



How animals compensate for a noisy channel by changing the sounds they produce.

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There has been growing recognition that humans are making habitats more noisy in the last century or so, and that this increase in noise may make it more difficult for animals that use sound for communication, orientation and echolocation. A dominant source of noise is human transportation, from vehicles and aircraft putting sound in the air, to ships putting sound into the ocean. The first alarm about the effects of sound on marine life involved calculations that the noise of ships could mask the calls of whales, reducing the range over which they could communicate from hundreds down to tens of kilometers. Acoustic measurements have shown that some whale calls can be detected hundreds of km away, but we still do not know how significant ship noise is in masking the calls of whales. What we do know is that when whales are exposed to noise, they can alter their calls to improve the chances that the call will be detected. Communication engineers have identified mechanisms for increasing the detectability of signals including: waiting to call until noise decreases, increasing the rate of calling, increasing signal intensity, increasing the signal duration, and shifting the frequency of a signal outside of the noise band. I will discuss evidence that animals such as birds and whales can use all of these mechanisms to compensate for elevated noise. The last three mechanisms involve modifying the acoustic structure of the call based upon auditory input. Biologists call this ability vocal production learning. It is viewed as enabling complex learned systems of communication in several taxa of birds and mammals, and is obviously important in the evolution of human language..

Noise is ubiquitous in communication, and I suggest that some mechanisms to compensate for noise represent primitive forms of vocal learning that may have enabled more complex forms of learning in the evolution of animal communication systems



**Thursday January 31st at 10.15; Room 127,
building 1131 (zoofys kaffestue)**