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Conservativity and Learnability of Determiners

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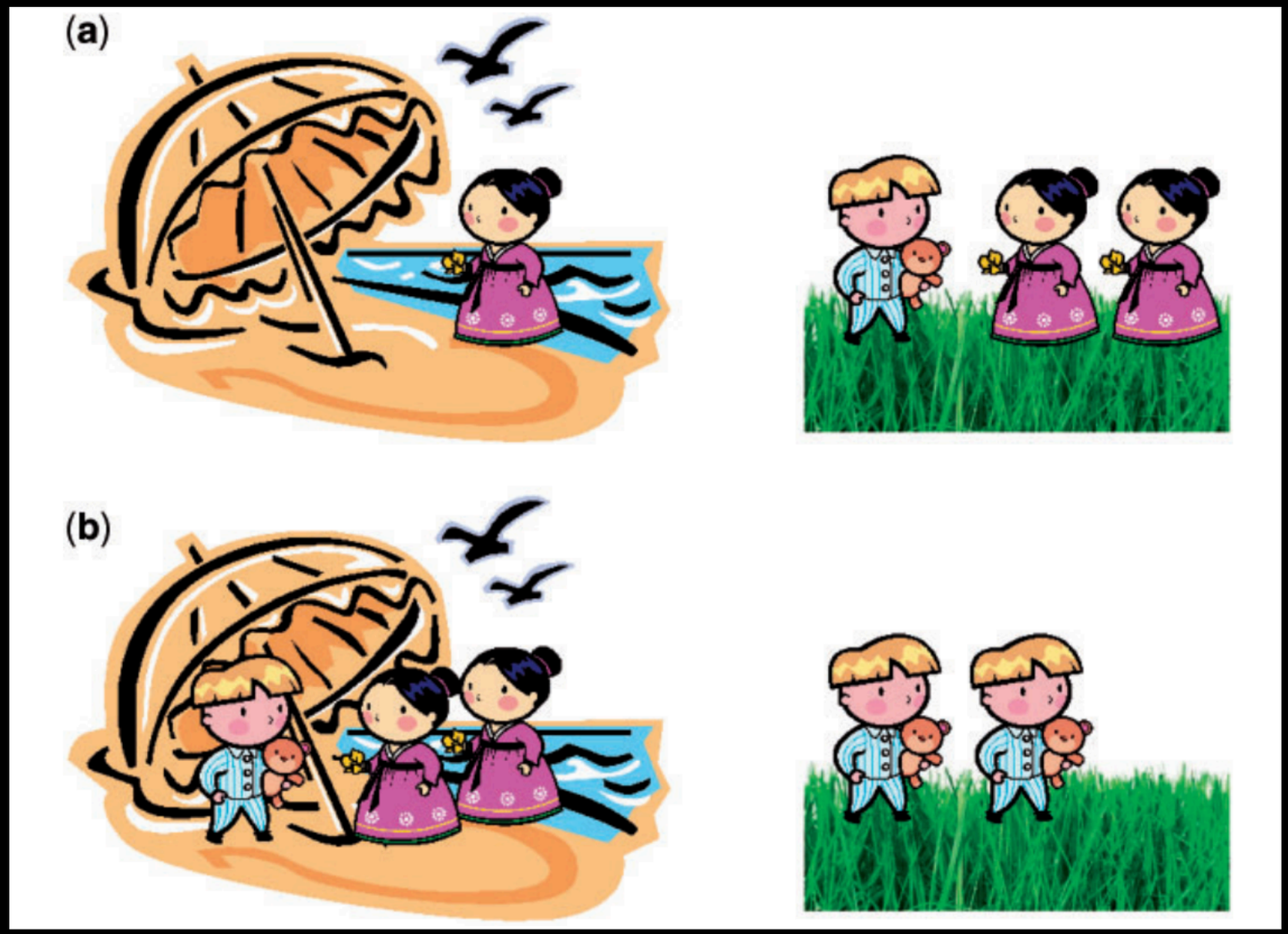
Abstract

A striking cross-linguistic generalisation about the semantics of determiners is that they never express non-conservative relations. To account for this one might hypothesise that the mechanisms underlying human language acquisition are unsuited to non-conservative determiner meanings. We present experimental evidence that 4- and 5-year-olds fail to learn a novel non-conservative determiner but succeed in learning a comparable conservative determiner, consistent with the learnability hypothesis.

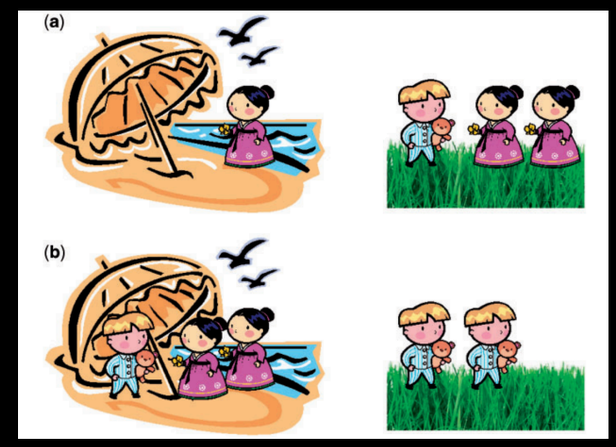
Gleeb vs Gleeb’

- Gleeb = ‘not all’
- Gleeb’ = ‘not only’



Hunter & Lidz, 2012

Lidz & Hunter's experiment



- Two conditions: CONS and non-CONS
- Picky puppet task (Waxman & Gelman 1986).
- Warm-up (3 cards) - Training (5 cards) - Target (5 cards)

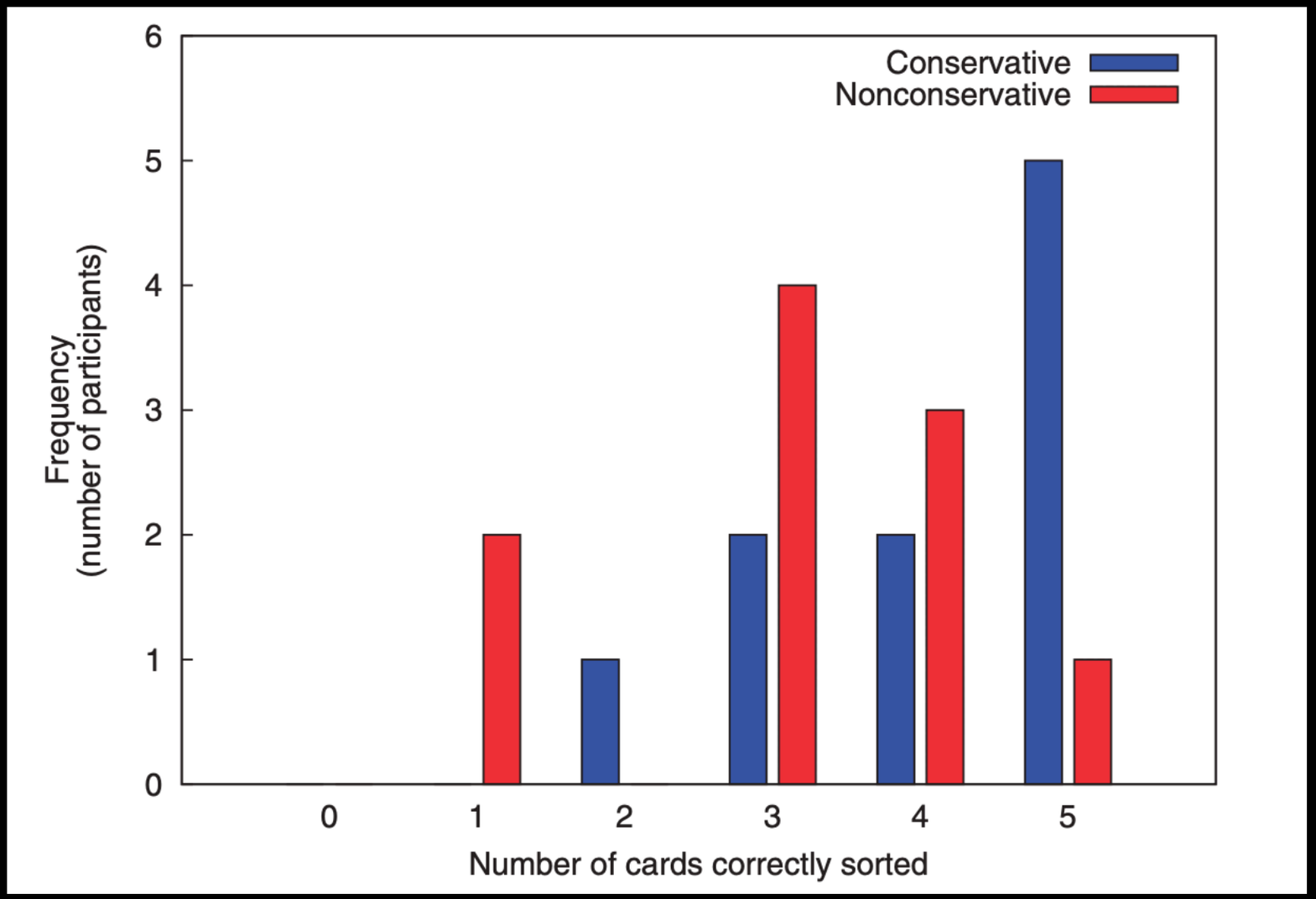
1. *The puppet told me that he likes this card because gleeb girls are on the beach*
2. *The puppet told me that he doesn't like this card because it not true that gleeb girls are on the beach.*

Participants

- 20 children
- Aged 4.5 to 5.6 (mean 5.0)
- Conservative condition 4.5 to 5.5 (mean 4.11)
- Non-conservative condition 4.11 to 5.3 (mean 5.1)

Results

Condition	Conservative	Non-conservative
Cards correctly sorted (out of 5)	mean 4.1 (above chance, $p<0.0001$)	mean 3.1 (not above chance, $p>0.2488$)
Subjects with "perfect" accuracy	50%	10%



Hunter & Lidz, 2012

“the puppet was confused about which characters on the cards were boys and which were girls”

–Perfect non-conservative kid; interpreting conservatively?

Discussion

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- Unclear that it replicates (Spenander and de Villiers 2019)

Discussion

- Are kids interpreting *gleeb* as a GQ?
- Are the results consistent with a structural account?
- Do the *gleeb* and *gleeb'* sentences differ only in conservativity? (Cf minimal pair discussion)
- Unclear that it replicates (Spenander and de Villiers 2019)
- Also, what about the other universals?

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OXFORD

Connecting Content and Logical Words

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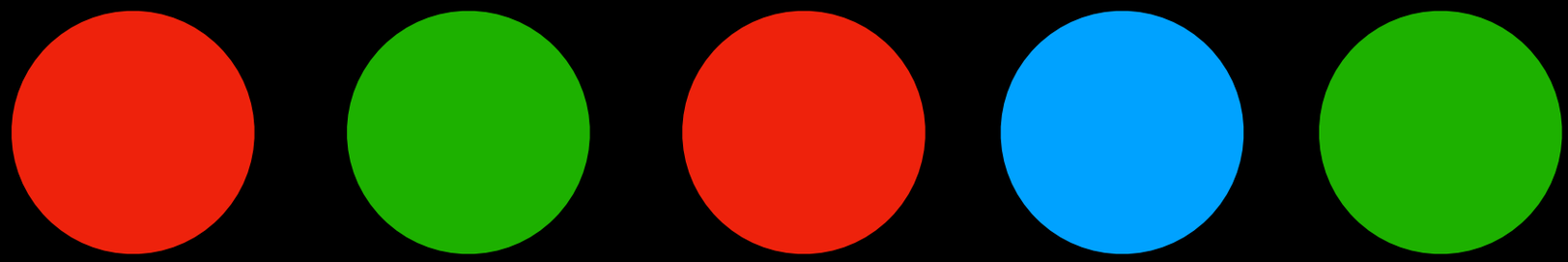
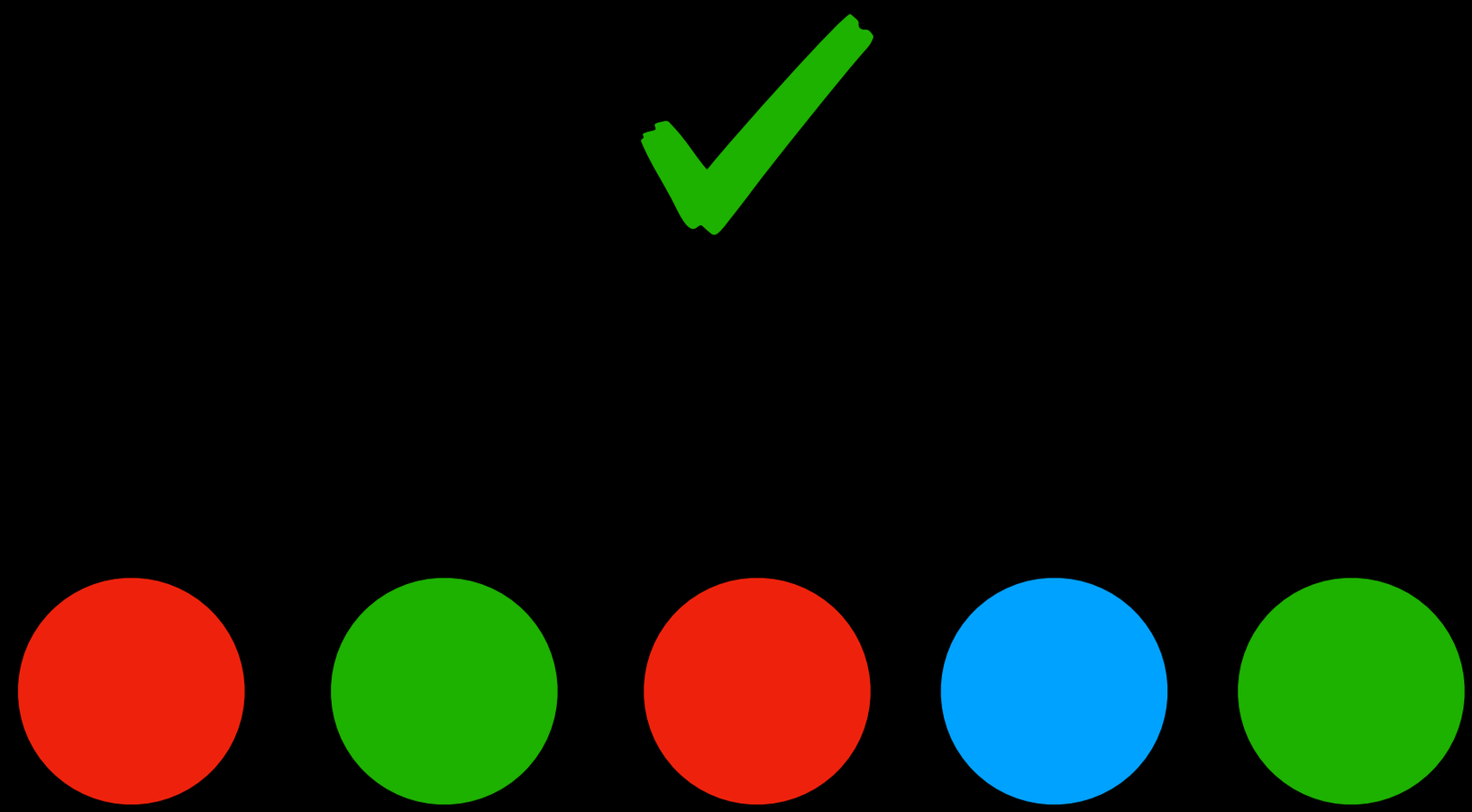
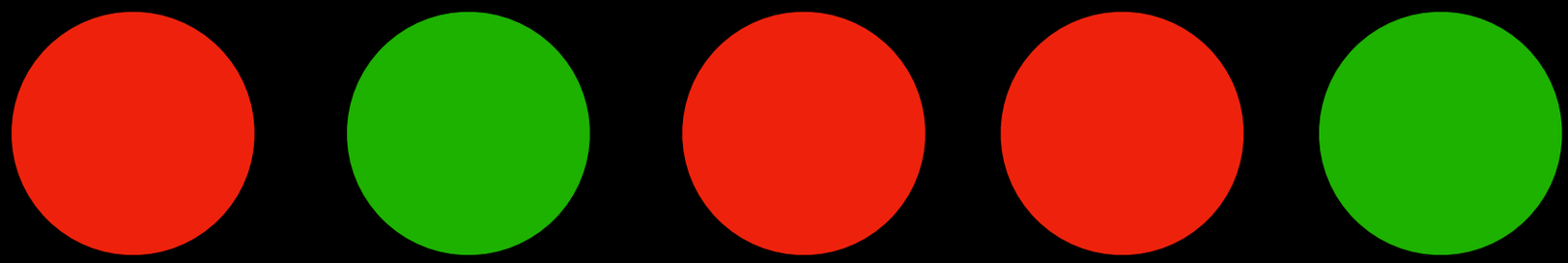
Abstract

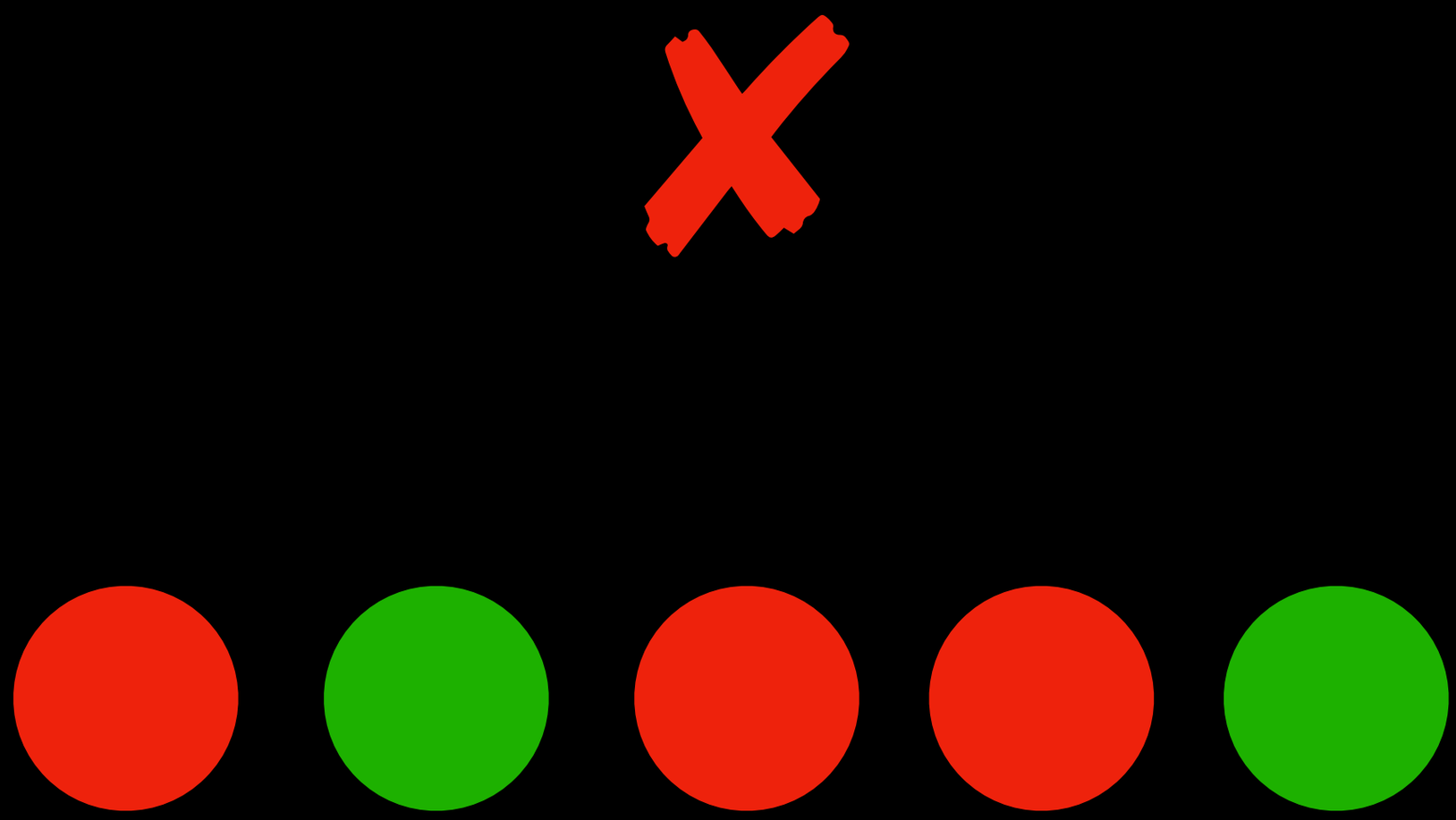
Content words (e.g. nouns and adjectives) are generally connected: there are no gaps in their denotations; no noun means 'table or shoe' or 'animal or house'. We explore a formulation of connectedness which is applicable to content and logical words alike, and which compares well with the classic notion of monotonicity for quantifiers. On

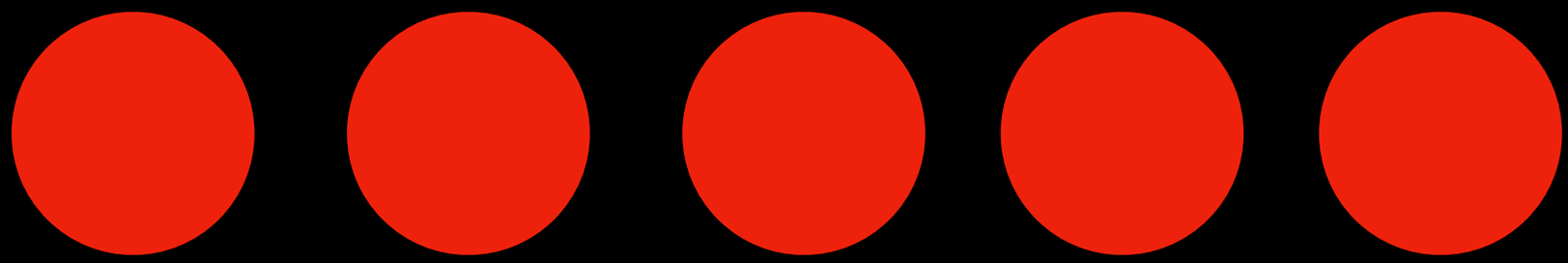
Experiment Time!

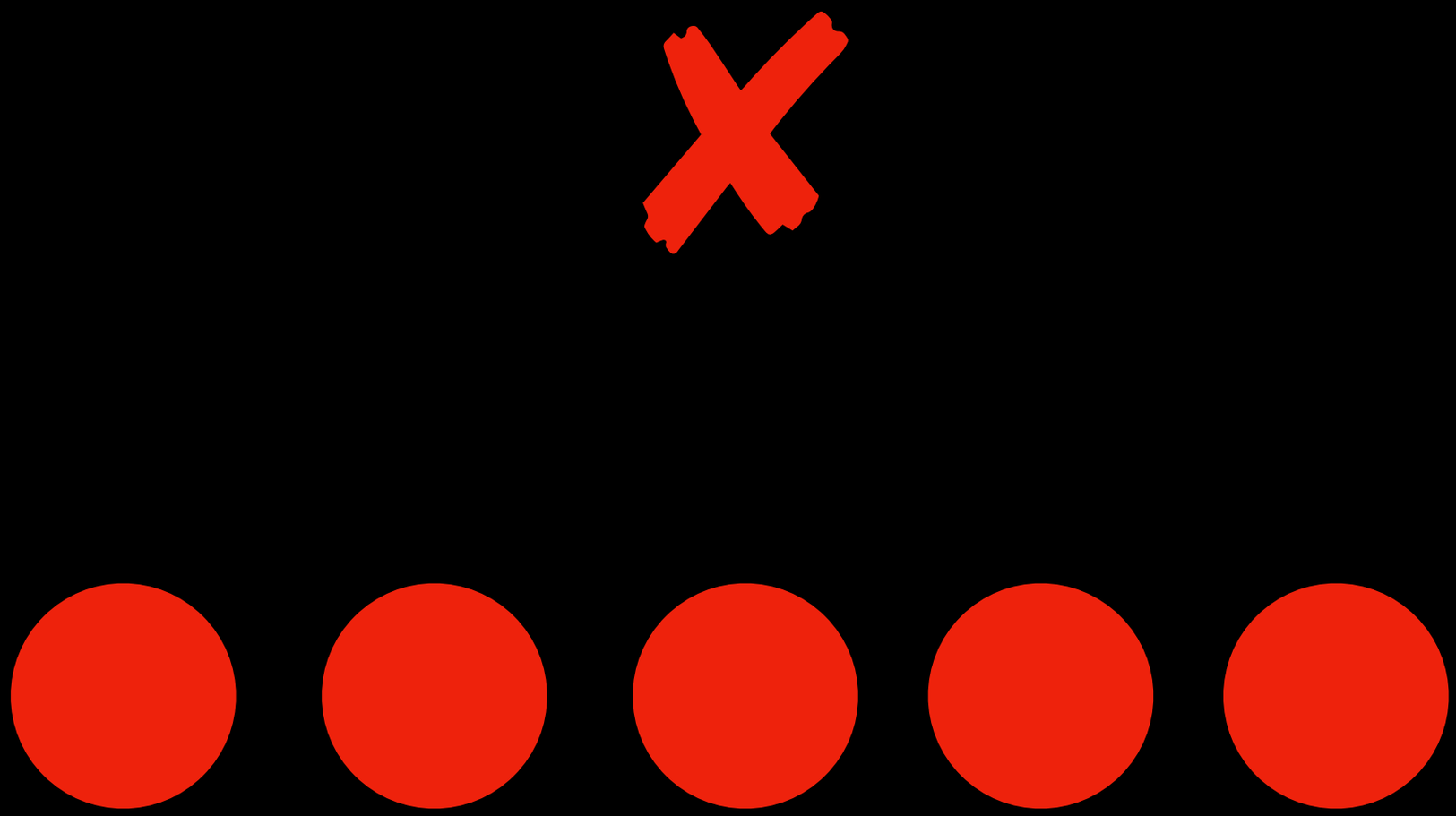


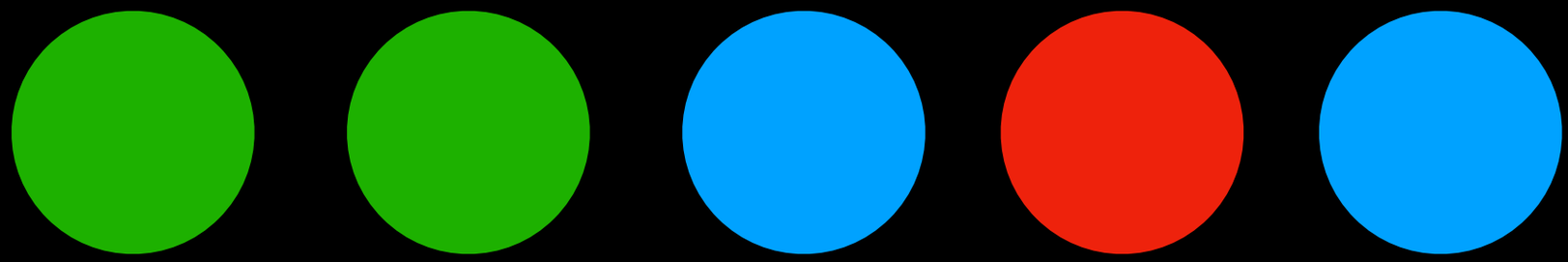


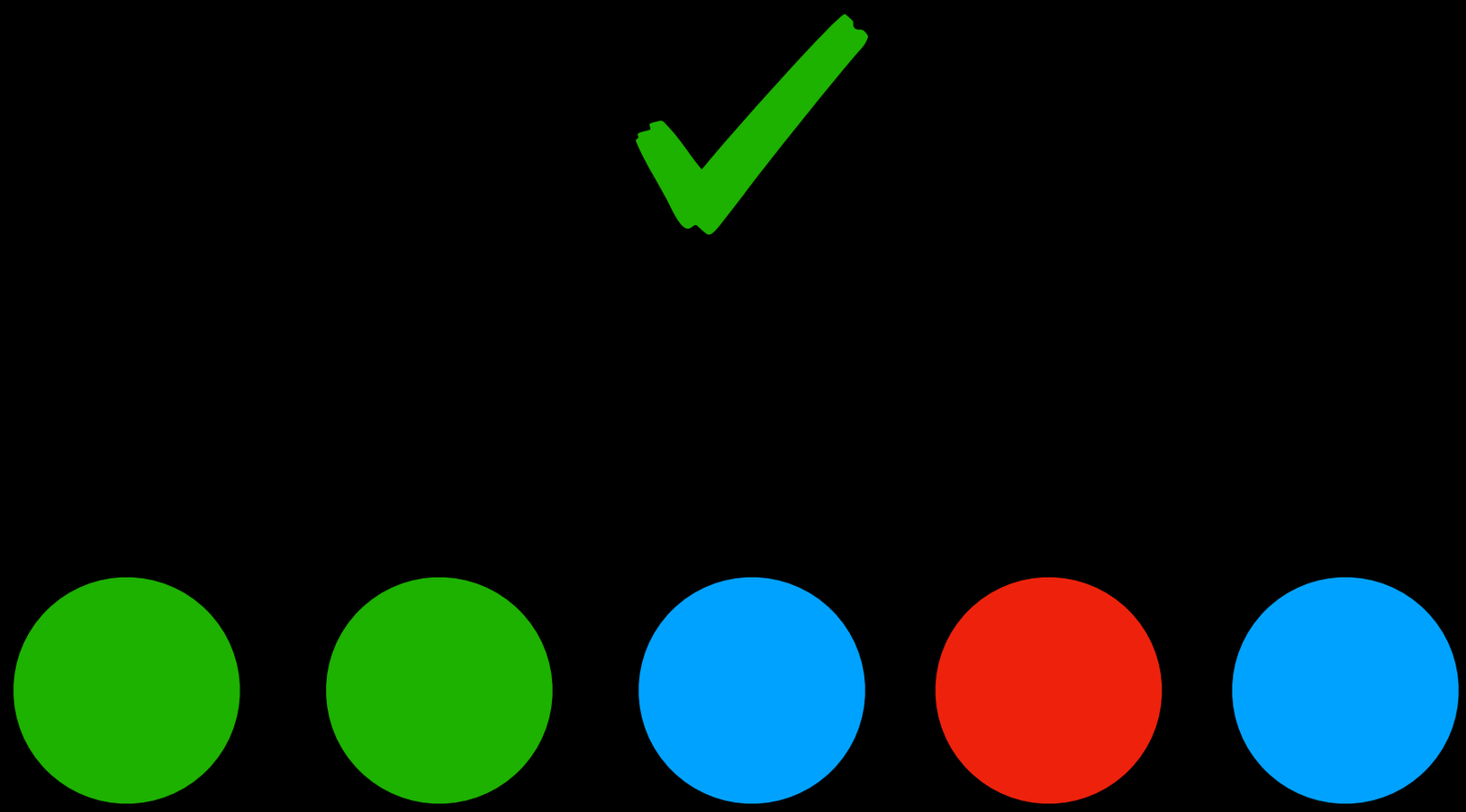


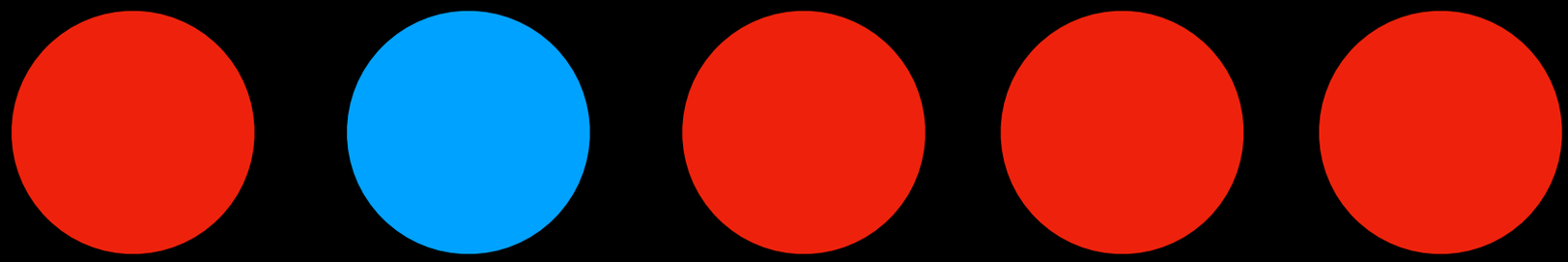


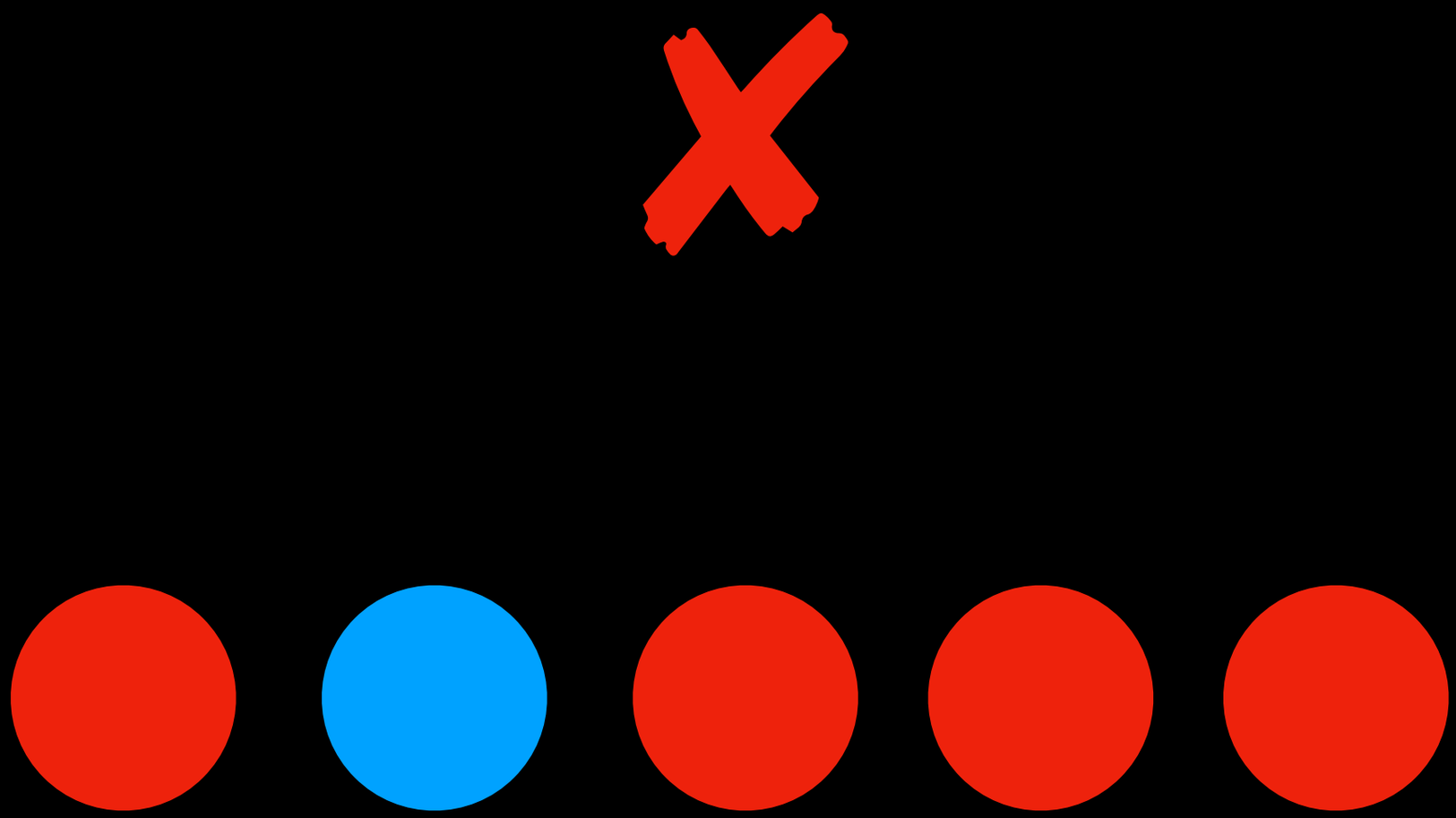


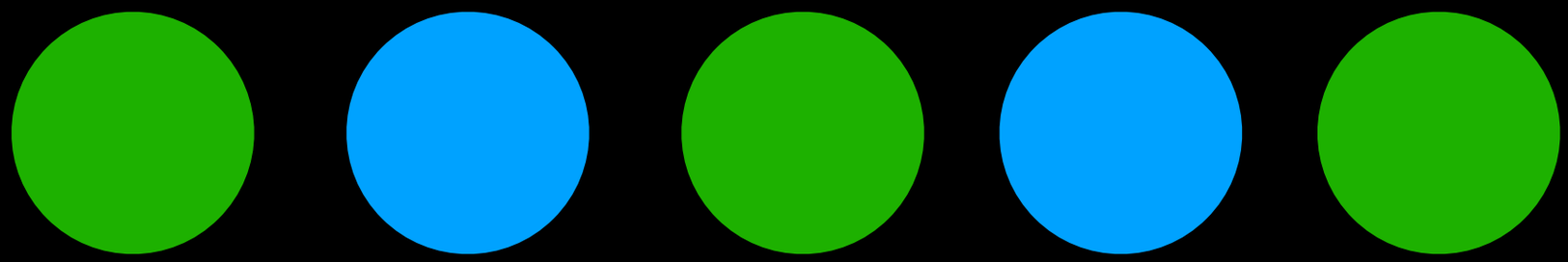


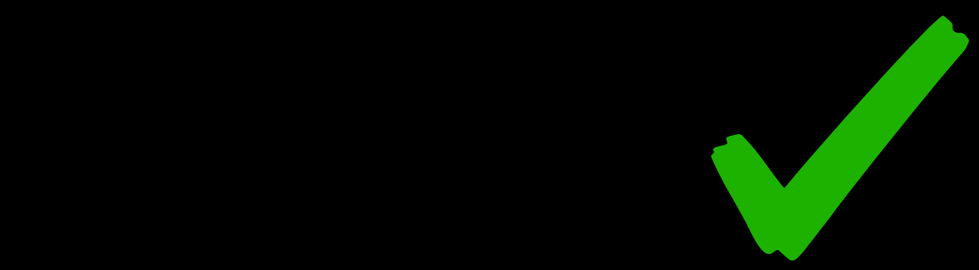


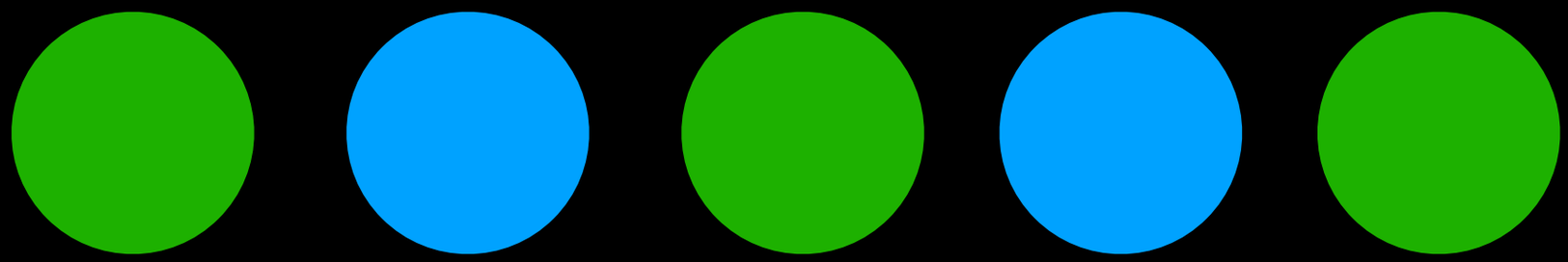




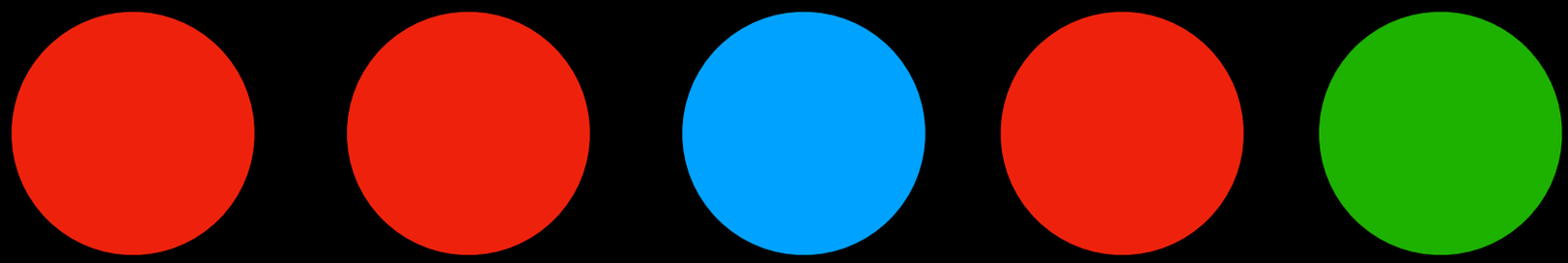


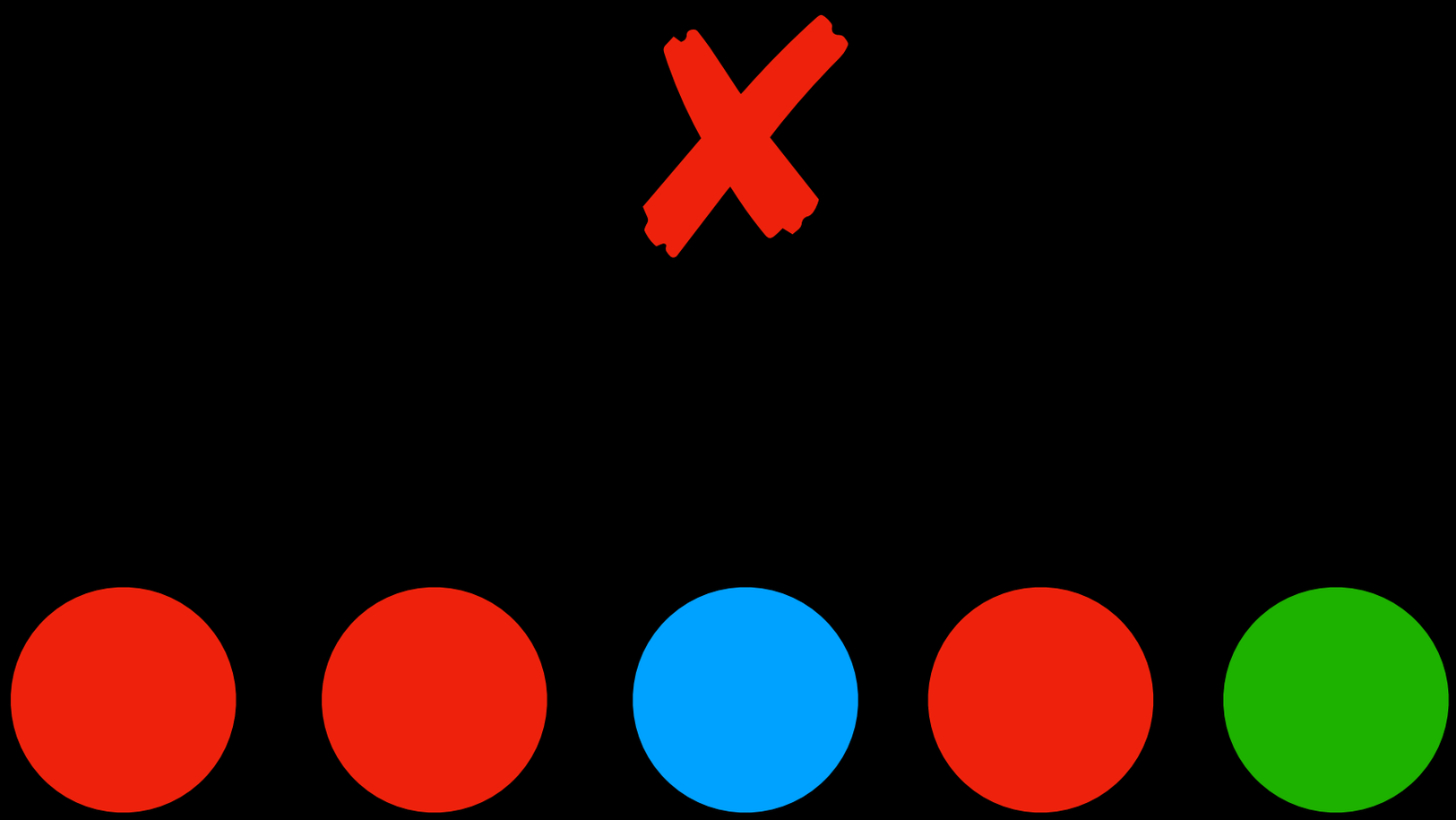


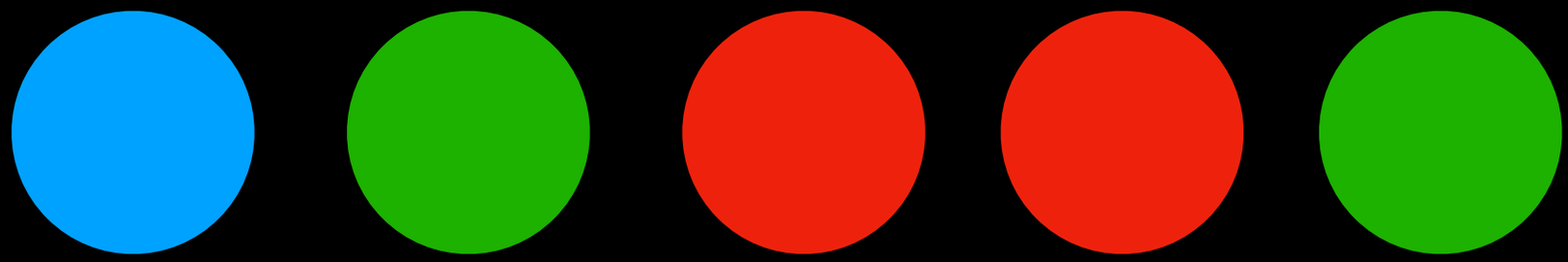


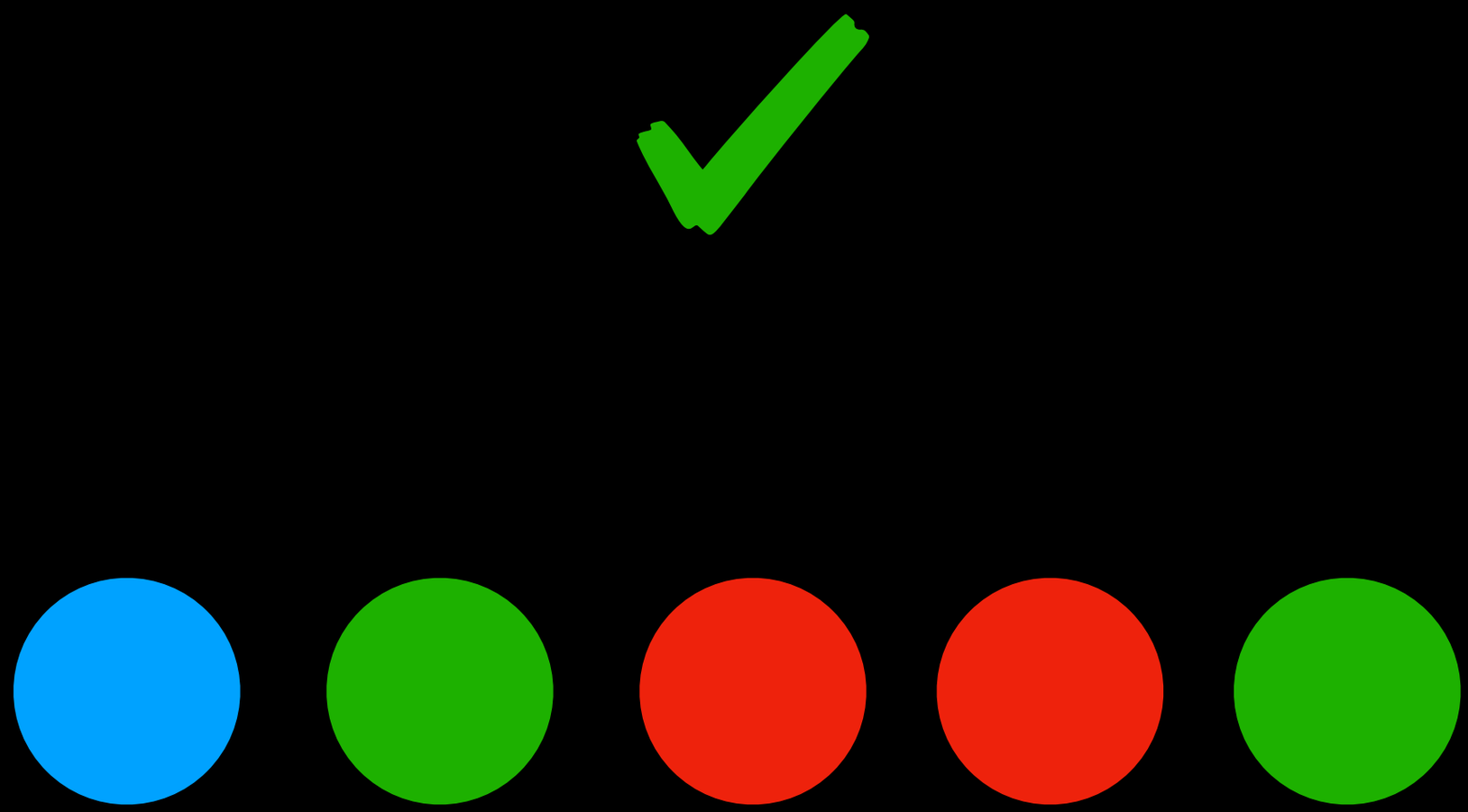


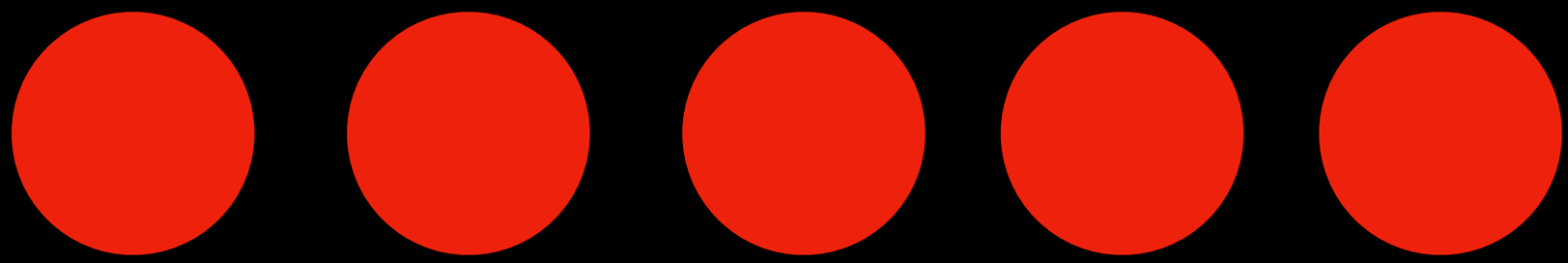
At most 2 red dots.

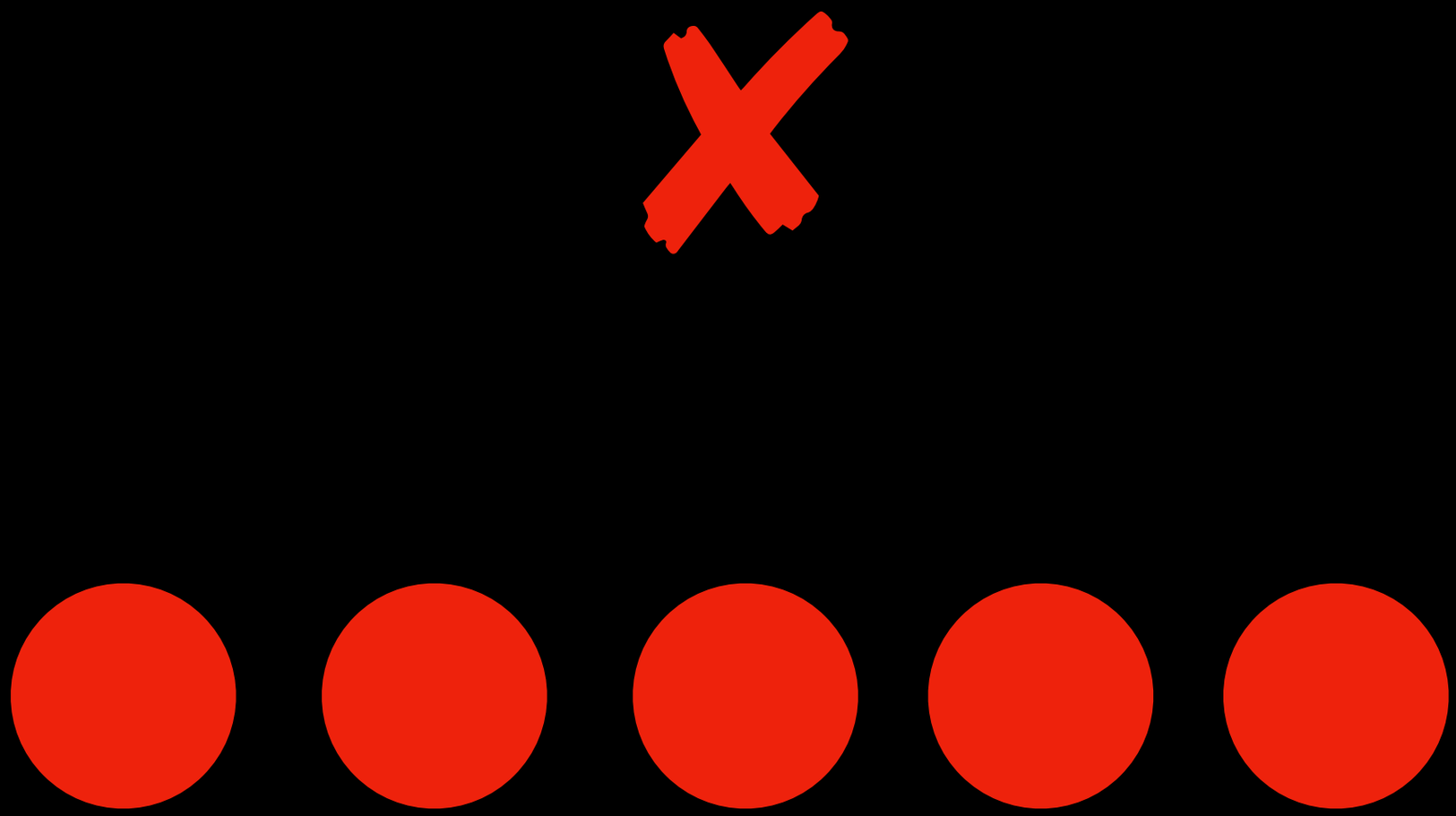


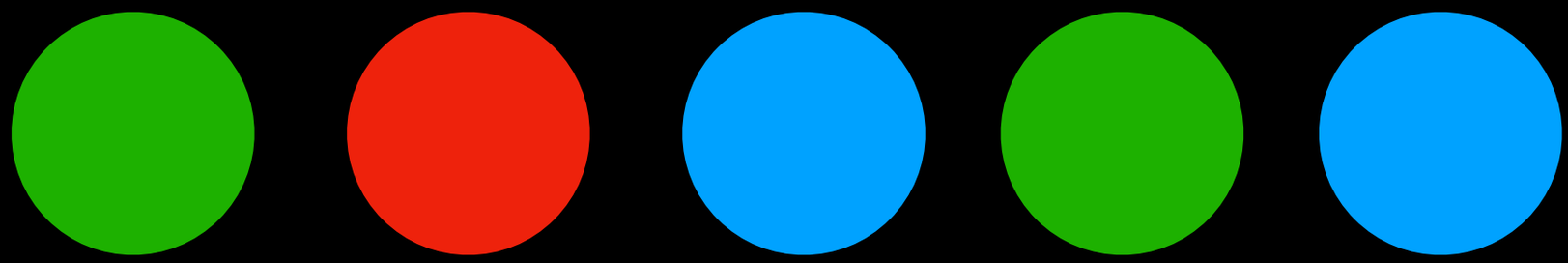


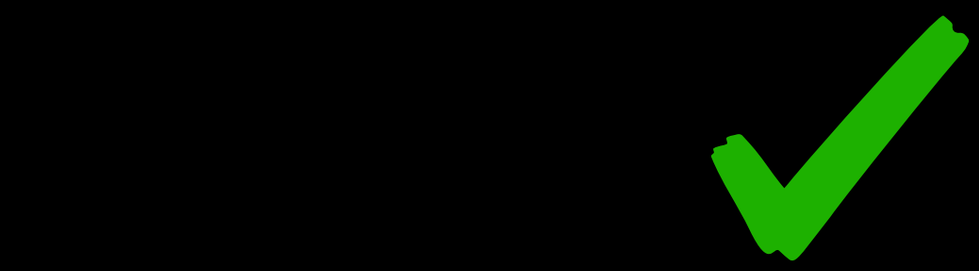


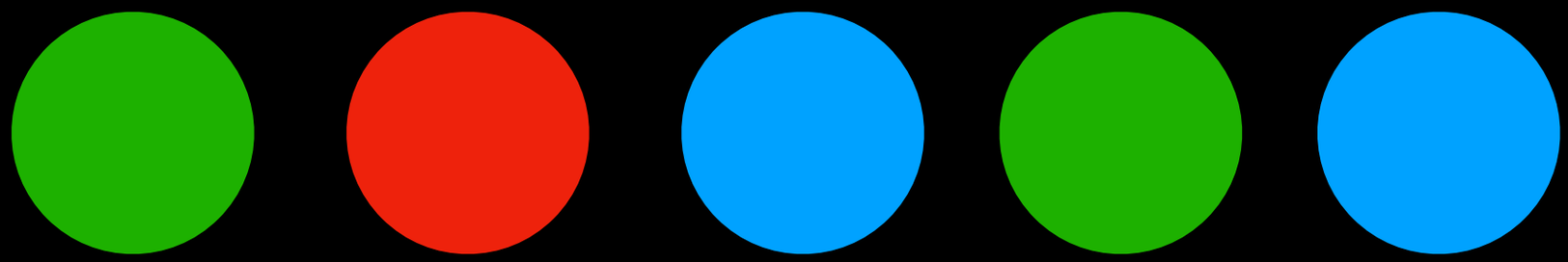


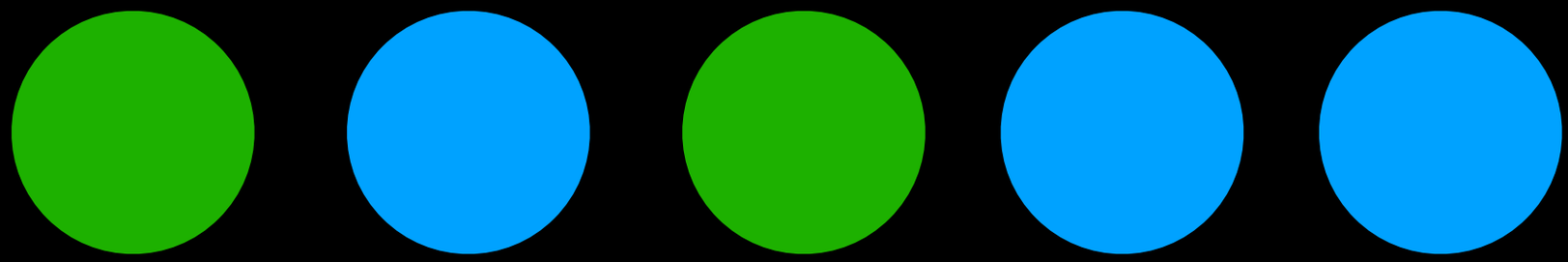


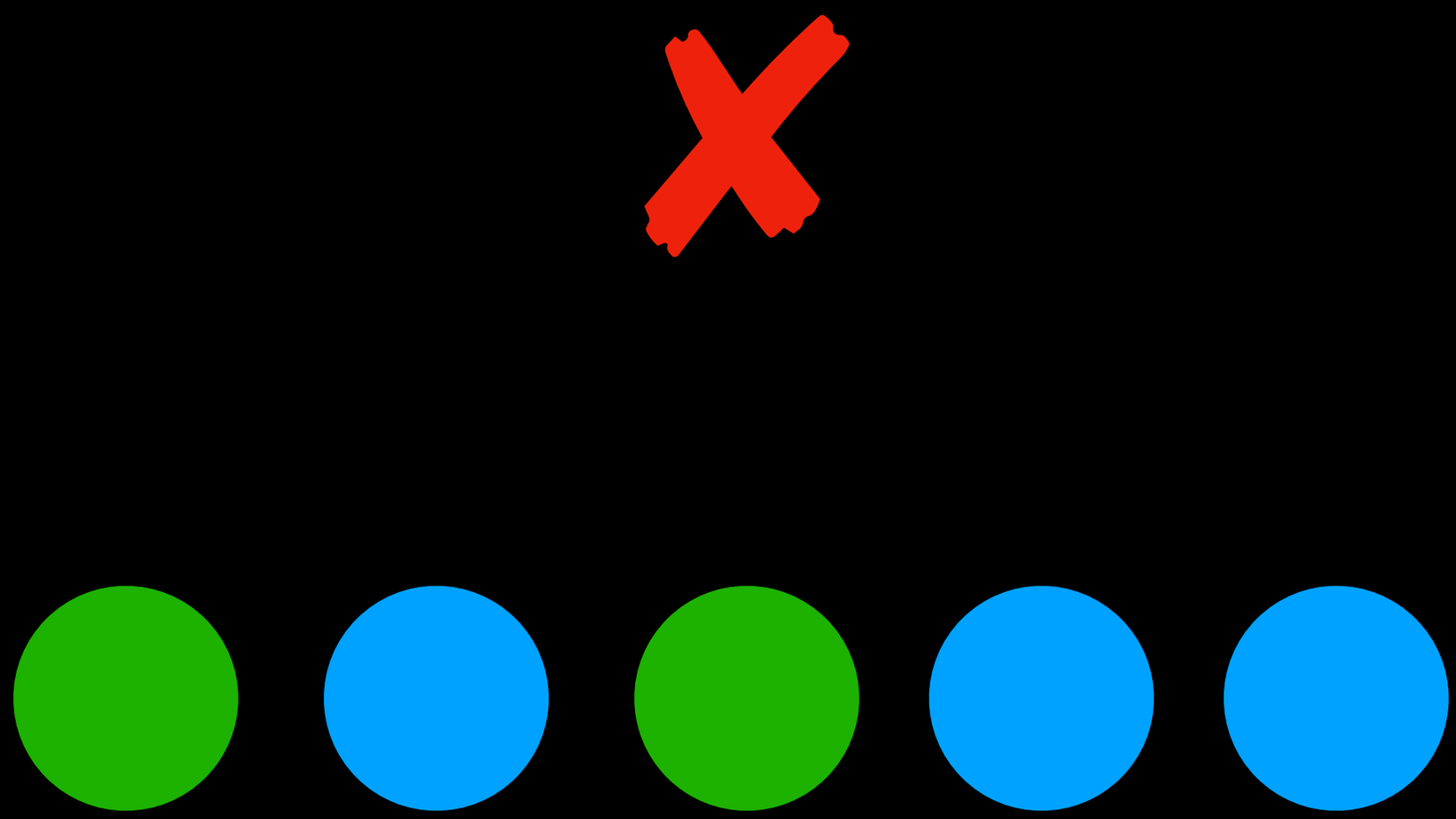


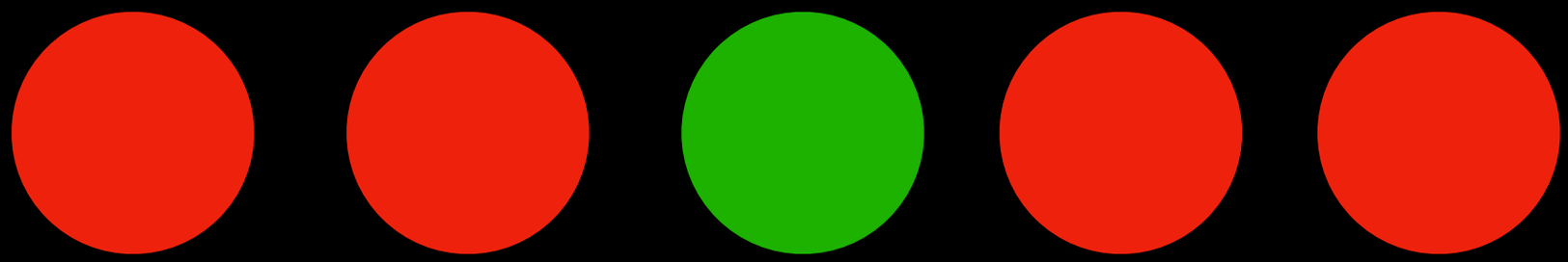










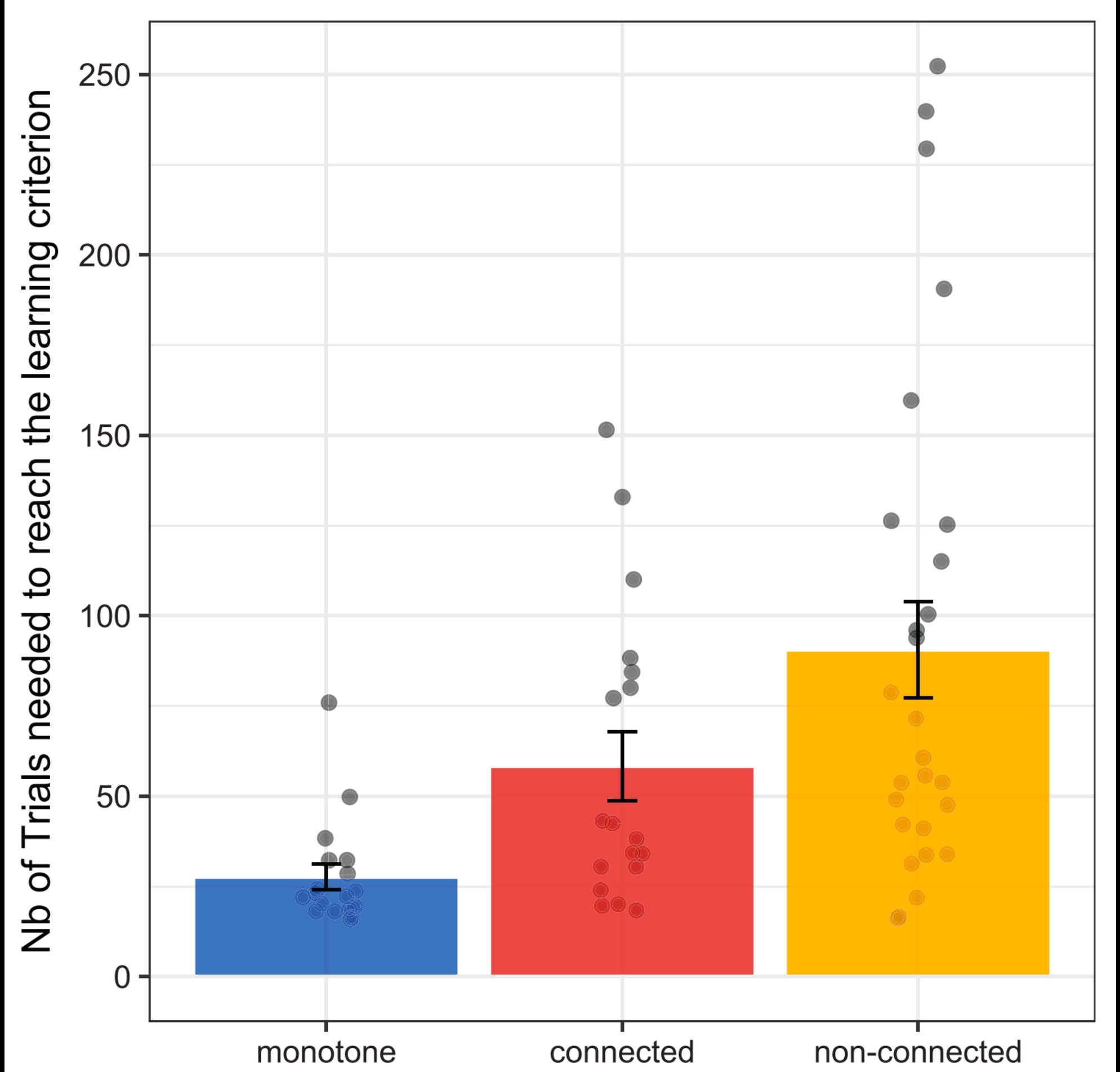


1, 2, or 4 red dots.

Learnability Prediction

monotone < connected < non-connected

Condition	Rules
Monotone	"There are 0, 1, or 2 red circles."
	"There are 3, 4, or 5 red circles."
Connected	"There are 1, 2, or 3 red circles."
	"There are 2, 3, or 4 red circles."
Non-connected	"There are 0, 1, or 5 red circles."
	"There are 0, 4, or 5 red circles."
	"There are 1, 2, or 4 red circles."


Nb of Trials needed to reach the learning criterion
250
200
150
100
50
0
monotone
connected
non-connected

Subtleties

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- Only monotone vs. non-connected was significant

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- “0, 4, or 5” and “0, 1, or 5” much faster than “1, 2, or 4”

Subtleties

- Only monotone vs. non-connected was significant
- “0, 4, or 5” and “0, 1, or 5” much faster than “1, 2, or 4”
- Connected re-coded as zero, one, or both (rule and negation) *is* then significantly different

Dynamic Analysis

- Odds of saying “yes” to *n* red dots, if already said “yes” to *n-1* and *n+1* in the same block significantly higher than if for only one or for neither.

- (even controlling for whether the actual rule is connected)

“The grand goal is to find a list of properties which are, in some sense, double universals: universals across languages, but also across word types….”

Constraints on the lexicons of human languages have cognitive roots present in baboons (*Papio papio*)

Emmanuel Chemla[a], Isabelle Dautriche[b,c,d], Brian Buccola[a,1,2], and Joël Fagot[c,d]

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Edited by Barbara H. Partee, University of Massachusetts Amherst, Amherst, MA, and approved June 14, 2019 (received for review April 24, 2019)

Using a pattern extraction task, we show that baboons, like humans, have a learning bias that helps them discover connected patterns more easily than disconnected ones—i.e., they favor rules like "contains between 40% and 80% red" over rules like "contains around 30% red or 100% red." The task was made as similar as possible to a task previously run on humans, which was argued to reveal a bias that is responsible for shaping the lexicons of human languages, both content words (nouns and adjectives) and logical words (quantifiers). The current baboon result thus suggests that the cognitive roots responsible for regularities across the content and logical lexicons of human languages are present in a similar form in other species.

connectedness | human languages and their lexicons | primate semantics

Humans and animals categorize objects in the world into

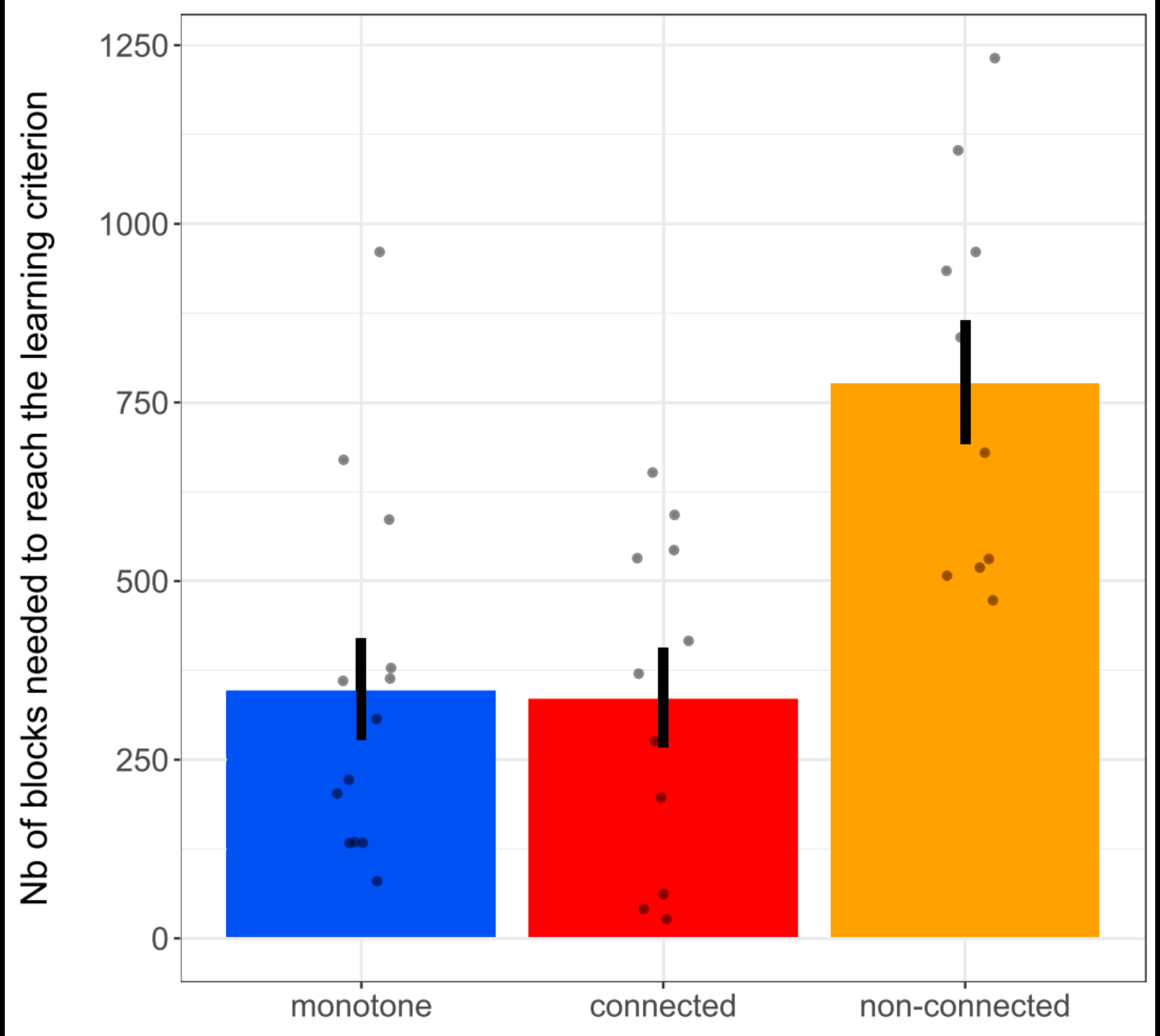
show that humans have corresponding learning biases favoring connected quantifiers, as evidenced by performance on rule learning, or pattern extraction, tasks: It is easier to discover connected rules than nonconnected ones, and easier still to discover monotone ones.

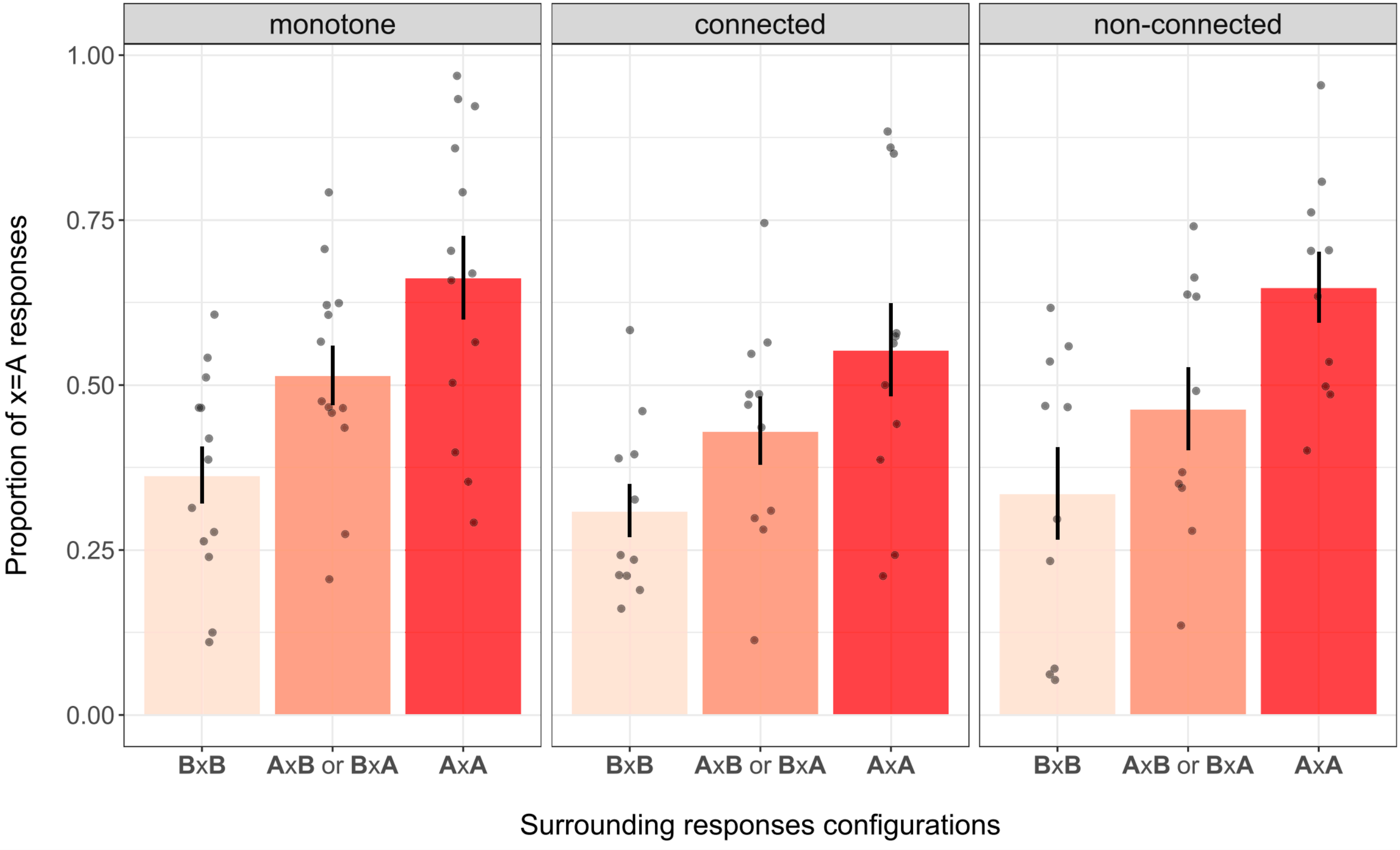
A natural hypothesis is that the source of the regularity of the world's lexicons, for both content and logical words, is a learning bias for connectedness. Indeed, Chemla et al. (4) argue that their experimental results with humans support this

Significance

Universals in language are hard to come by, yet one candidate is that words across the lexicons of the world's languages are, by and large, connected: When a word applies to two

	Displays						Response buttons	
	0%	20%	40%	60%	80%	100%	(comparison stimuli)	
Set 1							0	7
Set 2							1	8
Set 3							3	4


Nb of blocks needed to reach the learning criterion
1250
1000
750
500
250
0
monotone
connected
non-connected

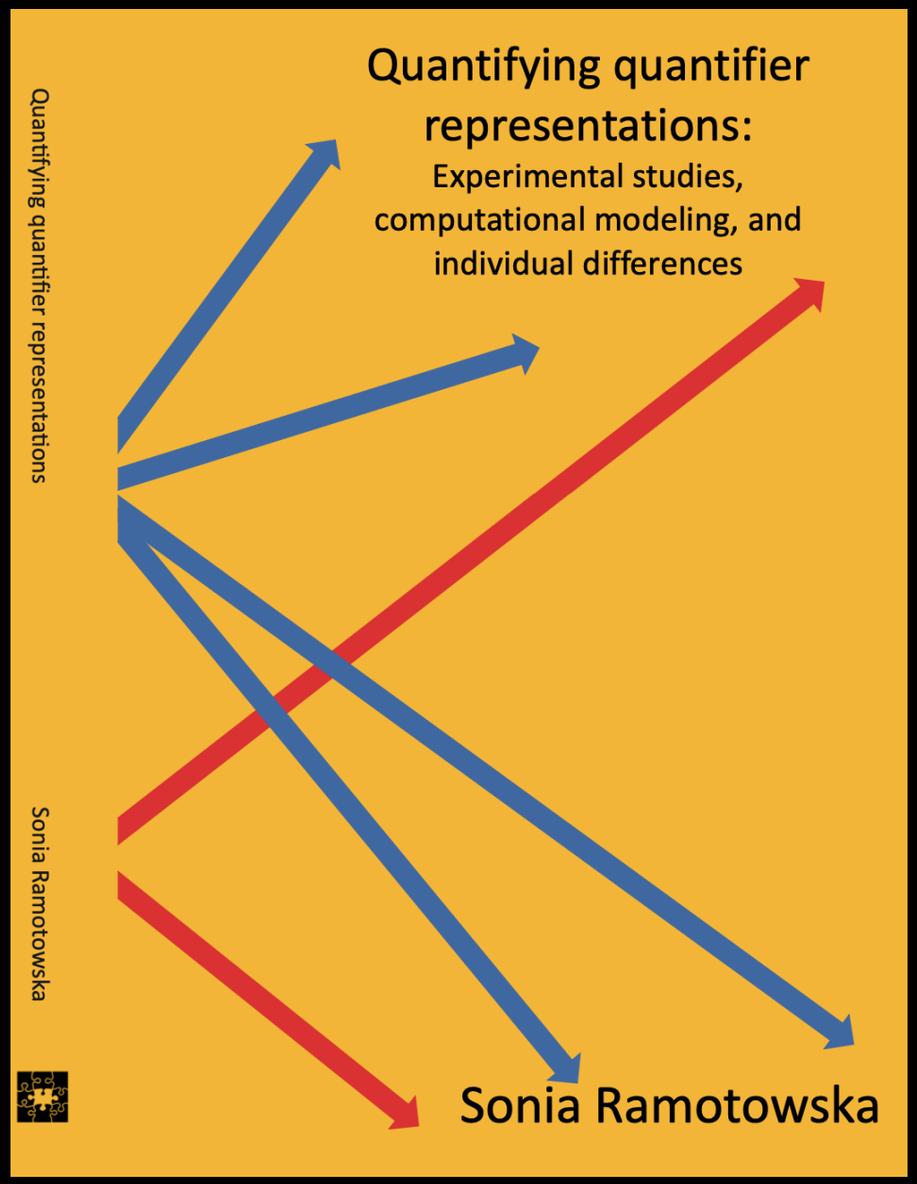

monotone
connected
non-connected
1.00
0.75
0.50
0.25
0.00
Proportion of x=A responses
BxB
AxB or BxA
AxA
Surrounding responses configurations

“The connectedness constraint is thus active in [humans and baboons] in a form that can explain how the referential and functional lexicons of human languages are shaped.”

Discussion

- Very small-scale
- No linguistic prompt (e.g. “gleeb of the dots are red”)
- Connectedness vs. monotonicity?

Large Scale Learnability Experiment

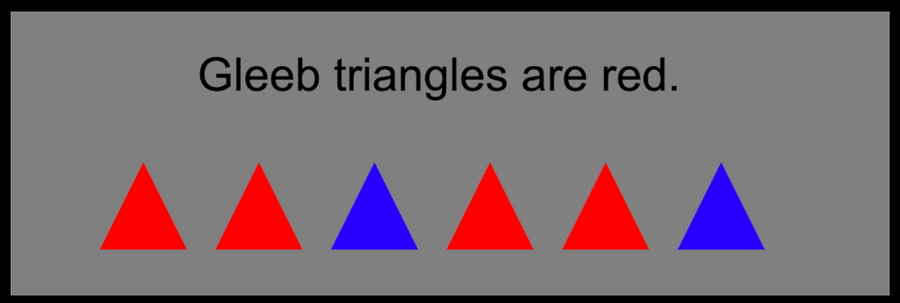


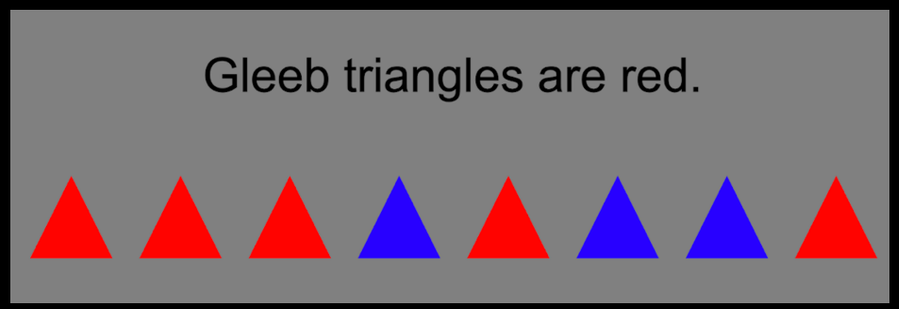
Tested Quantifiers

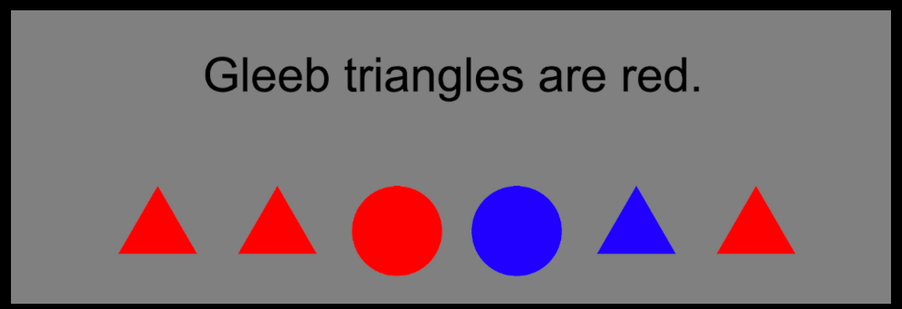
- at least 3 & at most 2 vs. between 3 and 6 & at most 2 or at least 7
- between 3 and 6 vs. at most 2 or at least 7
- at least 3 & at most 3 vs. first and the last 3
- not all vs. not only

Design

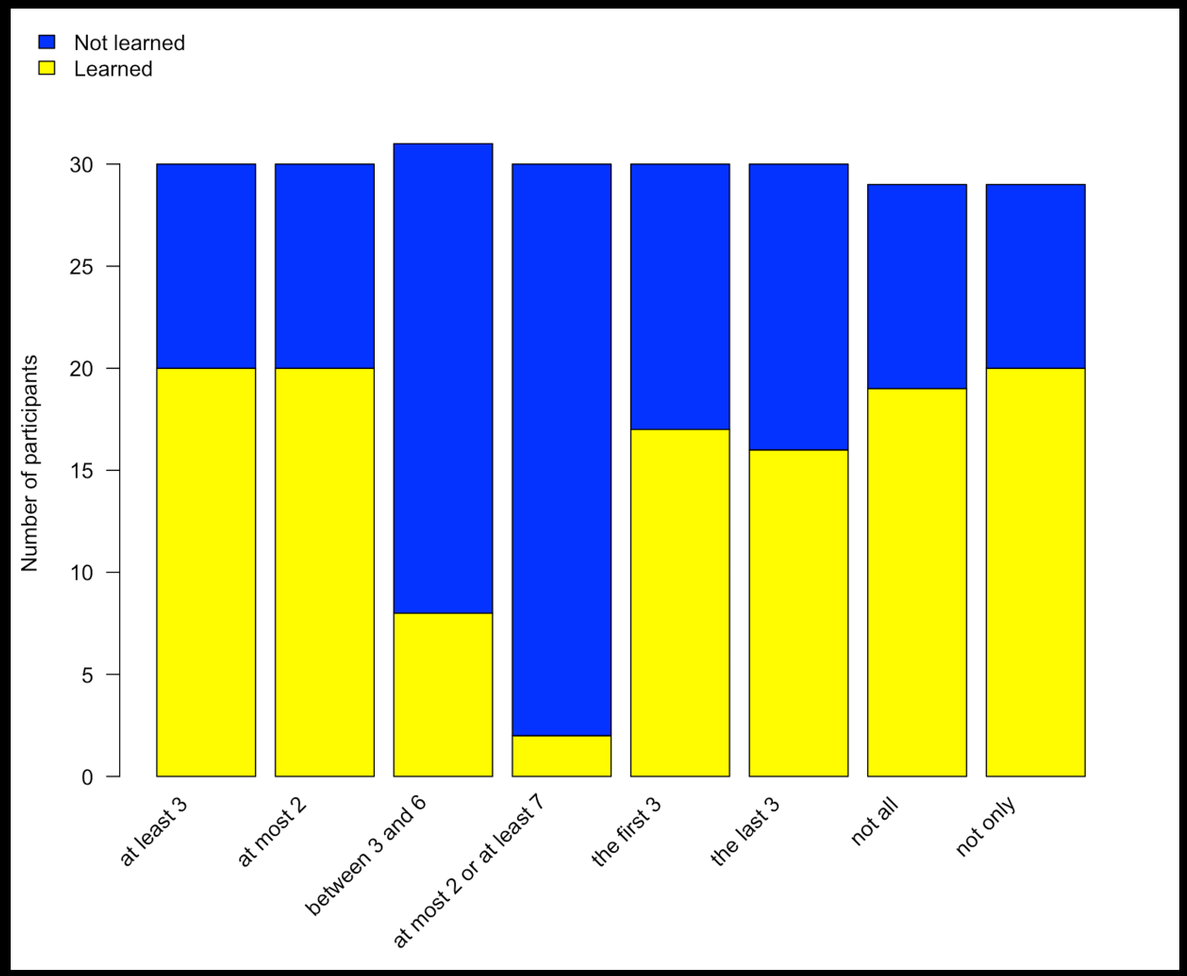
- ~30 participants for each quantifier (H&L:10, S&dV:9)
- 96 trials, 8 implicit blocks for 12 trials.





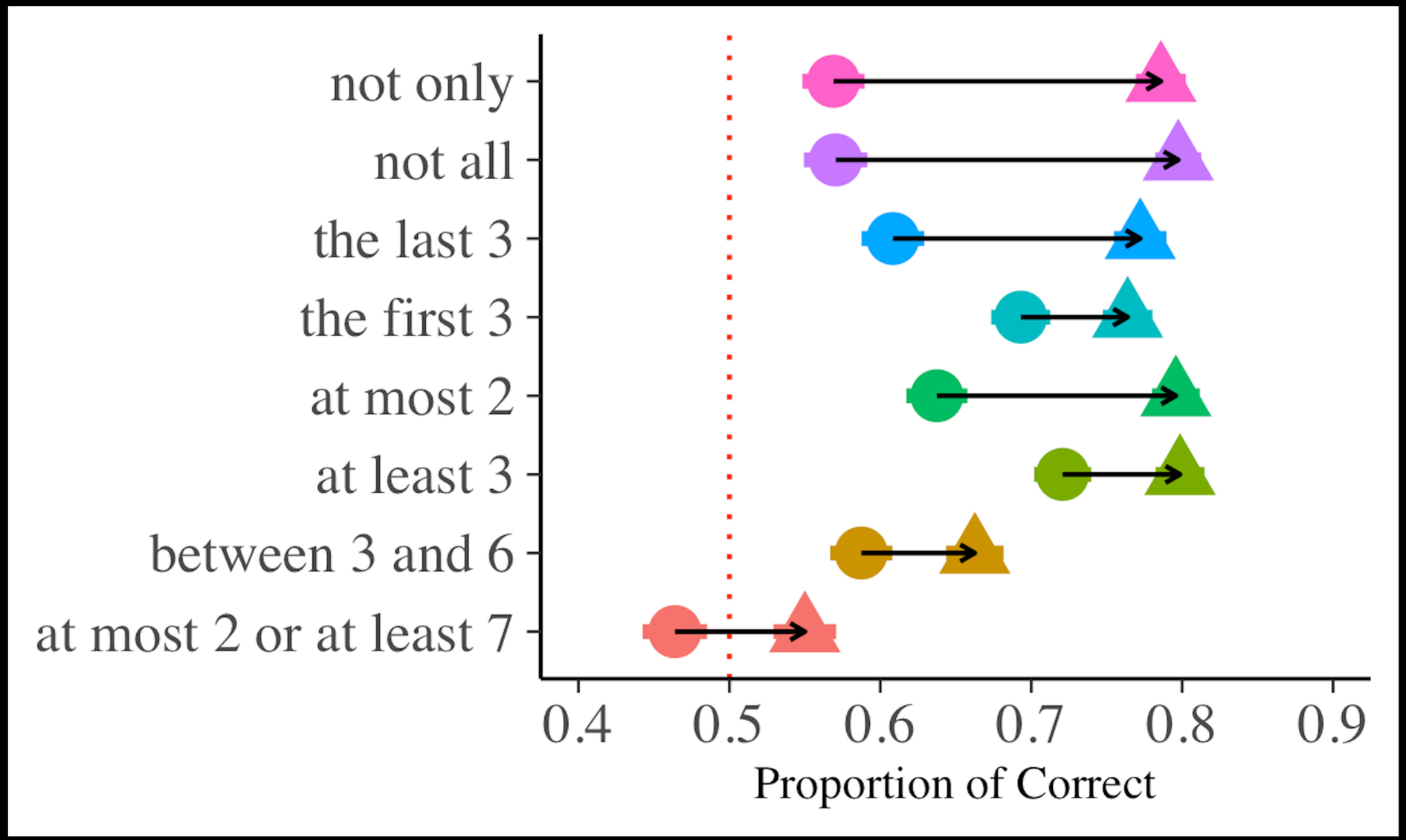


#participants performing above chance in the last block



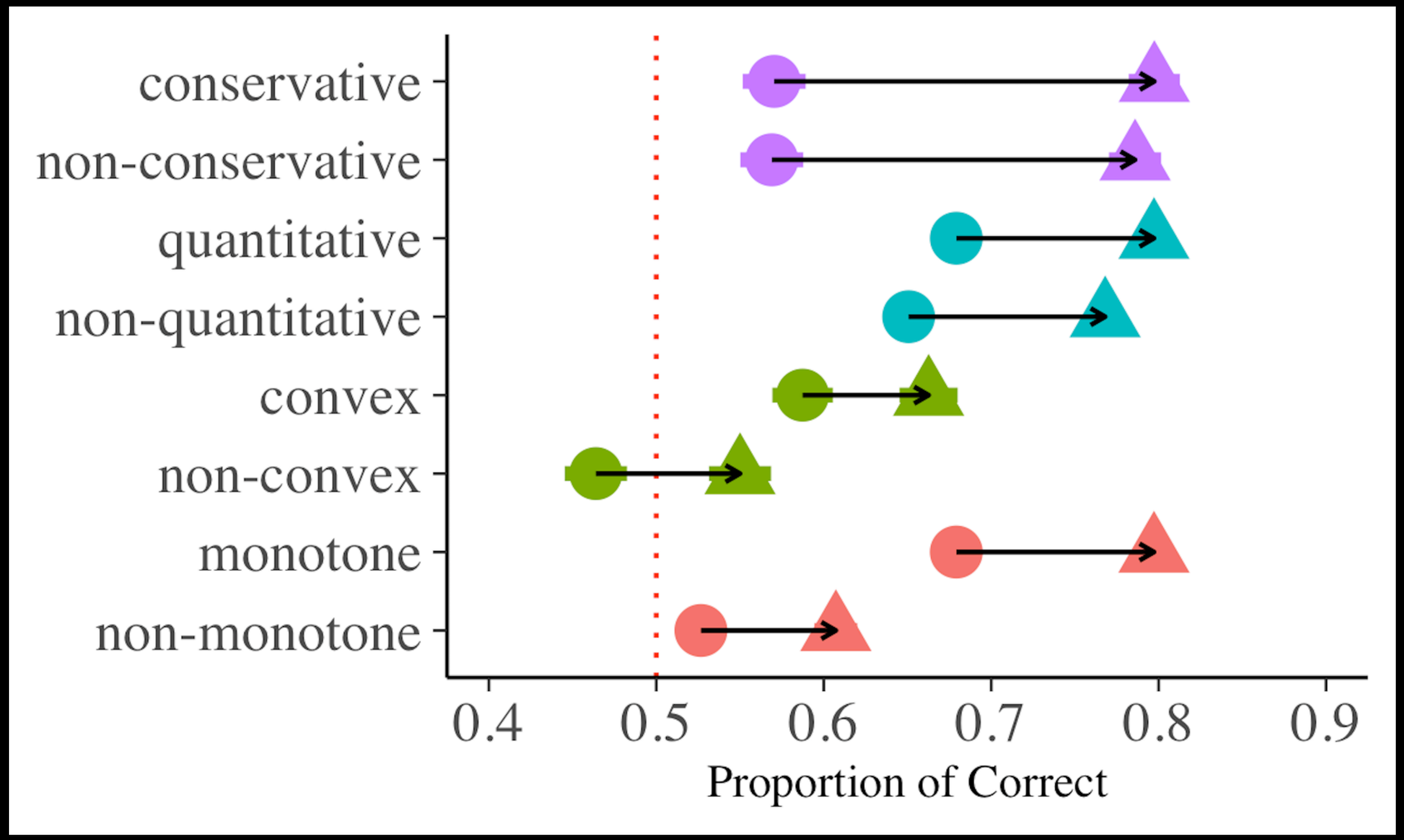
Ramotowska, van Maanen, Szymanik, 2022

Mean accuracies in the first 25% and the last 25% of the trials for each quantifier



Ramotowska, van Leendert, Szymanik, 2022

Mean accuracies in the first 25% and the last 25% of the trials for each universal



Ramotowska, van Maanen, Szymanik, 2022