

ANIMAL CULTURES

Major study groups: Primates and other terrestrial mammals

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CULTURAL
EVOLUTION
SOCIETY

Outline

- Observation in the wild
- Captive experiments
- Field experiments



Observations in the wild





Whiten et al. 1999 *Nature*

4,300-year-old chimpanzee sites and the origins of percussive stone technology



Culture in other apes



van Schaik et al. 2007 *Science*



Robbins et al. 2016 *PLoS ONE*

Punta Laguna Reserve

False branch shake	Overlording	Interspecies grooming	Play on ground
	Consume <i>Enterolobium</i> fruit	Consume <i>Anacardium excelsum</i> leaves	Consume <i>Phoradendron</i> leaves

Runaway Creek Nature Reserve

False branch shake	Overlording	Interspecies grooming	Play on ground
	Consume <i>Enterolobium</i> fruit	Consume <i>Anacardium excelsum</i> leaves	Consume <i>Phoradendron</i> leaves



Santa Rosa National Park

False branch shake	Overlording	Interspecies grooming	Play on ground
	Consume <i>Enterolobium</i> fruit	Consume <i>Anacardium excelsum</i> leaves	Consume <i>Phoradendron</i> leaves

Corcovado National Park

False branch shake	Overlording	Interspecies grooming	Play on ground
	Consume <i>Enterolobium</i> fruit	Consume <i>Anacardium excelsum</i> leaves	Consume <i>Phoradendron</i> leaves

Barro Colorado Island

False branch shake	Overlording	Interspecies grooming	Play on ground
	Consume <i>Enterolobium</i> fruit	Consume <i>Anacardium excelsum</i> leaves	Consume <i>Phoradendron</i> leaves

Neighbouring group differences



Chapman & Fedigan 1990
Folia Primatologica;
Perry et al. 2003 *Current
Anthropology*



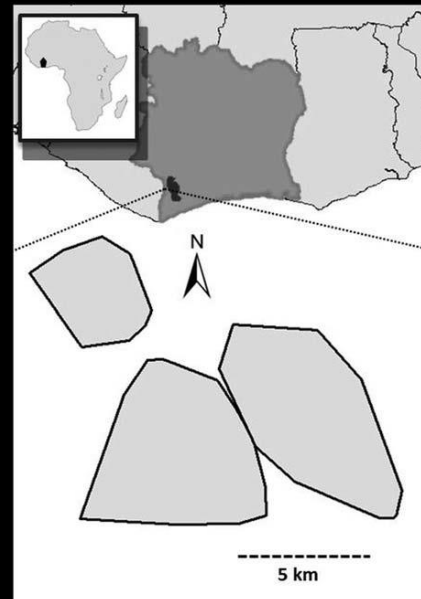
Mc Grew et al. 2001
Current Anthropology

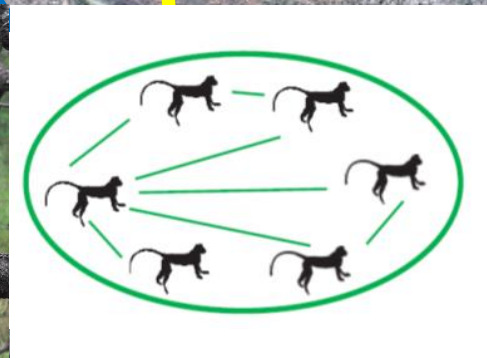
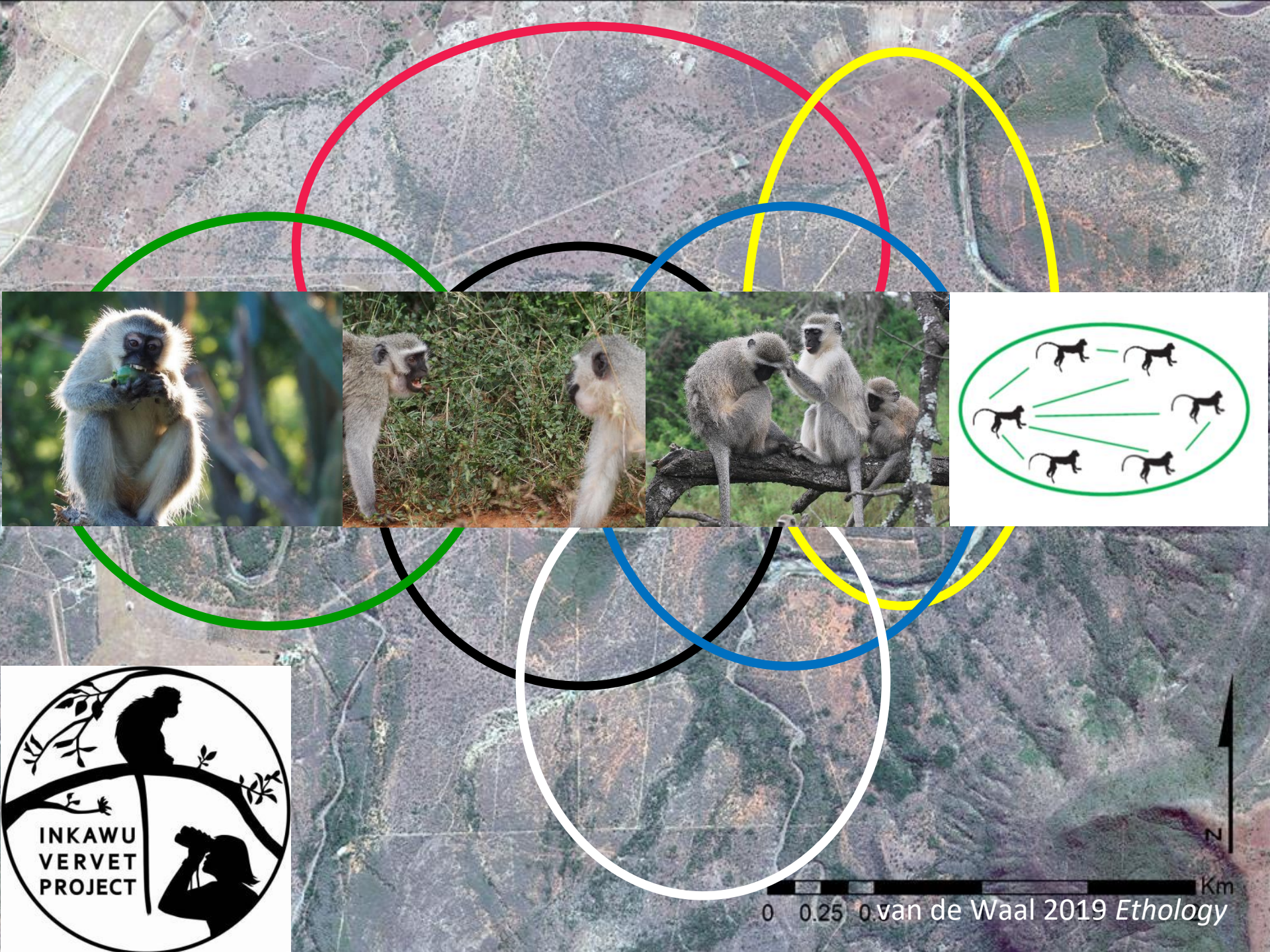


Tan et al. 2015 *PLoS ONE*

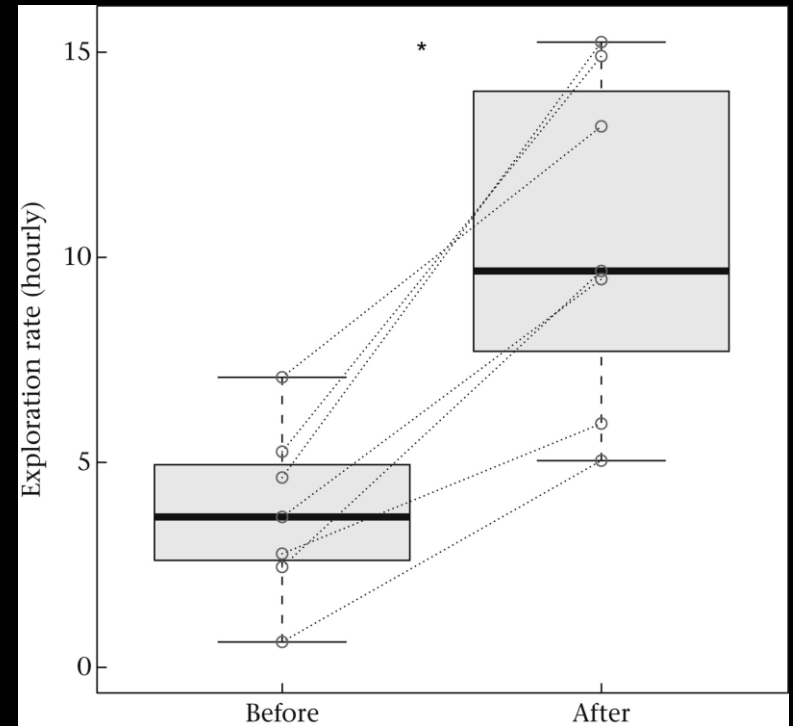
27 putative cultural traits in three neighbouring chimpanzee communities

- Tool use
- Foraging
- Social interaction
- Communication
- Hunting behaviour





Peering as a proxy for social learning



Animal cultures: how we've only seen the tip of the iceberg

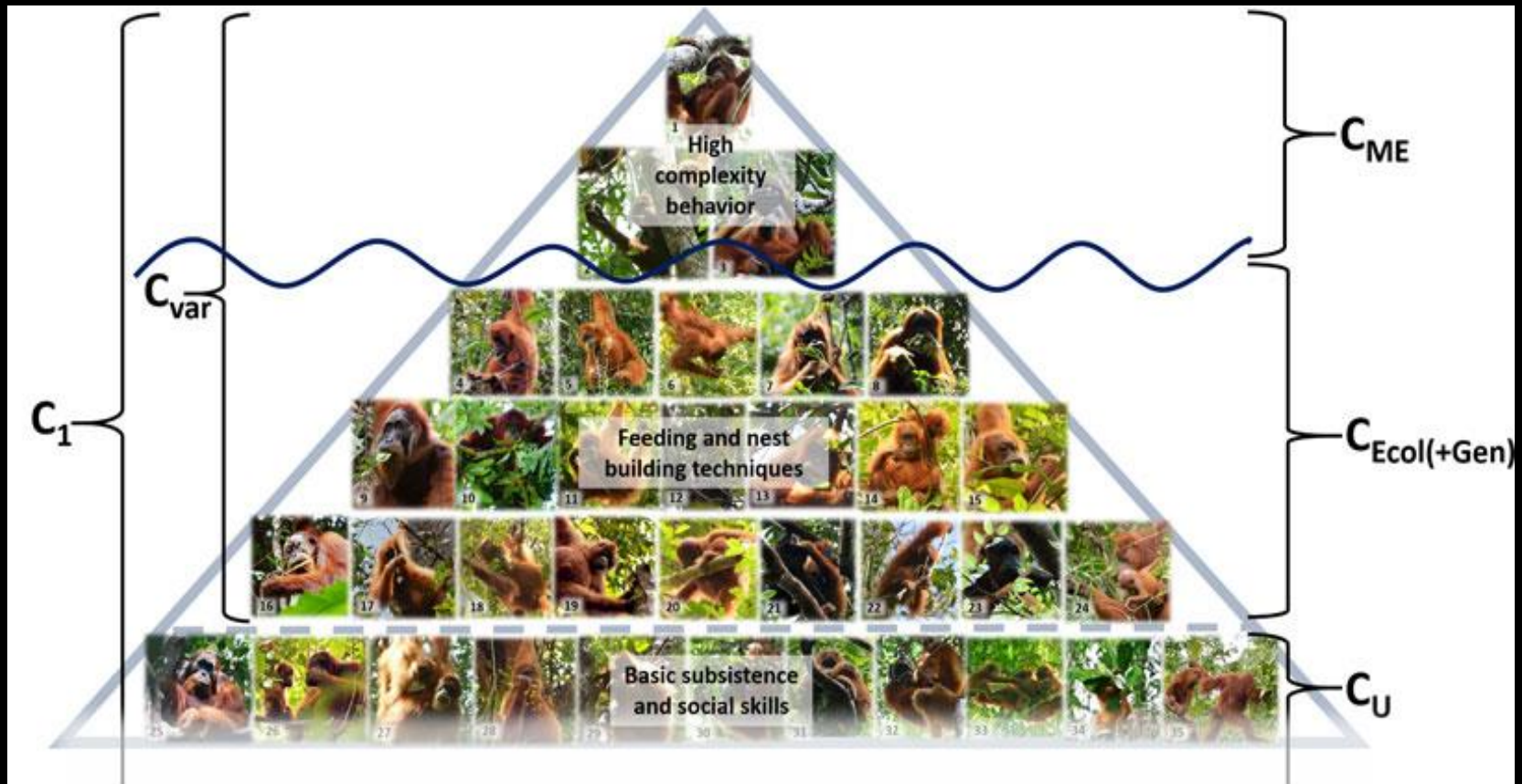


Figure 4. Different operationalizations of culture. The cultural behaviors captured by the MoE (C_{ME}) are socially learned behaviors with a patchy geographic distribution but without ecological correlates (mostly conspicuous and/or high complexity behaviors such as tool use). The cultural behaviors with ecological correlates (C_{Ecol}) are socially learned behaviors that vary between populations because they are influenced by a population's local ecology (e.g. feeding skills). The sum of C_{ME} and C_{Ecol} are all socially learned behaviors that vary across populations (C_{Var}). Cultural universals (C_U) are socially learned behaviors and knowledge that we find consistently across populations (e.g. basic subsistence and social skills). The sum of all socially learned behaviors represents an individual's cultural knowledge ($C_1 = C_{Var} + C_U$). See supplementary Table S3 descriptions of the behaviors depicted on the pictures.

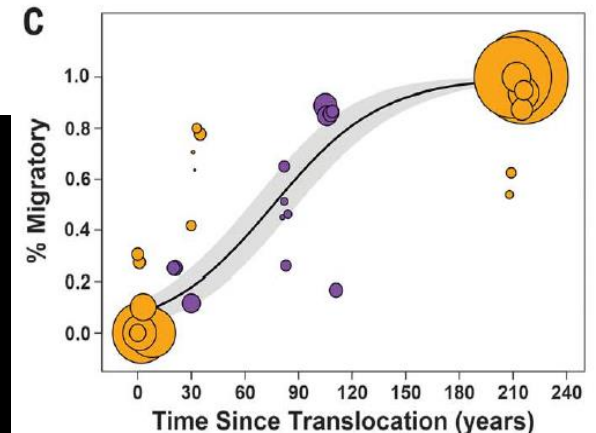
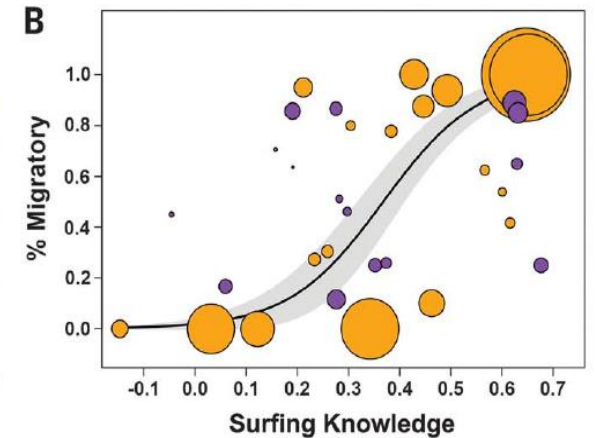
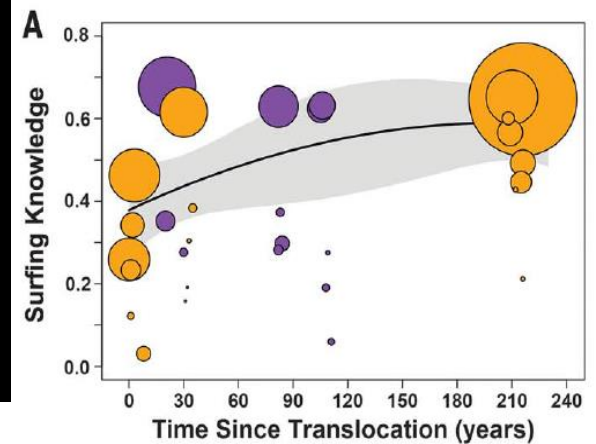
Matriarchs as repositories of social knowledge in African elephants



Migration routes in bighorn sheep and moose



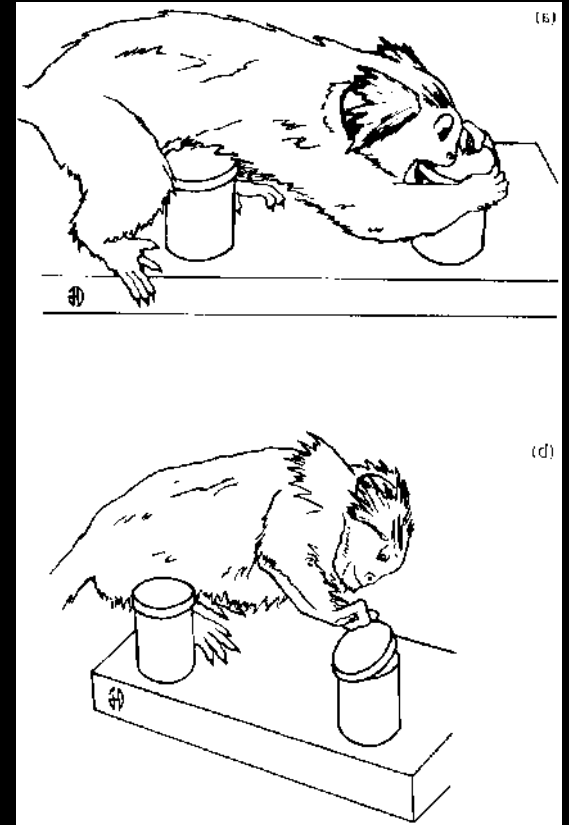
Fig. 3. Green-wave surfing knowledge and migratory propensity over time. (A) After translocation, populations of bighorn sheep (orange circles) and moose (purple circles) require decades to learn and culturally transmit information about how to best surf green waves, (B) eventually leading to the establishment of migration, which (C) takes many generations (the generation time for bighorn sheep and moose is ~7 years). Circles represent estimates of surfing knowledge and migratory propensity for a given population in a given year (i.e., a migratory event). Circle size depicts the amount of confidence (inverse variance) in each estimate. Black lines and gray shaded areas illustrate fitted generalized linear model predictions and their 95% confidence intervals. All relationships are significant at $P < 0.01$.



Captive experiments

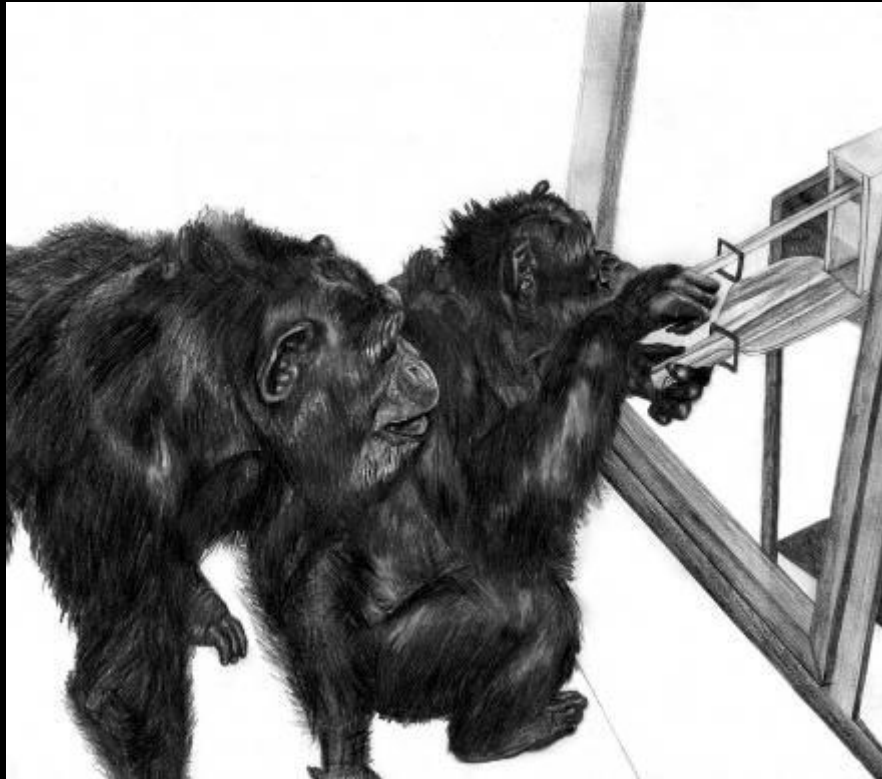
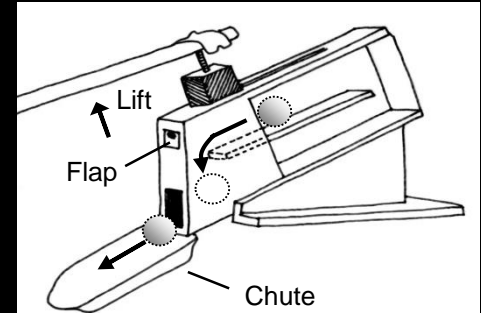
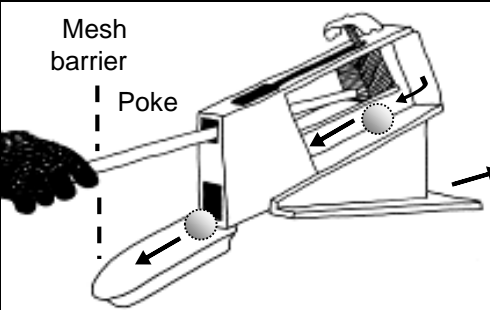


Whiten et al. 1996 *Journal of Comparative Psychology*



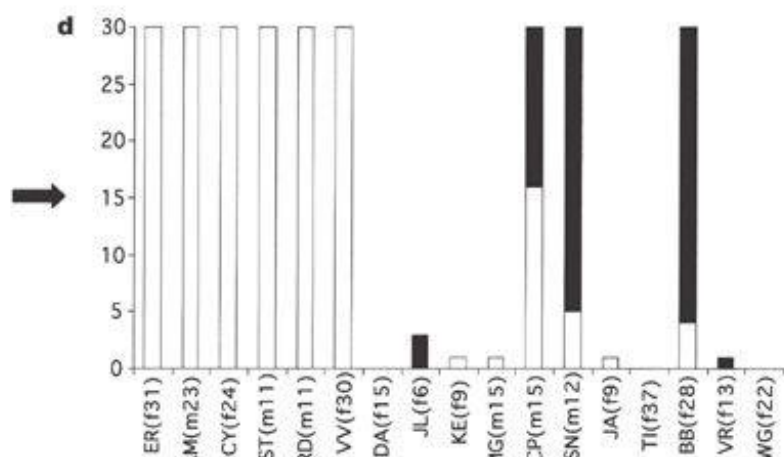
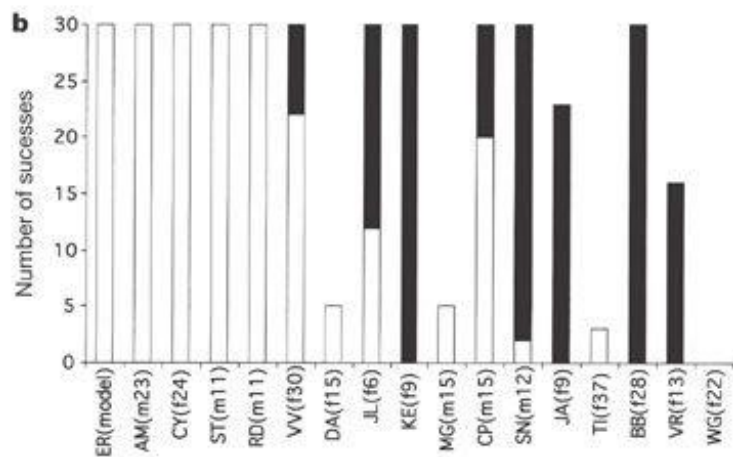
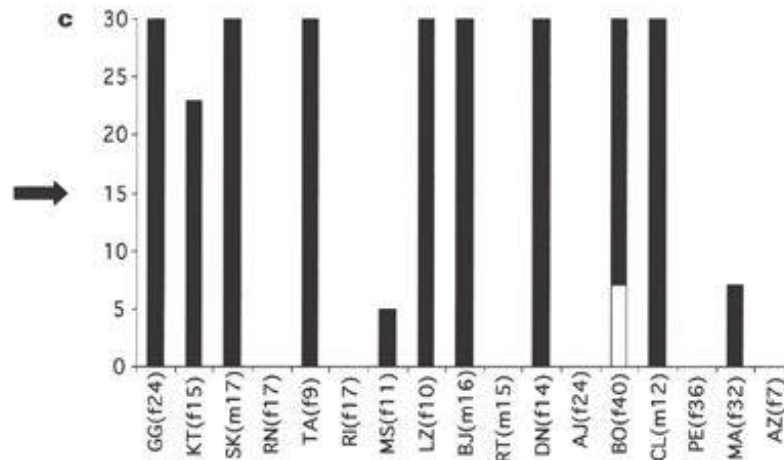
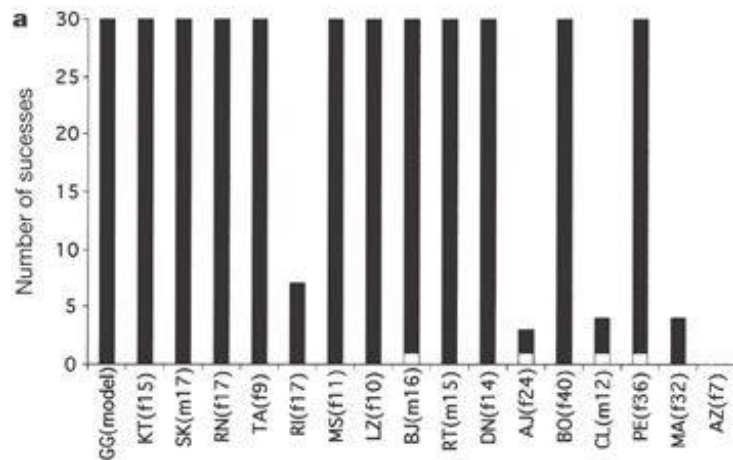
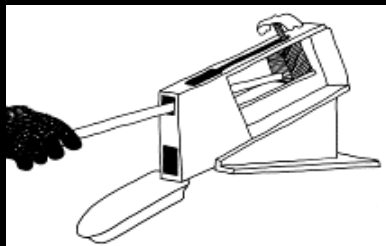
Voelkl & Huber 2000
Animal Behaviour

Conformity to cultural norms of tool use in chimpanzees



Amy Whiten

Whiten et al . 2005 *Nature*



Conformity in Norway rats?

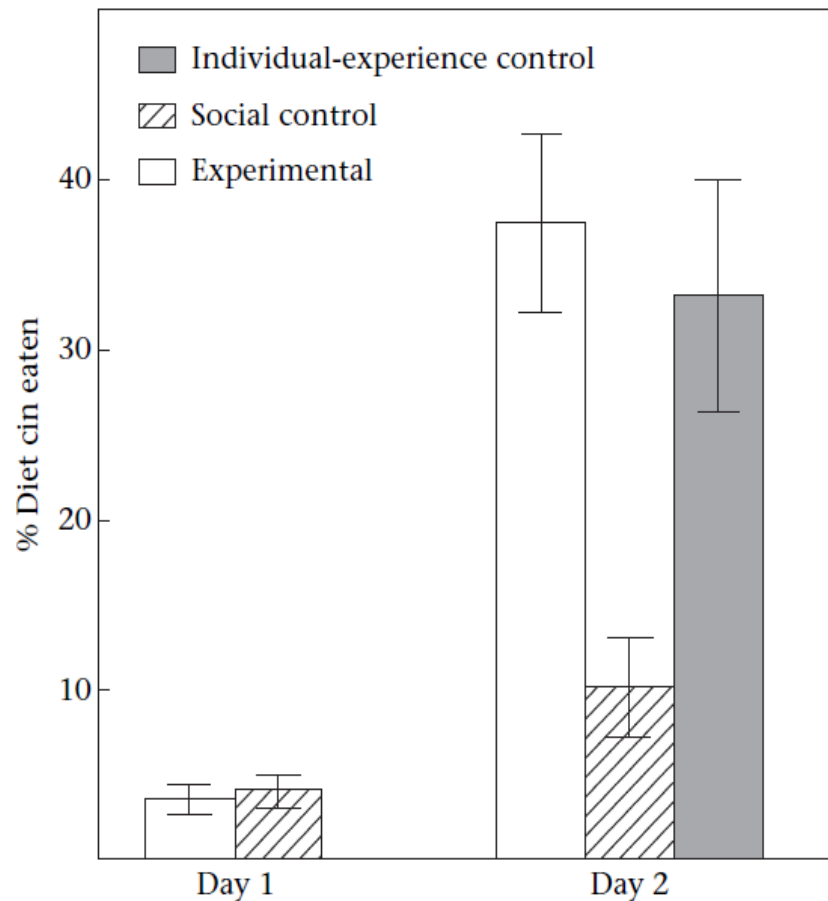
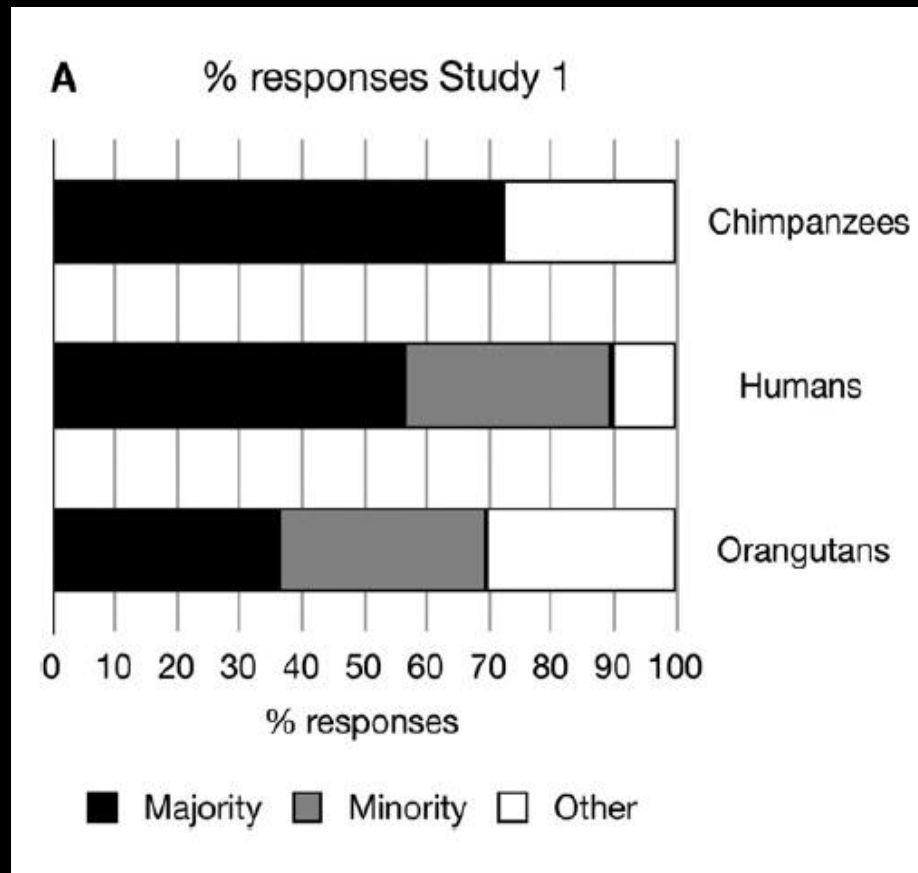
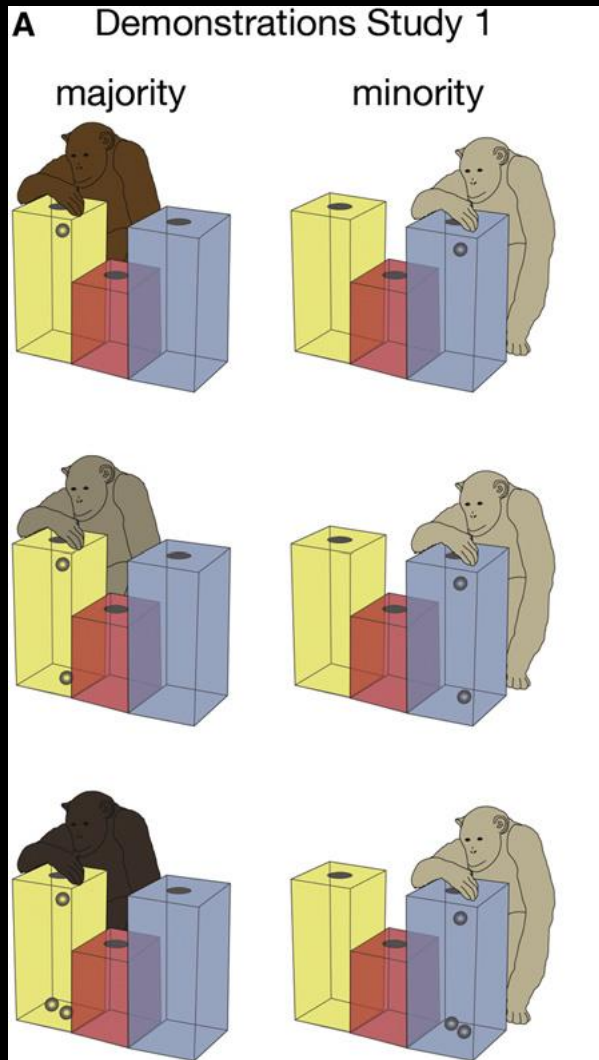


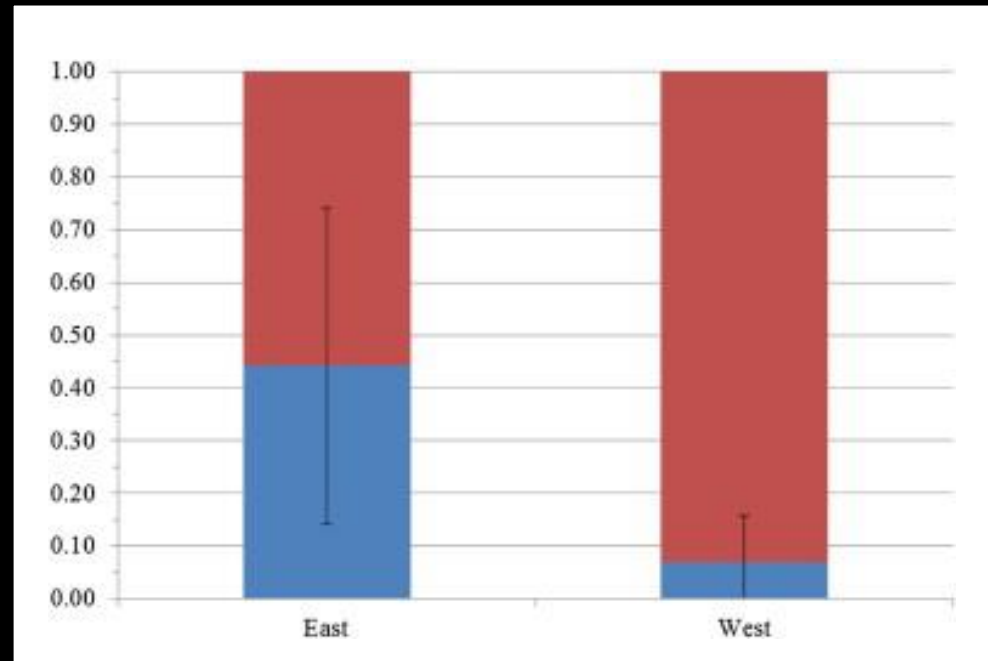
Figure 1. Mean \pm SE percentage of diet cin eaten by experimental and control subjects on days 1 and 2 of experiment 1.



Majority-biased transmission in chimpanzees and human children, but not orangutans



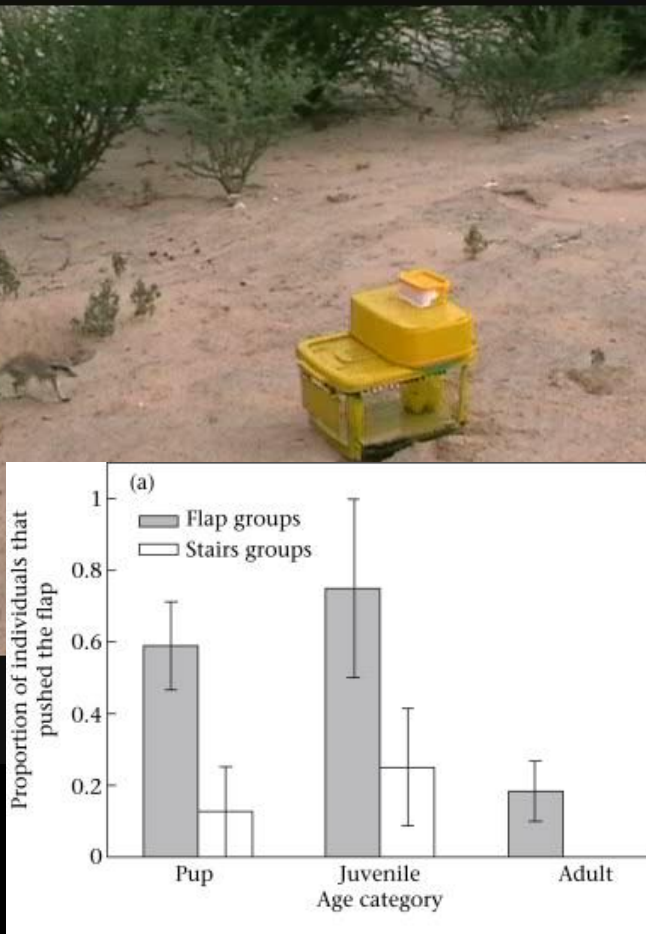
Diffusion dynamics of socially learned foraging techniques in squirrel monkeys



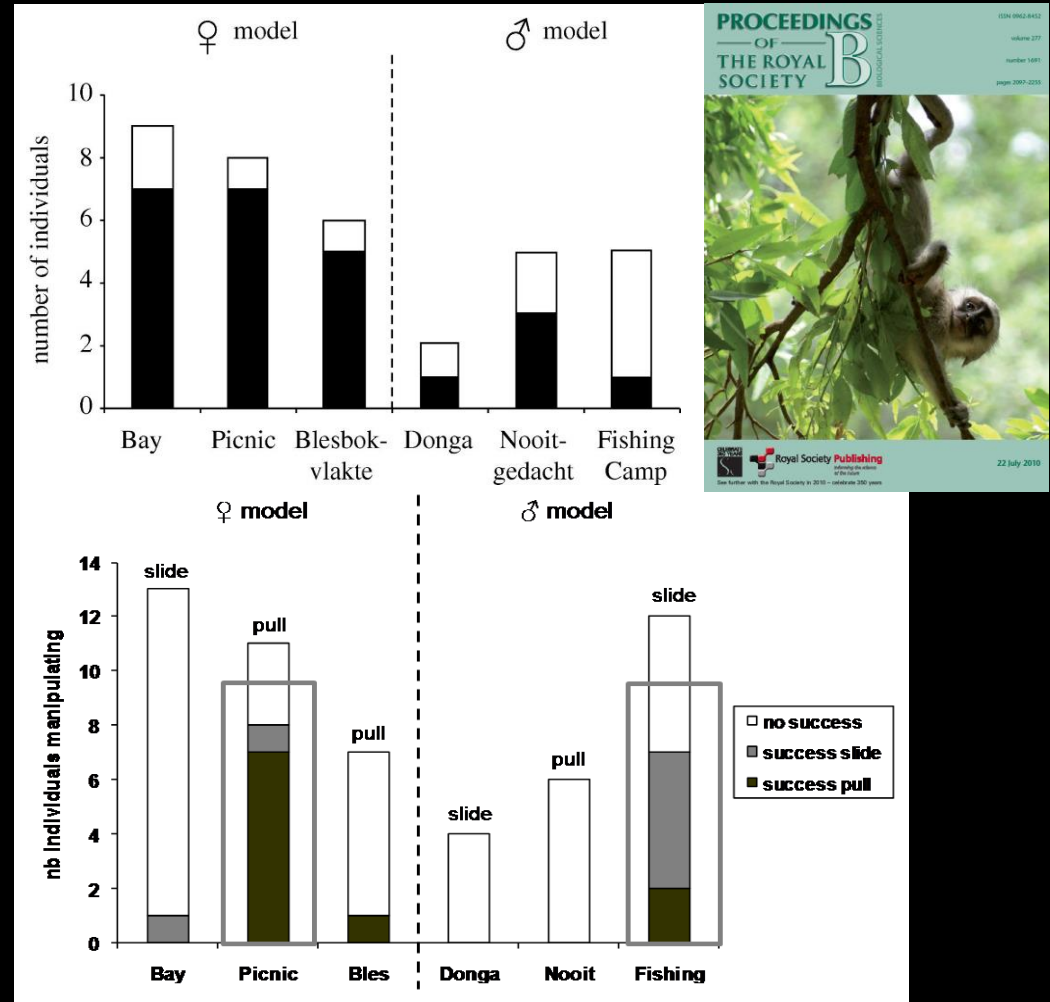
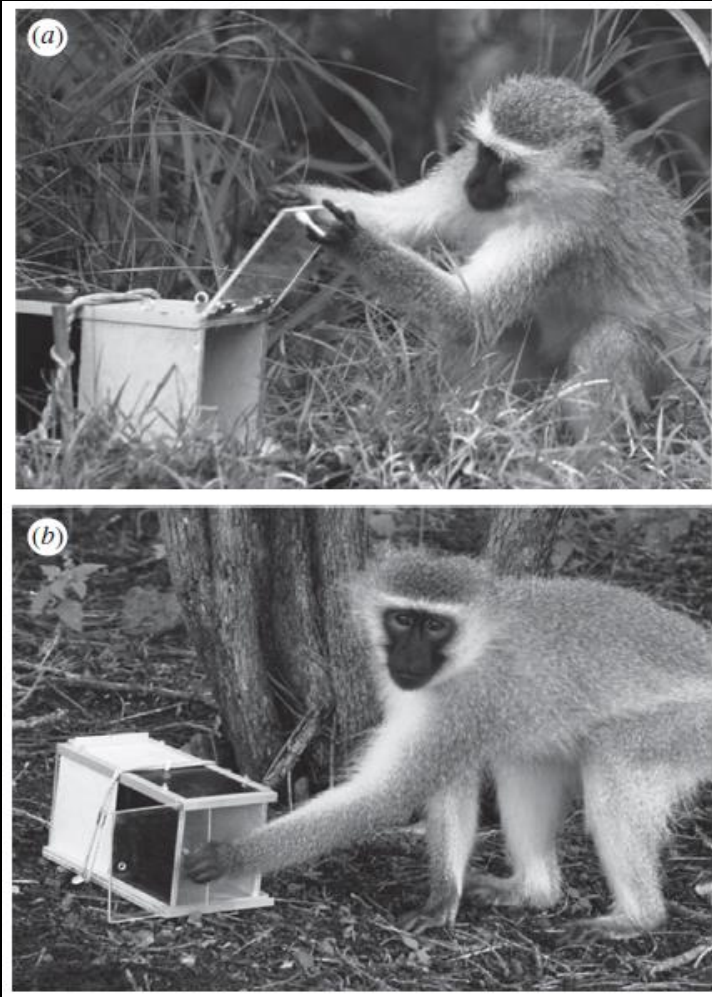
Field experiments



Experimental evidence for social transmission of food acquisition techniques in wild meerkats



Selective attention to philopatric models causes directed social learning in wild vervet monkeys



van de Waal et al. 2010 *Proceedings of the Royal Society B*, van de Waal & Bshary 2010 *Folia Primatologica*

Imitation and traditions in wild banded mongooses

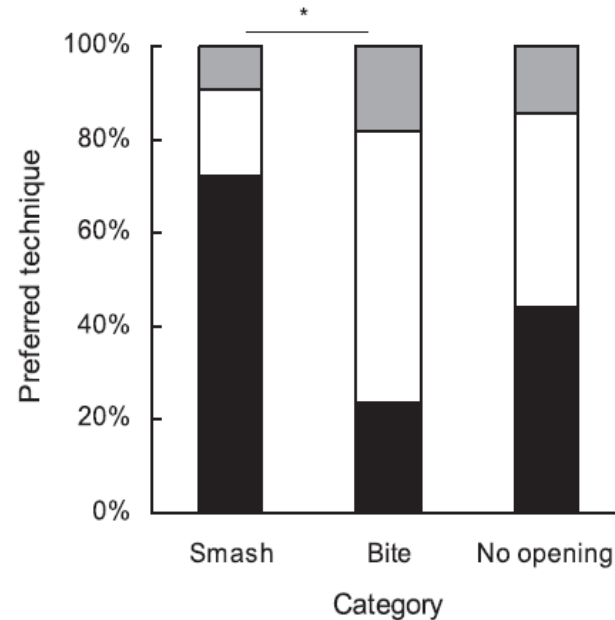


Figure 4. Juveniles' Preferences for Opening Techniques

Percentage of test trials during which the smashing technique was preferred (black), the biting technique was preferred (white), or no preference occurred (gray). The "No opening" category combines categories Open and None. * $p < 0.05$.

Evidence for social learning in wild lemurs (*Lemur catta*)



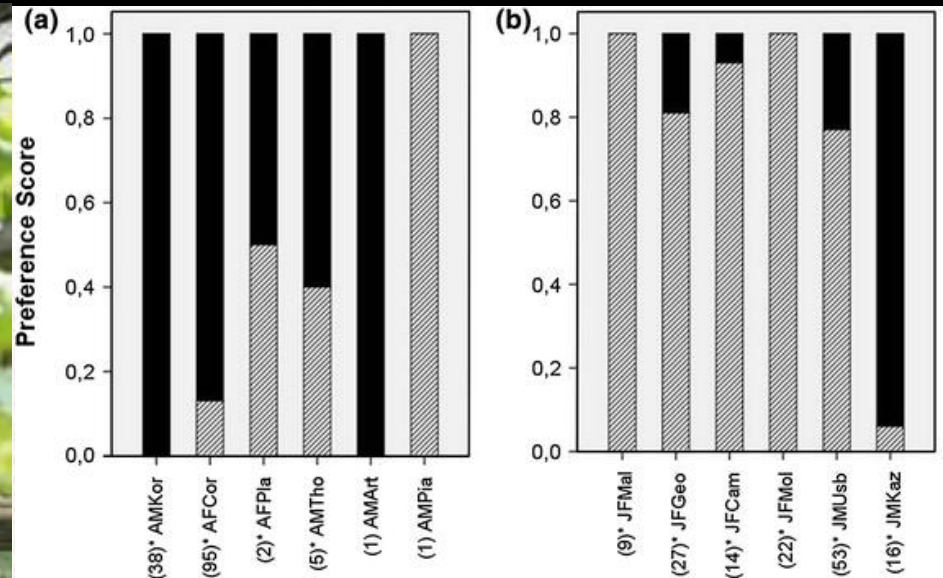
A



B

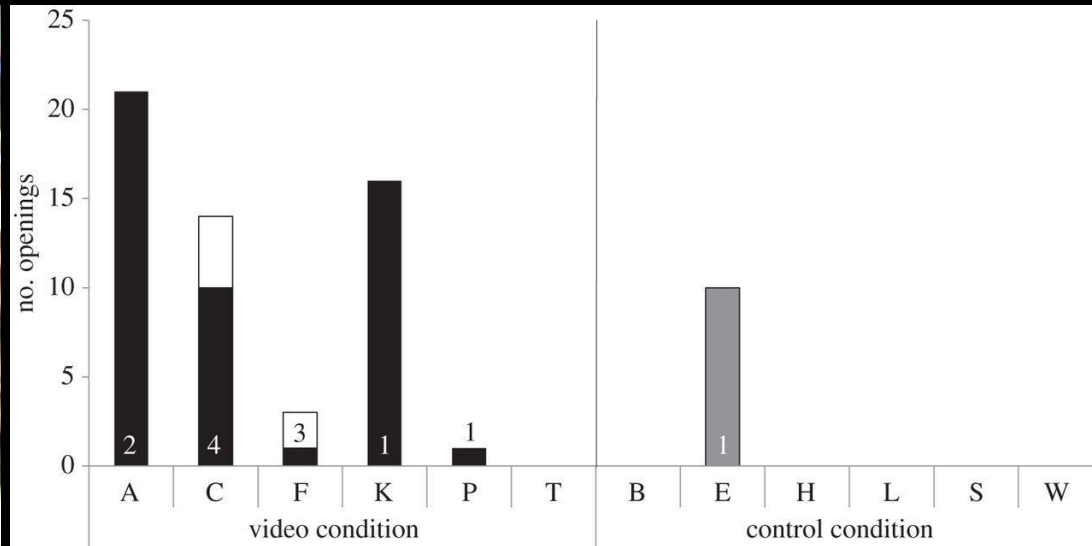


Wild redfronted lemurs use social information to learn new foraging techniques



Honey dipping experiment on wild chimpanzees

Video demonstrations seed alternative problem-solving techniques in wild common marmosets





**109 trained
individuals**

**LEMON
TREE
GROUP**

N= 24

N=26

**ANKHASE
GROUP**

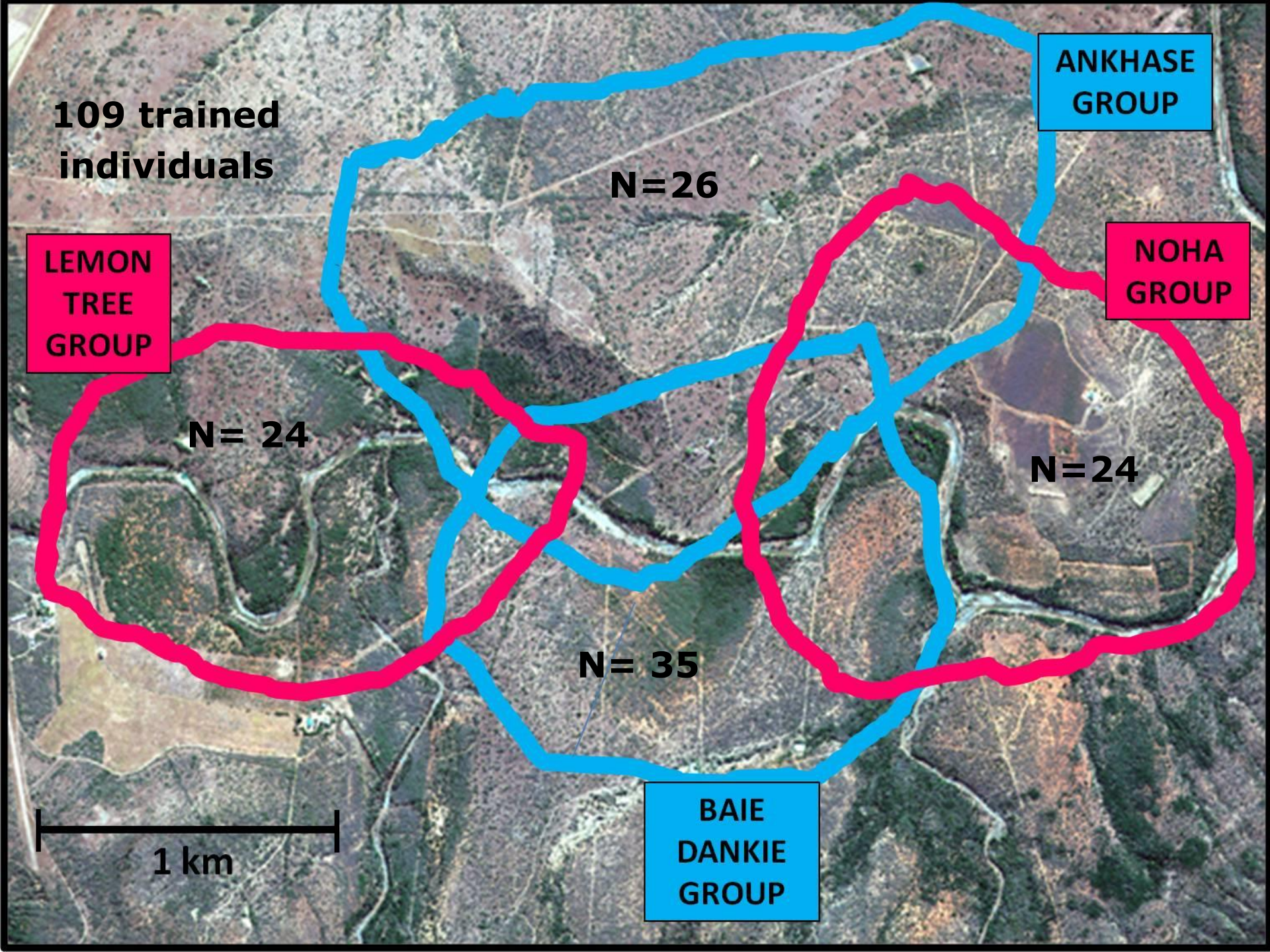
**NOHA
GROUP**

N=24

N= 35

**BAIE
DANKIE
GROUP**

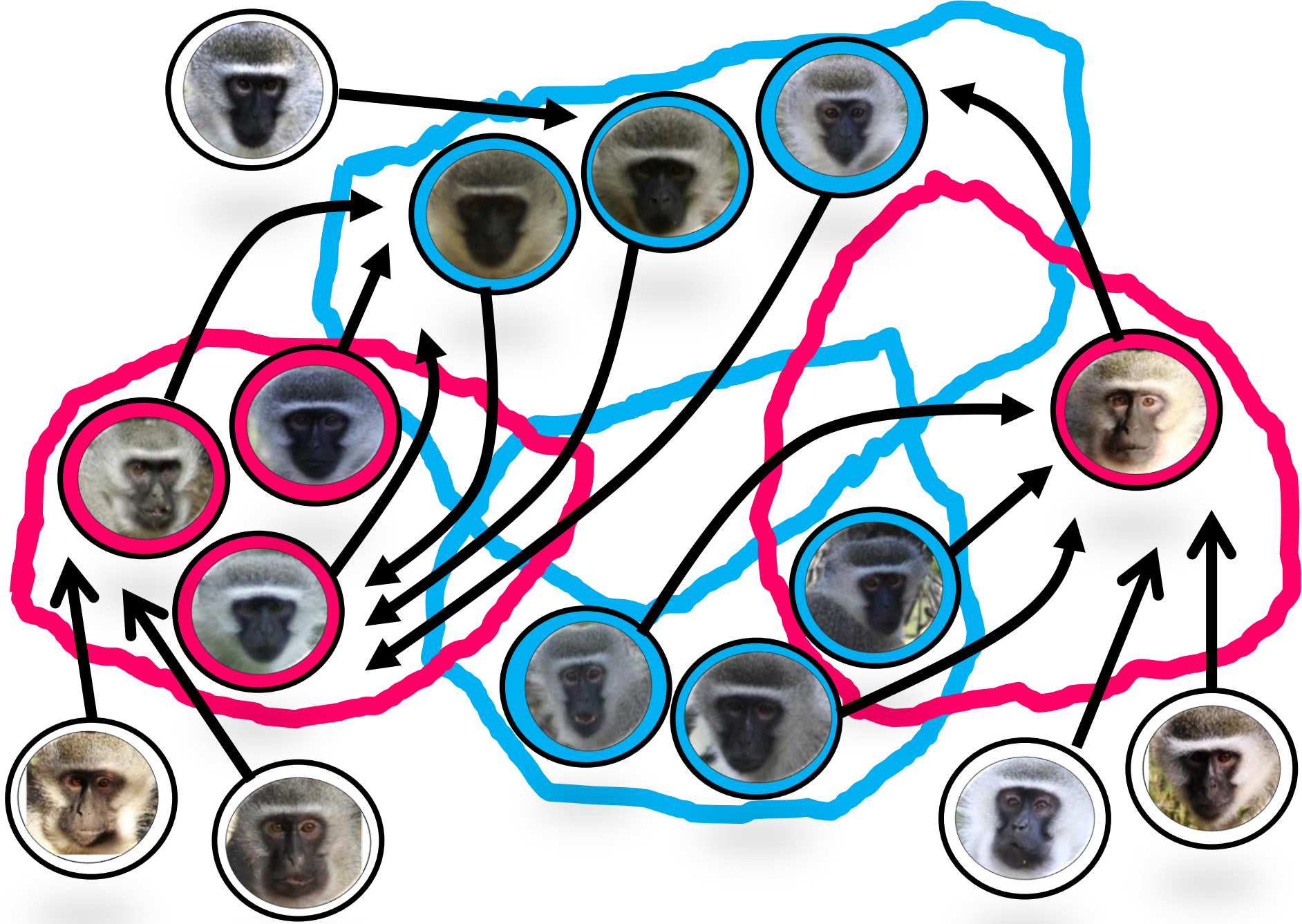
1 km



Vertical social learning



van de Waal et al. 2013 *Science*



van de Waal et al. 2013 *Science*

‘When in Rome, do as the romans do’



Aplin et al. 2015 *Nature*

ID	origin
El	LT
Th	LT
Ar	LT
Qu	NH
Bo	?

Er	BD
Le	BD
Gr	BD
Mf	AK
Ge	AK
Iz	AK
Au	?
Ch	?
Sh	?
Am	?



Luncz et al. 2015 *American Journal of Primatology*

Major phases in the ontogeny of social learning in primates



Phase 1. Learning from mother or other primary attachment figure. Baboon infant sniffs novel food mother is eating. Photo: A. Whiten



Phase 2. Selective learning in an expanding social world. Juvenile capuchin observes expert adult male nut-cracking . Photo: T. Falótico



Phase 3. Learning from residents after migration. Male vervet switches to eat colored corn preferred by new group. Photo: E. van de Waal

