

**Alcock Ch. 2, in part. " Proximate & Ultimate Causes of Bird Song"**  
**Study Guide/Questions**  
Ethology and Behavioral Ecology

Please read pp 29-43. *This assignment should take about 1 hour or so.*

*Introduction:* For the moment we will only read the part of the chapter that deals with proximate causation (mechanism – think of Tinbergen’s four approaches to behavior) of bird songs (an example behavior). As you read these pages notice the complex interactions that occur during the development of behavior and the complex relationships between genes, experience, and the production of structures needed for behavior and the behavior itself. As you read, think about the ill formed “nature-nurture debate” and also about the approaches required to bring us to our present understanding of the mechanisms and development of behavior.

1. What are song dialects and what evidence is there that these dialects in white crowned sparrows (wcs) are acquired through experience – but where not all experiences are equal?
2. Briefly summarize (in a few sentences) the main findings of Marler et al regarding the development of song in male white crowned sparrows (wcs)?
3. What is meant by the terms "critical period" and "crystallization" in regards to song? Are critical periods necessarily absolute in the wcs? Explain. Take a guess as to why, in mechanistic terms, critical periods might exist.
4. What does social experience have to do with the development of **wcs** song?
5. In the normal wcs environment, what song will a male eventually produce? Will it do so even if other songs are heard?
6. Discuss the differentiation of the brain of the male and female wcs as initially set in motion by having the ZZ vs. ZW chromosome complement. What hormones are involved in the sexual differentiation of the song control system in zebra finch brains? How do we know these are involved in one sex and not the other?
7. In general terms, what is a central nervous system **nucleus** (structurally and functionally)?
8. What is it about the structure of nuclei that makes control and information storage possible? (You may need to think about this one or ask in class)
9. Why should the size of the robust archistriatum (RA) vary according to sex and season?
10. Speculation – where do you think the bird song pattern generators are in wcs brains? One place or several? Explain your hypothesis.
11. Discussion question 2.2 is especially useful.