Evolution across the Disciplines
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In this year of Darwin’s 200th birthday, it should now be very clear to all that the evolutionary framework is important for its ability to make sense not only of biology, but also of many aspects of human life studied across the disciplines. The theory of evolution by natural selection is one of the most thoroughly tested and widely accepted theories in the sciences. Despite this, the relevance of evolution to the study of the human condition is at best poorly understood and at worst unrecognized by the broader intellectual community and the general public. All organisms are the result of a long history of interaction between genes, the structures they build, and the environments in which they evolved. Thus, the uniqueness of a species—what sets it apart from other life forms—ultimately stems from ecological variation and the design that arises in response to this variation: each species is designed by evolutionary processes to solve a unique set of environmental obstacles to survival and reproduction. This design includes everything from perception to pathogen defense to information processing. In other words, design affects how an animal perceives its surroundings (e.g., by sensing magnetic fields, electric currents, light waves, sound waves), how it protects itself from other organisms (e.g., immune system, fight-or-flight response), and the kinds of information it attends and responds to. Humans are no exception to this rule. Thus, a full appreciation of the human condition requires an understanding of the forces that shaped the human condition—that is, the unique features of our evolutionary history and resultant biological design that distinguish us zoologically from other species.

We propose a Big Idea focused on the application of evolutionary thinking to humans that unites Social Sciences, Natural Sciences, and Humanities, and has broad and immediate applications in the professional schools. This builds on the interdisciplinary endeavors within ICDS that integrate studies of human biology from anatomy and physiology to health and disease to mating and social behavior to psychology, emotions, thoughts, and ideas. This perspective encompasses studies of modern humans, the historical and archeological past, and extends back through human evolution to our shared heritage with other species. The Big Idea would be an integrated, inter-disciplinary approach that unites research and teaching at all levels.

The Evolution across the Disciplines Big Idea builds on a unique strength at the University of Oregon. We have broad expertise in the application of evolutionary thinking to human studies in many places across campus and beyond. The growth of such interdisciplinary evolutionary studies began in the Institute of Cognitive and Decision Sciences (ICDS) with an evolutionary focus group. It has now grown to include over 40 faculty from disciplines as varied as Anthropology, English, Political Sciences, Linguistics, Economics, Psychology, Physics, Human Physiology, and Biology as well as members from the
community including PeaceHealth, Oregon Social Learning Center (OSLC), Oregon State University, Oregon Medical Labs and the Oregon Research Institute (ORI). We have examined applications as varied as the Evolution of War (see the recent UO conference reviewed in New Scientist: http://www.newscientist.com/article/mg20026823.800-how-warfare-shaped-human-evolution.html?page=1), Evolutionary Medicine (including recent research projects with PeaceHealth, OSLC, Oregon Medical Labs, and ORI), understanding human mating systems and relationship choices, evolution of religion, political and security impacts of climate change, the physics of vision, and the psychology of decision making. The University of Oregon is now being recognized as a developing center for research in this new and expanding area with our hosting the 2010 meetings of the Human Behavior and Evolution Society. A description of the evolutionary focus and research groups can be found on the website of the Institute of Cognitive and Decision Sciences (http://www.uoregon.edu/~icds).

This Big Idea would benefit from administration support and development in both research and teaching. Most importantly, the university needs to expand its infrastructure to foster interdisciplinary collaborative research and teaching. This program cannot and should not be contained within a single discipline but needs to facilitate interactions among faculty across disciplines, as can happen within interdisciplinary institutes such as ICDS.

The core of this Big Idea resides in faculty intellectual interactions. The ICDS currently runs a series of focus groups that bring together a broad diversity of faculty interests. These interactions have given rise to cooperative research projects that have successfully in obtaining external funding. These efforts are driven by faculty interests and are often supported by departmental structures that do not have a culture or structure to recognize and encourage multi-individual, non-discipline based, research projects. This Big Idea would create greater departmental acknowledgement and administrative support for these collaborative endeavors.

This Big Idea is envisioned as the first phase of a larger enterprise: to establish a Human Evolution, Ecology, and Cognition Program at the University of Oregon comparable to the cross-disciplinary, evolution-based programs already underway at SUNY Binghamton [http://evolution.binghamton.edu/evos/] and the University of British Columbia [http://www.zoology.ubc.ca/evolution/]. This research and teaching Program would be the home to interdisciplinary and collaborative research projects by faculty and graduate students, as well as a teaching program in Evolutionary Studies. As part of this collaborative program, we also propose a mechanism be developed and established to encourage interdisciplinary, collaborative teaching of courses such as an introductory “Evolution for Everyone” as well as classes that bring evolutionary thinking to disciplines where it is not traditionally taught, as described in the curriculum proposal below.
The Evolution across the Disciplines Big Idea is one that the University of Oregon is uniquely poised to develop. Unlike other institutions that attempt to build an interdisciplinary human-focused evolution program out of a traditional biological approach, our program has grown out of studies of humans in the Social Sciences and now extends beyond the university’s borders. Faculty at the University of Oregon are also a part of the international consortium of Evolutionary Studies programs (see http://evolution.binghamton.edu/evos/Startyourown.html), a multi-institution program to unite and promote evolutionary teaching that provides support and guidance for developing such programs. Among these programs, the University of Oregon stands out for both its strength in traditional evolutionary biology but also in the breadth and depth of application of evolutionary thinking to human studies.

The Evolution across the Disciplines Big Idea would require broad and fundamental changes in the way that interdisciplinary research and teaching are conducted and viewed at the University of Oregon. The current disciplinary-focused approaches are a barrier to many interdisciplinary and multi-collaborative research projects and cooperative teaching curricula. Research activity in Institutes that lie out of departments, and especially activity within collaborative and cooperative projects will need to be viewed as important and valuable elements in a faculty member’s research agenda in all departments and tenure homes. Methods will need to be established to allow credit for faculty to co-teach classes and to allow courses to be cross-listed and recognized as important elements of a faculty member’s effort. These changes, while requiring considerable effort and needing strong administrative support, would be of minimal cost, but have far reaching consequences for the encouragement of truly interdisciplinary studies.

The Evolution across the Disciplines Big Idea has support from many ICDS members and includes several key faculty from a broad base of disciplines. ICDS is in a unique position to initiate this Big Idea because of the breadth of disciplines represented by its faculty including:

Holly Arrow and Warren Holmes, Psychology
Josh Snodgrass and Frances White, Anthropology (Biological)
Doug Kennett and Sarah McClure, Anthropology (Archeology)
Larry Sugiyama, Anthropology (Cultural)
William Cresko and Brendan Bohannan, Biology
Paul van Donkelaar and Chris Minson, Human Physiology
John Orbell, ICDS and Political Science
Eric Pederson, Linguistics
Glen Love, English
And many others (ICDS membership list can be found on the ICDS website at [http://www.uoregon.edu/~icds](http://www.uoregon.edu/~icds)).

The Evolution and across the Disciplines Big Idea would involve the development of several new classes and a curriculum that is not based in a single department, but that is truly interdisciplinary in nature. We propose creating an interdisciplinary curriculum from the Institute of Cognitive and Decision Sciences called “The Human Animal: Human Health, Cognition, and Culture in Evolutionary Perspective”. This curriculum would be developed to allow a minor in Evolutionary Studies that would draw on the expertise of many individuals and not be restricted to a single department.

The proposed suite of courses addresses this need by focusing on two overarching goals: (1) to present evolutionary theory in terms that an educated layperson can understand, and (2) to illustrate evolutionary principles and their relevance to the human condition with examples from everyday life. These goals are grounded in a desire to facilitate the application of evolutionary theory and research in non-scientific disciplines, and thereby foster a collaborative research environment between the humanities and social sciences. More broadly, we seek to give students the intellectual tools necessary to cross disciplinary boundaries and to think critically about relationships between the biological and cultural aspects of human nature, not only as this pertains to their college experience but to their careers and personal lives as well.

To start this development, we are proposing a single, 100 level, science credit, general class titled “Evolution for Everyone” to be followed by an interdisciplinary three-course series that explores the interrelationships between natural selection and three broad areas of human experience: learning, health and medicine, and creative expression. These courses approach the human condition in terms of problems specific to the human ecological niche and the adaptations that evolved in response to it. In so doing, they provide a foundation for understanding the larger question of what makes us human. Our evolutionary past is very much a part of our present: our modern minds and bodies are the product of, and are designed to address, ancestral conditions. This series will examine the ways in which human thought processes, motivations, and responses to the environment are influenced by this legacy. Course 1 will introduce the theory of natural selection and delineate human evolved cognitive design. Course 2 will examine human health, nutrition, and medical practices vis-à-vis forces that shape human anatomy and physiology. Course 3 will examine human creative behavior (e.g., narrative, visual art, music, dance) in terms of the functions it serves in small-scale societies and the cognitive capacities requisite to social learning. This series will thus address a fundamental issue at the border between science and the humanities: the relationship between our nature as an organism inherently subject to the limitations of biological design and our nature as an organism characterized by an ability to manipulate its environment to a greater extent than any other animal.
For 99% of their existence, humans have lived as hunter-gatherers. Understanding this niche is essential to understanding the human condition. The proposed course series will examine important matters of human concern—such as learning, medicine, and the arts—in terms of the evolutionary processes that shaped our species. Classes will be taught sequentially, over the course of an academic year: Course 1 will be taught fall quarter, Course 2 will be taught winter quarter, and Course 3 will be taught spring quarter. All concepts will be presented in terms that can be understood and applied by persons from all academic disciplines.

The first course in the series is **Evolutionary Psychology**. Evolutionary psychology is the application of evolutionary theory, first proposed by Charles Darwin, to the study of human behavior and the brain that generates our thoughts, feelings and actions. Evolutionary psychology is not a sub discipline within the field of psychology, like developmental or clinical psychology, but rather an approach to human behavior that is applied across disciplines (e.g., psychology, anthropology, economics, political science, literature). Evolutionary psychology provides a new, integrated approach to human behavior by attempting to explain how specialized mental mechanisms, designed by a long history of evolution by natural selection, guide our present-day behavior and help us solve the problems of daily life that affected our ancestors' ability to survive and reproduce successfully. Some of these "problems" include aggression both within and between groups, identifying and attracting a suitable mate, rearing children successfully, and negotiating social relationships with both family and non-family members. We will view the mind/brain as an evolved, adapted organ that has operated like other physical and behavioral traits in the service of day-to-day survival and successful reproduction. We will use Darwin's theory of evolution by natural selection and sexual selection to frame our analysis of the thoughts, feelings and actions that seem to characterize humans around the world, including variation in behavior that is associated with 'local' conditions.

The second course in the series is **Evolutionary Medicine**. This course provides an introduction to evolutionary (or Darwinian) medicine, a relatively new field that recognizes that evolutionary processes and human evolutionary history shape health among contemporary human populations. The field of evolutionary medicine emphasizes ultimate explanations, such as how natural selection and other evolutionary forces shape our susceptibility to disease; this perspective complements that of biomedicine, which generally focuses on identifying the immediate mechanisms that give rise to diseases and malfunctions. The evolutionary medicine approach has provided insights into why diseases occur at all and additionally has produced valuable insights on treatment strategies. This course will examine a variety of diseases using an evolutionary perspective, including infectious diseases, mental disorders, and cancers. The course will emphasize chronic diseases, such as cardiovascular disease, obesity, and
diabetes, and will focus particular attention on the role of diet and psychosocial stress in the development and progression of these conditions.

The third course in the series is **Cognitive Foundations of Cultural Transmission**. The hunting-and-gathering niche is characterized not by foraging *per se* but by the ability to manipulate the physical and social environment in innumerable, complex ways, such as the use of plant compounds to combat pathogens, or the use of cooperative hunting (such as game drives) to capture prey that would otherwise be inaccessible. Effective deployment of these strategies requires extensive, specialized knowledge, as well as a means of remembering and transmitting it. The ability to copy new information faithfully—known as the *ratchet effect*—is what makes the development of large knowledge bases possible: to a greater degree than any other animal, humans acquire their knowledge from conspecifics. Collectively, the generation, storage, and transmission of this knowledge constitutes much of what humans experience as “culture”. In this course, we will look at how humans “learn” by examining some of the cognitive structures that make it possible for humans to access and accurately copy the knowledge of others. In so doing, we will look at how foraging peoples use myth, ritual, visual art, music, and dance to acquire, store, and exchange information relevant to solving the problems of daily life: securing food, water, and protection from the elements, coping with illness and injury, finding a mate, raising children, and resolving conflict.