

CULTURAL EVOLUTION

Subsistence and social learning

Social learning is a crucial building block of human culture, but how and why do people vary in their propensity to learn from others? Experiments in Ethiopia suggest that pastoralists rely more on others' knowledge than do horticulturalists.

Alex Mesoudi

Every day we face decisions. Walk to work or take the bus? Drink red or white wine with dinner? Visit the zoo or the museum on your day off? Recent research has focused on two ways of determining the best option when making these sorts of decisions. We could use what's known as individual learning — try each option, observe the outcomes, and go with whichever tends to give the best results. Or, we could use 'social learning' — observe what others are doing and go with, say, the most popular option.

The seemingly trivial distinction between the two has received much attention among evolutionary biologists, anthropologists and psychologists^{1,2} and is the subject of a study published in *Nature Human Behaviour* by Luke Glowacki and Lucas Molleman³. Many species use individual and social learning to solve problems with unpredictable or changing solutions, such as where to find food, but the optimal mix of learning strategies depends on their relative advantages and disadvantages, which may vary across situations. Social learning is often cheaper than individual learning, but if environments change frequently you risk copying out-of-date information. On the other hand, individual learning may be more accurate but also more costly, particularly for decisions where one wrong choice could be fatal. In humans, much has

been made of our ability to learn things socially that we could never have learned individually — our 'cumulative culture'^{2,4,5}. For example, individually learning quantum physics is a no-go, we simply have to learn it from others.

Glowacki and Molleman contribute to this discussion in two ways. First, they show that groups of people vary systematically in how much they rely on social versus individual learning. There is neither a fixed, universal learning strategy, nor do people vary completely at random. Second, they show that this variation might be explained by a group's subsistence activities. Specifically, they find that within a single ethnic group, pastoralists who keep livestock rely more on social learning than do plant-growing horticulturalists.

Glowacki and Molleman designed an experiment to measure the propensity for individual or social learning among people of the Nyangatom ethnic group in Ethiopia. Bourgeois decisions about which wine to have with dinner are small fry compared with decisions made by the Nyangatom people. Some are nomadic pastoralists, tending herds of livestock in water-sparse environments under constant threat of theft (Fig. 1, left). Others are sedentary horticulturalists, growing plants for direct consumption near the Omo River (Fig. 1, right). Yet others work for wages

in multi-ethnicity towns. Each subsistence group faces innumerable decisions with potentially huge consequences for survival.

To measure learning strategies in a controlled and systematic way, Glowacki and Molleman ran a tablet-based social-learning task. Each participant made repeated choices between two options: a red circle and a blue triangle. One of the two options returned a higher average payoff, but participants were not given this information upfront and had to figure it out. This was complicated by the fact that the feedback was noisy: although one gave a higher payoff on average, on any given trial there was a chance that the low-payoff option would give more points than the high-payoff option. Accumulated points were converted into local currency at the end of the experiment to incentivize identification of the high-payoff option.

On each trial, participants could either choose to see the payoff associated with their previous choice or see the choices of three other participants who had done the experiment previously. The former allows for individual learning: if over time you see that red circles give higher payoffs than blue triangles, you should stick with red circles. The latter allows for social learning: if most other players chose blue triangles, it might be sensible to choose blue triangles yourself.

On average, pastoralists chose to view others' choices on 80% of trials, much more



Figure 1 | Subsistence practices. Pastoralists tend livestock (left) while horticulturalists grow plants (right).

often than horticulturalists, who, on average, viewed others' choices on only 36% of trials (town-dwellers were intermediate at 62%). Given that pastoralists and horticulturalists were from the same ethno-linguistic group, of similar ages, similar education levels, and the same gender (male), Glowacki and Molleman attribute this difference in learning strategy to differences in subsistence styles.

Why would subsistence shape learning style? Pastoralism, they argue, involves more interdependence in everyday decisions than horticulture. Pastoralism requires extensive knowledge of terrain, the location of water and rivals' territories, and how these change seasonally. In these situations, social learning is a safer bet than individual learning as one wrong decision could spell disaster. Pastoralism also requires collaboration in building communal water holes and stockades. Horticulture affords much more independence as decisions are made by individuals or individual families. One family's activities have little bearing on other families. These claims were supported by data showing that pastoralists interacted with more people and had more extensive social networks than horticulturalists.

The study has some limitations. The sample size is not huge, with only about 25 men in each of the three subsistence groups (pastoralists, horticulturalists, town-dwellers). The task has the advantage

of providing standardized decisions under controlled conditions, but it would also be useful to validate the responses: do those with a propensity for social learning in the task also consult others more in real life? Wealth may also be a confound. Horticulturalists receive small regular sums of money selling crops at market. Pastoralists receive occasional large sums of money selling livestock. If horticulturalists perceive themselves as less wealthy, they may focus more on payoffs and choose individual learning because this option, unlike social learning, shows their payoffs.

Overall though, Glowacki and Molleman's study is a valuable addition to a growing body of evidence that human learning strategies vary cross-culturally^{6–10}, and goes further than previous studies by identifying a potential factor — subsistence — that may shape that variation. More cross-cultural comparisons are needed with other groups that vary in subsistence as well as in other dimensions. Individual variation should be studied, as group differences obscure extensive individual differences⁶. Longitudinal studies would also be invaluable. Glowacki and Molleman note that Nyangatom horticulturalists often practiced pastoralism until losing their livestock to disease or theft. They assume that this change in subsistence causes a shift from social to individual learning. Longitudinal studies could test whether changes in subsistence do indeed

cause shifts in learning, rather than the reverse, or whether some additional factor is responsible.

Glowacki and Molleman's study is testament to the flexibility of human groups in balancing the need to maintain tried-and-tested cultural traditions via social learning with the need to innovate solutions to novel problems via individual learning. As the pace and impact of human-induced environmental changes grow, it will be increasingly important that all societies get this balance right. □

Alex Mesoudi is in the Human Biological and Cultural Evolution Group, Biosciences, University of Exeter, Cornwall TR10 9FE, UK.

e-mail: a.mesoudi@exeter.ac.uk

References

1. Aoki, K. & Feldman, M. W. *Theor. Popul. Biol.* **91**, 3–19 (2014).
2. Boyd, R. & Richerson, P. J. *Ethol. Sociobiol.* **16**, 125–143 (1995).
3. Glowacki, L. & Molleman, L. *Nat. Hum. Behav.* **1**, 0098 (2017).
4. Tennie, C., Call, J. & Tomasello, M. *Philos. Trans. R. Soc. B* **364**, 2405–2415 (2009).
5. Henrich, J. *The Secret of our Success: How Culture is Driving Human Evolution, Domesticating our Species, and Making us Smarter* (Princeton Univ. Press, 2015).
6. Mesoudi, A., Chang, L., Dall, S. R. X. & Thornton, A. *Trends Ecol. Evol.* **31**, 215–225 (2016).
7. Mesoudi, A., Chang, L., Murray, K. & Lu, H. *Proc. R. Soc. B* **282**, 20142209 (2015).
8. Bond, R. & Smith, P. B. *Psychol. Bull.* **119**, 111–137 (1996).
9. DiYanni, C. J., Corriveau, K. H., Kurkul, K., Nasrini, J. & Nini, D. *J. Exp. Child Psychol.* **137**, 99–110 (2015).
10. Berl, R. E. W. & Hewlett, B. S. *PLoS ONE* **10**, e0120180 (2015).

Competing interests

The author declares no competing interests.