

IBIO*6000 (Winter 2014)

Advances in Ecology and Behavior (0.5 graduate credits)

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General outline: Integration of behavior with other traits

Why do traits sometimes covary among individuals in a population? The traits expressed by an organism affect its performance at various tasks under particular ecological conditions, such as whether an organism can acquire nutrients to grow, avoid death (at least temporarily), and reproduce. Thus, performance potentially links trait values to parameters that govern population ecology (birth and death rates) and evolution through effects on individual fitness. Organisms express many traits though, and a significant challenge is to understand how multiple traits become integrated (may operate together to enhance performance) and so covary in a population. For example, predation may favor the adaptive integration of multiple anti-predator traits in a prey population, such as particular combinations of protective coloration and anti-predator behaviors. Selection may also favor the integration of various behavioral traits across different ecological contexts expressed as an adaptive behavioral syndrome. However, traits that appear to be integrated (ie, covary together) may also occur for other non-adaptive reasons, such as when the traits (or their underlying genes) are connected by unavoidable structural relationships. Thus, not all traits that covary actually jointly affect performance. A challenge then is to distinguish between traits that are integrated for performance reasons from those that only appear to be. In this course, we will explore how performance mediates the relationship between traits and fitness, and then try to extend this idea to test if behavioral and other traits may jointly affect performance in ways that favor behavioral traits to become integrated with other traits.

We will start by reading and discussing primary literature that introduces the concepts of trait-related performance, trait integration and behavioral syndromes. Students will then choose a particular system in which behavioral traits are correlated with other traits (behavioral, physiological, morphological, life history). They will then apply their understanding of performance and integration to critically evaluate whether the covarying traits may plausibly affect organismal performance, and so reflect adaptive trait integration. By doing so, you will develop ideas about how to test for behavioral trait integration.

Student roles:

- Attend weekly 1.5 hr seminars (or more! - depending on class size; TBD) where specific readings will be assigned and discussed
 - Initially, these seminars will be lead by the instructor.
 - Later, these seminars will be lead by each student when they present and discuss a particular example of behavioral trait integration (ie., with respect to predation, competition, social contexts, etc.)
 - presentations will normally be approximately 45 mins (max.) followed by 45 mins of discussion.
- Student presenters will provide 1-2 papers for the class to read 1 week prior to their presentation.

- Student presenters will also be provided on the date of their presentation an annotated bibliography that describes up to 10 primary source scientific papers (including those provided) that they have researched on their particular topic.
- The student presentation does not need to discuss in detail all of the papers studied in the annotated bibliography, but should try to make links among at least half of the papers included in the annotated bibliography.

Annotate the papers as follows:

- an alphabetical listing of each reference (including: authors, date, title, journal information, etc.)
- for each paper, a 1-2 paragraph analysis of its:
 - central question(s), methods used and central findings (don't simply reiterate the abstract),
 - your critical appraisal of the paper's strengths vs. weaknesses (whether it is novel vs. conventional with respect to ideas, methods, etc...),
 - your critical appraisal of how it contributes to understanding behavioral trait integration.

Students in the audience are required to read the scheduled paper(s) prior to each presentation, and come prepared to discuss and help the group to greater understanding. To facilitate this, bring 3 written questions about the readings to each presentation to motivate discussion. Give a copy of these questions to the instructor at the end of each session.

Evaluation: Evaluation will rely on four sources.

First, peer review is a central social element of science, and so students in the audience will evaluate each student presentation by filling out an evaluation report provided at each session.

Second, the instructor will also evaluate presentations and the annotated bibliography.

Third, each student will perform a self-evaluation following his or her seminar using the same form. Each student will then meet with the course instructor 1 week after their seminar to discuss the presentation/discussion evaluations from these 3 sources.

Fourth, all students will be evaluated on their participation in discussions throughout the term. Our goal is to learn together through discussion (and not rely only on the instructor!). Participation will be evaluated based on your intent to learn, not on the specific contents of your remarks (in other words, there are no stupid questions or attempts at answers!).

Seminar (70%): ((Mean of all Peer and Presenter evaluations) + Faculty evaluation)/2

Annotated bibliography (20%): determined by Instructor

Participation (10%): determined by Instructor