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Invited Commentary

Animal communication in a human-dominated world: a comment on Radford et al.

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Humans have caused widespread changes to environments worldwide. Such changes can impair animal communication by interfering with every stage of the communication process—from the way signals are produced and transmitted through the environment to how they are perceived and evaluated by receivers (Rosenthal and Stuart-Fox 2012). Critically, due to the pervasive nature of anthropogenic disturbance, few (if any) of the sensory modalities used by animals to communicate are likely to be immune. Changes that affect communication, in turn, can profoundly impact on animal reproduction and survival because of the vital role communication plays in mediating behaviors, such as foraging, predator avoidance, and mate selection (Candolin and Wong 2012). Not surprisingly, there has been considerable interest in trying to understand how human-induced environmental changes affect animal communication. Yet, despite this, much of our research attention remains focused narrowly on only a handful of taxa and sensory modalities. As a result, significant knowledge gaps remain. Radford et al. (2014) provides a timely reminder of why a more expansive approach is warranted.

BEYOND BIRDS

In the context of human disturbance and acoustic communication, most of what we know has come from studies carried out in terrestrial environments, with a heavy emphasis on birds and, to a lesser extent, frogs. In aquatic environments, studies have focused largely on marine mammals. However, as Radford et al. (2014) point out, many species of fish also use sound to communicate with each other. Indeed, the use of acoustic signals may be far more widespread in fish than is currently appreciated (Slabbekoorn et al. 2010). Thus, like birds, frogs, and marine mammals, acoustic communication in fish is also susceptible to anthropogenic noise and other human disturbances (Slabbekoorn et al. 2010; van der Sluijs et al. 2011). Unfortunately, detailed empirical studies of anthropogenic impacts on acoustic communication in fish are desperately lacking. Given the dearth of research, work on other taxa can certainly help provide insights and inform the kinds of questions that need to be addressed (Slabbekoorn et al. 2010; Radford et al. 2014). However, taxonomic differences in the mechanisms of sound production and detection, as well as differences in the transmission properties of sound in water and air, mean that the impacts of anthropogenic noise may not always be directly comparable. For instance, sound is able to travel further at higher amplitudes in aquatic environments, which has implications for acoustic communication—as well as the potential for anthropogenic noise to affect organisms at longer distances—in aquatic environments (Slabbekoorn et al. 2010). Such differences underscore the necessity for more direct testing of anthropogenic impacts in taxonomic groups that have, to date, been largely neglected.

…AND A BIT MORE SENSE

Another important challenge will be to overcome our own sensory predilections. To date, researchers interested in understanding the effects of human disturbance on animal communication have focused almost exclusively on visual, acoustic, and olfactory communication at the expense of other sensory modalities and their interactions (Rosenthal and Stuart-Fox 2012). Such a narrow approach can severely underestimate the impact of human activities on animal communication (Heuschele et al. 2009; Candolin and Wong 2012). Not only do many animals communicate using sensory channels that are dissimilar to our own (e.g., electrocommunication), but even in cases where the same sensory modalities are employed, perceptual abilities are often strikingly different (e.g., capacity to see ultraviolet signals or hear infrasound). Yet, despite all this, our knowledge of how such systems are affected by anthropogenic change remains rudimentary. Because communication typically involves multiple sensory modalities, impairment of any one (or combination) of these can have largely unexplored and underappreciated effects that are likely to depend on environmental context, the relative importance of the different sensory modalities, and the information being communicated (Candolin and Wong 2012; Rosenthal and Stuart-Fox 2012; Radford et al. 2014). Future advancements, in this regard, will require a research effort that is better informed by sensory ecology and far less encumbered by our own perceptual biases (Lim et al. 2008).

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