Chapter 1 : Adaptation and Natural Selection: Overview

While some evolutionary psychology focuses on issues of human mating, the field addresses concepts from across the spectrum of psychological content, including altruism, religion, love, memory.

A substantial part of the phenotypic variation in a population is caused by genotypic variation. The frequency of one particular allele will become more or less prevalent relative to other forms of that gene. Variation disappears when a new allele reaches the point of fixation â€”when it either disappears from the population or replaces the ancestral allele entirely. Before the discovery of Mendelian genetics, one common hypothesis was blending inheritance. But with blending inheritance, genetic variance would be rapidly lost, making evolution by natural selection implausible. The Hardyâ€"Weinberg principle provides the solution to how variation is maintained in a population with Mendelian inheritance. The frequencies of alleles variations in a gene will remain constant in the absence of selection, mutation, migration and genetic drift. Despite the constant introduction of new variation through mutation and gene flow, most of the genome of a species is identical in all individuals of that species. When mutations occur, they may alter the product of a gene , or prevent the gene from functioning, or have no effect. This process is easier once a gene has been duplicated because it increases the redundancy of the system; one gene in the pair can acquire a new function while the other copy continues to perform its original function. Sexual reproduction , Genetic recombination , and Evolution of sexual reproduction In asexual organisms, genes are inherited together, or linked, as they cannot mix with genes of other organisms during reproduction. In a related process called homologous recombination , sexual organisms exchange DNA between two matching chromosomes. If each individual were to contribute to the same number of offspring two , a the sexual population remains the same size each generation, where the b Asexual reproduction population doubles in size each generation. The two-fold cost of sex was first described by John Maynard Smith. This cost does not apply to hermaphroditic species, like most plants and many invertebrates. The Red Queen hypothesis has been used to explain the significance of sexual reproduction as a means to enable continual evolution and adaptation in response to coevolution with other species in an ever-changing environment. Gene flow Gene flow is the exchange of genes between populations and between species. Gene flow can be caused by the movement of individuals between separate populations of organisms, as might be caused by the movement of mice between inland and coastal populations, or the movement of pollen between heavy-metal-tolerant and heavy-metal-sensitive populations of grasses. Gene transfer between species includes the formation of hybrid organisms and horizontal gene transfer. Horizontal gene transfer is the transfer of genetic material from one organism to another organism that is not its offspring; this is most common among bacteria. It is possible that eukaryotes themselves originated from horizontal gene transfers between bacteria and archaea. From a neo-Darwinian perspective, evolution occurs when there are changes in the frequencies of alleles within a population of interbreeding organisms, [78] for example, the allele for black colour in a population of moths becoming more common. Mechanisms that can lead to changes in allele frequencies include natural selection, genetic drift, genetic hitchhiking, mutation and gene flow. Natural selection Further information: Sexual selection Evolution by means of natural selection is the process by which traits that enhance survival and reproduction become more common in successive generations of a population. It has often been called a "self-evident" mechanism because it necessarily follows from three simple facts: Different traits confer different rates of survival and reproduction differential fitness. These traits can be passed from generation to generation heritability of fitness. More offspring are produced than can possibly survive, and these conditions produce competition between organisms for survival and reproduction. Consequently, organisms with traits that give them an advantage over their competitors are more likely to pass on their traits to the next generation than those with traits that do not confer an advantage. The central concept of natural selection is the evolutionary fitness of an organism. These traits are said to be "selected for. Conversely, the lower fitness caused by having a less beneficial or deleterious allele results in this allele becoming rarerâ€"they are "selected against. These charts depict the different types of genetic selection. On each graph, the x-axis variable is the type of phenotypic trait and the y-axis variable is the number of organisms. Group A is the original population and Group B is the population after selection. Natural selection within a population for a trait that can vary across a range of values, such as height, can be categorised into three different types. The first is directional selection , which is a shift in the average value of a trait over timeâ€"for example, organisms slowly getting taller. This would be when either short or tall organisms had an advantage, but not those of medium height. Finally, in stabilising selection there is selection against extreme trait values on both ends, which causes a decrease in variance around the average value and less diversity. A special case of natural selection is sexual selection, which is selection for any trait that increases mating success by increasing the attractiveness of an organism to potential mates. Although sexually favoured, traits such as cumbersome antlers, mating calls, large body size and bright colours often attract predation, which compromises the survival of individual males. Eugene Odum , a founder of ecology , defined an ecosystem as: These relationships involve the life history of the organism, its position in the food chain and its geographic range. This broad understanding of nature enables scientists to delineate specific forces which, together, comprise natural selection. Natural selection can act at different levels of organisation , such as genes, cells, individual organisms, groups of organisms and species. If selection would favour either one out of two mutations, but there is no extra advantage to having both, then the mutation that occurs the most frequently is the one that is most likely to become fixed in a population. Most loss of function mutations are selected against. But when selection is weak, mutation bias towards loss of function can affect evolution. Loss of sporulation ability in Bacillus subtilis during laboratory evolution appears to have been caused by mutation bias, rather than natural selection against the cost of maintaining sporulation ability. In parasitic organisms, mutation bias leads to selection pressures as seen in Ehrlichia. Mutations are biased towards antigenic variants in outer-membrane proteins. Genetic drift Further information: Genetic drift and Effective population size Simulation of genetic drift of 20 unlinked alleles in populations of 10 top and bottom. Drift to fixation is more rapid in the smaller population. Genetic drift is the random fluctuations of allele frequencies within a population from one generation to the next. Genetic drift may therefore eliminate some alleles from a population due to chance alone. Even in the absence of selective forces, genetic drift can cause two separate populations that began with the same genetic structure to drift apart into two divergent populations with different sets of alleles.

Chapter 2 : The History of Evolutionary Theory - Science NetLinks

Concepts and models used in evolutionary biology, such as natural selection, have many applications. [] Artificial selection is the intentional selection of traits in a population of organisms.

Context Science never takes places in a void and evolutionary thought is no exception. Although Charles Darwin is considered to be by many the "father" of evolutionary thought, he was in fact aided and guided by the works of many scientists before him. The theories and ideas proposed by his predecessors were limited to the information available at the time. Darwin himself had no knowledge of genetics and therefore, his theory of natural selection as an explanation of evolution was based solely on what he observed and knew at the time. Because of the complexity of the evidence and the arguments that must be explained, a clear understanding of species evolution probably cannot be achieved earlier than high school. However, students in earlier grades should have developed the evidence base for which the theory attempts to account. This historical study provides a good opportunity to feature the importance in science of careful observation and description and to illustrate that not all scientific advances depend on experimentation. The goal of this lesson is for students to have the opportunity to examine how evolution has been scientifically explained historically. In doing so, students will examine the arguments and theories set forth by three historically important scientists: Information about Lamarck is found in most standard biology textbooks. Usually, there will be a brief description of his ideas and then a paragraph or two explaining why he was wrong. Often, students think that models that are no longer accepted must have been poorly developed. Students are also often unaware that Wallace independently developed the theory of natural selection to explain biological evolution. However, due to publishing dates, he is not given the same credit as Charles Darwin. The writings of both of these men made important contributions to evolutionary biology. Discussing these models provides a forum for talking about how and why scientific ideas change over time. Research shows that students have a tendency to think in Lamarckian terms. That is, students often invoke the needs of organisms when accounting for change over time Bishop and Anderson, They may also often believe that evolution is goal-directed. The purpose of this lesson, however, is not to begin to make comparisons, but simply to make certain students understand how arguments have changed over time. By understanding the arguments put forth by Lamarck and Darwin, students can make fruitful comparisons in another Science NetLinks lesson, Comparing Theories: Motivation Using the History of Evolutionary Theory student esheet, students should visit Pre-Darwinian Theories for an explanation of the development of modern evolutionary thinking. Students should read the page on Pre-Darwinian Theories and then move on to Darwin and Natural Selection by clicking on "Next Topic" at the bottom of the page. What is this reading about? How can scientific explanations change over time? Students may not know the distinction between evolution, the historical changes in life forms that are well substantiated and generally accepted as fact by scientists, and natural selection, the proposed mechanism for these changes. How do scientists explain how evolution occurs? This question should help students in distinguishing the theory of natural selection from the observed fact of evolution. Do you think that the way people have explained evolution has changed over time? Why or why not? Who was Charles Darwin? How did Charles Darwin explain how evolution occurs? When did Charles Darwin propose his theory about evolution? Did evolutionary theory exist before Darwin? How do you think Darwin developed his theory? Do you know of any other individuals who proposed theories on evolution? Development Tell students that they will examine writings from three influential scientists who proposed explanations for biological evolutionâ€”Jean Lamarck, Alfred Russel Wallace, and Charles Darwin. Assign the Lamarck reading, Zoological Philosophy , and have students answer the questions posed by the History of Evolutionary Theory student sheet. Students can also use their esheet to access the reading. In class the next day, discuss the Lamarck reading. Before asking questions, allow students the opportunity to ask their own questions about the vocabulary or reading that they may have found confusing. Encourage other students to answer these questions. Once students have cleared up any misunderstandings or confusion, move on to a discussion of the assigned questions. The exact mechanism proposed by Lamarck should be clear from the reading. Lamarck believed that individuals change over time due to environmental influences and these "acquired" characteristics are then passed on to the offspring. Over time, all the individual organisms that have been subjected to that particular environment will have changed. Implicit in this assertion is that species change as the result of the "needs" of individuals. Specifically, he argued that the fossil organisms that we no longer see on earth have not become extinct, but rather have changed to such an extent that we no longer recognize them as being the same. The gradual accumulation of these changes over time accounts for the changes that are evident in the fossil record. Discuss with students the example of the giraffe described by Lamarck as evidence for his theory. Why has this example been criticized by other scientists? Moreover, individuals can only pass on hereditary material, not a trait acquired due to environmental influences. Second, Lamarck had cleared the way towards developing a complete theory of explaining evolution and the diversity of life. Both Charles Darwin and Alfred Russel Wallace built upon the foundations of evolutionary thought laid down by Lamarck. Armed with additional ecological knowledge and worldly experience, they independently developed a durable theory of evolution by natural selection. Next, assign the Wallace reading, On the Tendency of Varieties to Depart Indefinitely from the Original Type , and have students answer the questions posed on the History of Evolutionary Theory student sheet. Students can also use the esheet to access the reading. As before, first allow students the opportunity to ask their own questions about the vocabulary or reading that they may have found confusing. Finally, assign students the Darwin reading, On the Origin of Species , and have students answer the questions posed in the student sheet. Tell students that they will read an excerpt from his book, On the Origin of Species published on November 24, , 23 years after the conclusion of his voyage on the H. As a side note, students may be interested to know that by the end of the day, the entire first edition copies was sold out. After discussing general questions and the reading questions, ask students: How were they the same or different? Both had the same theory. Darwin even credits Wallace for sending him his paper and the two presented their ideas together. Why do you think Darwin is more famous than Wallace, even though we know that they both had the same theory and both presented their findings together? The last published work of Darwin was On the Origin of Species, published ; hence, most of the credit of evolutionary thought has been given to Darwin. However, Darwin and Wallace were good friends and colleagues and Darwin mentions Wallace numerous times in his book, particularly in his introduction. Answers to the questions posed on the student sheet can be found in the History of Evolutionary Theory teacher sheet. Assessment Tell students that their assessment assignment is to describe the history of evolutionary theory. Students can choose to demonstrate their understanding and knowledge in any appropriate format, such as video, illustrations, poster, essay, or diorama. Go over the assignment with students and assign a due date. Extensions Follow this lesson with the Science NetLinks lesson: Rather than grading these surveys and telling students which of these answers are "right" or "wrong," have students keep their surveys and repeat them at the conclusion of the unit. Then, ask students to compare their responses before and after the unit. At this point, also discuss each statement and explain why certain points are true or false in accordance with scientific understanding of biological evolution. This Evolution Survey from the University of Indiana is a good example. To connect this lesson with social studies and world history, have students draw the history of evolution timeline as shown on the PBS Evolution website on a smaller scale sheets of paper. On the bottom half of the timeline, have students label the 31 events from the "Rise of Evolution" segment. On the top half, have students add events from world history that coincide with the changes in evolutionary thought. Students can research world history events from the Hyper History website. This will give students a better understanding of when the changes in evolutionary thought took place. It will also encourage students to consider how world events may have affected the development of evolutionary thought and vice versa. Evolution Library contains annotated links to a wide variety of useful articles, videos, Web resources, and other tools that can be used to supplement the teaching of evolution.

Chapter 3 : A list of 26 Species "Concepts" | ScienceBlogs

Evolutionary psychology is a theoretical approach in the social and natural sciences that examines psychological structure from a modern evolutionary perspective. It seeks to identify which human psychological traits are evolved adaptations - that is, the functional products of natural selection or sexual selection in human evolution.

Species concepts 08 Feb A new population that results from a speciation event is called a species. But although species result from a simple process, recognizing species in nature can be complicated. Because scientists have different kinds of evidence about organisms, they use different concepts of species when testing hypotheses about their evolution. Biological species The most obvious property that helps to define species is reproductive isolation. Biologists studying living animals often use the biological species concept, which envisions a species as a "group of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups" Mayr It is the biological species concept that primatologists use to grapple with whether chimpanzees and bonobos are different species, for example, by observing the differences in their reproductive behaviors and the strength of geographic isolation between their populations. The biological species concept has some important limitations for paleontology. Making use of the concept depends on observing the mating behavior and interbreeding patterns of animals in their natural environments, which is not possible with fossils of organisms that lived in the past. Other kinds of observations that paleontologists might gather, such as morphological differences between fossils, have no necessary value under this concept. Another limitation is that the biological species concept does not incorporate any idea of how species may change over time. Paleontologists study fossils that may be separated by hundreds of thousands of years of time. It is difficult to imagine such widely separated individuals as part of the same reproductive community, even if they were very similar to each other. Over such time periods, evolution can transform populations substantially. The biological species concept recognizes the genetic continuity within a species caused by gene flow, but it does not incorporate a view of species existing over evolutionary time. For these reasons, paleontology requires a different kind of species concept. Phylogenetic species concept The phylogenetic species concept is an attempt to define species by their relationships to other species. Instead of trying to determine the reproductive boundaries of populations, scientists using the phylogenetic species concept attempt to uncover their genealogical relationships. A group of individuals that includes all the descendants of one common ancestor, leaving no descendants out, is called a monophyletic group. Paleontologists Niles Eldredge and Joel Cracraft devised a species concept called the "Phylogenetic Species Concept," intended to apply to circumstances in which reproduction or isolation among organisms could not be observed. Under this concept, a species is "a diagnosable cluster of individuals within which there is a parental pattern of ancestry and escent, beyond which there is not, and which exhibits a pattern of phylogenetic ancestry and descent among units of like kind" Eldredge and Cracraft Key to the phylogenetic species concept is the idea that species must be "diagnosable. To look for the unique features that define a phylogenetic species, paleontologists must perform systematic comparisons with other related fossils or living species. These aspects of the concept make it widely applicable in paleontology. But the phylogenetic species concept is not without its problems. Because the concept defines species based on morphology, without explicitly referring to populations or reproductive boundaries, it does not apply well to cases where morphologically different populations are connected by gene flow. Morphological variation among populations is not uncommon within living species. Humans today are a species with substantial morphological variation from continent to continent. Humans on different continents are not reproductively isolated, and their variation is largely distributed as clines over large geographic distances. Yet a paleontologist who had only a few fragmentary specimens from each continent would not necessarily know the pattern of variation, and many features of his specimens would appear to be unique. What would the paleontologist make of the high nose of a European specimen, the forward-facing cheeks of an Asian fossil, or the strong browridge above the eye orbits of an Australian, each taken randomly from their variable populations? By applying the phylogenetic species concept, a paleontologist would probably conclude that the different continents were homes to different human species. Thus, because the phylogenetic species concept does not identify species based on the reproductive boundaries between them, it may have the effect of identifying populations connected by gene flow as different species. For this reason, a phylogenetic species as defined by a paleontologist may not correspond to a real prehistoric population that was the product of a speciation. Some paleontologists do not view this potential conflict as a problem, because identifying species based on unique characteristics will create as full as possible a systematization of the evolution of new features. Assuming that the number of ancient species was very large, and the number of fossils representing each of them is very small, then paleontologists can hardly hope to identify every speciation event in the past. The phylogenetic species concept may therefore provide a better approximation of the number and diversity of species that existed than other alternatives. On the other hand, identifying populations connected by gene flow as different species can be a significant problem for paleontologists who take a greater interest in the processes of evolution than in the diversity of species in the past. Gene flow is a significant force shaping evolutionary change within populations. Moreover, evolution may cause a single species to change over time, possibly acquiring new unique features without any division of a species into separate reproductively isolated populations. Some paleontologists approach these difficulties by altering their view of the evolutionary process. If speciations can happen as a transformation of a single population in addition to the appearance of reproductive boundaries between populations, then a single evolving population may over time comprise several phylogenetic species. Or if most evolutionary change happened at the time of speciation, as asserted by the concept of punctuated equilibrium, then the phylogenetic species concept might more closely approximate the actual pattern of speciations in the past. Evolutionary species The evolutionary species concept combines the genealogical basis of the phylogenetic species concept with the genetic basis of the biological species concept. An evolutionary species is a lineage of interbreeding organisms, reproductively isolated from other lineages, that has a beginning, an end, and a distinct evolutionary trajectory Wiley The end of a species occurs either with extinction or with the branching of the species into one or more descendants. Central to the evolutionary species concept is the idea of an evolutionary trajectory. The trajectory of a species is the evolutionary pattern of its characteristics over time. For example, one of the earliest species in the story of human evolution, Australopithecus afarensis , is represented by dozens of fossil teeth and mandibles, as well as other remains. Paleontologists hypothesize that these fossils, from several sites in East Africa, are members of a single species because of their many morphological resemblances. No very similar fossils have ever been found before 3. Nevertheless, the fossils do show some differences that appear over time. Although the molar teeth of the fossils do not change over time, the mandibles are thicker and more massive in more recent fossils than in the most ancient ones. As far as paleontologists can test, the mandibles form a single series evolving over time toward greater size and thickness. The evolutionary species concept infers that the fossils represent a species, beginning 3. The strength of the evolutionary species concept is that it allows paleontologists to focus on the causes of evolutionary change, whether they occur during speciations or at other times. Although the greater mandibular thickness of later mandibles might be a unique feature, attempting to establish a new phylogenetic species for the later fossils might detract from an explanation of the overall evolutionary pattern. Because it uses several different criteria, much more information may be necessary to define an evolutionary species. Some scientists do not view this as a drawback, since even if a scientific view of the species that once existed and their boundaries and relationships proves a challenge, it may nevertheless add to our understanding of the evolutionary process. At the same time, if scientists always hold out the possibility that two different fossils were actually connected by gene flow, it may impede an understanding of evolutionary changes that accompany the appearance of new reproductively isolated species. If we want to have a scientific, meaning falsificationist, view of the species that have existed and their boundaries and relationships to each other, we must accept that the process will in many cases be difficult. Simply making up many species hypotheses cannot add to our knowledgeand in many cases it may detract. What is important is that we realize that our record of past species is incomplete, and our failure to substantiate the existence of many species in the past does not constitute evidence that they did not exist. Testing species hypotheses However species are defined, whenever scientists identify a species, they actually are stating a hypothesis about the relationships among individual organisms. Such a hypothesis may be tested using morphological, genetic, or behavioral evidence. Discovering real species that existed in the past involves predicting the morphological variability of populations, including variation that occurs among populations connected by gene flow. In the relatively small fossil samples available to paleontologists, determining the number of species in a sample is a significant problem. Researchers use a number of techniques to test species hypotheses with limited morphological samples. What is the level of morphological difference between two or more specimens? Using a living species for comparison, scientists can determine the likelihood of sampling similar variability as the fossil sample Miller What are the relative frequencies of characteristics in two samples of fossils? Statistical comparison with the differences between different populations within a living species can determine whether the differences in frequencies observed in the fossils would be likely to occur within the comparison species. Such comparisons can be extended to the differences between the sexes of a living species to test whether sexual dimorphism accounts for differences between fossils Lee How do morphological features covary? If one fossil sample has a high incidence of several features that are absent or at low frequency in another sample, this supports the hypothesis that the two samples represent different species. With samples of sufficient size, say, 10 individuals or more, paleontologists can even estimate the maximum level of gene flow consistent with the morphological differences, and thereby frame a test of the hypothesis of different species in solid evolutionary terms Hawks and Wolpoff Do samples represent change over time? Sometimes paleontologists can use different populations from living species to evaluate likelihood that certain kinds of changes might occur over time. The best comparisons are with large samples of fossils that represent long spans of time, however. Although the evolutionary process is in ways unique for each species, analyses of the rate and level of changes in other species provide the most powerful tests of species hypotheses available in studying the past. Eldredge N, Cracraft J. Phylogenetic patterns and the evolutionary process: Method and theory in comparative biology. Hawks J, Wolpoff MH. The accretion model of Neandertal evolution. Evolution of human sexual dimorphism: Using assigned resampling method to estimate sexual dimorphism when individual sex is unknown. Systematics and the origin of species from the viewpoint of a zoologist. Craniofacial variation in Homo habilis: An analysis of the evidence for multiple species. Am J Phys Anthropol The evolutionary species concept reconsidered.

Chapter 4 : Darwin, evolution, & natural selection (article) | Khan Academy

This category combines several related evolutionary concepts that account for how the evolved human life course strategy and changed way of living have led to increased susceptibility to disease.

At its simplest level, diabetes mellitus type 2 can be envisaged as the response of the individual to a nutritional environment that gives them a metabolic load beyond their capacity to cope. While there are developmental and genetic factors that influence the adaptive metabolic capacity of an individual, ultimately, it is the exposure to high glycemic foods and a very different mix of macronutrient intakes, which is thought to be the basis of the diabetes epidemic. Even in populations such as the Pima Indian, for which it has been argued that genetic factors are critical for the high incidence of diabetes mellitus type 2, maintenance of higher energy expenditure and more fundamental nutrition in those villages that maintain a traditional subsistence lifestyle is associated with a lower incidence of diabetes Schulz et al. Scurvy can be considered as another example of mismatch. Only some primates, including humans, have lost the capacity to synthesize vitamin C Chatterjee et al. It is assumed that the enzyme responsible for its synthesis, L-gulonolactone oxidase, underwent neutral mutations in a frugivorous ancestor and that it was only with exposure to environments without access to fresh fruitsâ€”such as extreme famine and sailing shipsâ€"that our inability to make vitamin C is exposed. Myopia, or short-sightedness, is caused by the inappropriate growth of the eyeball in its sagittal dimension, leading to the light being focused in front of the retina. Eyeball growth occurs in childhood and is regulated by growth factors that are induced by light exposure, so that the growth can be affected by the dominant focal length of vision. While there may be a genetic predisposition to myopia in some populations, exposure of children in those populations to the outdoors leads to a lower incidence of this condition Dirani et al. Thus, myopia can be seen as a mismatch between the environment in which we evolvedâ€"outdoors in natural lightâ€"and the modern day largely indoor life. Robin Dunbar proposed, from the association between neocortical size and group size across different species of primate, that humans evolved to live in social groups of â€" Dunbar There is indeed much evidence in support of that proposition. But humans now live in much larger groups than in the Paleolithicâ€"groups that rely predominantly on verbal or even electronic communication, with less emphasis on the bonding effect of body language. If we add to that the complexity of modern society and its structures compared to those of the Paleolithic or even the modern hunter-gatherer social organizations, it is reasonable to speculate that some forms of mental illness simply reflect individuals living in a social environment beyond their evolved capacity to cope. With the development of animal husbandry and agriculture and the associated shift to a more concentrated way of living following the invention of agriculture, humans became much more exposed to parasitic loads from each other and proximity to animals. Pandemic influenza outbreaks generally arise from this association. Other infectious patterns reflect the changing environments: Similarly, increased irrigation following the development of canals in Africa led to a considerable increase in schistosomiasis Steinmann et al. The implications of the development of antibiotics are discussed later. Life history factors This category combines several related evolutionary concepts that account for how the evolved human life course strategy and changed way of living have led to increased susceptibility to disease. There is necessarily some overlap with the other pathways discussed in this paper, and it includes multiple possible mechanisms such as life history trade-offs and antagonistic pleiotropy; however, we find it a useful heuristic for considering a number of evolutionary explanations. In life history, there are two basic kinds of trade-off that may arise as a result of adaptive developmental responses to environmental influences. The first occurs when such responses are made to confer immediate advantage, such as the early metamorphosis of the tadpole of the spadefoot toad in response to pond desiccation, which promotes immediate survival but results in smaller adult size that is more susceptible to predation. The second type of trade-off arises from responses that result in an advantage that is manifest later, such as the presence of predators inducing the young of the water flea to develop defensive armor in adulthood, the trade-off being a decrease in resources for reproduction. In humans, where intrauterine growth restriction may be viewed as an immediate adaptive response of the fetus for surviving maternal ill-health or placental dysfunction, the fetus may also make anticipatory responses to more subtle nutritional or hormonal cues to adapt its developmental trajectory to the type of environment in which, according to its prediction, it will live postnatally. These ideas, and the adaptive nature of developmental plasticity, have been expounded extensively Gluckman et al. Anticipation is common across taxa, but becomes more obvious in a long-lived species such as the human. Whereas the strategy of bet-hedging is used by species with very high reproductive outputs Beaumont et al. Situations when different strategies between mother and offspring will emerge have been modeled Marshall and Uller Humans are at one extreme, and the situations in which maternal fitness will dominate as in some other species do not occur in humans. Even in famine, fecundity is maintained to a degree. Prediction need not be accurate to be selected Lachmann and Jablonka , and biases may exist in prediction. Because the consequences of predicting a high-nutrition environment and ending up in a low-nutrition environment are worse than the converse, there is a bias towards predicting a lower nutrition environment and, consequently, towards human susceptibility to disease in modern obesogenic environments. This argument is supported by the observation that under conditions of severe undernutrition, children of lower birth weight are more likely to develop the more benign syndrome of marasmus than those of higher birth weight, who develop kwashiorkor Jahoor et al. We argue that the marasmic children are better adapted to low nutrition by virtue of their lower birth weight and thus tolerate undernutrition better. This hypothesis is supported by the finding that the marasmic children as adults have a bias in their appetite towards carbohydrate and possibly fat consumption T. Forrester, unpublished data , analogous to the preference observed in rats that have been prenatally undernourished. In considering life course factors, it is important to recognize that a cue acting in early life may have different effects from cues acting later. For example, in rats, prenatal undernutrition shortens life while postnatal undernutrition prolongs life Jennings et al. Similar biphasic effects are seen for the influence of nutrition and possibly stress on the age of puberty Sloboda et al. There is increasing evidence for the role of developmental plasticity in influencing the susceptibility to developing disease in a particular environment. Offspring born in the hungry season had the same infant and juvenile mortalities as the children born in times of plenty, but after the age of 20 they started to show an increase in mortality such that their average life expectancy was 15 years shorter. David Barker Hales and Barker and many others showed that size at birth, which can be taken as a proxy measure of intrauterine conditions, was associated with altered risks of metabolic and cardiovascular disease, mood disorders, and osteoporosis in later life. We view this phenomenon as a classic example of developmental plasticity operating to ensure survival to reproduce but resulting in antagonistic pleiotropic disadvantages in later life. It is argued that constraint of fetal growth, lower maternal nutrition Gale et al. The developmentally plastic fetus may make responses incurring either immediate or delayed trade-offs and adjust its physiological development accordingly. A threatening world implies less nutritional security, and thus, an appropriate phenotype is based on a nutritional adaptive capacity to a plane that is lower than that of fetuses who anticipate a more benign world. Thus, the fetus exposed to a low-nutrition environment may or may not be smaller depending on the severity of the limitation , but either way as an adult it may reach the threshold of metabolic load to which it can respond healthily, leading to diabetes and other metabolic conditions at a lower nutritional level than an individual who, early in life, shifted to a developmental trajectory more appropriate for a higher nutrition environment Gluckman et al. Evidence to support this hypothesis includes epidemiological studies on humans prenatally exposed to famine, who have a higher risk of coronary heart disease and obesity in adulthood Painter et al. Experimental studies have also shown that rats that experienced fetal undernutrition have higher body fat and are more sedentary compared to their counterparts that received adequate fetal nutrition Vickers et al. They subsequently develop a constellation of symptoms similar to the human metabolic syndrome, such as obesity and hypertension, in adulthood, and these effects are exacerbated by a high-fat postnatal diet. However, if leptin, a satiety hormone made by fat, is administered to these rats neonatally thus artificially shifting their perception of their environment from low to high nutrition, neonatal weight gain, caloric intake, locomotor activity, and fat mass in these infant animals are normalized for the rest of their lives despite exposure to a high-fat diet Vickers et al. Pleiotropy describes how a single gene can influence several different physiological and phenotypic characteristics. Antagonistic pleiotropy refers to genes that confer an advantage in early life, but that result in ill effects later in life. We find utility in employing this term to encompass phenotypic traits that involve life course-associated trade-offs; for example, because human fitness depends primarily on survival to reproductive age Jones , a potential adaptive advantage in early life may become disadvantageous later on and manifest as obesity, diabetes, and cardiovascular disease in middle age. High levels of insulin growth factor-1 IGF-1 promote infant and childhood growth and presumably were selected for their consequent fitness advantage, but in later life are associated with higher rates of prostate and breast cancer. Importantly, these mechanisms operate in all pregnancies and are a reflection of the role of developmental plasticity in ensuring adaptability to a changing environment on a timescale of change between that of selection many generations and homeostasis minutesâ€"days. There is a growing body of experimental and clinical data showing that epigenetic processes are involved. Cues that induce plastic responses must be distinguished from those that disrupt the developmental program: For this reason, we would suggest that terms such as metabolic teratogenesis Freinkel are not particularly helpful. The human pregnancy is a co-adaptive compromise. The human fetus is born in a more altricial state than other closely related primates, because the human upright posture determines that the fetus must pass the pelvic canal that is narrower than in other primates Rosenberg and Trevathan Brain growth must continue for a long period after birth to reach the disproportionately larger brain size of the hominin clade. Fetal growth in mammals is not solely genetically controlled, otherwise the outcome would be fetal obstruction in every case where pregnancy followed a female mating with a larger male. Indeed, human fetal growth can be shown to be largely determined by the maternal environment Gluckman and Hanson In pregnancies where the egg has been donated, birth size is more closely related to the recipient than to the donor size Brooks et al. The constraining mechanism on fetal growth is likely primarily a consequence of the utero-placental anatomy of mother and her ability to deliver nutrients to the placental bed. Further, the placenta, at least in sheep, is able to clear excessive concentrations of growth factors such as IGF-1 from the fetal circulation. Other studies, primarily in mice, raise the possibility of a role for parentally imprinted genes in regulating fetal growth. From studies of the IGF-2 system in mice, David Haig has developed the concept of maternal-fetal conflict to explain the evolution of imprinting Haig However, imprinting appears in marsupials and possibly monotremes, and Eric Keverne and colleagues have made a good case for considering imprinting in terms of maternal-fetal co-adaptation rather than conflict Curley et al. Given the long life course of our species, this emergent field of developmental plasticity will become a major part of clinical medicine. As our understanding of epigenetic mechanisms including DNA methylation, histone modifications, and small noncoding RNAs grows, this area is likely to play a major role in clarifying disease causation and treatment. A major challenge for studies in contemporary evolution is the role of epigenetic inheritance. While epigenetic marks have long been established to transfer across mitosis, there is increasing evidence that some epigenetic marks transfer across meiosis. The most well-demonstrated mechanisms are via small RNAs in sperm that can transfer between generations inducing phenotypic effects on pigmentation and heart development in mammals reviewed in Nadeau Transgenerational genetic effects on body weight and food intake have also been shown to be passed through the mouse paternal germline for at least two generations Yazbek et al. There is inferential evidence of environmentally induced epigenetic inheritance in experimental animals. Similarly, there is some inferential evidence in humans of male line-mediated environmental influences Hitchins et al. In addition to direct epigenetic inheritance, epigenetic marks may be induced in the F1 generation as a result of maternal effects as discussed in the DOHaD example earlier, or via grand-parental effects where the F1 generation is female. This is because the oocyte that will contribute genetic material to the F2 offspring is formed by the F1 female fetus while in the uterus of the F0 generation and is therefore exposed indirectly to the F0 environment. Similarly, male-line germ cells that will form spermatogonia are sequestered in the testis when the male is itself a fetus. Indeed, in the grandchildren of women who became pregnant in the severe Dutch famine of â€", where the exposed fetus was female, their children are more likely to be obese Painter et al. A further form of indirect epigenetic inheritance may be seen in those cases where the environmental niche inducing the epigenetic change leading to the phenotype is recreated in each generation. The best demonstration is in rodents, where altered maternal care has been shown to induce epigenetic changes in the brain, resulting in behavioral changes and, in the next generation, the same pattern of maternal care Weaver et al. Cross-fostering and pharmacological agents both reverse the epigenetic change and associated phenotype. The potential implications of direct and epigenetic inheritance, as well as maternal and grand-parental effects, are likely to be particularly important in human medicine, where we must focus on a single generation. This has theoretical implications for the use of traditional genotypeâ€”phenotype interactive models. Contemporary evolutionary studies need to develop models that focus on phenotypeâ€”environment interaction. In these models, the phenotype at any point in time should be seen as a consequence of the cumulative effects of early environmental influences inducing epigenetic change, extending back to conception where the phenotype is determined by inherited genetic and epigenetic information. Demographic change, acting through these developmental processes, may also play a role in the changing patterns of disease. First-born children are smaller because of the processes of maternal constraint Gluckman and Hanson , and they have higher risk of obesity Reynolds et al. Their smaller size reflects greater maternal constraint and has also been interpreted in life history terms Metcalfe and Monaghan There are other dimensions to life course pathways to disease. The progressive loss of oocytes from the ovary is an inherent property and explains the decline in fertility in women from the beginning of the fourth decade of life. However, cultural changes mean that women can and do delay their pregnancies, and then, because of lower fertility in their later reproductive years, have a much greater requirement for medical intervention to treat infertility. Here is another example of how cultural developments have impacted on human biology; this phenomenon has arisen because of the interaction between prolongation of life course resulting from technological developments in medicine and public health, and shifting of reproductive timing caused by the social changes associated with the development of contraceptive technologies. Adolescence is an illustrative example of the changing nature of the human life course and the interaction with a changing social context. The age at menarche, the best documented sign of reproductive maturation, in Paleolithic times was probably around the ages of seven to 13 Gluckman and Hanson ; full reproductive competence would have been achieved in concert with the psychosocial maturation required for function as an adult within society.

Chapter 5 : evolution | Theory, Examples, & Facts | theinnatdunvilla.com

Evolution is among the most substantiated concepts in science and is the unifying theory of biological science. Charles Darwin co-originated, with Alfred Russel Wallace, the theory of evolution by.

Organismic trait designed to solve an ancestral problem s. Shows complexity, special "design", functionality Adaptation that has been "re-purposed" to solve a different adaptive problem. Williams suggested that an "adaptation is a special and onerous concept that should only be used where it is really necessary. Obligate and facultative adaptations[edit] A question that may be asked about an adaptation is whether it is generally obligate relatively robust in the face of typical environmental variation or facultative sensitive to typical environmental variation. By contrast, facultative adaptations are somewhat like "if-then" statements. For example, adult attachment style seems particularly sensitive to early childhood experiences. As adults, the propensity to develop close, trusting bonds with others is dependent on whether early childhood caregivers could be trusted to provide reliable assistance and attention. The adaptation for skin to tan is conditional to exposure to sunlight; this is an example of another facultative adaptation. When a psychological adaptation is facultative, evolutionary psychologists concern themselves with how developmental and environmental inputs influence the expression of the adaptation. Cultural universal Evolutionary psychologists hold that behaviors or traits that occur universally in all cultures are good candidates for evolutionary adaptations. Basic gender differences, such as greater eagerness for sex among men and greater coyness among women, [36] are explained as sexually dimorphic psychological adaptations that reflect the different reproductive strategies of males and females. Human evolution Evolutionary psychology argues that to properly understand the functions of the brain, one must understand the properties of the environment in which the brain evolved. That environment is often referred to as the "environment of evolutionary adaptedness". More specifically, the environment of evolutionary adaptedness is defined as the set of historically recurring selection pressures that formed a given adaptation, as well as those aspects of the environment that were necessary for the proper development and functioning of the adaptation. Humans, comprising the genus Homo , appeared between 1. Because the Pleistocene ended a mere 12, years ago, most human adaptations either newly evolved during the Pleistocene, or were maintained by stabilizing selection during the Pleistocene. Evolutionary psychology therefore proposes that the majority of human psychological mechanisms are adapted to reproductive problems frequently encountered in Pleistocene environments. The environment of evolutionary adaptedness is significantly different from modern society. Because humans are mostly adapted to Pleistocene environments, psychological mechanisms sometimes exhibit "mismatches" to the modern environment. One example is the fact that although about 10, people are killed with guns in the US annually, [44] whereas spiders and snakes kill only a handful, people nonetheless learn to fear spiders and snakes about as easily as they do a pointed gun, and more easily than an unpointed gun, rabbits or flowers. The term was coined by Niko Tinbergen to refer to non-human animal behavior, but psychologist Deirdre Barrett said that supernormal stimulation governs the behavior of humans as powerfully as that of other animals. She explained junk food as an exaggerated stimulus to cravings for salt, sugar, and fats, [48] and she says that television is an exaggeration of social cues of laughter, smiling faces and attention-grabbing action. The human mind still responds to personalized, charismatic leadership primarily in the context of informal, egalitarian settings. Hence the dissatisfaction and alienation that many employees experience. Salaries, bonuses and other privileges exploit instincts for relative status, which attract particularly males to senior executive positions. One of the major goals of adaptationist research is to identify which organismic traits are likely to be adaptations, and which are byproducts or random variations. As noted earlier, adaptations are expected to show evidence of complexity, functionality, and species universality, while byproducts or random variation will not. In addition, adaptations are expected to manifest as proximate mechanisms that interact with the environment in either a generally obligate or facultative fashion see above. Evolutionary psychologists are also interested in identifying these proximate mechanisms sometimes termed "mental mechanisms" or "psychological adaptations" and what type of information they take as input, how they process that information, and their outputs. Evolutionary psychologists use several strategies to develop and test hypotheses about whether a psychological trait is likely to be an evolved adaptation. Buss [53] notes that these methods include: Characteristics that have been demonstrated to be cross cultural human universals such as smiling, crying, facial expressions are presumed to be evolved psychological adaptations. Several evolutionary psychologists have collected massive datasets from cultures around the world to assess cross-cultural universality. Function to Form or "problem to solution". The fact that males, but not females, risk potential misidentification of genetic offspring referred to as "paternity insecurity" led evolutionary psychologists to hypothesize that, compared to females, male jealousy would be more focused on sexual, rather than emotional, infidelity. Form to Function reverse-engineering â€” or "solution to problem". Morning sickness , and associated aversions to certain types of food, during pregnancy seemed to have the characteristics of an evolved adaptation complexity and universality. Margie Profet hypothesized that the function was to avoid the ingestion of toxins during early pregnancy that could damage fetus but which are otherwise likely to be harmless to healthy non-pregnant women. Evolutionary psychology and cognitive neuropsychology are mutually compatible â€” evolutionary psychology helps to identify psychological adaptations and their ultimate, evolutionary functions, while neuropsychology helps to identify the proximate manifestations of these adaptations. In addition to evolutionary models that suggest evolution occurs across large spans of time, recent research has demonstrated that some evolutionary shifts can be fast and dramatic. Consequently, some evolutionary psychologists have focused on the impact of psychological traits in the current environment. Such research can be used to inform estimates of the prevalence of traits over time. Such work has been informative in studying evolutionary psychopathology. Survival and individual level psychological adaptations[edit] Problems of survival are clear targets for the evolution of physical and psychological adaptations. Major problems the ancestors of present-day humans faced included food selection and acquisition; territory selection and physical shelter; and avoiding predators and other environmental threats. However, even voluntary behavior involves unconscious mechanisms. Many cognitive processes take place in the cognitive unconscious, unavailable to conscious awareness. Some behaviors are conscious when learned but then become unconscious, seemingly automatic. Learning, especially implicitly learning a skill, can take place outside of consciousness. For example, plenty of people know how to turn right when they ride a bike, but very few can accurately explain how they actually do so. Sensation psychology and perception Many experts, such as Jerry Fodor , write that the purpose of perception is knowledge, but evolutionary psychologists hold that its primary purpose is to guide action. Homing pigeons, for example, can hear very low-pitched sound infrasound that carries great distances, even though most smaller animals detect higher-pitched sounds.

Chapter 6 : Species concepts | Ask A Biologist

Evolutionary psychology is a relatively new scientific discipline that looks at how human nature has evolved over time as a series of built up psychological adaptations. Many evolutionary biologists and other scientists are still reluctant to recognize evolutionary psychology as a valid science.

This article has been cited by other articles in PMC. Professionalism is an important feature of the professional jobs. Dynamic nature and the various interpretations of this term lead to multiple definitions of this concept. The aim of this paper is to identify the core attributes of the nursing professionalism. Texts published in scientific databases about nursing professionalism between and were assessed. After applying the selection criteria, the final sample consisting of 4 books and articles was selected, examined, and analyzed in depth. Two experts checked the process of analysis and monitored and reviewed them. The analysis showed that nursing professionalism is determined by three attributes of cognitive, attitudinal, and psychomotor. In addition, the most important antecedents concepts were demographic, experiential, educational, environmental, and attitudinal factors. Nursing professionalism is an inevitable, complex, varied, and dynamic process. In this study, the importance, scope, and concept of professionalism in nursing, the concept of a beginning for further research and development, and expanding the nursing knowledge are explained and clarified. Dynamic feature and multiple interpretations of professionalization result in numerous definitions with different functions and nature. Therefore, there are multiple definitions and characteristics for professionalization in nursing. Nursing profession status is an inter-profession and intra-profession challenge. Whether there is nursing professionalism or not is a challenge among the nurses, sociologists, and historians. Gradually, development of education standards and professional certificates led nursing move to professional status. Social understanding about nursing made the society consider nurses as costâ€”benefit health care providers and independent decision makers. Therefore, nursed could receive more funds and governmental financial aids. These changes also created new nursing environments that require professional nursing. Accordingly, nursing professionalization definition and its attributes need to be clarified and adapted with rapid changes. For this purpose, concept analysis is a suitable method. Concepts are the building blocks of theories. Concept analysis is one of the strategies in concept development. In this strategy, the basic elements of a concept for understanding its structure and function are assessed. During concept analysis process, a researcher, theorist, or clinician becomes familiar with different attributes and definitions of concept and its function. Evolutionary approach of Rodgers in concept analysis is based on contemporary philosophical thinking on concepts and their roles in knowledge development. In this approach, dynamic features of concepts over time and different social contexts are emphasized. Consequently, this process results in a form of cyclical concept development. With this approach, the final results are the starting point for more concept analysis. Since the contemporary nursing believed human and other nursing phenomena have constantly a changing and interrelated context, it seems that nursing professionalization is also better understood in the context. This perspective is congruent with evolutionary approach in concept analysis. Study process has a non-linear, rotational, and flexible nature. The six stages merely indicate activities that should take place during the study, and it should not be regarded as a continuous process. In this way, Rogers uses inductive approach and detailed analysis and focuses on the collection and analysis of raw data. In this approach, concepts in the specific social and cultural context of a given profession are studied. Next, to achieve more precise results, the inclusion criteria were identified. The main criterion for inclusion in the final analysis was the literature published in English from to in the context of nursing and health sciences. The exclusion criterion was non-English language articles. Preliminary results of the search gave articles meeting the inclusion criteria, and after deleting the duplicated items 14 items , the number decreased to about In addition, four books were used in the analysis process to cover the subjects. Books and papers were carefully reviewed and studied. For analyzing, thematic analysis and content analysis were used. All articles in the context of nursing were exactly read, and hints and useful features, antecedents, consequences, related concepts, surrogate terms, and definition of concept were extracted. Then, the data were reviewed several times to allow the researcher to be immersed in, and this enabled deriving key tags and notes to provide clear explanations about every aspect of the concept. Overall, inductive analysis of data was done and themes were identified. Information units consisted of the words and sentences related to the information or responses concerning the following questions: What are the specific characteristics of professional nursing? How do you define nursing professionalization? How do you pretend nursing professionalization? What factors are associated with the incidence of professional nursing? What are the consequences or outcomes of nursing professionalization? Papers based on conceptual analysis of studied information were grouped. In order to ensure impartiality, reliability, and bias reduction, the analysis process was checked by two nursing experts in concept analysis. RESULTS Identification of the characteristics of the concept is the first stage of the analysis that leads to the actual definition of the concept. Cognitive dimension of nursing professionalization Nursing education should be able to develop professional knowledge. It seems that getting all the essential aspects of professional knowledge in all phases of professionalization must be considered and principles of professionalization must be combined at different levels of professional education. Professional training in formal programs can be provided with specific workshops and courses of training development modules,[27] working in small groups on problem-solving, use of role play, simulated patients,[28] or clinical courses. Although professionalization is a category related to culture, some of its properties are mentioned as to be autonomous, cooperative, retained jurisdiction, membership in professional organizations and professional development, community service and social services, compliance with codes of nursing, conduct and evaluation of nursing theory. Professional identity is a secret knowledge that shows the continuation of a profession. Professional nursing is characterized by clinical working. This view has led to the expansion of the nursing role, so that they allowed getting involved in the therapeutic activities based on their personal qualifications and are actively involved in patient care. It is also for those who are self-learning and self-controlled. Barber defined four properties for a professional manner: High degree of systematic and public knowledge, awareness about the interests of society rather than the personal interests, a high degree of self-control in behavior through moral codes, and existence of a reward system as a sign for success. Focus in this view is on marketing and customer orientation. He indicates that we can be sure about a professional service when the presented service is market-oriented. Thus, creating an environment where the focus is on value and satisfaction of the customer is important. Antecedents are the events that happened before the concept occurrence and consequences can occur as a result of them. Antecedents of nursing professionalization are identified and classified in the following five groups: Demographic factors, factors related to the experience, training-related factors, factors related to the position, and value factors. Demographic factors Age is one of the effective factors on nursing professionalization, identified in the studies. It can be said that maturity in professional experiences has a large impact on professional attitude. Factors related to the education Degree,[22 , 72 , 79 , 80 , 81] membership in professional organiza tions,[1 , 4 , 15 , 81 , 82] having specialized certification,[1 , 15 , 78 , 81] the place where the last degree was issued,[1] political awareness,[83] educational readiness,[78] training and socialization,[72] teachers of nursing,[84 , 85] and length of the course,[1 , 86] all have been shown to have a significant relationship with professionalization in academic studies. Factors related to the position Position of nurse practitioners,[58 , 79] type of organization,[87 , 88 , 89] organizational culture,[69 , 90 , 91] the appearance of nurses in the workplace,[92 , 93 , 94 , 95 , 96] caregiver employment status,[1] work place,[1] existence of a reward system,[81 , 97] lack of staffs,[98] increasing the number of patients,[98] the existence of standards of activity,[99] lack of time, having stress and fatigue,[41] patients, clinicians, managers, and co-workers,[84 , 85] the gap between education and clinical practice,[22] and expectations of health care organizations,[22] all have been mentioned as precursors to professionalization in the reviewed studies. Value factors Professional satisfaction and organizational commitment,[4] professional freedom and independence and motivational factors,[78] belonging, knowing, and acknowledging,[ ] support and guidance, acceptance, willingness, responsibility, and trust,[, ,] altruism,[, , , ,] and professional identity[93] have shown a significant relationship with professionalization. Studies showed belonging to a team, answering the questions of the patients and their families, and valuing the work do affect the understanding and meaning of students from professionalization. Consequences of nursing professionalization Consequences of nursing professionalization consist of two components: Enhancement of patient care quality and improvement of the outcomes of care,[3 , , ,] satisfaction of staffs, customers, clients, and agencies,[83 , 91 , ,] enhancement of the professional authority and the power to make decisions,[58] development of training programs to improve educational efficiency,[69] reduction of accidents and mistakes and risk management,[ ] non-occurrence of burnout,[ ] creating employment standards,[91] socialization, professional development, self-concept development, business retention,[, ,] and increased recognition of patients[ ] are the compatible consequences that have been discussed in several studies. Although professionalization can be very positive for professional practice, it can create blind spots in organization and stop vital information flow in uncertain conditions. This is because professional groups form their own subculture, especially in their language and communication habits. Therefore, they tend to be separated, even if they are working with other groups in an organization. On the other hand, as the professional members of the profession must accept responsibility, self-regulation, and control of the market for their services, the foundation of professionalization is based on the competition over resources and power that are divided between the characters and organizations. The meaning of their root is claimed or confessed. Many authors have searched for the profession and its indicators. Aydellotle defined a profession as an organized and sophisticated job through which the clinicians obtain their exclusive knowledge in a protracted course for providing an exclusive, essential, or favorite service. He indicates that the essential features of a profession include having extensive and systematic knowledge, focusing on society interests, controlling the behavior through codes of ethics, having relationships with other professions, and existence of a professional reward system. The articles defining the characteristics of the nursing profession list them as: Strong commitment, long-term and regular education, special body of knowledge and skills, ethics, autonomy, power for standard service, valuing and existence of professional associations. Qualified, trained, skilled, white-collar professional people like doctors and engineers, expert, experienced, finished, skilled, masterly, efficient, etc. Sacrifice, altruism, accountability, self-regulation, self-determination, and independence are features of the professional values. In fact, professional employees are different. Their activities are associated with their attitudes and social behaviors. Rogers states that providing an example is essential to clarify a practical implementation of the concept related to the context. This can be considered as a study limitation. Interpretation and implications of the concept analysis The aim of the present study was to assess nursing professionalization in relevant literatures to identify attributes, antecedents, and consequences of the concept. The results showed that nursing professionalization has cognitive, attitudinal, and psychomotor dimensions. Antecedents of nursing professionalization included demographic factors, factors related to education, factors related to experience, factors related to the position, and value factors. Consequences of nursing professionalization included two components of compatible and incompatible mechanisms. Results of the analysis are important because although a lot of literature is available about the nursing professionalization, there is little integration and inference about the concept.

Chapter 7 : Evolution - Wikipedia

Evolutionary Psychology. In its broad sense, the term "evolutionary psychology" stands for any attempt to adopt an evolutionary perspective on human behavior by supplementing psychology with the central tenets of evolutionary biology.

General overview The evidence for evolution Darwin and other 19th-century biologists found compelling evidence for biological evolution in the comparative study of living organisms, in their geographic distribution, and in the fossil remains of extinct organisms. The amount of information about evolutionary history stored in the DNA and proteins of living things is virtually unlimited; scientists can reconstruct any detail of the evolutionary history of life by investing sufficient time and laboratory resources. The following sections identify the most productive of these sources and illustrate the types of information they have provided. The fossil record Paleontologists have recovered and studied the fossil remains of many thousands of organisms that lived in the past. This fossil record shows that many kinds of extinct organisms were very different in form from any now living. It also shows successions of organisms through time see faunal succession, law of ; geochronology: Determining the relationships of fossils with rock strata , manifesting their transition from one form to another. When an organism dies, it is usually destroyed by other forms of life and by weathering processes. On rare occasions some body partsâ€"particularly hard ones such as shells, teeth, or bonesâ€"are preserved by being buried in mud or protected in some other way from predators and weather. Eventually, they may become petrified and preserved indefinitely with the rocks in which they are embedded. Methods such as radiometric dating â€"measuring the amounts of natural radioactive atoms that remain in certain minerals to determine the elapsed time since they were constitutedâ€"make it possible to estimate the time period when the rocks, and the fossils associated with them, were formed. Radiometric dating indicates that Earth was formed about 4. The earliest fossils resemble microorganisms such as bacteria and cyanobacteria blue-green algae ; the oldest of these fossils appear in rocks 3. The oldest known animal fossils, about million years old, come from the so-called Ediacara fauna , small wormlike creatures with soft bodies. Numerous fossils belonging to many living phyla and exhibiting mineralized skeletons appear in rocks about million years old. These organisms are different from organisms living now and from those living at intervening times. Some are so radically different that paleontologists have created new phyla in order to classify them. The first vertebrate s, animals with backbones, appeared about million years ago; the first mammal s, less than million years ago. The history of life recorded by fossils presents compelling evidence of evolution. The fossil record is incomplete. Of the small proportion of organisms preserved as fossils, only a tiny fraction have been recovered and studied by paleontologists. In some cases the succession of forms over time has been reconstructed in detail. One example is the evolution of the horse. The horse can be traced to an animal the size of a dog having several toes on each foot and teeth appropriate for browsing; this animal, called the dawn horse genus Hyracotherium , lived more than 50 million years ago. The most recent form, the modern horse Equus , is much larger in size, is one-toed, and has teeth appropriate for grazing. The transitional forms are well preserved as fossils, as are many other kinds of extinct horses that evolved in different directions and left no living descendants. Numbered bones in the forefoot illustrations trace the gradual transition from a four-toed to a one-toed animal. Using recovered fossils, paleontologists have reconstructed examples of radical evolutionary transitions in form and function. For example, the lower jaw of reptiles contains several bones, but that of mammals only one. The other bones in the reptile jaw unmistakably evolved into bones now found in the mammalian ear. At first, such a transition would seem unlikelyâ€"it is hard to imagine what function such bones could have had during their intermediate stages. Yet paleontologists discovered two transitional forms of mammal-like reptiles, called therapsid s, that had a double jaw joint i. Not one but many creatures intermediate between living apes and humans have since been found as fossils. The oldest known fossil hominin sâ€"i. Ardipithecus lived about 4. Numerous fossil remains from diverse African origins are known of Australopithecus , a hominin that appeared between 3 million and 4 million years ago. Australopithecus had an upright human stance but a cranial capacity of less than cc equivalent to a brain weight of about grams , comparable to that of a gorilla or a chimpanzee and about one-third that of humans. Its head displayed a mixture of ape and human characteristicsâ€"a low forehead and a long, apelike face but with teeth proportioned like those of humans. Other early hominins partly contemporaneous with Australopithecus include Kenyanthropus and Paranthropus; both had comparatively small brains, although some species of Paranthropus had larger bodies. Paranthropus represents a side branch in the hominin lineage that became extinct. Along with increased cranial capacity, other human characteristics have been found in Homo habilis , which lived about 1. The brain sizes of H. See also human evolution. All but Homo sapiens, the species that comprises modern humans, are extinct and have been reconstructed from fossil evidence. Structural similarities The skeletons of turtles, horses, humans, birds, and bats are strikingly similar, in spite of the different ways of life of these animals and the diversity of their environments. The correspondence, bone by bone, can easily be seen not only in the limbs but also in every other part of the body. From a purely practical point of view, it is incomprehensible that a turtle should swim, a horse run, a person write, and a bird or a bat fly with forelimb structures built of the same bones. An engineer could design better limbs in each case. But if it is accepted that all of these skeletons inherited their structures from a common ancestor and became modified only as they adapted to different ways of life, the similarity of their structures makes sense. Homologies of the forelimb among vertebrates, giving evidence for evolution. The bones correspond, although they are adapted to the specific mode of life of the animal. Comparative anatomy investigates the homologies , or inherited similarities, among organisms in bone structure and in other parts of the body. The correspondence of structures is typically very close among some organismsâ€"the different varieties of songbirds, for instanceâ€"but becomes less so as the organisms being compared are less closely related in their evolutionary history. The similarities are less between mammals and birds than they are among mammals, and they are still less between mammals and fishes. Similarities in structure, therefore, not only manifest evolution but also help to reconstruct the phylogeny , or evolutionary history, of organisms. Comparative anatomy also reveals why most organismic structures are not perfect. The imperfection of structures is evidence for evolution and against antievolutionist arguments that invoke intelligent design see below Intelligent design and its critics. Embryonic development and vestiges Darwin and his followers found support for evolution in the study of embryology , the science that investigates the development of organisms from fertilized egg to time of birth or hatching. Vertebrate s, from fishes through lizards to humans, develop in ways that are remarkably similar during early stages, but they become more and more differentiated as the embryos approach maturity. The similarities persist longer between organisms that are more closely related e. Common developmental patterns reflect evolutionary kinship. Lizards and humans share a developmental pattern inherited from their remote common ancestor; the inherited pattern of each was modified only as the separate descendant lineages evolved in different directions. The common embryonic stages of the two creatures reflect the constraints imposed by this common inheritance, which prevents changes that have not been necessitated by their diverging environments and ways of life. The embryos of humans and other nonaquatic vertebrates exhibit gill slits even though they never breathe through gills. These slits are found in the embryos of all vertebrates because they share as common ancestors the fish in which these structures first evolved. Human embryos also exhibit by the fourth week of development a well-defined tail , which reaches maximum length at six weeks. Similar embryonic tails are found in other mammals, such as dogs, horses, and monkeys; in humans, however, the tail eventually shortens, persisting only as a rudiment in the adult coccyx. A close evolutionary relationship between organisms that appear drastically different as adults can sometimes be recognized by their embryonic homologies. Barnacle s, for example, are sedentary crustaceans with little apparent likeness to such free-swimming crustaceans as lobsters, shrimps, or copepods. Yet barnacles pass through a free-swimming larval stage, the nauplius, which is unmistakably similar to that of other crustacean larvae. Embryonic rudiments that never fully develop, such as the gill slits in humans, are common in all sorts of animals. Some, however, like the tail rudiment in humans, persist as adult vestiges, reflecting evolutionary ancestry. The most familiar rudimentary organ in humans is the vermiform appendix. This wormlike structure attaches to a short section of intestine called the cecum , which is located at the point where the large and small intestines join. The human vermiform appendix is a functionless vestige of a fully developed organ present in other mammals, such as the rabbit and other herbivores, where a large cecum and appendix store vegetable cellulose to enable its digestion with the help of bacteria. Vestiges are instances of imperfectionsâ€"like the imperfections seen in anatomical structuresâ€"that argue against creation by design but are fully understandable as a result of evolution. Biogeography Darwin also saw a confirmation of evolution in the geographic distribution of plants and animals, and later knowledge has reinforced his observations. For example, there are about 1, known species of Drosophila vinegar flies in the world; nearly one-third of them live in Hawaii and nowhere else, although the total area of the archipelago is less than one-twentieth the area of California or Germany. Also in Hawaii are more than 1, species of snails and other land mollusks that exist nowhere else. This unusual diversity is easily explained by evolution. The islands of Hawaii are extremely isolated and have had few colonizersâ€"i. Those species that did colonize the islands found many unoccupied ecological niches , local environments suited to sustaining them and lacking predators that would prevent them from multiplying. In response, these species rapidly diversified; this process of diversifying in order to fill ecological niches is called adaptive radiation. In Africa are rhinoceroses, hippopotamuses, lions, hyenas, giraffes, zebras, lemurs, monkeys with narrow noses and nonprehensile tails, chimpanzees, and gorillas. South America , which extends over much the same latitudes as Africa, has none of these animals; it instead has pumas, jaguars, tapir, llamas, raccoons, opossums, armadillos, and monkeys with broad noses and large prehensile tails. These vagaries of biogeography are not due solely to the suitability of the different environments. There is no reason to believe that South American animals are not well suited to living in Africa or those of Africa to living in South America. The islands of Hawaii are no better suited than other Pacific islands for vinegar flies, nor are they less hospitable than other parts of the world for many absent organisms. In fact, although no large mammals are native to the Hawaiian islands, pigs and goats have multiplied there as wild animals since being introduced by humans. This absence of many species from a hospitable environment in which an extraordinary variety of other species flourish can be explained by the theory of evolution, which holds that species can exist and evolve only in geographic areas that were colonized by their ancestors. Molecular biology The field of molecular biology provides the most detailed and convincing evidence available for biological evolution. This has made it possible to reconstruct evolutionary events that were previously unknown and to confirm and adjust the view of events already known. The precision with which these events can be reconstructed is one reason the evidence from molecular biology is so compelling. Another reason is that molecular evolution has shown all living organisms, from bacteria to humans, to be related by descent from common ancestors. A remarkable uniformity exists in the molecular components of organismsâ€"in the nature of the components as well as in the ways in which they are assembled and used. In all bacteria, plants, animals, and humans, the DNA comprises a different sequence of the same four component nucleotide s, and all the various protein s are synthesized from different combinations and sequences of the same 20 amino acid s, although several hundred other amino acids do exist. The genetic code by which the information contained in the DNA of the cell nucleus is passed on to proteins is virtually everywhere the same. Similar metabolic pathwaysâ€"sequences of biochemical reactions see metabolism â€"are used by the most diverse organisms to produce energy and to make up the cell components. This unity reveals the genetic continuity and common ancestry of all organisms.

Chapter 8 : How evolutionary principles improve the understanding of human health and disease

Here is a working list of species concepts presently in play. I quote "Concepts" above because, for philosophical reasons, I think there is only one concept - "species", and all the rest.

He introduces the convention to distinguish a particular research tradition Laudan from other approaches to the biology of human behavior. Evolutionary psychology rests upon specific theoretical principles presented in section 2 below not all of which are shared by others working in the biology of human behavior Laland and Brown ; Brown et al. For example, human behavioral ecologists present and defend explanatory hypotheses about human behavior that do not appeal to psychological mechanisms e. Behavioral ecologists also believe that much of human behavior can be explained by appealing to evolution while rejecting the idea held by evolutionary psychologists that one period of our evolutionary history is the source of all our important psychological adaptations Irons Developmental psychobiologists take yet another approach: Michel and Moore ; but see Bateson and Martin ; Bjorklund and Hernandez Blasi for examples of developmentalist work in an adaptationist vein. These theorists believe that much of our behavior can be explained without appealing to a suite of specific psychological adaptations for that behavior. Instead they emphasize the role of development in the production of various human behavioral traits. Paul Griffiths argues that evolutionary psychology owes theoretical debt to both sociobiology and ethology Griffiths ; Griffiths Evolutionary psychologists acknowledge their debt to sociobiology but point out that they add a dimension to sociobiology: Human behaviors are not a direct product of natural selection but rather the product of psychological mechanisms that were selected for. Evolutionary psychology is also related to cognitive psychology and the cognitive sciences. This overt cognitivism sets evolutionary psychology apart from much work in the neurosciences and from behavioral neuroendocrinology. In these fields internal mechanisms are proposed in explanations of human behavior but they are not construed in computational terms. Many neuroscientists and behavioral neuroendocrinologists work at the implementation level while cognitive psychologists work at the level of the computations that are implemented at the neurobiological level cf. Evolutionary psychologists sometimes present their approach as potentially unifying, or providing a foundation for, all other work that purports to explain human behavior e. This claim has been met with strong skepticism by many social scientists who see a role for a myriad of types of explanation of human behavior, some of which are not reducible to biological explanations of any sort. This discussion hangs on issues of reductionism in the social sciences. Little has a nice introduction to these issues. There are also reasons to believe that evolutionary psychology neither unifies nor provides foundations for closely neighboring fields such as behavioral ecology or developmental psychobiology. See the related discussion in Downes In other work, evolutionary psychologists present their approach as being consistent with or compatible with neighboring approaches such as behavioral ecology and developmental psychobiology. The truth of this claim hangs on a careful examination of the theoretical tenets of evolutionary psychology and its neighboring fields. The brain is a computer designed by natural selection to extract information from the environment. Individual human behavior is generated by this evolved computer in response to information it extracts from the environment. Understanding behavior requires articulating the cognitive programs that generate the behavior. The cognitive programs of the human brain are adaptations. They exist because they produced behavior in our ancestors that enabled them to survive and reproduce. The cognitive programs of the human brain may not be adaptive now; they were adaptive in ancestral environments. Natural selection ensures that the brain is composed of many different special purpose programs and not a domain general architecture. Tenet 1 emphasizes the cognitivism that evolutionary psychologists are committed to. It is these programsâ€”psychological mechanismsâ€”that are products of natural selection. While they are products of natural selection, and hence adaptations, these programs need not be currently adaptive. Samuels ; Samuels There is a lot packed into this tenet and we will examine this thesis in some detail below in section 3. In brief, evolutionary psychologists maintain that there is an analogy between organs and psychological mechanisms or modules. Organs perform specific functions well and are products of natural selection. There are no general purpose organs, hearts pump blood and livers detoxify the body. The same goes for psychological mechanisms; they arise as responses to specific contingencies in the environment and are selected for to the extent that they contribute to the survival and reproduction of the organism. Just as there are no general purpose organs, there are no general purpose psychological mechanisms. Finally, tenet 6 introduces the reductionist or foundational vision of evolutionary psychology, discussed above. There are numerous examples of the kinds of mechanisms that are hypothesized to underlie our behavior on the basis of research guided by these theoretical tenets: This one is a specifically male psychological mechanism. Singh claims that the detection and preference suite are adaptations for choosing fertile mates. What is important to note about the research guided by these theoretical tenets above is that all behavior is best explained in terms of underlying psychological mechanisms that are adaptations for solving a particular set of problems that humans faced at one time in our ancestry. Also, evolutionary psychologists stress that the mechanisms they focus on are universally distributed in humans and are not susceptible to much, if any, variation. They maintain that the mechanisms are a product of adaptation but are no longer under selection Tooby and Cosmides , 39â€" Barrett also expands the scope of evolutionary psychology and notes the addition of research methods developed since Cosmides and Tooby first set out the parameters for research in the field. Todd Shackleford and Viviana Weekes-Shackleford have just completed a huge compendium of work in the evolutionarily based psychological sciences. In this volume a vast array of different research methods are presented and defended and there are a number of entries comparing the merits of alternative approaches to evolutionary psychology. The methods for testing hypotheses in evolutionary psychology come mostly from psychology. Buss, Singh and other evolutionary psychologists emphasize the cross cultural validity of their results, claiming consistency in responses across a wide variety of human populations. But see Yu and Shepard ; Gray et al. For the most part standard psychological experimental methods are used to test hypotheses in evolutionary psychology. Shapiro and Epstein ; Lloyd ; Lloyd and Feldman A response profile may be prevalent in a wide variety of subject populations but this says nothing about whether or not the response profile is a psychological mechanism that arose from a particular selective regimen. The Massive Modularity Hypothesis Claims that the mind has a modular architecture, and even massively modular architecture, are widespread in cognitive science see e. Hirshfield and Gelman The massive modularity thesis is first and foremost a thesis about cognitive architecture. As defended by evolutionary psychologists, the thesis is also about the source of our cognitive architecture: Barrett and Kurzban ; Barrett Our cognitive architecture is composed of computational devices, that are innate and are adaptations cf. Samuels ; Samuels et al. This massively modular architecture accounts for all of our sophisticated behavior. Our successful navigation of the world results from the action of one or more of our many modules. Jerry Fodor was the first to mount a sustained philosophical defense of modularity as a theory of cognitive architecture Fodor His modularity thesis is distinct from the massive modularity thesis in a number of important ways. The modular detection systems feed output to a central system, which is a kind of inference engine. Fodor presents a large number of arguments against the possibility of modular central systems. Fodor draws a bleak conclusion about the status of cognitive science from his examination of the character of central systems: Carruthers is well aware that Fodor see e. Fodor does not believe that central systems can be modular but he presents arguments from evolutionary psychologists and others that support the modularity thesis for the whole mind. Perhaps one of the reasons that there is so much philosophical interest in evolutionary psychology is that discussions about the status of the massive modularity thesis are highly theoretical. Richard Samuels speculates that argument rather than empirical data is relied on, because the various competing modularity theses about central systems are hard to pull apart empirically. Carruthers exemplifies this approach as he relies heavily on arguments for massive modularity often at the expense of specific empirical results that tell in favor of the thesis. There are many arguments for the massive modularity thesis. Some are based upon considerations about how evolution must have acted; some are based on considerations about the nature of computation and some are versions of the poverty of the stimulus argument first presented by Chomsky in support of the existence of an innate universal grammar. See Cowie for a nice presentation of the structure of poverty of the stimulus arguments. Myriad versions of each of these arguments appear in the literature and many arguments for massive modularity mix and match components of each of the main strands of argumentation. Here we review a version of each type of argument. Each of these organs arises as a result of natural selection and the organs, acting together, contribute to the fitness of the organism. The functional decomposition is driven by the response to specific environmental stimuli. Rather than natural selection acting to produce general purpose organs, each specific environmental challenge is dealt with by a separate mechanism. All versions of this argument are arguments from analogy, relying on the key transitional premise that minds are a kind of biological system upon which natural selection acts. The second type of argument makes no appeal to biological considerations whatsoever although many evolutionary psychologists give these arguments a biological twist. Call this the computational argument, which unfolds as follows: This type of argument is structurally similar to the biological argument as Carruthers points out. The key idea is that there is no sense to the idea of a general problem solver and that no headway can be made in cognitive science without breaking down problems into their component parts. Many evolutionary psychologists see e. Tooby and Cosmides appeal to the idea that there is neither enough time, or enough available information, for any given human to learn from scratch to successfully solve all of the problems that we face in the world. If we invoke this argument across the whole range of problem sets that humans face and solve, we arrive at a huge set of innate mechanisms that subserve our problem solving abilities, which is another way of saying that we have a massively modular mind. There are numerous responses to the many versions of each of these types of arguments and many take on the massive modularity thesis head on without considering a specific argument for it. I will defer consideration of responses to the first argument type until section 4 below, which focuses on issues of the nature of evolution and natural selection â€” topics in philosophy of biology. The second type of argument is one side of a perennial debate in the philosophy of cognitive science. Fodor , 68 takes this argument to rest on the unwarranted assumption that there is no domain-independent criterion of cognitive success, which he thinks requires an argument that evolutionary psychologists do not provide. Samuels responds to evolutionary psychologists that arguments of this type do not sufficiently discriminate between a conclusion about domain specific processing mechanisms and domain specific knowledge or information. The library model of cognition is not massively modular in the relevant sense but type two arguments support it. According to Samuels, evolutionary psychologists need something more than this type of argument to warrant their specific kind of conclusion about massive modularity. Buller introduces further worries for this type of argument by tackling the assumption that there can be no such thing as a domain general problem solving mechanism.

DOWNLOAD PDF RELATED EVOLUTIONARY CONCEPTS.

Chapter 9 : Species concepts Â· john hawks weblog

The theory of evolution by natural selection, first formulated in Darwin's book "On the Origin of Species" in , is the process by which organisms change over time as a result of changes in.

Other Referenced Works 1. It gained wide attention in with the publication of the landmark volume The Adapted Mind by Jerome Barkow, Leda Cosmides and John Tooby, and since then numerous textbooks for example, Buss and popular presentations for example, Pinker , ; Wright have appeared. These days, Evolutionary Psychology is a powerful research program that has generated some interesting research, but it has also sparked a heated debate about its aspirations and limitations see, for example, Rose and Rose The human mind is not an all-purpose problem solver relying on a limited number of general principles that are universally applied to all problemsâ€"a view that dominated early artificial intelligence AI and behaviorism for example, Skinner , For the idea of an all-purpose problem solver see, for example, Newell and Simon ; for some of the earliest AI work related to this idea see, for example, Newell and Simon , Newell et al. Rather, the human mind is a collection of independent, task-specific cognitive mechanisms, a collection of instincts adapted for solving evolutionary significant problems. The human mind is sort of a Swiss Army knife Pinker This conception of the mind is based on three important ideas adopted from other disciplines Cosmides and Tooby , 54; Samuels , The Computational Model of the Mind Following the development of modern logic Boole ; Frege and the formalization of the notion of computation Turing , early AI construed logical operations as mechanically executable information processing routines. Eventually, this led to the idea that mental processes for example, reasoning and mental states for example, beliefs and desires may themselves also be analyzable in purely syntactic terms. The "Computational Theory of Mind," developed by philosophers like Hilary Putnam and Jerry Fodor , , for instance, conceives of mental states as relations between a thinker and symbolic representations of the content of the states, and of mental processes as formal operations on the syntactic features of those representations. Evolutionary Psychology endorses the computational model of the mind as an information processing system or a formal symbol manipulator and thus treats the mind as a collection of "computational machines" Cosmides and Tooby , 54 or "information-processing mechanisms" Tooby and Cosmides a, 21 that receive input from the environment and produce behavior or physiological changes as output. To this, it adds an evolutionary perspective: The brain is thus not just like a computer. The Computational Model of the Mind: The human mind is an information processing system, physically realized in the brain, and can be described at a computational level as a device whose evolutionary function is to process information by mapping informational input onto behavioral output. The Modularity of Mind Early attempts at simulating human intelligence revealed that artificial cognitive systems that are not already equipped with a fair amount of "innate knowledge" about a particular problem domain are unable to solve even the easiest problems see, for example, the idea of "scripts" in Schank and Abelson In the s and s, the work of scientists like Noam Chomsky, Jerry Fodor, or David Marr further undermined the idea of the mind as a "blank slate" which acquires knowledge about the world by means of only a couple of general learning mechanisms. Their findings suggested instead that the mind incorporates a number of cognitive subsystems that are triggered only by a certain kind of input. According to his "Poverty of the Stimulus" argument, a child cannot learn her first language through observation because the available stimuli that is, the utterances of adult speakers neither enable her to produce grammatically correct nor prevent her from producing grammatically incorrect sentences. Instead, Chomsky argued, we possess a "language acquisition device" which, rather than extracting all information from the world through some general mechanism, comes already equipped with a certain amount of "innate knowledge. The model of the mind as a general learning mechanism that is indiscriminately applied to any problem domain was also disconfirmed in other areas of cognitive science. Garcia and Koelling showed that while rats can learn some associations by means of stimulus-response mechanisms, others, albeit structurally similar, cannot be learned at all, or only much slower: Comparable "learning biases" have been found for humans in various areas for example, Cook et al. Evolutionary Psychologists conclude that the assumption that the human mind is composed mainly of a few content-free cognitive processes that are "thought to govern how one acquires a language and a gender identity, an aversion to incest and an appreciation for vistas, a desire for friends and a fear of spidersâ€”indeed, nearly every thought and feeling of which humans are capable" Ermer et al. Such mechanisms would be "limited to knowing what can be validly derived by general processes from perceptual information" Cosmides and Tooby , 92 and thus incapable of efficiently solving adaptive problems see section 2d. Instead, Evolutionary Psychologists claim, "our cognitive architecture resembles a confederation of hundreds or thousands of functionally dedicated computers" Tooby and Cosmides , xiii , the so-called "modules": The mind consists of a possibly large number of domain-specific, innately specified cognitive subsystems, called "modules. Adaptationism Since cognitive mechanisms are not directly observable, studying them requires some indirect way of discovering them see section 2b. Evolutionary Psychologists adopt the kind of adaptationist reasoning well known from evolutionary biology that also characterizes many works in sociobiology Wilson During the s, sociobiologists argued that "social behaviors [too] are shaped by natural selection" Lumsden and Wilson , 99; for the original manifesto of sociobiology see Wilson and started to seek adaptationist explanations for cognitive, cultural, and social traits, like the ability to behave altruistically, different mating preferences in males and females, or the frequently observed parent-offspring conflicts. Our mind, they argue, is a complex, functionally integrated collection of cognitive mechanisms, and since the only known natural process that can bring about such functional complexity is evolution by natural selection Cosmides and Tooby , ; Symons , ; Tooby and Cosmides b, , these cognitive mechanisms are likely to be adaptations to the adaptive problems of our ancestors. This, Evolutionary Psychologists hold, intimately links psychology with evolutionary theory: While evolutionary theory is used to describe the relevant ancestral problems and to make educated guesses about the information processing cognitive mechanisms that have been shaped by natural selection in response, the task of psychology is to establish that current humans actually possess these mechanisms see section 2b. The human mind, like any other complex feature, was shaped by a process of evolution through natural selection. Key Concepts and Arguments According to Evolutionary Psychology, the human mind is a set of cognitive adaptations designed by natural selection. Since such design takes time, the adaptive problems that shaped our mind are not the ones we know from our life as industrialists during the past years, or from our life as agriculturalists during the past 10, years, but those characteristic of our past life as hunter-gatherers. Since these problems varied considerably, the human mind contains many problem-specific adaptations. The task of Evolutionary Psychology is to discover these modules by means of what is called a "functional analysis," where one starts with hypotheses about the adaptive problems faced by our ancestors, and then tries to infer the cognitive adaptations that must have evolved to solve them. This theoretical framework of Evolutionary Psychology centers on a couple of key ideas which will be explained in this section: Adaptation and Adaptivity That our evolutionary history influenced not only our bodies, but also our brains, and thus our minds, is not very controversial. But how exactly has evolution affected the way we are, mind-wise? How exactly can evolutionary theory elucidate the structure and function of the human mind? It may seem that "behavioral traits are like any other class of characters" Futuyama , , so that they can be subject to natural selection in the same way as physiological traits. In that case, an evolutionary study of human behavior could then proceed by studying behavioral variants and see which of them are adaptive and which selectively neutral or detrimental. However, since natural selection is heritable variation in fitness, it can act only on entities that are transmitted between generations, and behavior as such is not directly transmitted between generations, but only via the genes that code for the proximal cognitive mechanisms that trigger it. Hence, an evolutionary approach to human psychology must proceed by studying the cognitive mechanisms that underlie our behavior: By sharply distinguishing between adaptive behavior and the cognitive mechanisms that are adaptations for producing adaptive behavior, Evolutionary Psychologists provide "the missing link between evolutionary theory and manifest behavior" Tooby and Cosmides , Section 2b shows how Evolutionary Psychologists try to cope with this difficulty, and section 5a discusses a version of evolutionary psychology that focuses on adaptive behavior. We also willfully refrain from doing things that would be conducive to survival buy some healthy food, exercise or boost our potential for reproduction donate our sperm or eggs to cryobanks. If Evolutionary Psychology is right that our mind contains cognitive mechanisms that are adaptations for producing adaptive behavior, then why are we behaving maladaptively so often? The claim that the brain is an adaptation for producing adaptive behavior does not entail that it is currently producing adaptive behavior. Adaptations are traits that are present today because of the selective advantage they offered in the past, and the past environment arguably differed notably from the current one. The modern metropolis in which we live in unprecedented large groups, consume fast food and use contraceptives is not even years old, and even agriculture arose only some 10, years ago. Compared to this, our ancestors spent an unimaginably long time in Pleistocene conditions roughly, the period spanning 1. The cognitive mechanisms produced by natural selection are adaptations for producing adaptive behavior in these circumstances, not for playing chess, passing logic exams, navigating through lower Manhattan, or keeping ideal weight in an environment full of fast food restaurants. The ability to solve them would not have enhanced the survival or reproduction of the average Pleistocene hunter-gatherer" and hence "the performance of modern humans on such tasks is generally poor and uneven" Cosmides and Tooby , As Evolutionary Psychologists colorfully put it: Since the environment in which a trait was selected for may differ from the current one, "[t]he hypothesis that a trait is an adaptation does not imply that the trait is currently adaptive" Symons , But if cognitive adaptations can neither be discovered in the brain, nor by observing current human behavior, how can they be studied? Functional Analysis Verifying the claim that a trait is an adaptation is difficult because this is essentially a historical claim. A trait is an adaptation because it was adaptive in the past, and it is unclear what the past was like, let alone what would have been adaptive under past conditions. According to Evolutionary Psychology, however, it is possible to verify adaptationist claims: Tooby and Cosmides , 28 What Tooby and Cosmides suggest is a procedure known as functional analysis. One uses evolutionary reasoning to identify the adaptive problems our ancestors presumably awaited in their evolutionary environment, infers from this the cognitive mechanisms that one thinks must have evolved to solve these problems, conducts psychological experiments to show that they are actually found in current human beings, and rules out alternative explanations. A bit more precisely, identifying adaptations by means of functional analysis proceeds in six steps Tooby and Cosmides , 40â€”1: Step 1 uses evolutionary considerations to formulate a model of the past adaptive problems the human mind had to solve. Step 2 generates hypotheses about exactly how these problems would have manifested themselves under the selection pressures present in the evolutionary environment of our ancestors. Step 3 formulates a "computational theory" that specifies "a catalog of the specific information processing problems" Cosmides and Tooby , that had to be solved to overcome the adaptive problems identified in step 2. Step 4 uses the computational theory "as a heuristic for generating testable hypotheses about the structure of the cognitive programs that solve the adaptive problems in question" Cosmides and Tooby , Step 5 rules out alternative accounts of the cognitive mechanisms in question that do not treat them as the result of evolution by natural selection. Step 6 tests the adaptationist hypotheses by checking whether modern Homo sapiens indeed possess the cognitive mechanisms postulated in step 4. If this test is successful, Evolutionary Psychologists contend, it is quite likely that the cognitive mechanisms are indeed adaptations for solving the problems identified in step 1. For examples of empirical research that, by and large, follow this theoretical framework, see section 3. One may add a seventh step which tries to discover the neural basis of the cognitive mechanisms, so that eventually theories of adaptive problems guide the search for the cognitive mechanisms that solve them, while knowing what cognitive mechanisms exist in turn guides the search for their neural basis. The procedure of functional analysis shows what sort of evidence would support the claim that a cognitive mechanism is an adaptation for solving a given adaptive problem. How can we today know with any certainty which adaptive problems our ancestors faced? The human EEA consists in the set of environmental conditions encountered by human populations during the Pleistocene from 1. Yet, the EEA "is not a place or a habitat, or even a time period. Rather, it is a statistical composite of the adaptation-relevant properties of the ancestral environments encountered by members of ancestral populations, weighted by their frequency and fitness consequences" Tooby and Cosmides b, â€”7. Importantly, "different adaptations will have different EEAs. Some, like language, are firmly anchored in approximately the last two million years; others, such as infant attachment, reflect a much lengthier evolutionary history" Durrant and Ellis , Speaking about the EEA is thus at least misleading, since strictly speaking one has to distinguish between the EEA of a species and the EEA of particular cognitive adaptations. There are two crucial questions with regard to the EEA: First, why suppose that our cognitive mechanisms, even if they are adaptations, are adaptations to exactly the problems faced by our ancestors in the EEA? Second, how can we today determine the EEA of a particular adaptation in enough detail? Evolutionary Psychologists offer two related arguments in response to the first question. The first draws attention to the large amount of time our ancestors spent in Pleistocene conditions compared to the brief stretch of time that has passed since the advent of agriculture or industrialization: Human psychological mechanisms should be adapted to those environments, not necessarily to the twentieth-century industrialized world" Cosmides and Tooby , The second argument maintains that since natural selection is a slow process, there just have not been enough generations for it to design new cognitive mechanisms that are well-adapted to our post-agricultural industrial life: Both arguments seem to suffer from the same difficulty. The 10, years that have passed since the Pleistocene correspond to roughly generations, and if the selection pressure and the heritability roughly, a measure of the response to selection are high enough, quite a lot can happen in generations. In particular, no one needs to hold that "whole new mental organs could evolve since the Pleistocene. The same observation threatens the first argument: How much time our ancestors spent in one environment as compared to another is completely irrelevant, if the selection pressures in one differ radically from those in the other. In response to the second question, Evolutionary Psychologists point out that, first, we can be relatively sure that the physical conditions were comparable to the ones todayâ€”"an enormous number of factors, from the properties of light to chemical laws to the existence of parasites, have stably endured" Tooby and Cosmides b, â€”and, second, we can be relatively certain on paleontological grounds that a great deal of our ancestors spend a great deal of their time on African savannahs as hunter-gatherers. Yet, since it is in response to the social problems faced by our ancestors that our cognitive adaptations are said to have evolved, what matters is not so much the physical environment which may have stayed constant, by and large but the social environment, and the question is what we can know with any certainty about the social life of our ancestors, given that social traits do not fossilize. Evolutionary Psychologists contend that with regard to the social environment little has changed, too: However, such general knowledge about the EEA seems to be of little use, for discovering cognitive adaptations requires formulating a computational theory that provides "a catalog of the specific information processing problems" Cosmides and Tooby , ; italics added , and that goes significantly beyond being told that our ancestors had to find mates, care for children, find food and so forth for more on this see section 4c.