SUPPLEMENTARY TEXT

This text accompanies Aplin et al. *Experimentally induced innovations lead to persistent culture via conformity in wild birds*

Cognitive processes associated with learning the task:

In this experiment, we chose to present a sliding-door task that could be solved by pushing to the left or right. We assumed that both of these options were similar in difficulty. This conclusion was supported by our experimental results, where the diffusion speed for each action was very similar, and with no difference between variants (A or B) in the GEE model (coefficient ± SE = 0.13±0.22, $P = 0.55$). However we also colored each side of the door differently (left-blue, right-red). Therefore while it is possible birds may have been observing demonstrators and copying their action of either "pushing left" or "pushing right", it is also possible that they may have been copying the color choice "blue" or "red". To help disentangle these possibilities, we conducted an extra trial in Feb 2013, additional to the main experiment. Puzzle-boxes were placed back into one sub-population where the established tradition was "right-red" with either: a) the door turned 180 degrees so that the color pattern was reversed (1 day); or b) the door turned 90 degrees so that each side showed both colors and the color-side association was completely broken (for 2 days).

In the first trial where the color-side association was reversed, 98% of individuals pushed at the established side (right) rather than at the established color (red): no. of solves = 62, no. of individuals = 31. In the second trial where the color-side association was completely broken, again 97% of individuals pushed at the established side (no. of solves = 266, no. of individuals = 54). Thus, in these trials, individuals were following a side preference rather than a color preference. This suggests that they had learnt either a fine-scale spatial or body action rule (i.e. either “push left”, or “peck at the right edge”). However we cannot exclude the alternative possibility that birds may have initially copied the color, and then subsequently formed a habitual movement behavior that strongly reinforced a side preference.

	Option A	Option B	No. of Individuals	% Established Variant
180 ^{o} 'Reverse' Condition	61	1	31	98%
90 ^{o} 'Broken' Condition	257	9	54	97%

Heterospecific contact with the puzzle-box:

Birds of four other species that regularly associate with great tits in the winter were also opportunistically PIT-tagged in the course of the study and in the preceding breeding seasons: blue tits (*Cyanistes caeruleus)*, marsh tits (*Poecile palustris*), coal tits (*Periparus ater*), and Eurasian nuthatches (*Sitta europaea*). Of these, only a high proportion of blue tits were PIT-tagged, as this species is abundant but also habitually uses artificial nest-boxes for breeding. The total number of individuals of these four species observed in each local population varied between 44 (T4) and 127 (T1). Of these, from 18 (T2) to 86 (T1) individuals apparently acquired the behavior in each replicate, showing a similarly strong bias towards the seeded variant as great tits (Table S1).

Due to the small proportion of individuals PIT-tagged, nuthatches, marsh tits and coal tits were not included in the main analysis. Although the majority of blue tits in Wytham Woods are PIT-tagged, only a subset of individuals could successfully and reliably manipulate the task, possibly due to their overall smaller size. While the total number of solutions performed by these species is large (3863), it is relatively small compared to the number performed by great tits (55,679), i.e. fewer than 7% of all solutions. Consequently, the focus in this study is on intraspecific social learning between great tits. However we note that the data in Table S1 provides suggestive evidence of interspecific social learning, with cultural transmission of the foraging technique moving from great tits to other species within multi-species flocks. Further exploration of the conditions under which information moves between as well as within species, using both observation and experimental techniques, would be valuable.

Table S1. Other species observed on the puzzle-box. Four other species were observed on the puzzle box. These species tended to perform many fewer solves per individual than in great tits where the average number of solves in treatment replicates was 133.5: blue tits, average = 12.3; marsh tits, average = 79.1; coal tit, average = 11.9; nuthatch, average = 21.8. Table shows the number of individuals of species observed on the puzzle-boxes in each replicate, the number of individual that solved and the total number of solves for option A/B for each species.

Replicate	Species	No. Visited	No. Solved	Total option A	Total option B
(a) Demonstrator = option A					
T1	Blue tit	107	71	453	29
	Marsh tit	7	6	619	2
	Coal tit	9	5	42	2
	Nuthatch	4	4	110	1
T2	Blue tit	35	15	60	1
	Marsh tit	7	2	314	0
	Coal tit	2	1	68	0
	Nuthatch	0	-	-	-
(b) Demonstrator = option B					
T3	Blue tit	71	34	5	1032
	Marsh tit	6	3	1	8
	Coal tit	9	4	0	17
	Nuthatch	2	0	-	-
T4	Blue tit	39	19	3	203
	Marsh tit	3	2	1	13
	Coal tit	0	-	-	-
	Nuthatch	3	2	0	20
T5	Blue tit	53	23	5	65
	Marsh tit	3	0	-	-
	Coal tit	3	1	0	2
	Nuthatch	0	-	-	-
(c) No demonstrator = control					
C1	Blue tit	13	2	4	43
	Marsh tit	0	-	-	-
	Coal tit	2	0	-	-
	Nuthatch	0	-	-	-
C2	Blue tit	53	9	19	8
	Marsh tit	4	2	1	1
	Coal tit	7	4	9	1
	Nuthatch	2	1	2	0
C3	Blue tit	23	14	104	397
	Marsh tit	1	0	-	-
	Coal tit	0	-	-	-
	Nuthatch	0	-	-	-