

Personalities promote adaptability

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Great Tit. Credit: Jan Wilmenga

Bold great tits lay their eggs earlier when under threat, the shy ones put it off. Such personality differences help maintain the biological variation essential for the survival of populations, as LMU biologists have now shown.

Bird populations can adapt to environmental change, as revealed by their flexible choice of the optimal time for rearing their chicks. Thus [high temperatures](#) induce them to begin nest building and egg-laying early in the year. In colder years, they tend to postpone the whole business until later. Natural selection favors such behavioral adaptability – provided that the required variation is available, i.e. genetic variants are present that confer 'phenotypic plasticity' on local populations. A study of [great tits](#) (*Parus major*), carried out by LMU behavioral biologist Niels Dingemanse and his doctoral student Robin Abbey-Lee, has now shown that this adaptability is in part attributable to differences in character and 'personality' between individuals. Their findings appear in the online journal *Nature Communications*.

In addition to ambient temperatures, the level of predation has an influence on the timing of nesting behavior, as fledglings are particularly vulnerable to attacks by [birds](#) of prey. The European sparrowhawk (*Accipiter nisus*) is a major predator of great tits. Sparrowhawks brood at a time when the new generation of tits is at the fledgling stage, which ensures that there will be plenty of food available for their young families. Conversely, great tits react to the hawks' presence by deferring breeding, in order to reduce the risk to their own offspring. As soon as they hear the call of the hunting sparrowhawk, they become markedly more alert and sing less often. "In previous studies, however, we found that not all birds display this reaction to the same degree," says Dingemanse. "Different individuals exhibit different personalities, and some are more explorative, daring and more aggressive than others."

Abbey-Lee and Dingemanse have now investigated whether these differences in character contribute to variation in the timing of breeding at the population level. During the [breeding season](#) – from April to June – the researchers exposed birds in a total of 12 tit populations to either the recorded call of the sparrowhawk or the song of the harmless blackbird.

The results showed, under these two conditions, character differences indeed had an impact on the timing of the breeding season. The more daring birds eagerly explore their local environment and normally breed late. But when confronted with an imminent threat – implied by the apparent presence of actively hunting sparrowhawks – they began breeding earlier than usual. The less valiant pairs behaved in exactly the opposite way. In the end, the two personality types achieved essentially equal levels of breeding success. The study's authors conclude from this that variation in character and personality does contribute to phenotypic plasticity in the timing of breeding periods in the population as a whole. "In this way, populations can also become more resilient in the face of anthropogenic alterations of their environments, such as climate change," Dingemanse points out.

More information: Adaptive individual variation in phenological responses to perceived predation levels. *Nature Communications*. DOI: doi.org/10.1038/s41467-019-09138-5

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