Cognition

PSYC 2040

W13: Culture

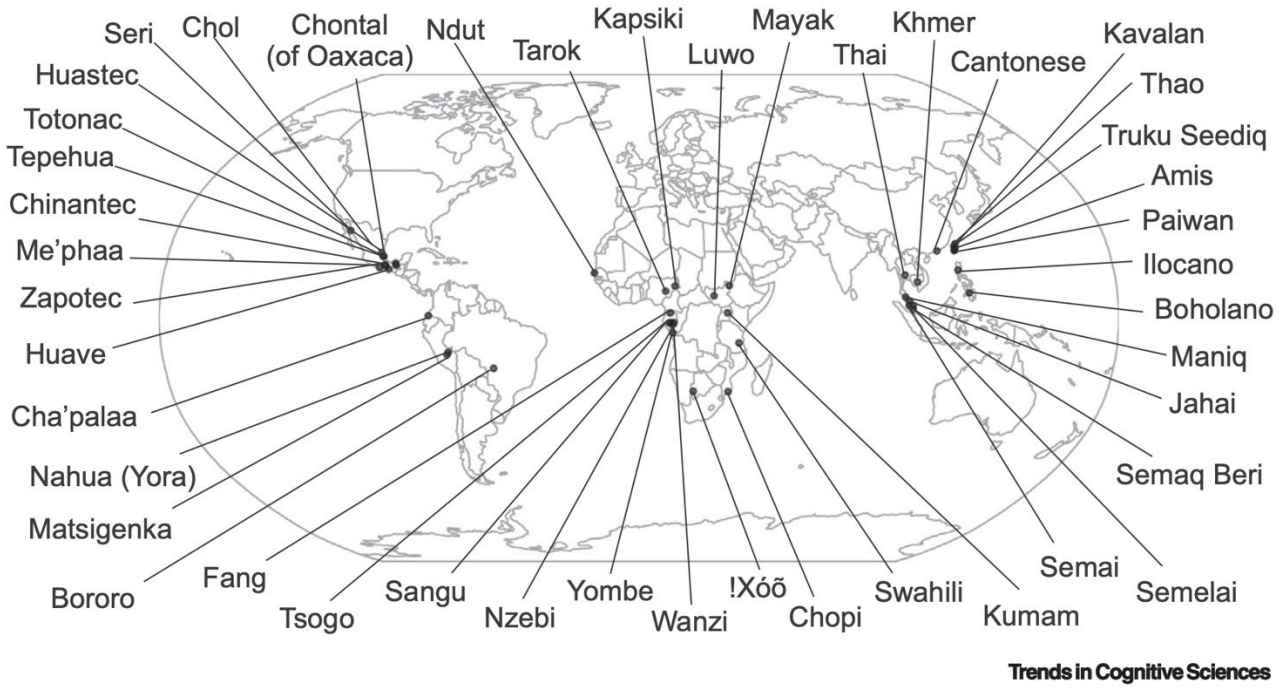
Part 2

today’s agenda

- *some* universals
- wisdom of crowds
- collective intelligence

culture & olfaction

- wide differences in how many smells we can recognize and label
- why?
  - ecology
  - culture
  - genes



paper

culture & olfaction

- wide differences in how many smells we can recognize and label
- why?
  - ecology
  - culture
  - genes

Table 1
Jahai odor and color terms. A list of the Jahai odor terms are given. Not all of these were attested in the experimental task. The color terms listed were dominant for at least one color chip in the color naming task, unless otherwise indicated. Glosses are based on a separate focal color elicitation task.

Odor terms	Approximate translation	Color terms	Approximate translation
cŋəs	'to smell edible, tasty' e.g., cooked food, sweets	*byɔk*	'to be white' (not a dominant response)
crŋir	'to smell roasted' e.g., roasted food	*gcĩh*	'to be black'
harɨm	'to be fragrant' e.g., various species of flowers, perfumes, soap (Malay loan; original Malay meaning 'fragrant')	*rhɨk*	'to be red'
ltpɨt	'to be fragrant' e.g., various flowers, perfumes, bearcat	*rgɔy*	'to be red'
haʔɛ̃t	'to stink' e.g., feces, rotten meat, prawn paste	*bkup*	'to be beige'
pʔus	'to be musty' e.g., old dwellings, mushrooms, stale food	*puteh*	'to be white' (Malay loan; original Malay meaning 'white')
cŋɛs	'to have a stinging smell' e.g., petrol, smoke, bat droppings	*merah*	'to be red' (Malay loan; original Malay meaning 'red')
sʔɪŋ	'to have a smell of human urine' e.g., human urine, village ground	*klabuʔ*	'to be grey' (Malay loan; original Malay meaning 'grey, ash-colored')
haɲcĩŋ	'to have a urine-like smell' e.g., urine (Malay loan; original Malay meaning 'foul odor, stench')	*hijɔw*	'to be grue' (Malay loan; original Malay meaning 'green')
pʔih	'to have a blood/fish/meat-like smell' e.g., blood, raw fish, raw meat	*biruh*	'to be blue' (Malay loan; original Malay meaning 'blue')
plʔeŋ	'to have a blood/fish/meat-like smell' e.g., blood, raw fish, raw meat	*meloh*	'to be brown' (Malay loan; source-based term; original Malay meaning 'milo-colored', 'brown')
plʔɛŋ	'to have a bloody smell which attracts tigers' e.g., crushed head lice, squirrel blood	*kuniŋ*	'to be yellow' (Malay loan; original Malay meaning 'yellow')

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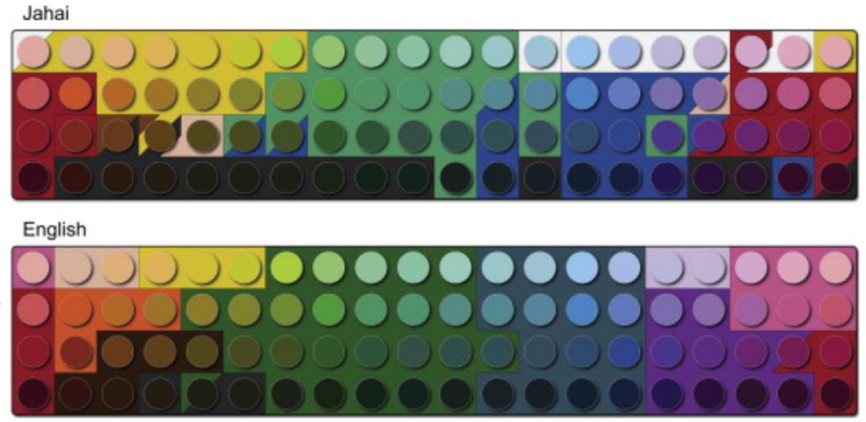
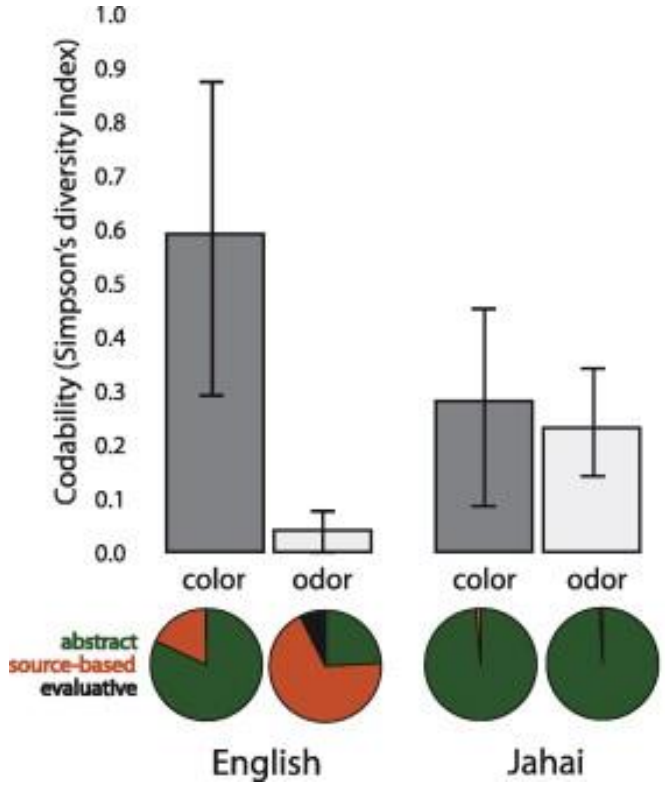
culture & olfaction



- English and Jahai (nomadic hunter-gatherers in the Malaysian & Thai peninsula) people
- English speakers show poor codability (an index of expressibility) for odors in comparison to color
- Jahai speakers show equal codability for odors and colors, using abstract terms for both



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some universals

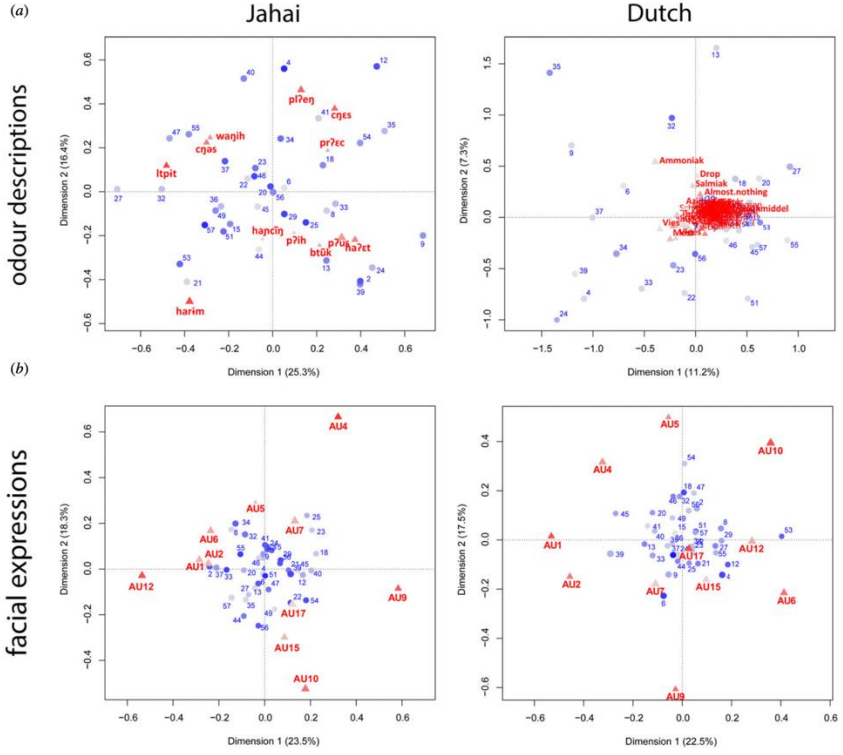
- pleasantness of odors
- groupings of stars in constellations
- language networks

culture & olfaction

- despite differences in naming and identification of odors, whether or not an odor is pleasant is a universal experience

Table 2. Action units (AUs) coded for facial expressions, their brief description, and correlation values (Pearson *r*) across odorants between Jahai and Dutch participants (with *p* one-tailed; $df = 35$).

action unit	description	r	p
AUs associated with pleasant emotions			
AU1	inner brow raise	0.033	0.423
AU2	outer brow raise	−0.087	0.305
AU6	cheek raise	0.295	0.038
AU12	lip corner pull	0.360	0.014
AU17	chin raise	0.234	0.082
AUs associated with unpleasant emotions			
AU4	brow lower	0.461	0.002
AU7	lid tight	0.520	0.000
AU9	nose wrinkle	0.292	0.040
AU10	upper lip raise	0.290	0.041
AU15	lip corner depress	0.105	0.268
AU5	upper lid raise	−0.045	0.396



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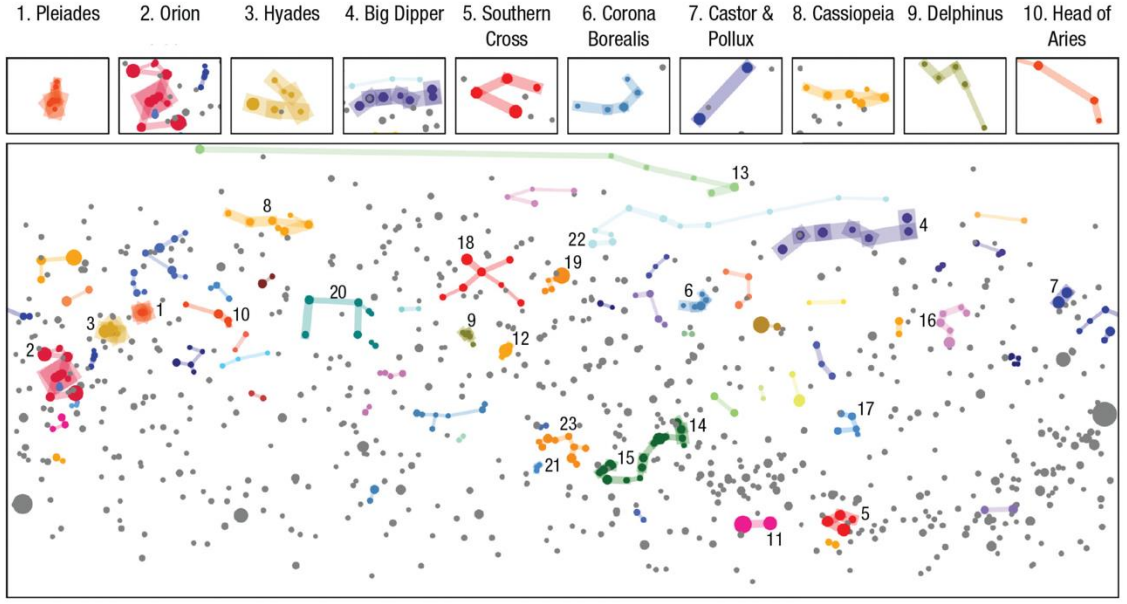
constellations and culture

- groupings of stars from 27 cultures
- perceptual properties such as brightness and proximity account for many of the groupings
- while constellations have different names and stories across cultures, basic perceptual processes seem to guide what is defined as a constellation



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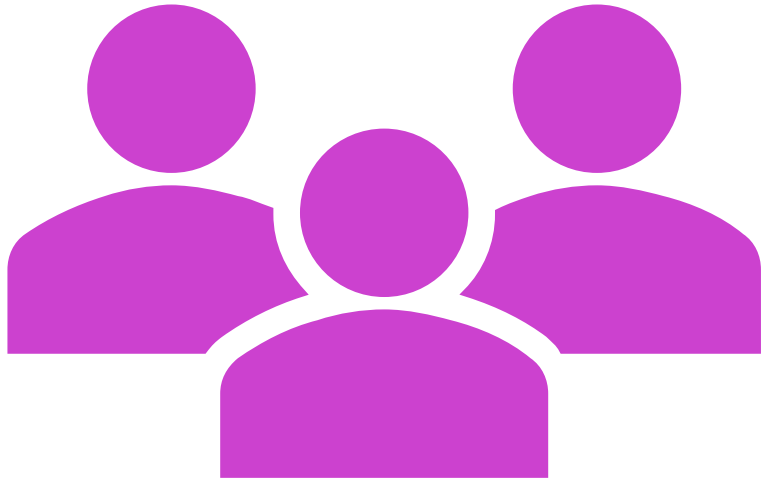
culture & language networks

- topography of the language network in speakers of 45 languages is similar, and the variability observed is similar to the variability that has been reported for the speakers of the same language

paper

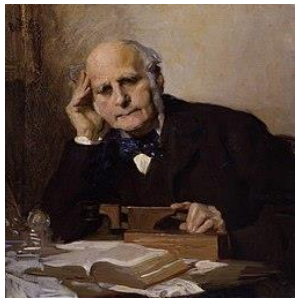
wisdom of crowds

- “group decisions based on aggregated information can be more accurate than solo decisions made by the best individuals”
- why?



wisdom of crowds: examples

- Galton’s ox competition
- Who wants to be a millionaire
  - phone a friend
  - ask the audience
- Wikipedia / Reddit



SCIENCE ADVANCES | RESEARCH ARTICLE

SOCIAL SCIENCES

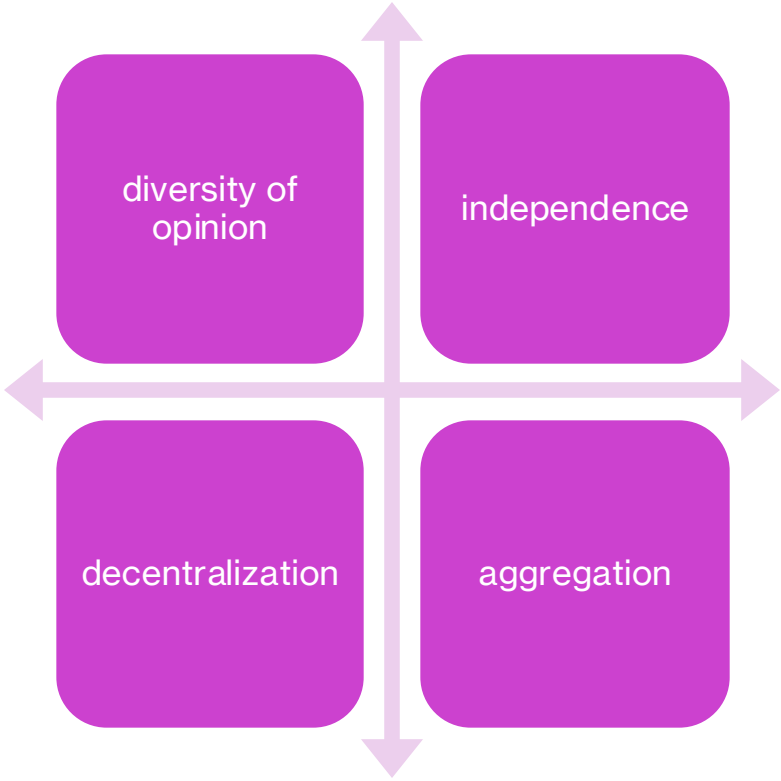
Scaling up fact-checking using the wisdom of crowds

Jennifer Allen[1†], Antonio A. Arechar[1,2,3†], Gordon Pennycook[4], David G. Rand[1,5,6*]

Professional fact-checking, a prominent approach to combating misinformation, does not scale easily. Furthermore, some distrust fact-checkers because of alleged liberal bias. We explore a solution to these problems: using politically balanced groups of laypeople to identify misinformation at scale. Examining 207 news articles flagged for fact-checking by Facebook algorithms, we compare accuracy ratings of three professional fact-checkers who researched each article to those of 1128 Americans from Amazon Mechanical Turk who rated each article's headline and lede. The average ratings of small, politically balanced crowds of laypeople (i) correlate with the average fact-checker ratings as well as the fact-checkers' ratings correlate with each other and (ii) predict whether the majority of fact-checkers rated a headline as "true" with high accuracy. Furthermore, cognitive reflection, political knowledge, and Democratic Party preference are positively related to agreement with fact-checkers, and identifying each headline's publisher leads to a small increase in agreement with fact-checkers.

wisdom of crowds: conditions

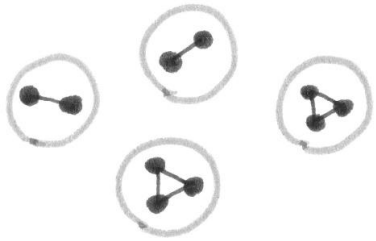
- why are these conditions important?
- what are the consequences of violating these conditions?



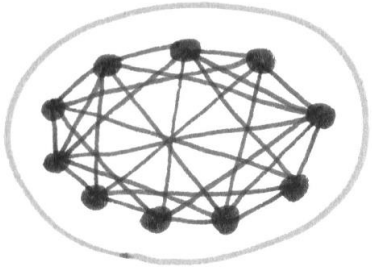
wisdom of crowds: conditions

"Unity without uniformity". "Diversity without division". "E Pluribus Unum: out of many, one".
No matter how it's phrased, people across times and cultures often arrive at the same piece of wisdom: **a healthy society needs a sweet spot of bonds *within* groups and bridges *between* groups.** That is:

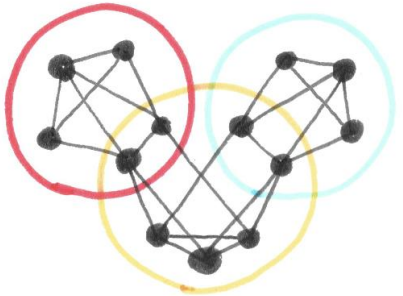
Not this...
(because ideas can't spread)



nor this...
(because you'll get groupthink)



...but *THIS:*



Network scientists now have a mathematical definition for this ancient wisdom: the **small world network** * . This optimal mix of bonding+bridging describes how our neurons are connected *, fosters collective creativity * and problem-solving *, and even once helped US President John F. Kennedy (barely) avoid nuclear war! * So, yeah, small worlds are a big deal.

ok, let's wrap this up... →

collective intelligence: a human hallmark?

- cumulative cultural evolution (CCE)
  - “the accumulation of increasingly effective modifications without reverting back to prior, less effective states” (Mesoudi & Thornton, 2018)
  - “culturally transmitted behaviors that no single human individual could invent on their own” (Boyd & Richardson, 1996, p.80)
- ratchet effect: some individual or group of individuals first invented a primitive version of [an] artifact or practice, and then some later user or users made a modification, an ‘improvement,’ that others then adopted perhaps without change for many generations, at which point some other individual or group of individuals made another modification, which was then learned and used by others, and so on over historical time in what has sometimes been dubbed ‘the ratchet effect’ (Tomasello, 1999, p. 5).

CCE: core criteria (Mesoudi & Thornton, 2018)

innovation	social learning	improvement	repeated improvement
• a change in behavior	• the transfer of modified behavior via social learning	• the learned behavior causes an improvement in performance	• sequential improvement over time

paper

CCE human evidence: planes & towers

- Caldwell & Millen, 2008
- participants completed simple tasks in “microsocieties” (a paper plane and spaghetti tower)
- staggered procedure with observation and building
- feedback from each “chain” was provided to the next chain

2.3. Procedure

Participants were randomly assigned to the positions 1 to 10 in each chain. The participants were informed that they were about to take part in a team challenge and that they would be called in turn to engage in the task. In order to simulate generational succession, the participants' start times were staggered, such that every 2.5 min, a new person entered the group (see Table 1 for information on group composition at any given time). While they were in the test group, each participant had 5 min of observation time, during which they could watch the previous participants building their artefact, followed by 5 min of building time, during which they had to construct their own artefact. Once their time was up, they left the test group. The staggered start and finish times had the effect that, at any given time (except at the very start and very end of any given chain), there were four individuals together in the group, two of whom were observing and two of whom were actually engaged in the task (see Table 1). So, for example, a chain would begin with Participant 1 building their artefact, with Participants 2 and 3 observing. Then, 2.5 min after, Participant 2 would also start building, and Participant 4 would join the group as an observer. The aim was to simulate a miniaturised society, in which one generation would have the opportunity to interact with and observe individuals from the previous two generations, but not those further back. However, we did retain all artefacts for inspection by later participants to reflect the more permanent record generated by material culture.

paper

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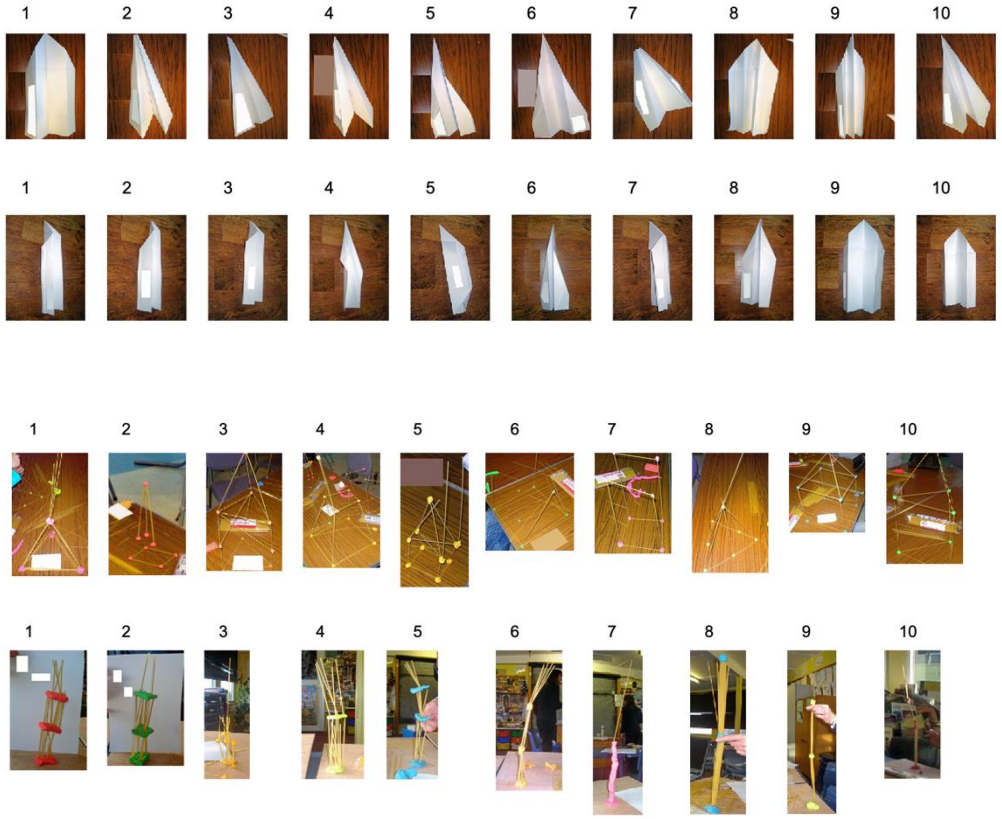

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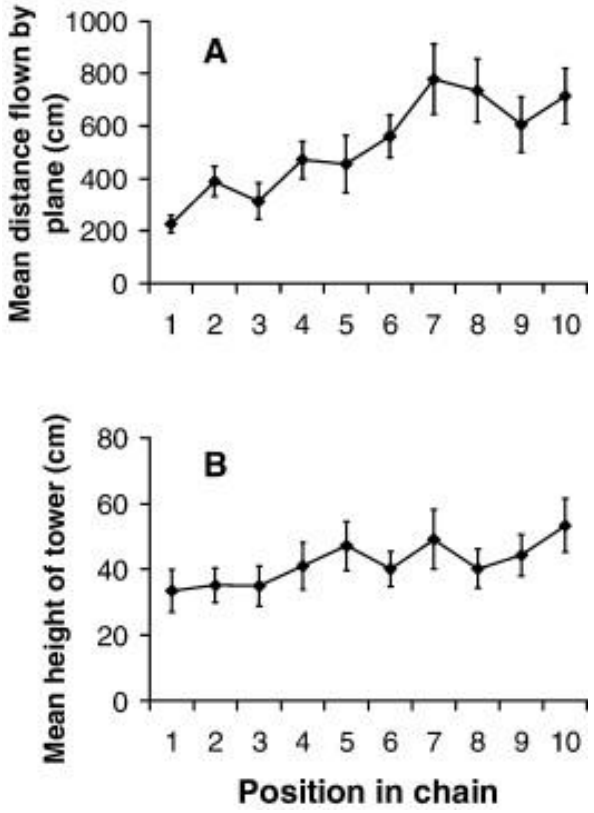

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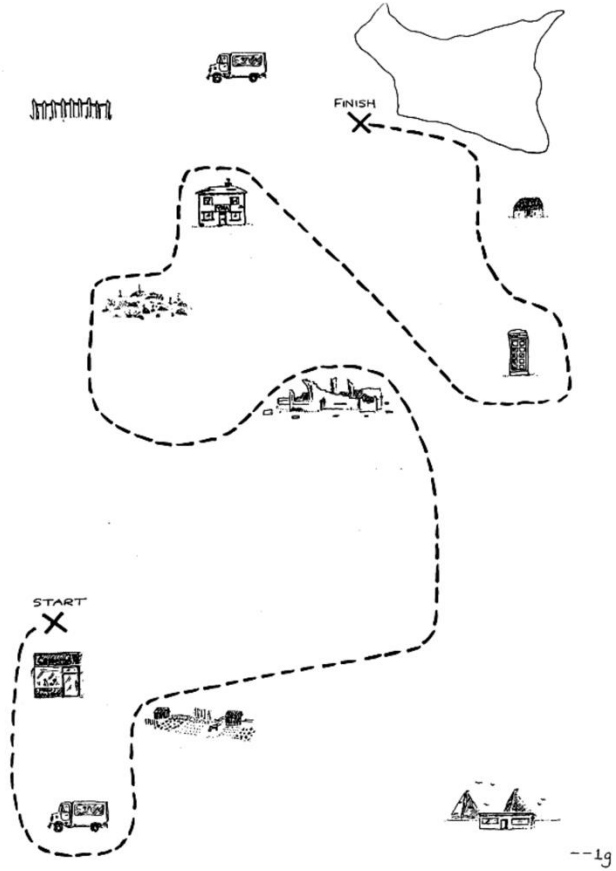
CCE human evidence: language game

- Fay et al. 2018
- language game: communicate map route to the next participant
- 8-person (or generation) transmission chains
- two conditions
  - social coordination: Instruction-Follower could directly interact with the Instruction-Giver
  - observation: instruction-Followers could observe the route descriptions from the Instruction-Giver, but they could not respond to or question the Instruction-Giver



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CCE human evidence: language game

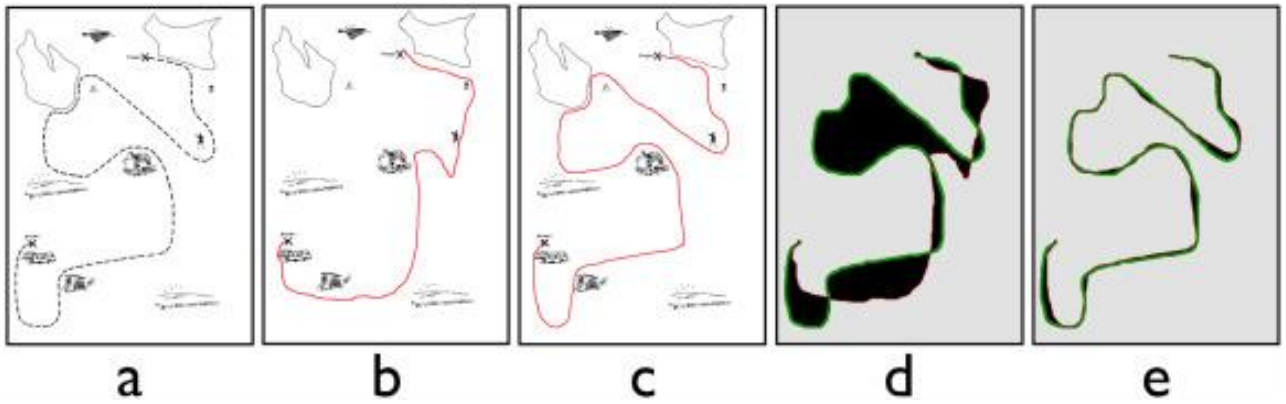
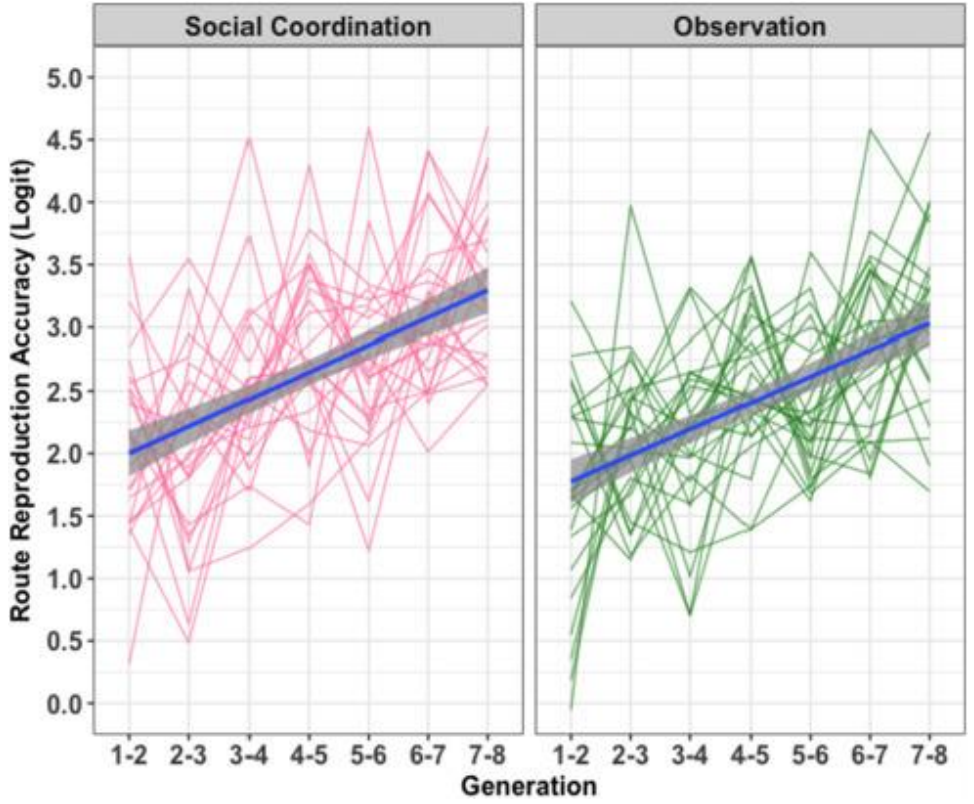


Fig. 1. Example Instruction-Giver map (Panel a) and the reproduced route by an Instruction-Follower at Generation 1–2 (Panel b) and at Generation 7–8 (Panel c) across two separate transmission chains (from the Observation condition). The Instruction-Follower's reproduced route (in red) was superimposed onto the Instruction-Giver's route (transformed to a solid green line). The deviation score (in pixels) was calculated (black area) and subtracted from the total number of pixels to give a route reproduction accuracy score (grey area; see Panel d and e). A lower deviation score returned a higher accuracy score (expressed as a fraction of total pixels). In this example, route reproduction accuracy was higher at Generation 7–8 (Panel e) than at Generation 1–2 (Panel d). The stimuli in Fig. 1, and in Supplementary materials 1, were downloaded from the HCRC website (http://groups.inf.ed.ac.uk/maptask/index.html ↗). They were modified for our study and are reproduced here under a creative commons license (https://creativecommons.org/licenses/by-nc-sa/2.5/ ↗).

paper

CCE human evidence: language game

- routes were reproduced with higher accuracy across the experimental generations in both conditions
- route reproduction accuracy was higher in the Social Coordination condition compared to the Observation condition



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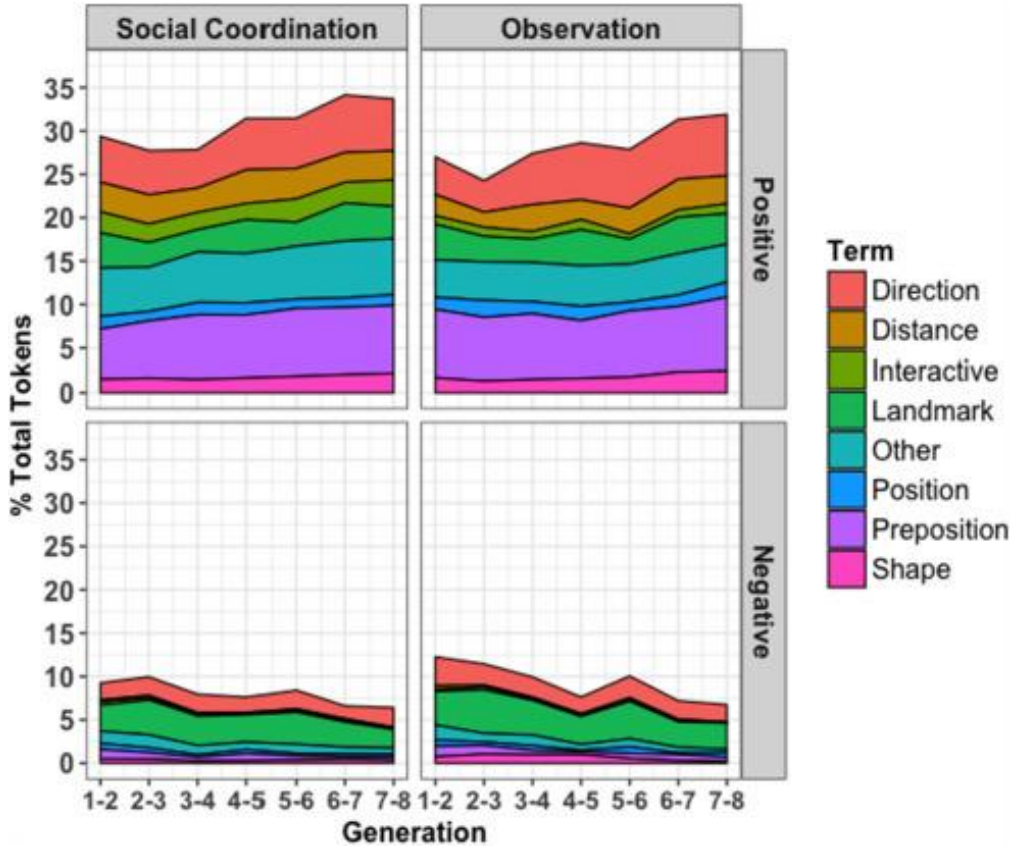
CCE human evidence: language game

- measured whether the terms used were positively associated with task performance
- higher density of positively-biased terms in the Social Coordination condition and a lower density of negatively-biased terms



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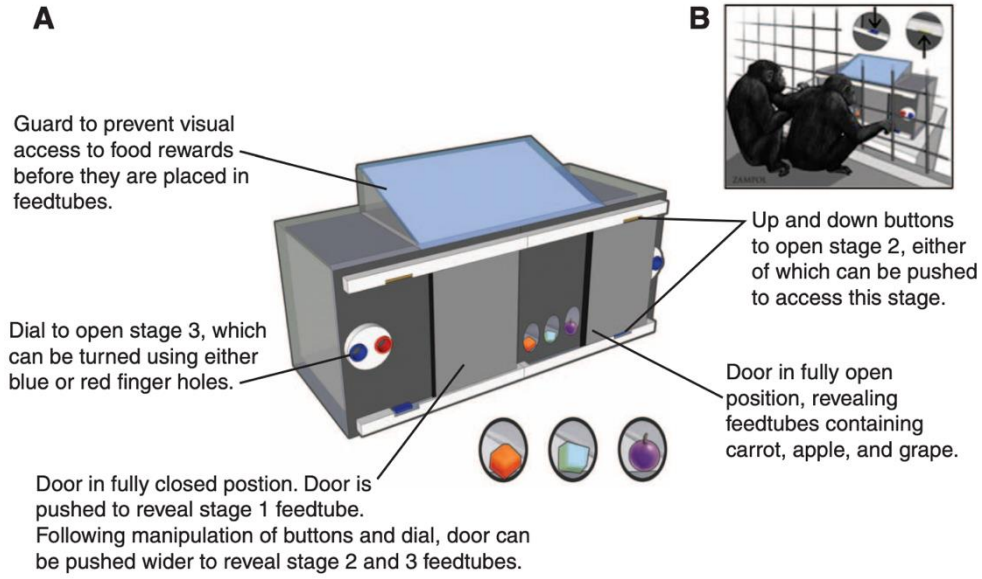
CCE in non-human animals: chimps

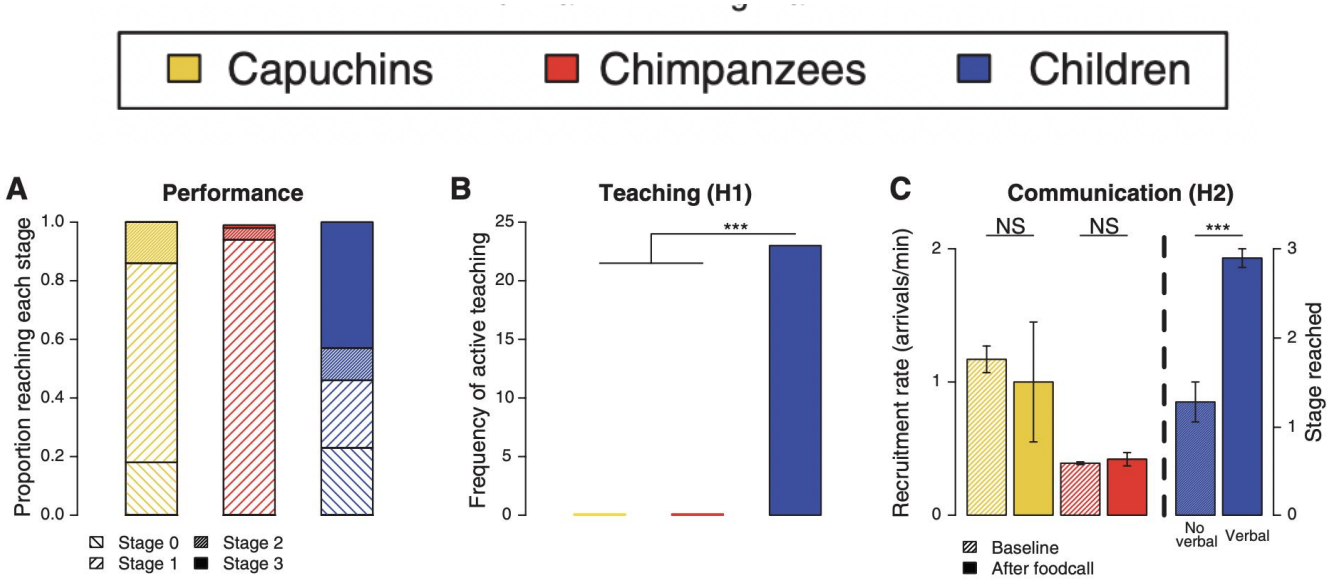
- Dean et al. (2012) tested children, chimpanzees, and capuchins on a three-stage puzzle box with increasingly higher rewards



paper

CCE in non-human animals: chimps

- "After 30 hours of presentation of the task to each of four chimpanzee groups, only 1 of 33 individuals reached stage 3, with a further 4 having reached stage 2, and with each group having witnessed multiple solvers at stage 1"
- "The success of the children, but not of the chimpanzees or capuchins, in reaching higher-level solutions was strongly associated with a package of sociocognitive processes – including teaching through verbal instruction, imitation, and prosociality" (Dean et al., 2012)



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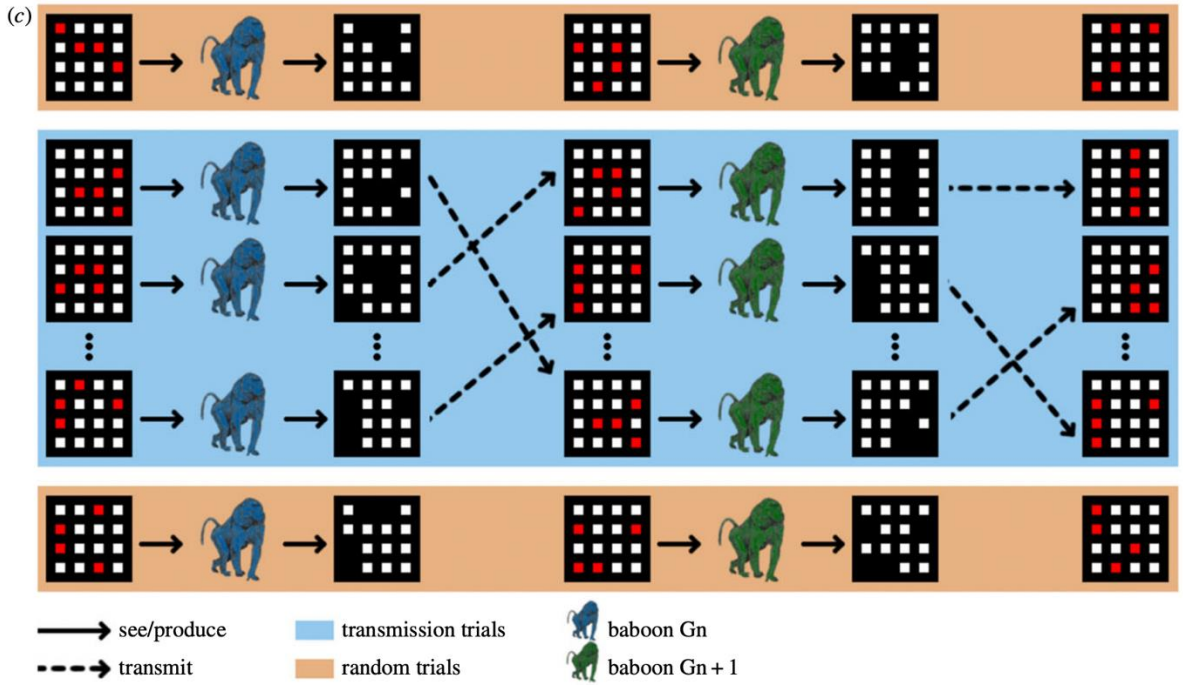
CCE in non-human animals: baboons

- Claidiere et al. (2014) tested baboons on a pattern reproduction task where they had to mimic a previous baboon's patterns of clicking red squares



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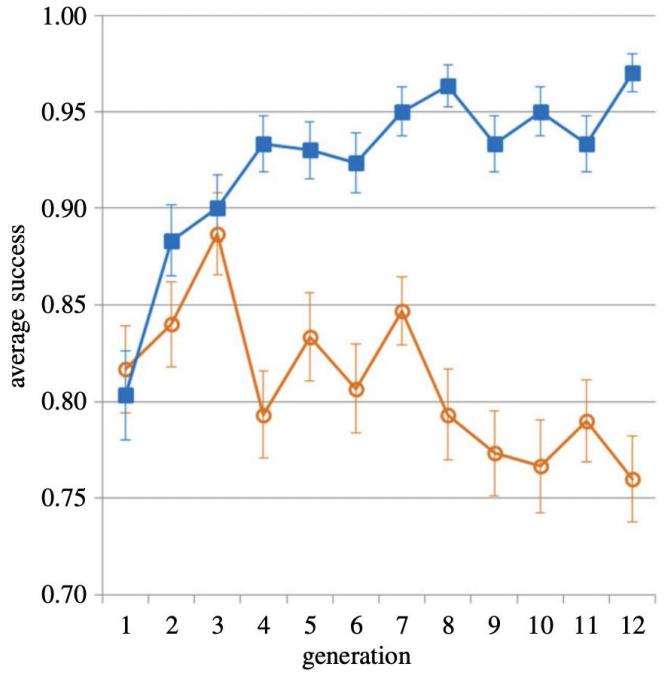
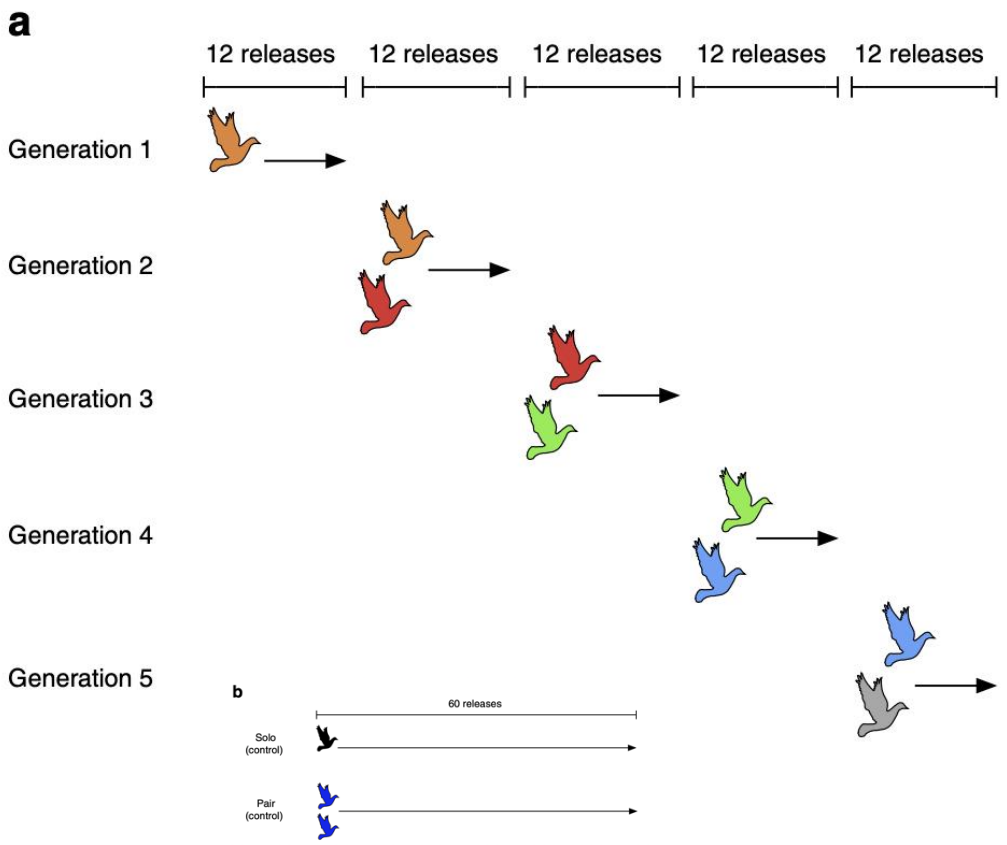


Figure 2. Gradual increase in performance over time. The proportion of successful trials increased over generations in transmission trials (blue squares) compared with matched random trials (orange circles). Error bars indicate standard error.

paper

CCE in non-human animals: pigeons

- Sasaki & Biro (2017) investigated collective navigation by homing pigeons
- “generational succession was simulated through the sequential replacement of experienced birds with naive birds within 10 independent chains as they were repeatedly required to solve the same (navigational) task”
- experimental vs. control group



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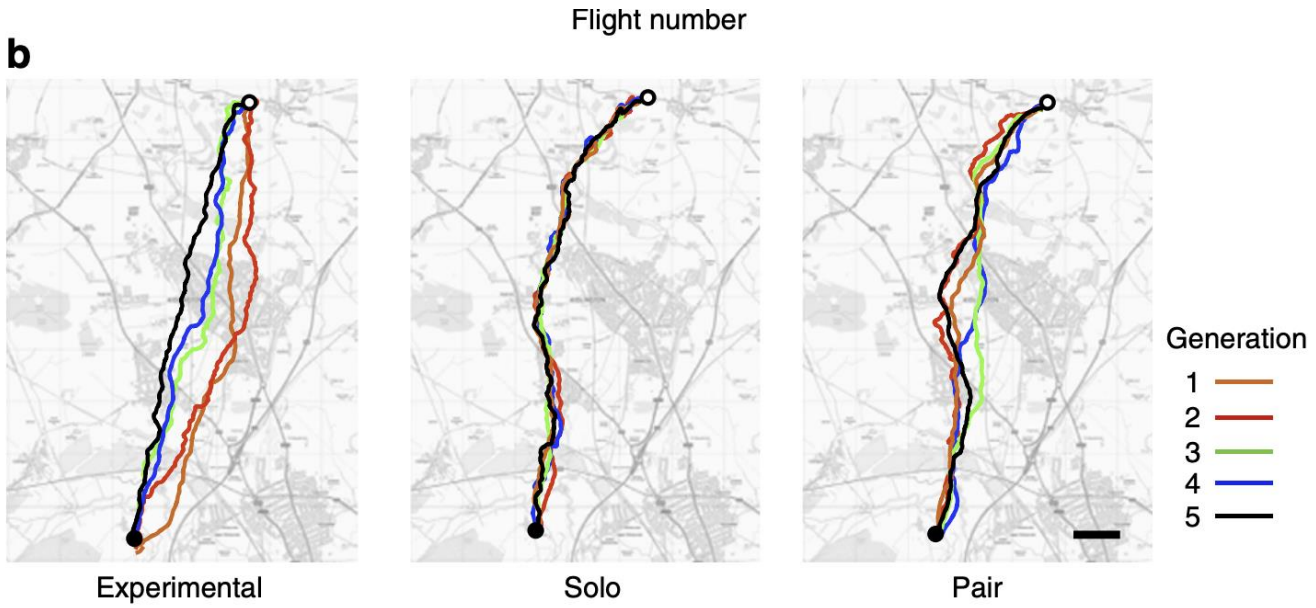
CCE in non-human animals: pigeons

- pairs improved in performance over generations



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evaluating CCE

study	innovation or change	social learning	improvement	repeated improvement
Caldwell & Millen, 2008 (planes & towers)				
Fay et al. 2018 (language game for routes)				
Dean et al. 2012 (puzzle box)				
Claidiere et al. (2014): baboons				
Sasaki & Biro (2017): homing pigeon flights				

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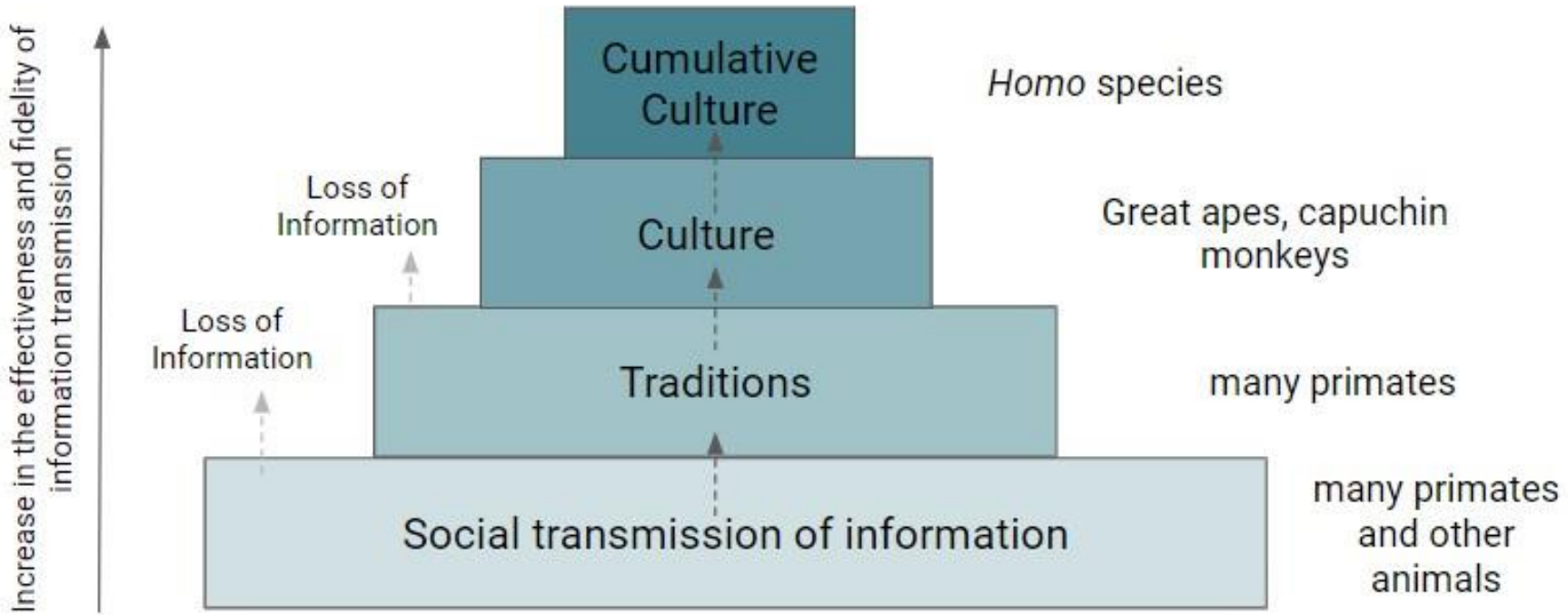

Increase in the effectiveness and fidelity of information transmission
Cumulative Culture
Culture
Traditions
Social transmission of information
Loss of Information
Loss of Information
Homo species
Great apes, capuchin monkeys
many primates
many primates and other animals

cognitive foundations of CCE

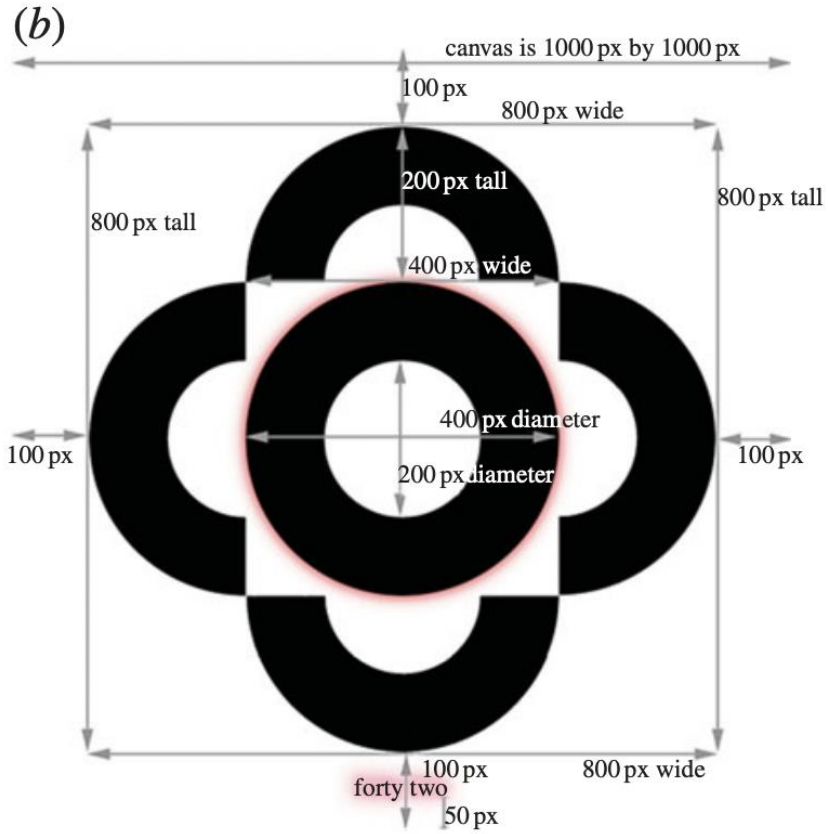
capacities	processes
• cognitive flexibility • norm psychology • prosociality • theory of mind	• imitation • teaching • exploration • observation • participation • asocial learning

paper

additional evidence

CCE human evidence: images and knots

- Muthukrishna et al. (2014)
- participants in a one parent vs. five parent condition
- experiment 1: recreate image in a complex software, write 2 pages for next person



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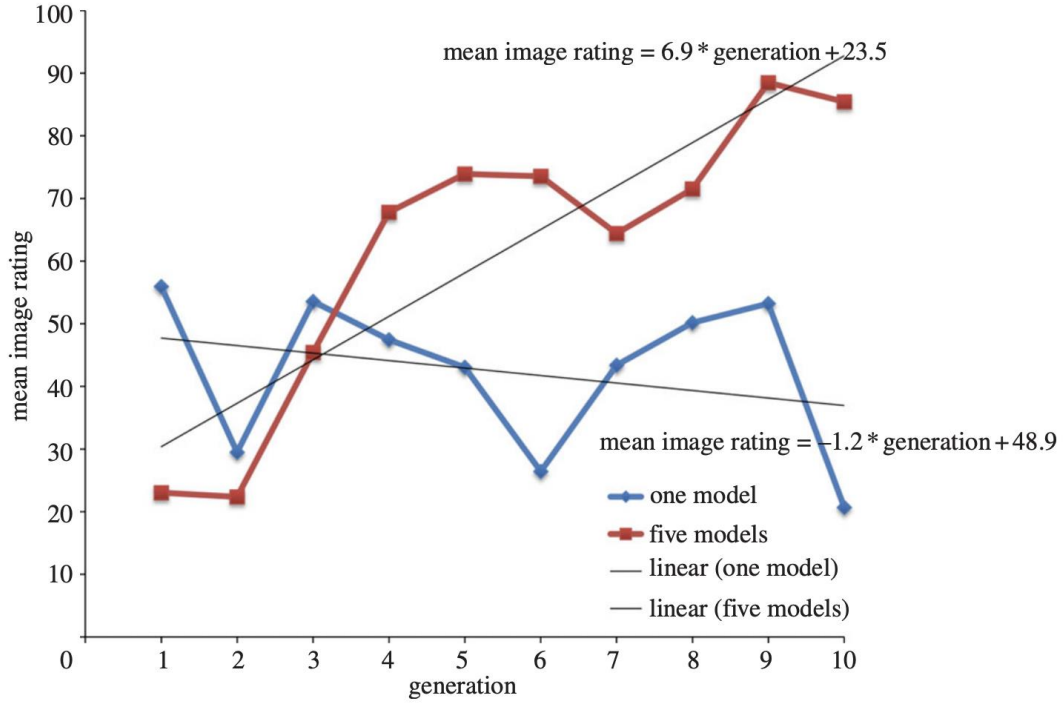
CCE human evidence: images and knots



participants also showed a success bias*
sampled most from best performer but also from all except worst performer

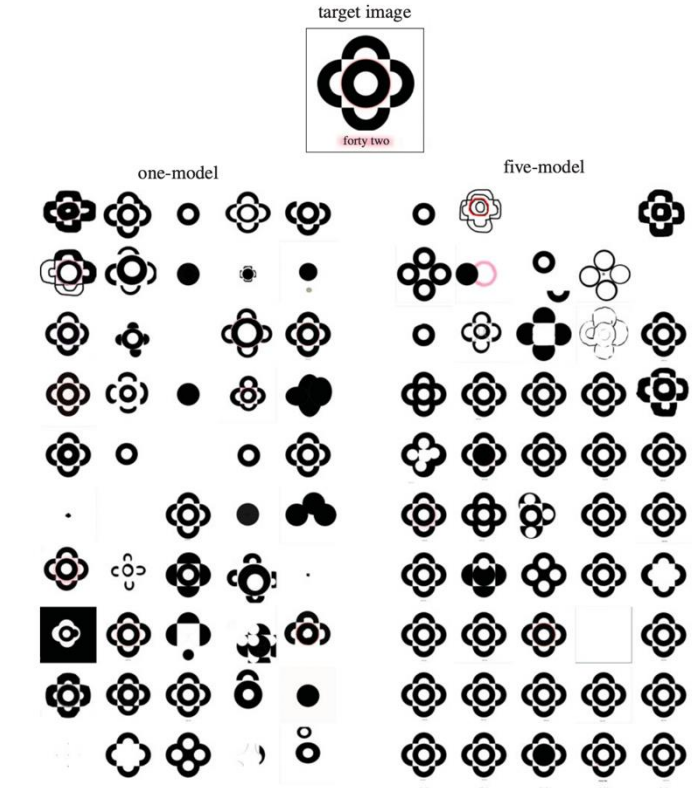


Figure 3. Experiment 1 final images from participants in the one-model and five-model treatments. The target image is included at the top for comparison. The columns are chains of participants in the one-model treatment. Rows are generations going from top (generation 1) to bottom (generation 10). An obvious difference between the two treatments can be seen in the last row.

paper

next week

- intelligence

Before Tuesday

- Complete W14 Activity 1

Before Thursday

- Complete W14 Activity 2

Here are the to-do's for the week:

- Week 13 Exit Ticket (due Thursday)
- Week 13 Quiz (due Sunday)
- Post any lingering questions here
- Extra credit opportunities:
  - Submit Exra Credit Questions (1 point for 8 submissions)
  - Submit Optional Meme Submission (1 point for winners!)