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Invited Commentary

The struggle to be heard in an increasingly noisy world: a comment on Roca et al.

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Noise associated with urbanization and other human activities represents a formidable challenge for wildlife, especially those that communicate acoustically (Lowry et al. 2013; Slabbekoorn 2013). This is because the low frequencies typically associated with anthropogenic noise can make it extremely difficult for individuals to be heard. In order to communicate effectively, animals need to be able to find ways to prevent their vocalizations from being masked. One way this can be achieved is for animals to elevate the frequency of their acoustic signals (i.e., calls and songs) above the urban din. But is it enough?

FUTILE FREQUENCIES

The results of Roca et al.'s (2016) meta-analysis underscore important taxonomic differences in the capacity of acoustically communicating animals to adjust the frequency of their calls or songs in response to anthropogenic noise. A key finding is that birds, on average, are able to shift the dominant frequency of their vocalizations, whereas anuran amphibians are less capable of doing so. Hence, some species may simply lack the capacity to flexibly adjust their call or song frequencies. Instead, such taxa may have to counter the effects of vocal masking in other ways (e.g., calling or singing during less noisy periods of the day or adjusting other vocal parameters, such as amplitude, call rate, or acoustic complexity)—or potentially risk extirpation.

It is important to realize, however, that even if animals are able to adjust their vocalizations (or behavior), such changes may still not be enough to counter the effects of a noisy environment (Nemeth and Brumm 2010). Nor are vocal adjustments necessarily beneficial. In this respect, modifications to acoustic signals could potentially be maladaptive if the changes result in a conflict between audibility, on the one hand, and signal reliability, on the other (Halfwerk et al. 2011). For example, certain call parameters (e.g., song complexity, frequency, call rate) are known to reveal important information about the quality of the caller and, as a result, play a crucial role in mate choice. By influencing reproductive outcomes, changes that affect the reliability of such signals could have a direct bearing on the quality and quantity of offspring produced—with important population-level and evolutionary consequences (Candolin and Wong 2012; Wong and Candolin 2015).

NOT JUST A SONG CONTEST

Animals communicate acoustically for a myriad of reasons. Yet, research focusing on adjustment of acoustic signals has focused almost exclusively on signals involved in mate attraction (e.g., bird songs and anuran advertisement calls). By contrast, far less attention has been given to understanding the effects of anthropogenic noise on acoustic signals produced in other contexts, such as predator avoidance (Potvin et al. 2014) or parent–offspring communication (Leonard and Horn 2005). This needs to be redressed, especially as the efficacy of vocalizations, such as alarm calls, can directly influence survival.

PUTTING LESSONS INTO PRACTICE

And what about the practical lessons that can be gleaned from studies such as Roca et al.? Largely untapped opportunities lie at the intersection of behavioral ecology and wildlife conservation and management (Caro 1998). In the context of anthropogenic noise, the application of behavioral knowledge could be used to contribute toward practical conservation and management outcomes. For example, the finding that birds and anurans differ in their capacity to shift vocal frequencies (or other call parameters, for that matter) suggests that different approaches may be warranted in managing anthropogenic noise in different urban habitats (e.g., wetlands vs. forests). Sound barriers and noise curfews, which are already widely used in urban planning to limit the impact of anthropogenic noise on human inhabitants, could also be useful in helping animals to find their voice in an increasingly noisy world (Slabbekoorn and Ripmeester 2008).

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