

Social Learning Processes



This lecture

1. Social learning processes

a. “Inadvertent” social learning

- i. Indirect processes – e.g. enhancement
- ii. Direct processes – e.g. observational conditioning; imitation

b. Teaching

2. Consequences

- a. Individual behaviour: skills & knowledge
- b. Group behaviour: traditions & culture

What is social learning?

“Learning that is influenced by observation or interactions with another individual or its products”

Heyes (1994) *Biol. Rev.* 69: 207-231.



1. How do animals learn socially?

a. “Inadvertent” social learning



- Knowledgeable individual goes about its business
- Onus for learning is on the naïve individual

b. Teaching



- Knowledgeable individuals actively help the naïve to learn

a. “Inadvertent” social learning

- Hoppitt & Laland identify 10 processes

Hoppitt & Laland (2008) *Advances in the Study of Behavior* 38: 105-165

(i) Processes that can lead indirectly to social learning:

- Local enhancement
- Stimulus enhancement
- Response facilitation
- Social facilitation

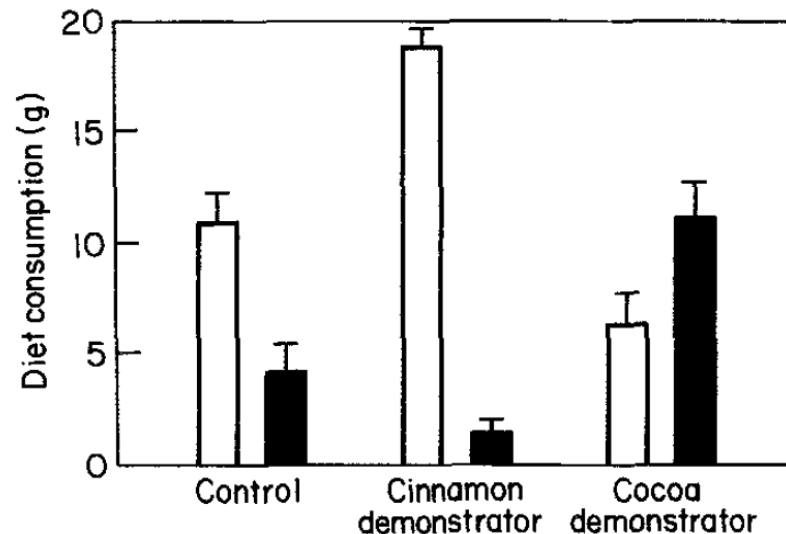
(ii) Processes that lead directly to social learning:

- Observational conditioning
- Social enhancement of food preferences
- Emulation
- Observational learning
- Contextual imitation
- Production imitation

(i) Indirect forms of social learning

E.g. *Local Enhancement & Stimulus Enhancement*

The presence/actions of another individual attracts attention to a location or a stimulus and promotes learning



Mean +SE food consumption (g) for each group.

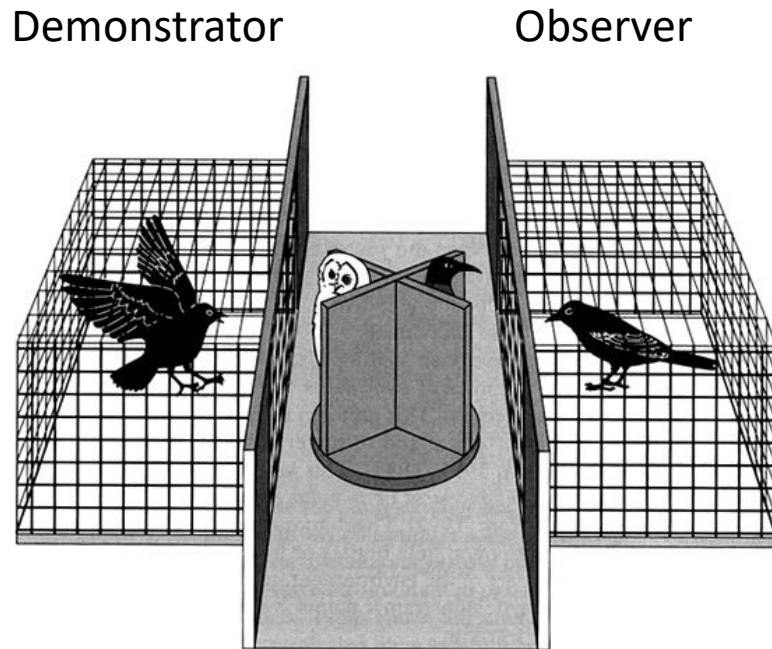
□ cinnamon flavoured diet
■ cocoa flavoured diet



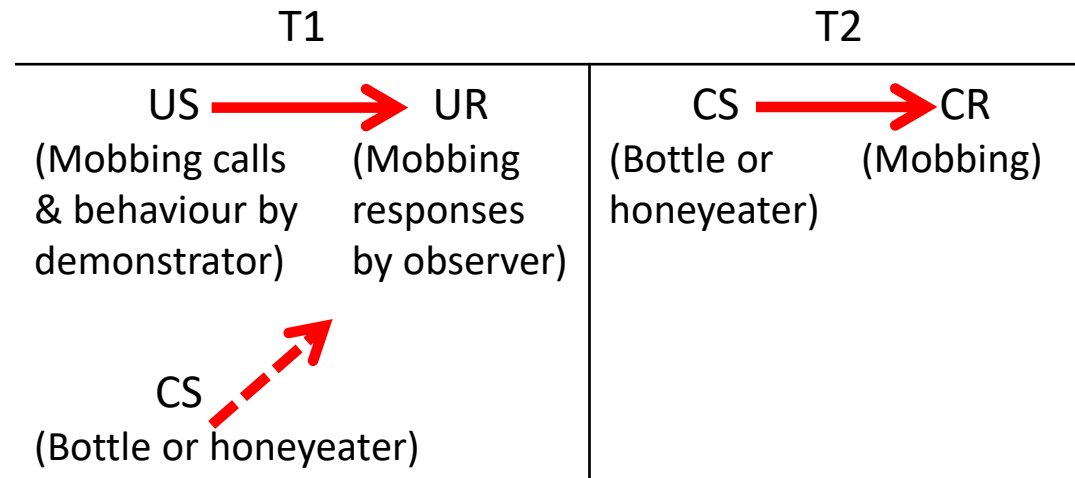
Excretory deposits surrounding food sites promote social learning of food preferences in Norway rats

(ii) Direct forms of social learning

E.g. *Observational conditioning*



Setup for the experiments of Curio and his colleagues in which the observer (on the one right) learns to mob a harmless object as a result of the actions of a demonstrator (on the left). Redrawn from Gould & Gould (1994)



Observational conditioning is Pavlovian conditioning with a social stimulus. Table re-drawn from Shettleworth Ch13

US: Unconditioned stimulus

UR: Unconditioned response

CS: Conditioned stimulus

CR: Conditioned response

Curio (1978) *Z. Tierpsychol.* 48: 184-202.

(ii) Direct forms of social learning

E.g. *Imitation*

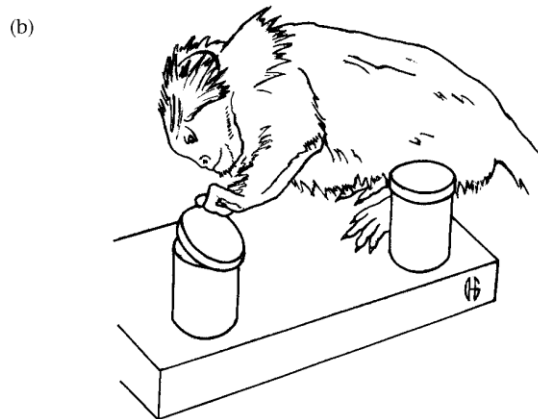
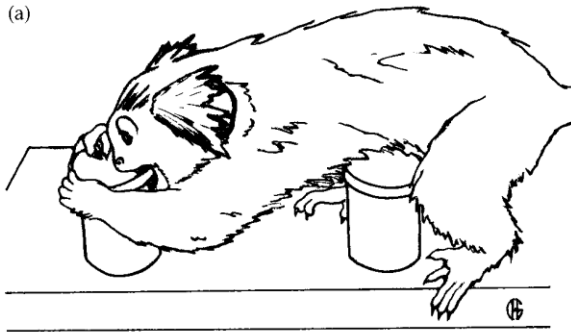
- Copying the *form* of an action (Whiten & Ham 1992)
- Cognitively demanding? “Correspondence Problem”: matching self to other
- Often assumed to be critical for human culture

(ii) Direct forms of social learning

E.g. *Imitation*

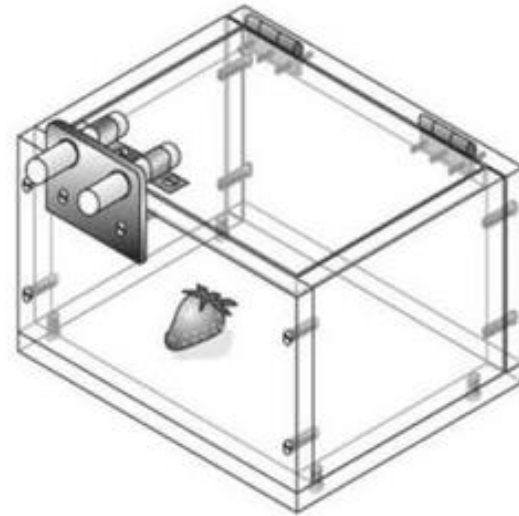
Contextual imitation in marmosets?

Voelkl & Huber (2000) *Anim. Behav.* 60: 195-202



Production imitation in chimpanzees?

Whiten et al. (1996) *J. Comp. Psychol.* 110:3-14



b. Teaching in animals?

- Teaching is a form of *cooperation*
- Knowledgeable individuals change their behaviour to promote learning by the naïve
- This contrasts with all the inadvertent forms of social learning we've seen so far

Thornton & Raihani (2008) *Animal Behaviour* 75: 1823-1836

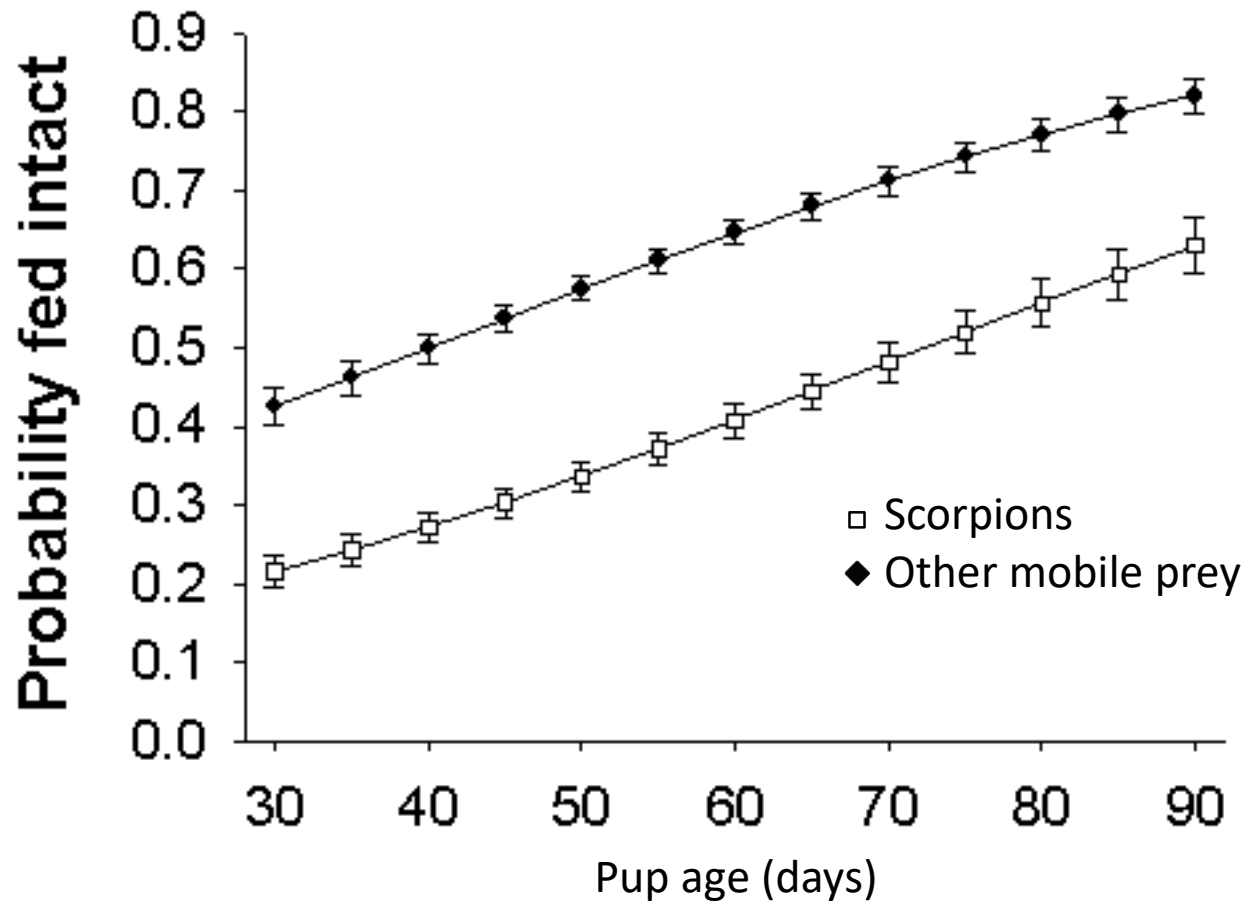
Caro & Hauser's operational definition of teaching

1. Knowledgeable individual **modifies its behaviour** in the presence of naïve individual
2. Knowledgeable individual **incurs some cost/ derives no immediate benefit** by modifying its behaviour
3. **Naïve individual learns** as a result of knowledgeable individual's behaviour

Caro & Hauser (1992) *Q. Rev. Biol.* 67:151-174



1. Adults gradually introduce pups to live prey

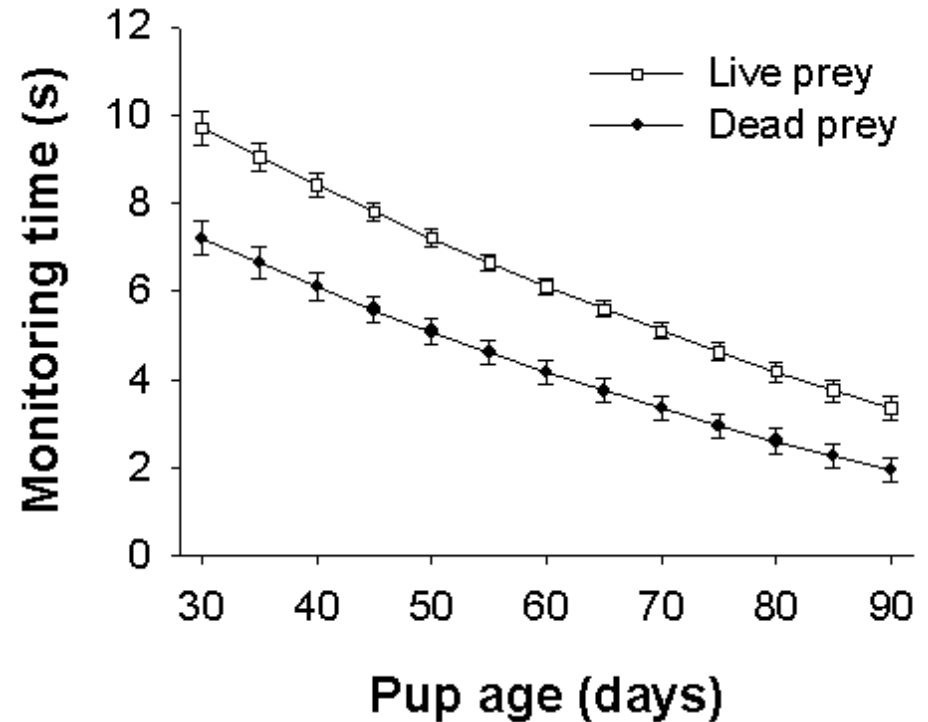


- Video of meerkat teaching:

<https://www.youtube.com/watch?v=48rhtgtNxRI>

2. Giving away live prey is costly

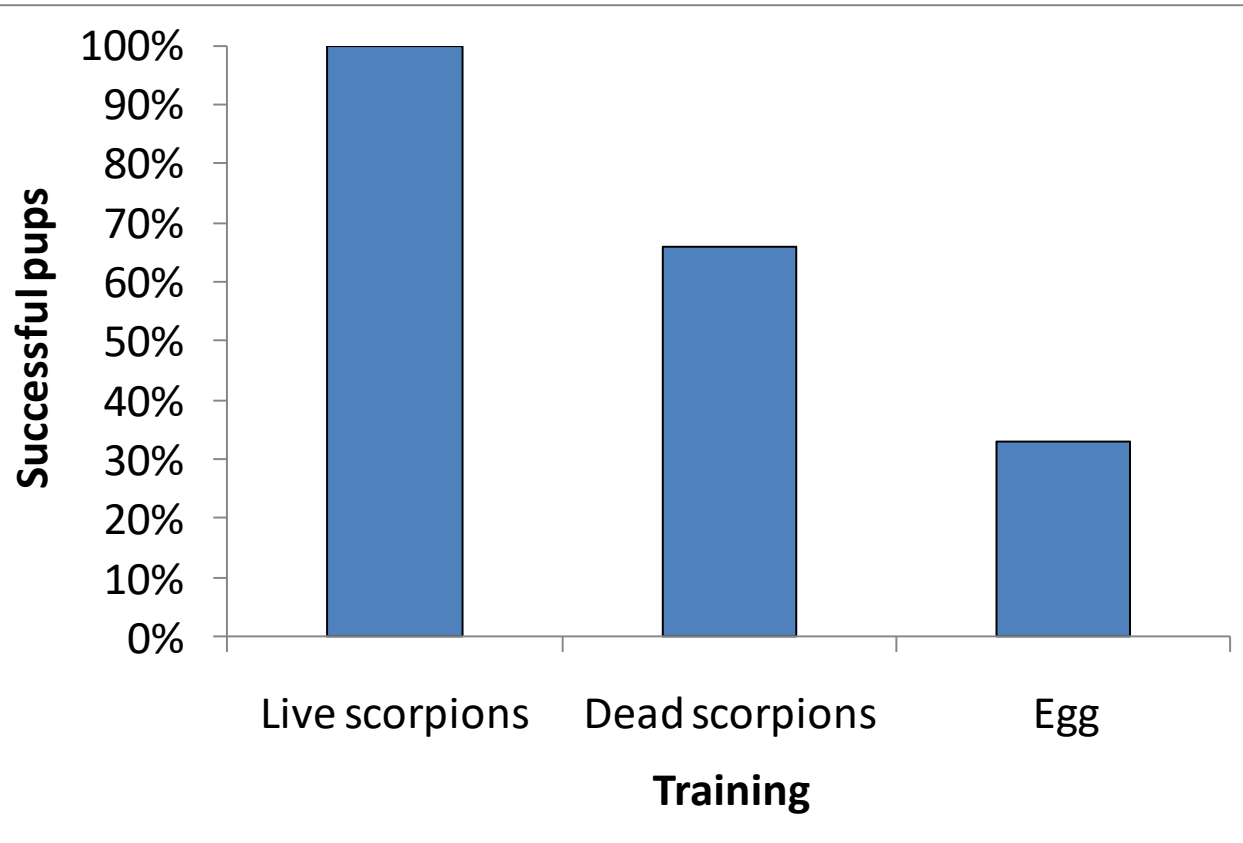
- Prey may escape
- Risk of injury to pups
- More time spent monitoring pups



Thornton & McAuliffe 2006 *Science*

3.

...but promotes learning by pups



Thornton & McAuliffe 2006 *Science*



Animal teachers

- Strong experimental evidence

Meerkats



Thornton & Raihani
2006 *Science*

Tandem-
running ants



Franks & Richardson
2006 *Nature*

Pied
babblers



Raihani & Ridley
2008 *Anim. Behav.*

Superb
fairy-wrens



Colombelli-Négrel et al.
2012 *Curr. Biol.*

Zebra finches



Chen et al.
2016 *PNAS*

- Suggestive evidence



2. Consequences of social learning processes

- a. **Individual behaviour:** skill & knowledge acquisition
- b. **Group behaviour:** traditions/culture
- c. Ecological and evolutionary consequences (later lectures)

PHILOSOPHICAL
TRANSACTIONS OF THE ROYAL
SOCIETY B BIOLOGICAL
SCIENCES

Social learning and the development of individual and group behaviour in mammal societies

Alex Thornton and Tim Clutton-Brock

Phil. Trans. R. Soc. B 2011 **366**, 978–987
doi: 10.1098/rstb.2010.0312

INTERFACE
FOCUS

rsfs.royalsocietypublishing.org

A second inheritance system: the extension of biology through culture

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Animal Behaviour

journal homepage: www.elsevier.com/locate/anbehav

Special Issue: Cognitive Ecology

Culture and cultural evolution in birds: a review of the evidence

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a. Individual behaviour: skills & knowledge



Foraging



Tool use



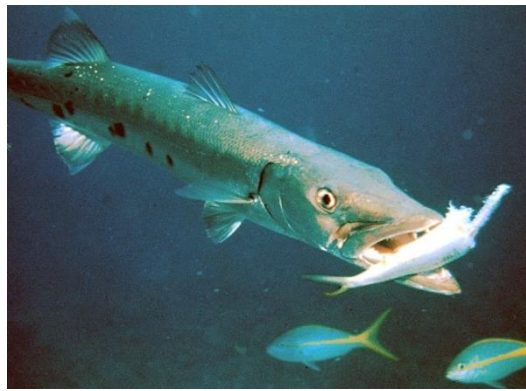
Migration



Communication



Mate choice



Predator avoidance



Social behaviour

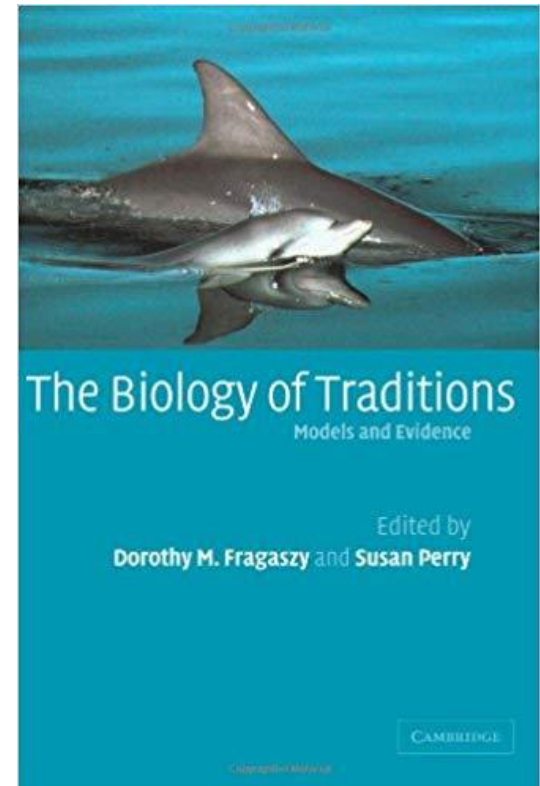


Self-medication?

b. Group behaviour: traditions & culture

- **Tradition:** “a distinctive behaviour pattern shared by two or more individuals in a social unit, which persists over time and that new practitioners acquire in part through socially aided learning” Fragaszy & Perry 2003
- **Culture:**
 - Equivalent to tradition?
 - Hoppitt & Laland 2003
 - Multiple traditions?
 - Whiten & van Schaik 2007

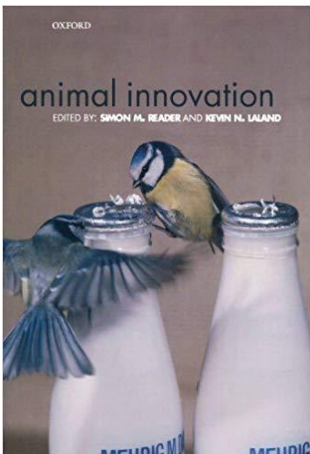
Key ingredients:
Innovation + Transmission



b. Group behaviour: traditions & culture

Key ingredients:
Innovation + Transmission

- Even “simple” social learning processes may generate traditions



Case study: milk bottle opening

BBC Archive Footage



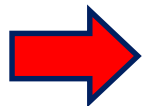
“Cultural transmission without imitation”



Sherry & Galef (1984) *Anim. Behav.* 32: 937-938

Trained demonstrator black-capped chickadees to open tubs of cream

Experimental group	Observer watches demonstrator opening the tub	Observer allowed to feed from opened tub	Observer watches empty cage containing closed tub
Observer opens tub?	YES	YES	NO



Transmission through local/stimulus enhancement



Experimental spread of foraging innovations in the wild



Lucy Aplin



Aplin et al. 2015 *Nature* 7540: 538-541

Experiments show traditions can spread via social learning ...in the lab



...and in the wild



BUT

Learning socially is not always a good idea
Social learning strategies are needed (next lec)