**Biology Seminar: Mar. 7**

**Communication Networks in Bats**

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**Abstract**

How bats adapt their sonar behavior to accommodate the noisiness of a crowded day roost is a mystery. Some bats change their pulse acoustics to enhance the distinction between theirs and another bat’s echoes, but additional mechanisms are needed to explain the bat sonar system’s exceptional resilience to jamming by conspecifics. Variable pulse repetition rate strategies offer one potential solution to this dynamic problem, but precisely how changes in pulse rate could improve sonar performance in social settings is unclear. Here we show that bats decrease their emission rates as population density increases, following a pattern that reflects a cumulative mutual suppression of each other’s pulse emissions. Playback of artificially-generated echolocation pulses similarly slowed emission rates, demonstrating that suppression was mediated by hearing the pulses of other bats. Slower emission rates did not support an antiphonal emission strategy but did reduce the relative proportion of emitted pulses that overlapped with another bat’s emissions, reducing the relative rate of mutual interference. The prevalence of acoustic interferences occurring amongst bats was empirically determined to be a linear function of population density and mean emission rates. Consequently as group size increased, small reductions in emission rates spread across the group partially mitigated the increase in interference rate. Drawing on lessons learned from communications networking theory we show how modest decreases in pulse emission rates can significantly increase the net information throughput of the shared acoustic space, thereby improving sonar efficiency for all individuals in a group. We propose that an automated acoustic suppression of pulse emissions triggered by bats hearing each other’s emissions dynamically optimizes sonar efficiency for the entire group.