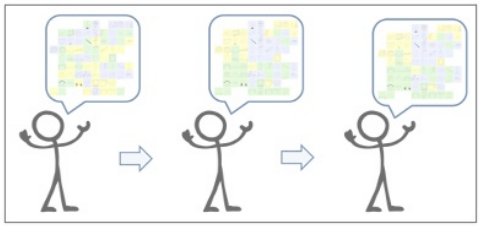

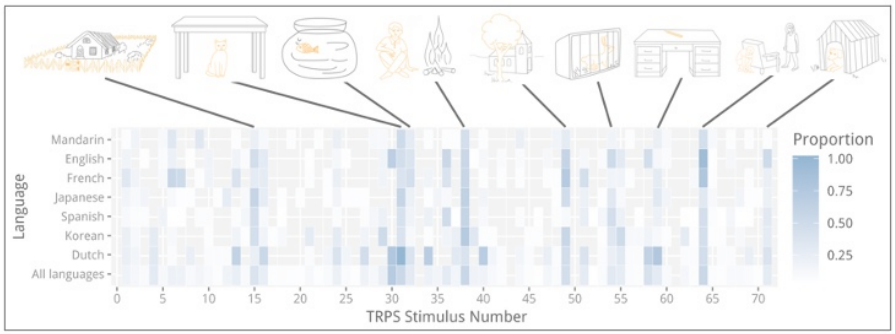

Consistency
is broadly functional

Variation
is pervasive