

Evolutionary Processes and Puzzles
Psychology 4850N
Spring 2010

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Office Hours: Tuesday from 1:00 – 2:00pm or by appointment

Class Time: Mondays from 6:00 – 8:50pm; Wednesday April 14 from 6:00 – 8:50pm

Classroom: C630

Seminar Description:

Darwin's theory of evolution by natural selection provides a framework for understanding the incredible biological diversity we observe in nature. Yet, many phenomena seem to defy Darwinian logic and are, therefore, "puzzles" in need of solutions. This seminar is broadly organized into two parts. During the first part of the course, we will focus on puzzles that have been addressed since Darwin began thinking about evolution in the mid-nineteenth century. This will allow us to become familiar with various processes by which evolution by natural selection occurs as well as identify general principles concerning the biological phenomena that evolution by natural selection produces. Furthermore, because this course is offered by the Department of Psychology, we will work towards an understanding of how these processes and general principles apply to psychology and behavior. In the second part of the course, we will use our understanding of evolution by natural selection to tackle some of the remaining evolutionary puzzles that contemporary evolutionary psychologists are working toward solving. The overall goal of the course will be to illustrate, through readings and discussion, how novel and creative thinking aimed at explaining puzzling phenomena in the context of evolutionary theory can help further elucidate the various processes by which the evolution of psychology and behaviour can occur.

Seminar classes are intended to be quite different from lecture-based courses. Most obviously, seminar classes emphasize discussion and active participation among students. I will, as the instructor, guide discussion, but ultimately the more effort you put in, the more you stand to gain from the learning experience this course has to offer. Thus, it is key that you come to class prepared. Adequate preparation entails that you come to class not only ready to discuss the content of the readings, but also that you come to class after having given yourself time to think beyond the content of the readings and consider their broader implications. To help you along, I have provided "food for thought" types of questions to go along with each week's readings. My expectation is that you will reflect on these questions such that I can call upon you to share your thoughts during class. Please do not let this make you anxious. I am not doing this because I am trying to torture you. I am also not doing this because I want everyone to know the answers to the questions before class even starts (a lot of the time, I suspect, there will not be a single "right" answer anyway). Whatever intelligent thoughts or even further questions you come up with will be sufficient. My aim is for students to come to class after having

thought deeply about similar issues in the hope that it will foster better discussion and an opportunity to learn from each other.

I recognize that most students who take this course are not likely to become evolutionary psychologists, and so the subject matter, although likely of interest to you seeing as you are here, might not directly apply to the career path you inevitably choose. That said, this course offers a lot beyond the opportunity to learn about and discuss a number of interesting topics that will be applicable to almost any career. First and foremost, this class will challenge you to think critically and creatively, combining concepts and lessons from the past and applying them to new problems in need of solutions. Second, this class will help you hone your abilities to articulate ideas and arguments as well as “think on your feet.” To this end, I encourage you to participate because the only way to improve your communication skills is to practice communicating. Even if you are worried that you do not know the best way to get your ideas across or that your ideas are “half-baked,” I strongly encourage you to speak up. I can tell you from personal experience that once you get over the anxiety of expressing your ideas publicly and stop caring about whether you look smart, that is when you really start to get the most out of seminar classes.

Required Readings:

The full list of readings is presented in the seminar schedule (see below). The schedule highlights the readings that will be focused on each week as well as the “food for thought” questions that will form the basis of each seminar class.

For the first part of the course, we will read a well-written, prize-winning popular science book that encapsulates many fundamental aspects of evolution by natural selection while simultaneously engaging the reader. The book is available at the campus bookstore, and the full citation is:

Weiner, J. (1994). *The Beak of the Finch*. New York: Vintage Books.

For the second part of the course, we will read a series of carefully chosen academic articles and book chapters, each of which details a particular aspect of psychology or behavior that is an evolutionary puzzle (see seminar schedule below). In general, the readings are more conceptual, as opposed to empirical and data-rich, in scope.

The required readings (i.e., journal articles) are made available on the university Coureware (WebCT) seminar page, which can be accessed by logging in with your uleth webmail username and password here:

<https://courseware.uleth.ca/webct/logonDisplay.dowebct>

Grading:

The following ranges will be employed in assigning grades in this course:

A+ > 89.5	C+ 66.5-69.4
A 84.5-89.4	C 63.5-66.4
A- 79.5-84.4	C- 59.5-63.4
B+ 76.5-79.4	D+ 56.5-59.4
B 73.5-76.4	D 50-56.4
B- 69.5-73.4	F <49.9

In accordance with the University of Lethbridge Calendar,

A = Excellent
B = Good
C = Satisfactory
D = Poor
F = Fail

Evaluation:**Quizzes (40%):**

Quizzes will take place each week at the beginning of class to assess comprehension of the reading material. The format of the quizzes will be multiple choice, matching, and/or short answer. In all, there will be ten quizzes. I will use your eight best marks out of the total ten quizzes to calculate this portion of your grade.

Oral Responses to “Food for Thought” Questions (20%):

Each week, I will provide a list of “Food for Thought” questions to go along with the readings. I will select students at random to provide oral responses to these questions. Quality responses are those that contribute insightful and well-reasoned perspectives that are well-articulated and foster discussion (they do not need to entail “be all and end all” answers to the questions). Students can expect to be selected approximately once out of every two weeks. That said, just because you are selected one week, that does make you “safe” the following week. Again, I would like to stress that I include this as part of the evaluation to encourage you to think deeply about the course material as well as develop effective communication skills, not because I am trying to torture you.

The basic structure for this part of your grade will be: 20% = always provide a quality response; 15% – 19% = almost always provide a quality response; 10% - 14% = often provide a quality response; 5% - 9% = often provide a poor-quality response; 0% – 4% = almost always provide a poor-quality response.

Participation in Classroom and Courseware/WebCT Discussions (20%):

Students can earn 20% of their grade simply by participating. If you say something intelligent in each class (even raising an insightful question counts, regardless of whether you know the answer), you’ll receive participation marks. Participation in Courseware (WebCT) directed discussions will also count toward participation marks. Both the in-class and Courseware (WebCT) discussions will be “directed” by the “Food for Thought”

questions. These questions will, therefore, serve as a launching pad for discussion, but I encourage students to think (and discuss) broadly about the issues under investigation. I will rein in the discussion if it runs too far a field. Students who relate seminar material to other readings that they have made the effort to search out will be viewed very favorably.

If you do not participate in discussions inside and outside of the seminar via the University Courseware (WebCT) system, your final grade will suffer. Students who do not participate in the seminar discussions should not be surprised to get zero for this portion of their grade. No grades will be assigned for attendance (it's not enough to simply be a warm body).

The basic structure for this part of your grade will be: 20% = always participated; 15% – 19% = almost always participated; 10% - 14% = often participated; 5% - 9% = participated sometimes, but not often; 0% – 4% = little to no participation.

End-of-Term Test (20%):

An end-of-term test is worth 20% of your grade. The test will be written-format. Two weeks prior to the test (March 29), I will provide a handout containing a number of questions. Some, but not all, of these questions will be based on readings that I will also provide you with on March 29. I will choose a subset of the questions from this handout to put on the end-of-term-test, which will take place on Wednesday April 14, 2009.

Bonuses:

Participation in Department of Psychology studies (maximum 2%):

After your final grade has been calculated (not including possible bonuses you might accrue from the short presentations [see below]), you can have an additional 2% added onto your final grade if you have participated in some research in the Department of Psychology. This will give you an opportunity to experience how psychological research is conducted. A list of potential projects in which you can participate will be listed on the seminar's Courseware (WebCT) Announcements page approximately two weeks after the start of the course. Because research projects start up throughout the semester, additional projects may be listed during the course of the seminar.

Short presentations (2%):

Every week, students (up to a maximum of 2 students/week) who choose to do so will each give a short (approximately 2-3 minute) presentation. For these presentations, students are asked to find an example of an odd or elaborate behavior found in the animal kingdom (you must choose a non-human animal), to describe the behavior to the class, and to briefly talk about why the behavior might exist. In preparing your presentation, please provide a visual (acetate overhead or powerpoint slide) of the animal engaging in the odd behavior as well as one or two brief points. The goals of this exercise are to give you an opportunity to earn additional marks, practice speaking to a group of people, and provide a fun way of learning about some of the intriguing behaviors that exist in the animal kingdom. Those students who wish to do short presentations should identify themselves during the first class and a schedule will be drawn up. (If you choose to use powerpoint, please come to class early to set up the presentation).

Other information about the seminar:

- (1) If you are disrespectful to other members of the class, you will be asked to leave.
- (2) Additional work will not be assigned for those who wish to improve their grades.
- (3) Please turn off your cell phones during the seminar (this falls under being disrespectful).
- (4) Students can write missed tests if they provide appropriate documentation from a doctor stating that they were ill and that their test performance would have been seriously affected on the day of their illness. The documentation must have the doctor's name, address, and phone number. Non-medical reasons for missed exams (e.g., a death in the family) must also be supported with appropriate documentation.

SEMINAR SCHEDULE

<u>Date and Readings</u>	<u>Food for Thought Questions</u>
<p><u>Jan. 11</u> Introduction to the Course</p>	
<p><u>Jan. 18</u> <i>The Beak of the Finch:</i> Chapters 1 - 5</p>	<p>What is natural selection? How does it work? What's needed for it to occur? Why is it useful to study the beaks of finches?</p> <p>Do you have to study natural selection in an isolated population? Why or why not?</p> <p>What's the answer to Darwin's question in the last sentence of paragraph 2 on page 40?</p> <p>Why is variation necessary for selection to take place?</p> <p>Explain Paley's watchmaker argument and how the theory of natural selection stands in contrast.</p> <p>Describe Lack's work on San Cristobal and the evolutionary principle it revealed.</p> <p>Why was it important to study the finches on Daphne major in the dry and wet season? What evidence is there that natural selection affects behaviour in the finches?</p> <p>How and why did the selection event of 1977 affect males</p>

	and females differently on <i>Daphne major</i> ?
<p><u>Jan. 25</u> <i>The Beak of the Finch:</i> Chapters 6 - 10</p>	<p>Provide an example of how several conflicting selection pressures affect the evolution of a species.</p> <p>How is sexual selection different from natural selection? What was being sexually selected among <i>fortis</i>?</p> <p>If selection favours larger finches, then why are there species of small and medium sized finches? How did the events that followed the El Nino rains help elucidate this?</p> <p>Why is there biological diversity?</p> <p>One male finch lived an extremely long time, but left no descendents. What principle does this underscore?</p> <p>Why might you think hybrids would be (un)fit? Examples?</p> <p>How does natural selection produce complexity?</p> <p>How does natural selection produce new species?</p> <p>If you split a population of animals into two and then put each half on identical, but separate islands, would they follow the same evolutionary trajectory? Why or why not?</p> <p>Describe the concept of an adaptive peak. Is there always only one?</p>
<p><u>Feb. 1</u> <i>The Beak of the Finch:</i> Chapters 11 – 15</p>	<p>Why is mate choice important for fitness? How does selection make animals sexually discriminative? What other sorts of discriminations are necessary?</p> <p>Describe the example of how a developmental “mistake” in bird song learning might on rare occasions lead to fitness benefits.</p> <p>Describe the decoy experiments of Ratcliffe and Grant. What do these experiments tell us about the mating psychology of the finches? What are the general principles we can gather from these experiments? What are the consequences of sexual selection on psychology and</p>

	<p>population divergence?</p> <p>What evidence is there that the manner in which animals advertise themselves might be reflective of their physical characteristics?</p> <p>Why is the rise of novel adaptations from small and gradual beginnings an evolutionary puzzle? What's the answer to this puzzle?</p> <p>What are some consequences of the emergence of a new adaptation?</p> <p>Why does one species of stickleback feed on the bottom and one on the top? How is this similar to the finches? What's the general principle?</p> <p>How has the cactus finch specialized? What is the consequence of specializing? How is it beneficial and how is it detrimental?</p>
<p><u>Feb. 8</u> <i>The Beak of the Finch:</i> Chapters 16 - 20</p>	<p>Consider the case of the soapberry bug and describe the evolutionary principle that comes to mind when you read the statement "the beak of the soapberry bug should be just long enough to reach the seeds."</p> <p>In what way is the effect of humans on other species novel? In what way is it not? What types of consequences are the behaviour of humans having on the earth's species?</p> <p>What happens when selection pressure increases? What happens when it decreases? Apply this principle to selection on an animal's psychology? Examples of psychological domains to consider are mating, recognition of conspecifics, visual perception abilities (can you find examples from the animal literature to support your claims?).</p> <p>The principles of evolution are ubiquitous. That is, selection is everywhere. Provide examples of other arenas (i.e., beyond the genotypes of populations) in which the principles of selection apply.</p>

	<p>In what way is tool use in humans similar to tool use in other animals? In what ways is it different? What are some different ways in which the psychology of tool use can be organized (think of examples from the book and elsewhere)?</p> <p>Given the principles we've become familiar with in this book, what sorts of considerations do we have to make when we consider the issue of how selection has shaped the way that animal (including human) brains and behavior work? How should they be organized? What sorts of themes should we expect (e.g., high degree of specialization versus flexibility)?</p>
<p><u>Feb. 15</u> Reading week: No Class</p>	
<p><u>Feb. 22</u> Buss et al. (1998). Adaptations, exaptations, and spandrels. <i>American Psychologist</i>, 53, 533 – 548.</p> <p>Bailey, N. W., & Zuk, M. (2009). Same-sex sexual behavior and evolution. <i>Trends in Ecology and Evolution</i>, 24, 439 – 446.</p>	<p>What was Darwin trying to explain via his theory of evolution by natural selection? How is this similar to what evolutionary psychologists are trying to explain?</p> <p>How does inclusive fitness theory refine Darwin's original theory?</p> <p>What are adaptations, exaptations, spandrels, and functionless by-products? How are they different? How are they similar, if at all? Why are these concepts important when trying to understand the evolution of psychology?</p> <p>Why is same-sex sexual behaviour an evolutionary puzzle?</p> <p>How do the different types of hypotheses listed in Table 2 relate to the different concepts described in the Buss et al. (1998) article?</p> <p>What are the implications of each of the hypotheses listed in Table 2 for the underlying psychology of same-sex sexual behaviour?</p> <p>What are some of the evolutionary consequences of same-sex sexual behaviour?</p>

<p><u>Mar. 1</u> Nesse, R. (1998). Emotional disorders in evolutionary perspective. <i>British Journal of Medical Psychology</i>, 71, 397 – 415.</p> <p>Keller, M. C., & Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? <i>Behavioral and Brain Sciences</i>, 29, 385 – 452. (Note: I am only assigning the main article, and not the peer commentaries that follow. You may wish to read the commentaries as well because they may aid critical thinking regarding the target article).</p>	<p>What are the functions of emotions? What aspects of psychology and behaviour do they influence? Examples?</p> <p>How should the psychology of emotion be organized if emotions are the product of natural selection?</p> <p>Why are emotional disorders an evolutionary puzzle?</p> <p>Which concepts from <i>The Beak of the Finch</i> and the Buss et al. (1998) article seem to apply to emotional disorders? How so? Examples?</p> <p>Why are mental disorders an evolutionary puzzle? What are some of the arguments to the contrary and why are they weak?</p> <p>What is the distinction between pathological and non-pathological symptoms of mental illness? Why do Keller and Miller emphasize conceiving of mental illnesses as being part of a continuum as opposed to discrete mental states?</p> <p>What are the different genetic models concerning mental illnesses? How does each account for the persistence of mental illnesses over evolutionary time?</p> <p>Describe the Watershed analogy. How might this concept relate to mental illnesses specifically and the manner in which psychology is organized more generally?</p>
<p><u>Mar. 8</u> Sachs et al. (2004). The evolution of cooperation. <i>Quarterly Review of Biology</i>, 79, 135 – 160.</p>	<p>What is cooperation? What are the different types of cooperation? Why is cooperation an evolutionary puzzle?</p> <p>Why is it easier to explain cooperation among genetic relatives than it is to explain cooperation among non-relatives?</p> <p>What are some of the different models of cooperation and what do they suggest about the psychological underpinnings of cooperative behaviour?</p>

<p>Sterelny, K. (2006). The evolution and evolvability of culture. <i>Mind & Language</i>, 21, 137 – 165.</p>	<p>Much of the paper deals with cooperation in other species. How might some of these ideas relate to cooperation in humans or between humans and other species?</p> <p>What is culture and cultural information? How is the flow of cultural information (e.g., memes) from one generation to the next similar to the flow of genetic information from one generation to the next? How are they different?</p> <p>What situational conditions and psychological abilities are needed to have a flow of cultural information?</p> <p>Can other species have culture (as defined and discussed by Sterelny)? Why or why not?</p> <p>Why is the existence of culture puzzling from an evolutionary perspective? How might we explain its existence by considering the costs and benefits of culture? What might some of the implications of the costs and benefits of culture be for how people behave toward one another?</p>
<p><u>Mar. 15</u> Alexander, R. (1986). Ostracism and indirect reciprocity: The reproductive significance of humor. <i>Ethology and Sociobiology</i>, 7, 253 – 270.</p> <p>Sosis R., & Alcorta, C. (2003). Signaling, solidarity, and the sacred: The evolution of religious behavior. <i>Evolutionary Anthropology</i>, 12, 264 - 274.</p>	<p>What does Alexander hypothesize to be the functions of humour? Can you think of additional functions of humour that might be of evolutionary significance?</p> <p>Why might humour be unique to humans? What psychological abilities are necessary for humour? How might the concepts of adaptation, exaptation, spandrel, and functionless by-product apply?</p> <p>What is puzzling about the existence of religion?</p> <p>How are religious rituals similar to ritualized communication behavior in nonhuman animals?</p> <p>Describe “Social Solidarity Theories” and “Costly Signaling Theory” in regards to religion. How do these theories differ in terms of the adaptive uses of religion that are emphasized? How do these theories differ from those that suggest religion is nonadaptive?</p> <p>What psychological abilities are required for religion and religious experience? Relate these to the ideas of adaptation, exaptation, spandrel, and functionless by-product.</p>

<p><u>Mar. 22</u> Mishra, S., & Lalumière, M. L. (2008). Risk taking, antisocial behavior and life histories. In J. Duntley & T. K. Shackelford (Eds), <i>Evolutionary Forensic Psychology</i>, pp. 139 – 159. Oxford: Oxford University Press.</p> <p>Lalumiere et al. (2008). In cold blood: The evolution of psychopathy. In J. Duntley & T. K. Shackelford (Eds), <i>Evolutionary Forensic Psychology</i>, pp. 176 – 199. Oxford: Oxford University Press.</p>	<p>Why might risky behaviour be viewed as an evolutionary puzzle?</p> <p>Describe Life History Theory. What does it suggest about how organisms make decisions? When does it make sense to be risky? How might a disposition toward taking risks impact fitness?</p> <p>What types of psychological abilities are necessary to make adaptive decisions about whether to adopt a pattern of risk-taking behaviour?</p> <p>What are some of the general personality traits that risky individuals exhibit? How do these influence risky behaviour? How do they relate to the concepts of adaptation, exaptation, spandrel, and functionless by-product?</p> <p>Describe how life-long risk prone individuals are similar to, but different from psychopaths.</p> <p>Why is psychopathy puzzling from an evolutionary perspective?</p> <p>Describe the hypotheses outlined regarding the evolution of psychopathy.</p> <p>In what ways is the psychology of psychopaths “specialized”? How might these specializations enhance fitness?</p> <p>How do the concepts of adaptation, exaptation, spandrel, and functionless by-product apply to psychopathy?</p>
<p><u>Mar. 29 (Handout for end-of-term-test)</u> Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? <i>Perspectives on Psychological Science</i>, 4, 359 – 366.</p>	<p>What is personality? What is meant by the term “individual differences”? Why is the existence of personality and individual differences puzzling from an evolutionary perspective?</p> <p>Describe the theories Buss proposes to account for the existence of personality and individual differences. What do each of these suggest about the underlying psychology that</p>

<p>Flinn et al. (2005). Ecological dominance, social competition, and coalitionary arms races: Why humans evolved extraordinary intelligence. <i>Evolution and Human Behavior</i>, 26, 10 – 46.</p>	<p>produces personality and individual differences? Relate your ideas about the underlying psychology to the concepts of adaptation, exaptation, spandrel, and functionless by-product.</p> <p>From an evolutionary perspective, should personalities be capable of changing over the life course? Why or why not?</p> <p>Why is human intelligence an evolutionary puzzle?</p> <p>Describe theories detailing the process of hominin cognitive evolution. What are the strengths and shortcomings of each?</p> <p>What does the fossil record tell us and what doesn't it tell us about human cognitive evolution?</p> <p>What do the design features of the modern human brain suggest about why human intelligence evolved? What psychological abilities do these design features suggest were selected for in the course of human evolution?</p>
<p><u>Apr. 5</u> Documentary: <i>Sex with Strangers</i></p>	<p>This class will be different. There will be no readings, quiz, or food for thought questions. I am choosing to show this documentary instead because it will challenge us to think creatively using the concepts we've become familiar with throughout the course. The documentary depicts a group of people whose behaviour defies Darwinian logic. These people are heterosexual swingers (i.e., heterosexual relationship partners who engage in sexual interactions outside of their primary romantic relationships with the knowledge and consent of their partners). In the real world, academics aren't told that a particular behaviour or aspect of psychology defies Darwinian logic. They only come to realize this through observing, armed with their understanding of evolutionary principles. Hence, it is my hope that through this exercise we will be able to watch the video and pick out what is puzzling about the behaviour of heterosexual swingers from a Darwinian perspective.</p> <p>Following the documentary, we will discuss why the case of heterosexual swingers presents a puzzle and how evolution might have made such behaviour possible through its influences on psychology.</p>

	<p>Note: This documentary depicts sexually explicit material. I recognize this may make some students uncomfortable, and you are not required to come to this particular class; you will not lose marks and your grade will not suffer if you choose not to attend. That said, heterosexual swinging is a fascinating phenomenon from an evolutionary perspective. I know of no other behaviour among humans that is as perplexing and under-studied, thus making it deserving of academic attention and an ideal topic to use for this exercise.</p>
<p><u>Apr. 12</u> No Class (Time to prepare for end-of-term-test)</p>	
<p><u>Apr. 14</u> End-of-term-test</p>	