

Summary

Our knowledge of how aquatic birds hear and make use of sound cues in-air and underwater is currently very limited. The in-air and underwater hearing sensitivities of the great cormorant (*Phalacrocorax carbo*) were investigated, using psychophysical methods and operant conditioning techniques. Psychophysical studies rely on training an animal to understand a paradigm, where by answering correctly to a sound stimulus it will obtain a reward. Even though it takes much longer time to collect such data than using ABR (auditory brainstem response), the benefit is that the derived thresholds not only incorporates signals generated by the brainstem, but also incorporates the decisions regarding whether or not a stimulus is detected in different areas of the brain, from the brainstem to the cortex. The studies were performed without having to constrain the bird's diet and maintaining a healthy body weight throughout all experiments. The great cormorant is an interesting species for these investigations, being one of the most effective marine predators, able to take long and deep dives, and relying on the marine environment for food year round. Our findings show that the great cormorant is more sensitive to in-air sounds than previously believed and its hearing abilities are comparable to several other species of birds of similar size. In water, the great cormorant is surprisingly sensitive to underwater sounds. Its thresholds are similar to the ones of underwater hearing specialists such as true seals and toothed whales within this frequency range. These results may have great implications for our understanding of the sensory capabilities of not only cormorants but also other marine birds, and for how they are affected by human underwater noise sources. A further study was conducted to investigate whether engaging in research provides positive mental stimulation in an animal. The purpose was to examine methods for ensuring the mental well-being of animals in human care. The findings show that captive animals might react to research involving cognitive challenges differently, not only between species, but also between animals of different personalities.