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Tools Up or Tools Down? Modelling the Efficiency of Cricket Singing

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4pm - 5pm ET

Most have heard the deafening evening chorus of singing insects somewhere in the world. Typically crickets dominate this chorus and are indeed thought to have evolved to be as loud as possible. The males make sounds that attract females. Loudness confers a fitness advantage because the sound travels further, potentially attracting more females. For the most part, crickets exploit resonance in their sound producing structures to improve their acoustic efficiency. Unfortunately, they are quite small making them inefficient at the next step, as they radiate the sound that this vibration generates. One group of crickets, the tree crickets, have evolved a tool called a baffle to escape this constraint. In the first part of the talk, I'll describe how we used finite element modelling to study the efficiency and optimality of baffles. This method generated an interesting opportunity. Since we now have a method to quantitate the efficiency of cricket singing, we can also ask why other insects continue to sing without baffles. Tool use is generally rare among animals and the "lack of utility" hypothesis suggests tools do not produce sufficient advantage in most real-world scenarios to drive their evolution. In the second part of the talk, I'll describe our attempt to understand whether singing efficiency in realistic scenarios with non-idealised sound-propagation indeed explains the lack of tool use across most cricket groups.

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