**BIONB 4200: Writing assignment 2**

**Due Friday Oct 23rd before midnight via email (jld276@cornell.edu)**

Appropriate length: 5-7 paragraphs

This writing assignment will assess your understanding of the concepts presented in class 7 and class 8, learned and innate signals and the evolution of acoustic communication, respectively. Use your notes from class, the powerpoint slides from lectures (http://www.jenelledowling.com/#!writing-assignment-2/pbge7) and the readings that were assigned for each class. Both guest lecturers will be available via email if you have questions about the concepts they presented: Kevin Rohmann (knrohmann@gmail.com), Sam Carouso (svc22@cornell.edu). Sam will also be available for office hours, just email her to set up a time. I will also be available during my normal office hours (M and F 1:30-2:30) to read drafts and answer questions.

1. In class 8, you learned about how the characteristics of the peripheral auditory system affect sensitivity to different frequencies. Come up with a hypothetical scenario for how acoustic communication could develop over evolutionary time. Start with an ancestral organism of your choice. Describe in detail the anatomical factors that determine the limits of acoustic space that organisms can perceive.

* What characteristics of the peripheral nervous system and hair cells determine the frequency range the animal can hear?
* How would this affect the signal characteristics that could be used to communicate?

From there, describe how an elaborate acoustic communication system (like many we see today) might develop over generations in this species (review the definition of communication in ch 1 of Bradbury and Vehrencamp). How might ecological factors and selective pressures cause the ancestral population to split into isolated groups (i.e. speciate) who communicate in different acoustic ranges and in different ways? Be creative and descriptive! Describe the process as a story, but be sure not to sacrifice accuracy of the process (describe evolution by natural selection correctly, and check with me if you’re unsure about any aspect).

2. Once you’ve described how acoustic communication evolved in your imaginary scenario, describe how a single newly born/hatched individual in your ancestral population is able to develop the ability to communicate over their lifetime. Describe whether the trait is innate or learned in your species and what exactly that means in terms of neural circuitry, involvement of tutors, feedback from conspecifics etc. Draw a timeline that summarizes the process of signal acquisition in your individual (include when the sensory and sensorimotor phases occur, when the acoustic signal is plastic and if/when signal is crystallized). Describe how this timeline affects the possibility of plasticity later in life and the possibility of socially guided learning.