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Founders of Evolutionary Psychology

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Synonyms

[David Buss](#); [John Tooby](#); [Leda Cosmides](#); [Margo Wilson](#); [Martin Daly](#)

Definition

Evolutionary psychology is a psychological science where hypotheses are informed by evolutionary theory (especially middle-level theories, such as Trivers' parental investment theory or life history theory, see Buss 1995), as well as a consideration of known features of the species' relevant evolutionary past, i.e., relevant selection forces. In addition, there is a specific model of mind, where one considers the mind made up of a mosaic of mental mechanisms. This form of modularity follows Pinker's (1997) definition where modules are only partially informationally compartmentalized, not Jerry Fodor's more informationally encapsulated definition, as the modules are partly interacting and partly informationally encapsulated. These mechanisms are designed

through natural, social, or sexual selection. They are context-dependent and process information according to specific rules as selected for. This may by many be called the Santa Barbara school of evolutionary psychology, but that specific approach has been somewhat broadened by a greater interest in sex differences and individual differences during the last decades. Founders are those who contributed to the formation of the psychological evolutionary research program as it may be recognized today, especially as opposed to other evolutionary research programs within human behavioral science such as human behavioral ecology or gene-culture coevolution. Founders presented in the following include John Tooby and Leda Cosmides, Margo Wilson and Martin Daly, and David Buss. These were historically the five scholars who worked on the very first "Foundations of Evolutionary Psychology" at Palo Alto.

Introduction

Evolutionary psychology was founded in the 1980s, developed into a comprehensive and burgeoning field during the 1990s, and slowly became an integrated part of psychology in general the last 20 years. Considering the foundations of evolutionary psychology therefore warrants a look at papers written during the 1980s and the early 1990s, as well as work that has influenced the field the last 30 years.

There are three major research labs/groups that may be recognized as foundational and will be considered in greater detail in this chapter, although they all met at Harvard: John Tooby and Leda Cosmides, founding directors of the Center of Evolutionary Psychology at the University of California at Santa Barbara; Margo Wilson and Martin Daly, McMaster University, Canada; and David Buss, at Harvard, University of Michigan, and the University of Texas at Austin in charge of the evolutionary psychology and individual differences graduate program.

The current chapter will provide a brief introduction to some of the most influential contributors to the formulation and foundation of mainstream evolutionary psychology (EP). This research program was developed through more or less formal meetings over several years, but was most clearly formulated by John Tooby and Leda Cosmides as what is sometimes referred to as the Santa Barbara school. Parallel to Tooby and Cosmides' empirical work, Margo Wilson and Martin Daly published large studies based on basic EP principles. The major communicator of EP within academia is probably David Buss, who in addition to large empirical studies also added a focus on sex differences to the mainstream EP research program, as well as personality and individual differences. While many more researchers – both independent and collaborators of the aforementioned – have also contributed to mainstream modern EP, this chapter will be restricted to the basic contributions of these five founders.

Evolutionary Psychology Is Not Sociobiology

Historically, evolutionary psychology is obviously not the first evolutionary approach to behavior, psychology, or human nature. In *Origin* Darwin is often quoted as pointing out that he believes that “In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation.”

This is an interesting quote, but from a historical perspective, it is important to note how early

this was in the development of any scientific psychology. Certainly Darwin's work on human emotions is one of the first works on human psychological features from an evolutionary perspective, and he is also one of the first developmental psychologists with his observational study of his own child published in *Mind*. Pioneers such as William James and Sigmund Freud also were famously interested in phylogenetic musings and speculation. Prominent mainstream theorists such as John Bowlby and Mary Ainsworth were explicitly evolutionary, despite many current attachment scientists downplaying the evolutionary foundations of their classical theoretical work. Within anxiety theory, mainstream clinical work has always been based on an appreciation of the evolved functional underpinnings (Kennair 2007; Marks and Nesse 1994). However, none of these previous evolutionary approaches to behavior or psychology were part of an organized theoretical framework or research program. The most influential approach to human evolved behavior prior to the advent of evolutionary psychology was human sociobiology, strongly influenced by E.O. Wilson's popular work on sociobiology, heralding the use of recent theoretical developments in evolutionary biology to investigate behavior in animals, including humans.

It is important to note at this point the difference in considering manifest behavior versus considering the underlying evolved mental mechanisms. Dennett suggested that EP is merely the marriage of sociobiology with cognitive science. This might not fully appreciate the complexity of focusing on the adaptation as a cognitive structure (Kennair 2002). Once one accepts mental mechanisms as the relevant object of study, something behaviorists such as Wilson was hesitant to do, this affects both methods and how one implements theory in generating hypotheses. First, one stops primarily counting babies; that is, one stops to primarily consider current selection or adaptiveness. Don Symons was dismissive of evolutionary oriented scholars who sought a psychologically agnostic science, where humans are fitness maximizers. Cosmides and Tooby

(1987) provide the link between manifest behavior and evolutionary science: the evolved psychological adaptation.

It takes time to construct human mental mechanisms through selection. Human universals, and thereby the cognitive underpinnings of our human nature, have to have been in place before humans migrated out of Africa. It is therefore not necessarily our current environment we are adapted to, but rather the relevant selection forces that were stable enough across deep time to design the mental mechanisms that make up universal human nature. Environments change faster than selection can form adaptations, especially when species migrate as far as humans have. Such mismatch makes it less relevant to consider current adaptiveness, but predictable output from hypothesized mental adaptations may be studied, and design features may be discerned based on such output.

While sociobiology considered current adaptiveness and built upon a behaviorist psychological model that studied behavior in current environments, evolutionary psychology predicts that mental mechanisms have been formed over evolutionary time due to middle-level evolutionary theory and available knowledge about the relevant selection forces (EEA). Evolutionary psychology thus focuses on adaptations and is inherently founded on a mainstream social-cognitive psychology model of mind. This shift made evolutionary psychology more relevant for mainstream psychological science. In summary, where sociobiology was founded on the psychological theory of behaviorism, which studied observed behavior and considered whether this was currently adaptive, evolutionary psychology was founded on mainstream cognitive theory, which studies the results of mental processing and considers the underlying evolved mental adaptations.

Basic Evolutionary Underpinnings

Dawkins has had a great influence on EP through his synthesis of how selectionist reasoning and the new (in the 1970s) theories of behavioral and social evolution by Hamilton (1964a, b) and

Trivers (1972, 1974) might be implemented in research. George Williams also provided fundamental insight, through the focus on formal criteria of the adaptation. It is important to note that the field also in general clearly identifies with Williams' refutation of group selection and his focus on the adaptation. From an evolutionary psychology perspective, group selectionist models are moot. Thus evolutionary psychologists in general take a Darwinian, gene level selectionist approach, focusing on inclusive fitness and middle-level theories (i.e., Trivers 1972) or specific versions of these (i.e., sexual strategy theory, Buss and Schmitt 1993) that may generate testable hypotheses and predictions (Buss 1995; Ketelaar and Ellis 2000).

In addition to focusing on identifying mental adaptations and using middle-level theories, an evolutionary psychology approach builds on what is known about the species' relevant evolutionary past: the relevant selection forces or the environment of evolutionary adaptedness (EEA). Knowledge about selection forces may suggest how specific traits could be shaped today. The combination of these two aspects provides the evolutionary basis of evolutionary psychology hypothesis and prediction generation.

At this point it may also be important to note the following: Evolutionary psychology is not a comparative approach, like sociobiology often was. Other species have had species-specific selection that has formed the adaptations that define those species; the same is true for human evolution. Considering what model species to choose when attempting to consider either warfare or sexual behavior is hard enough; chimpanzees and bonobos are both related to humans to an equal degree, but differ dramatically in those two specific areas. Furthermore, many of the most interesting human psychological phenomena are species-specific and demand a consideration of specifically hominin evolution. That said, it is the same underlying middle-level theories that describe the selection mechanisms in all species.

A Short Introduction to Evolutionary Psychology

Evolutionary psychology is really indistinguishable from mainstream psychology if one considers research methods, statistics, or even to a large degree the journals evolutionary psychologists publish in. And despite what some critics argued, there probably are no differences in politics either (Tybur et al. 2007). More than traditional social psychologists, and despite changes in the last decade, evolutionary psychologists share a natural science epistemology and an acceptance of biological underpinnings to social cognition. That is not surprising given the fact that the most basic tenet of evolutionary psychology is that many relevant human psychological abilities, traits, or phenomena are the results of directional natural, social, or sexual selection.

One of Cosmides and Tooby's foundational contributions is the formulation of how the mind is best conceived within evolutionary psychology. While many other psychological theories either have no precise formulation of how the mind may be understood, evolutionary psychologists suggest that the mind is best understood as a mosaic of mental mechanisms. This is what is referred to as the modular mind. These modules are not fully informationally encapsulated; they are partially interconnected and communicate with each other, but particular parts are not connected to all other parts, and they all process information differently. These modules are, as stated above, considered to be mental adaptations, results of selection. They are therefore behavior-generating mental organs evolved to solve specific tasks relevant to reproduction and survival. They are therefore also context dependent to some degree, with a certain expectation of specific forms of input. These mechanisms contributed to increasing fitness due to processing information according to certain rules and generating fitness-enhancing behavior in evolutionary relevant ecologies in our species' past. The sum of these mental adaptations and their output make up human universal nature.

Methodologically, as mentioned above, the aim is to apply knowledge about the past environment and evolutionary middle-level theories to

generate original, testable hypotheses and predictions (Buss 1995; Tooby and Cosmides 1990b). These predictions are often concerned with specifying the functionally specified mental mechanisms, and specific predictions will suggest how these will process relevant information. This functional cognitive approach to hypothesis generation is at the heart of what makes evolutionary psychology stand out among psychological research programs. While most psychologists probably agree with evolutionary theory being the only explanation of how life has diversified and adapted to local ecological demands, psychologists in general seldom consider how evolutionary middle-level theories can help specify the information-processing mechanisms they study. Also, evolutionary theory is generally considered explanatory, not hypotheses generating. Further, while in the recent years most psychologists, even within social psychology, will accept a biological underpinning of mental activity, continued resistance to considering human behavior as a result of natural and sexual selection still exists.

A Meeting During an Earthquake

Ground shifting science rarely happens while the ground actually shakes. It did for evolutionary psychology. In the years 1989–1990 (during which the Loma Prieta earthquake occurred), David Buss collected five major names within evolutionary psychology at the Center for Advanced Study in the Behavioral Sciences in Palo Alto for a special center project entitled “Foundations of Evolutionary Psychology.” Although no great manifest was published, there is little doubt that this was an important meeting given the theoretical and empirical output over the next few years from all involved. The five were, of course, Margo Wilson, Leda Cosmides, John Tooby, Martin Daly, and David Buss. These are therefore the founders whose work and contributions will be considered in further detail below.

Wilson and Daly: Young Male Syndrome and Homicide

Margo Wilson and Martin Daly are two of the most important pioneers of empirical research into human behavior from a psychological and

evolutionary perspective. Science only grows and matures through data collection and hypothesis testing. While theoretical contributions are necessary to formulate a research program and develop the hypotheses to be tested, without empirical research, there will be little development.

Beyond their own scientific contributions, it is probably a safe claim that they influenced the field immensely with their editorship of the Human Behavior and Evolution Society flagship journal. This journal changed its name from *Ethology and Sociobiology* to *Evolution and Human Behavior*, marking both theoretical development and its increased scientific impact.

Young Male Syndrome

Sex differences are still a source of controversy within the social sciences and even to some degree within psychology. Many differences are quite small, and generally evolutionary psychology is not as interested in such differences: Relevant differences must have been due to stable evolutionary selection forces over evolutionary time and differences predicted by evolutionary middle-level theories.

Who will take the most risk? Based on sexual selection theory and analyses of age and sex, Wilson and Daly (1985) point out that those who have had the greatest reproductive competition and are at greatest danger of not reproducing are young men. They consider how many violent crimes may be the result of status competition, however petty the situations that can lead to violence among men might seem (e.g., bar fights). These male-male violence and status competitions are driven ultimately by increased reproductive success among young men who can acquire status, as risk-taking behavior including crime and violence has historically been one possible avenue to greater status for disenfranchised young men. They report how specifically young males but not young females show a surge of violent crime after puberty. Without the *young male syndrome*, many crimes might not be committed. War might not even be possible without this effect. One needs a certain hypophobia concerning one's own mortality, as pointed out by Tooby and Cosmides in their analysis of the necessary psychological

foundations of human warfare. The paper also considers general risky behavior among young men, including gambling.

Risky lifestyle choices, including risk-taking behavior, lead to increased mortality. Kruger and Nesse's studies on male to female mortality ratios have continued this line of work. Being born male is the greatest epidemiological risk factor for early mortality in Western countries. Research on risk versus worry highlights how both women in general might worry more, but men – especially young men – may be in danger due to being hypophobic, a concept used by Marks and Nesse to describe less than normal levels of anxious activation. The concept of the young male syndrome therefore sets the stage for a different appreciation of relevant health psychology and safety and risk phenomena based on an understanding of the function of reduced anxiety and greater risk-taking behavior in a specific subset of the population.

Homicide

Who kills who? And when and why do people kill each other? Daly and Wilson's (1988) classical book *Homicide* was groundbreaking as it was explicitly based on an evolutionary approach to behavior. Most importantly, and despite a background in comparative psychology, it focused on specific human behavior, and it left mere theoretical speculation behind: It backed up several of the theoretical a priori predictions with evidence from official registers. This was novel. As such, it mapped an epidemiology of violence and abuse from an evolutionary psychology perspective, actually stating this explicitly and using the concept of evolutionary psychology in the foreword. From violent crimes to killing of kinfolk, Daly and Wilson chronicled different aspects of the history of homicide, human life history, evolved sex differences, and the killing of family members.

One of the most discussed and challenged results of this evolutionary approach to murder and abuse was the *Cinderella effect*, the increased likelihood of stepparents killing their partner's child, compared with biological parents killing their own children. This finding has been

challenged both on the basis of findings from different countries and on the basis of bias in the registration of murder and abuse of children. In both cases, correcting the sample statistics suggests that there might be differential rates of murder across nations as well as a bias for registration of stepparents as perpetrators, but in general the Cinderella effect is supported and robust, and no other explanation has outcompeted the original evolutionary perspective. As a side note, even if one resorts to attachment theory for a competing explanation, it is surprising that critics are not aware that in their eagerness to refute one evolutionary perspective, they are actually invoking another. Finally, it is important to make clear how the Cinderella effect works: Many believe that Daly and Wilson are suggesting that humans, like lions taking over another male's pride, kill children that are not theirs to increase their own fitness. This is explicitly not what Daly and Wilson claim; they refute this position in *Homicide*. Their position is that for stepparents the bond that prevents parents in general from hurting their children is weaker, and therefore, some stop mechanisms have reduced function. They are therefore not arguing that biological parents cannot kill their offspring or that stepparents in general will hurt their stepchildren. At the population level, the Cinderella effect is still a statistically documented phenomenon.

Cosmides and Tooby: Human Universals and Interpersonal Competition

John Tooby and Leda Cosmides were recently awarded the lifetime achievement award by the HBES. They may be considered the most influential theoreticians within EP and probably the founders of the basic theory through their theoretical papers in the 1980s and early 1990s. While some of the theoretical claims such as the non-adaptiveness of personality differences might not be accepted by the entire field, their work on human universals sets the stage for a social-cognitive evolutionary psychology situated safely within normal psychological science methodology. At the same time, their attacks on the Standard Social Science Model (SSSM) created a certain distance to social psychology and social

science, but highlighted the necessity of functional analysis, which they rightly claimed given their own fruitful methodology is not an explanatory luxury; it is a tool which when properly applied provides novel insights into how cognitive mechanisms function.

Culture, Learning, and Evolved Human Universals

In one of the most provocative and misunderstood essays, Tooby and Cosmides (1992) identify and criticize the Standard Social Science Model (SSST). They suggest that explanations of behavior that rely merely on invoking the general concepts of culture or learning as explanations in themselves – without actually explaining the mechanism of transference in detail – are not scientific. This criticism caused reactions, including a misplaced conclusion that evolutionary psychology is adverse to learning in general. The biophobic social scientist was also, according to detractors of Tooby and Cosmides position, a strawperson. Many researchers claimed that there was more attention given to the biological underpinnings of culture and learning than Tooby and Cosmides acknowledged. On the other hand, the lip service to such biological factors with no place for any specific theory, no methodology that accounted for the relevance of such factors, and a general reflexive dismissal of all attempts to add functional approaches to scientific explanation was exactly what Tooby and Cosmides were targeting. Most evolutionary psychologists have met these alleged straw men among both editors and reviewers, as well as colleagues. Actually, to some degree, some evolutionary psychologists share SSST features in their thinking about development, with regard to behavioral genetic findings.

There was no dismissal of learning nor culture, as relevant and important phenomena in this essay. Only a very clear caveat that learning is not an explanation without further specification of what exactly it is that one means. It is very unlikely that Skinner would have disagreed with their critique of the simple incantation of general learning by general mechanisms without further evidence and description of the mechanism,

including the possible evolutionary history of the learning mechanism. This essay largely functioned as a call to arms for evolutionary psychologists, laying the foundation for a more stringent science of both learning and culture from an evolutionary perspective. As such, one might note that it was considered more convincing in the long run by psychologists than by anthropologists.

Solving the Wason Selection Task

The Wason selection task is a logical problem in which people are shown four cards. They have a numeral printed on one side and a letter on the other side. They are placed on the table in front of the participant. Two of these cards are dealt with the numeral facing up; the other two show the letters, for example, [7][H][3][D]. The participant is then given a rule for the cards and asked which card(s) to turn to test the rule. In this case the rule is behind every [D], there is a [7]. The question then is: Which cards would you turn? Typically, people are governed by their confirmation bias. They therefore flip over [7] and [D], in both cases to confirm the rule rather than attempting to falsify it. This phenomenon occurs irrespective of intelligence and education. Furthermore, when people have learnt the solution of by heart, they will in some cases still provide erroneous explanations, yet again reverting to their confirmation bias – which illustrates how strong this tendency is. The correct answer, which is not typically the human response, is to flip over [3] to find a [D], and the most difficult, to flip over [D] to *not find* a [7].

It may seem strange, given how much more attention sexual research gets, that an abstract cognitive bias test was probably the single empirical research finding that paved most of the way for EP as a specific scientific research program. While Tooby and Cosmides have continued their research into coalitional, innate, and evolved psychology (including topics from war to incest avoidance), it all started with a groundbreaking finding: that human limitations in solving logical problems, documented in a multitude of studies, vanished once they were made ecologically

relevant for detecting social contract rule breaking (Cosmides 1989).

It is not particularly important what social contract rule one tests; it can be made up or a familiar social rule in participants' culture. If the rule to be tested is a social contract rule and there are potential cheaters to be detected, people solve the Wason selection task much more frequently. Note that from a logical perspective, the problem and solution are the same.

Consider this example: Four cards representing four people in a seedy bar. The rule is that only those who are older than 18 may drink beer. The cards display the age (either above or below 18) on one side and what the person is drinking (either soda or beer) on the other. The four cards show [Soda] [Beer] [Above 18] [Below 18]. Who do you want to check, to test the rule? While most people want to check and confirm [D] and [7] above, that solution is no longer interesting. Now most people want to find cheaters. Most people want to see whether the person below 18 is drinking beer (falsification not confirmation) and how old the beer drinker is (yet again and contrary to what one does in the non-social cheating context, in order to check whether the person is too young).

In other words, we become natural Popperian falsifiers and ditch our normal human confirmation bias problems if someone might be breaking a social contract. This applies to the majority of people, and it is not dependent upon familiarity or cultural context. Finally and most importantly, it was not predicted by any other theory. Perhaps most surprisingly, there is probably dedicated neural circuitry involved in cheater detection (Stone et al. 2002) – which in turn provided support for the modular approach.

Why should we be good at discovering cheaters? We are hyper-social intelligent animals, both dependent upon and in active competition with other humans. We are able to make social rules and break these same rules. Being naïve about rule breakers is not a viable evolutionary strategy. The finding that a module for solving a specific, adaptively relevant problem could make us better at solving generally unsolvable logical problems was groundbreaking. The immense

creativity of these founders, and their ability to succinctly formulate the basic theoretical logic underlying many psychological problems, has resulted not only in fundamental theoretical papers: research into other social, coalitional cognitive processes, such as welfare-benefit ratios and race perception followed from the same interest in the underlying evolved adaptations and provided our science with findings and explanatory principles that were both original and counterintuitive.

Strategic Modeling

Together with Irvin DeVore, John Tooby wrote a classic on why human evolutionary psychology must take into account specific human evolution. While many earlier approaches to human evolutionary behavioral science were to a large degree comparative, Tooby and DeVore (1987) point out that in order to study the species-specific adaptations of humans, such an approach will be severely limited. Evolutionary psychology is therefore to a much lesser degree comparative in its general approach than sociobiology was or to the degree that more biological approaches to human psychology often are. While homologous structures exist, when considering human nature, it is primarily relevant and even imperative to consider specific hominin evolution and selection, especially those traits that are unique to humans. This gem is not as often cited as it ought to be but provides insights into how early evolutionary psychology theorizing differed from other evolutionary approaches to both animal and human behavior. While many academics believe that humans are freed from the animal shackles of evolution, Tooby and DeVore suggest that the complexities of proximate mechanisms hide the fact that the ultimate function has not changed. Strategic modeling of complex proximate mechanisms is therefore a tool to reduce such complexity, which reveals how they are “adaptively patterned.” Note that while this chapter is primarily a contribution to paleontological modeling of hominin species, the principle strategic modeling they suggest is most relevant as a metatheory of evolutionary and behavioral analyses of function and specific human evolution.

Buss: Individual Differences and Mate Preferences

Mate choice is a fundamental aspect of evolution, and mates vary. There are individual differences among potential mates, and we choose among these potential sexual partners either to mate romantically for life or for the sexual thrill of the moment. If someone were to steal our romantic partner, it would hurt us, both emotionally and through possible fitness costs. All of these areas that might seem very familiar to anyone with an interest in evolutionary psychology have been pioneered by David Buss. And beyond important theories such as sexual strategy theory, with David Schmitt, and error management theory with Martie Haselton maybe Buss is the researcher that has provided the field with the broadest and deepest empirical basis. This has also aided the communication of evolutionary psychology to the rest of academic psychology. For the field, his textbook and *The Handbook of Evolutionary Psychology* have become landmarks, improving the teaching and uniting the field.

Cross-Cultural Mate Preferences

Cross-cultural research has not been typical in social sciences in general or psychology specifically. While critics of merely considering Western, Educated, Industrialized, Rich, and Democratic (WEIRD) populations have made important corrections to the generalizability of psychological research, it is worth noting that from early on evolutionary psychology has been oriented toward cross-cultural studies and more so than many other areas of psychological research. One of the most groundbreaking of these evolutionary cross-cultural studies was David Buss' mammoth collaborative study of mate choice in 37 cultures.

Building on his early work on mate choice (Buss 1985), and inspired by Don Symons' (1979) work on human sexuality and human universals, Buss started collecting one of the largest international data sets at the time. While some have criticized the cultural variance and national sample sizes, this is a landmark study, with few studies in psychology, and especially cross-

cultural studies, coming close in influence and citations.

Buss (1989) reported several cross-culturally robust similarities between the sexes. For example, both men and women are interested in intelligence and agreeableness traits, especially in long-term relationships. On the other hand, stable male-older findings, where both sexes seem to agree that he should be older than her, greater male interest in female physical attractiveness, and greater female interest in male financial prospects suggested evolutionarily predictable sex differences in partner preferences. These original findings have been reproduced repeatedly and have proven to be stable across cultures as well as within cultures across time. Age preferences have also received attention in the last few years. While many critics of evolutionary psychology have attempted to challenge these findings on human universal mate preferences, they appear to be among social psychology's most replicated conclusions.

Evolutionary Personality Psychology

There are two major approaches to the science of psychology reflected in many areas of research. In some disciplines and theories, one considers human universal nature, and the theories and findings are considered relevant for all humans. Such areas include learning psychology and to a large degree social psychology in general. Personality psychology, on the other hand, considers individual differences. This is one of the interesting areas of open disagreement among the founders of EP. The basic formulation of EP by Tooby and Cosmides (1990a) focuses explicitly on human universals and does not even consider sex differences in their study of evolved mental mechanisms. As mentioned above, EP is in its original formulation by Tooby and Cosmides, largely a theory of the minds of both men and women, equally. Tooby and Cosmides (1990a) were quite explicit about personality and other individual differences not being key areas of study from an EP or adaptationist perspective. There is therefore a certain shift in focus in different directions even within mainstream EP. On the other hand, they suggested mechanisms that could explain

adaptive individual differences, including frequency-dependent selection and their concept of reactive heritability (where, e.g., some traits are more efficient in specific bodies or in concert with other traits and thus may become more expressed under the right and adaptive circumstances).

A full understanding of human nature demands that we also understand the evolution of stable differences in fitness-relevant behaviors, as defined by traits. Also, trait psychologists have suggested that evolutionary psychology has to address the question of how the five major personality traits of openness, conscientiousness, extroversion, agreeableness, and neuroticism have evolved (Nettle 2011). David Buss pioneered the area of evolutionary personality psychology, which has been slow to gain momentum in empirical data collection, but in recent years' has increased with interest in life history approaches. Future empirical testing is still much needed for evolutionary personality psychology data collection to catch up with theory generation. At the moment, we have different approaches within EP that consider either how individual differences in life histories may provide testable predictions about behavior, but also theories of how the five major personality traits are a result of specific evolutionary processes, including selective neutrality, frequency-dependent selection, and mutation-selection balance. We need more work testing different hypotheses. At the same time, from an evolutionary personality psychology perspective, it would be odd if these value-laden descriptions of others that make up the basis of traits had not been relevant for selection. Noise or adaptive? We still do not know. This area still needs more evidence.

Sexual Strategy Theory

Formulated with David Schmitt, sexual strategy theory (SST) is one of the most influential approaches to the understanding of human sexual behavior (Buss and Schmitt 1993). SST starts with the general principles of Trivers' (1972) parental investment theory, but specifies the theory for human women and men and our species-typical adaptive sexual problems. An important contribution of the theory is the attention given to mating

context as well as sex: Men and women have different preferences and behavior in short-term and long-term mating contexts. This lays the foundation for several predictions about how men and women in short-term and long-term mating situations will act or display preferences.

Women and men have engaged in both long-term and short-term sexual relations throughout evolutionary history and been selected for these kinds of behavior if the benefits outweigh the average cost. But each context presents different adaptive problems for the two sexes. Due to differences in minimal parental investment and possibilities to benefit from multiple matings, men will have greater interest in short-term sex than will women. This exemplifies one adaptive problem difference, but there will be predictable similarities and differences between men and women in all four combinations of sex and context. Buss and Schmitt (1993) list the following four adaptive problems for men for either a long-term relationship or short-term sexual encounters:

Long-term relationships: (1) discerning reproductive value, (2) ensuring paternal certainty, (3) identifying good mothers, and (4) identifying willingness to commit

Short-term sexual encounters: (1) acquiring a large number of partners, (2) discerning who is sexually accessible, (3) discerning fertility, and (4) minimizing any investment and commitment

Note that reproductive value is very important for long-term relationships, while current fertility is relevant for short-term relationships. Similarly, minimizing investment is not as relevant for a monogamous long-term relationship. The ability and willingness to commit in long-term relationships will not differ between the sexes and should rank high among partner preferences for both sexes.

Women's reproductive success has not been constrained by access to sex, but rather access to resources and maybe genes of the men that are interested in investing in them and their offspring, both here and now and on a long-term basis. The

following five adaptive problems need to be solved by women in the adaptive problem of acquiring the best possible long-term relationship (Buss and Schmitt 1993): discerning men who are (1) able and (2) willing to invest resources in her and her children on a long-term basis, (3) identifying men who will be good fathers, (4) identifying men who are willing and able to commit, and (5) identifying men who will be both able (formidable) and willing (aggressive) to defend them against other men.

The evolutionary perspective suggested that men and women have been selected so that they on average will solve the adaptive problems effectively when engaging in short-term sex or long-term relationships. While the word strategy might be confusing, the strategy is the evolved, effective solution to the adaptive problems, the mental adaptations solving context specific adaptive problems, with no conscious goal being assumed. Beyond being a very influential theoretical paper, it also provided data that tested direct predictions about, for example, male interest in both long-term and short-term relationships and interest in sexual variety.

SST met with criticism from mainstream social psychology. One claim was that our sexual psychology is inherently monomorphic, but cultural structures will cause differentiation. Therefore, detractors of SST believed one would not find similar results as in the American sample in other more gender egalitarian nations. Such criticism must be testable in order to be scientific; one cannot make such claims and not accept findings from the world's most gender egalitarian nations as not relevant. Since 1993, hypotheses from SST have been tested internationally; in some cases, there are differences – with both smaller and larger sex differences being reported from more gender egalitarian nations than the USA. In general, though, these results have supported SST as the best theory for generating hypotheses about modern human sexual behavior and sex and context differences in preferences. For example, direct tests suggest that one finds almost exactly the same results for the original SST findings in a more gender egalitarian Norwegian sample.

Jealousy

It is simple: Imagine that there is no parental investment, no long-term relationships, and full knowledge of who both parents are. In this scenario there is no jealousy. Now, change a few things: Add father investment with no or low paternal certainty. Is it then possible that male sexual jealousy would not evolve? Men are among 5 % of mammals in which fathers invest in assumed offspring. Concealed conception results in less than complete paternity certainty, despite different cultural inventions that attempt to control female sexuality. What would happen to the more protective and skeptical or jealous men compared to the men who are naïve and uncaring about their partner's sexual escapades? The same is the case for women: What would happen to women who were uninterested in their partner's interest in investing in their joint children? Rather than attempt to prove how sex differences in jealousy evolved, one might turn that around: How could these specific types of interest in fatherhood or future resource investment *not* evolve? And what feedback mechanism could help us learn the effects? Men would never get to know the negative effect. If women did see the effect, it would certainly be too late.

Prior to Buss' original work on jealousy, psychologists were not aware of sex differences in jealousy: men being more distressed by sexual infidelity than emotional infidelity than women are (Buss et al. 1992). It is worth noting that it is the interaction that is relevant by testing whether men, relative to women, find sexual infidelity more distressing than emotional infidelity. While the logic of the evolutionary theory seems convincing, there have been several challenges to the theory. First, that one sort of infidelity (either emotional or sexual) would elicit the conclusion that the other form had occurred, so that there was not really a sex difference. This was called the double-shot theory. It is simple to test: One changes the question from "what is most distressing, sexual or emotional infidelity?" to "if both sexual and emotional infidelity have occurred, which type is most distressing?" In this double-shot scenario, sex differences persist. Another challenge is that the stable sex difference

is not detectable with continuous measures, maybe due to ceiling effects. At the same time, continuous measures are considered more meaningful by some critics, and some suggest the sex difference is merely a methodological artifact. Recent work found that when randomly distributing either continuous or forced choice questionnaires in the same population, there was no difference between the two methodologies (Bendixen et al. 2015). This study also found that, rather than there being smaller sex differences in jealousy in more gender egalitarian nations, the effect sizes are larger, probably driven by greater expected male investment as proposed by Buss et al. (1992). Another criticism is that sex differences in jealousy might only hold for young, heterosexual participants. However, finding that postmenopausal female partners elicit less jealousy is congruent with evolutionary theory.

Considering Future Developments

Evolutionary psychology has developed during the almost 35 years since the first formulations of the evolutionary psychology basic theory, not just in general acceptance among academics and inclusion in mainstream psychology textbooks but also as a theory. In the beginning, the focus was largely on human universals, but there has been a clear shift toward considering individual differences in both normal personality (Buss and Penke 2015) as well as psychopathology (Del Giudice 2014; Kennair 2011) and the effects of cultural differences, highlighted by the work of David Schmitt. In the last few years, greater emphasis has been placed on life history theory (Del Giudice et al. 2015), primarily as an explanation of individual differences, but also psychopathology. Furthermore, there is a continued interest in evolutionary developmental science. All of these areas need empirical and theoretical developments to be tempered with knowledge from the field of behavioral genetics in order to fully come to fruition. While many researchers are now considering how unstable childhood environments predict instability in personality traits or behavior of young adults, it is worth noting that behavioral genetics research suggests that parent-offspring similarities in general are due

more to genetics rather than environmental influences.

The many students of the founders have also started making large contributions in their own right, both empirically and theoretically, and many of these may be considered part of the foundations of EP. Two select examples: Martie Haselton and David Buss's (2000) *error management theory*, is generating both supportive and critical research within EP. Also, research on race perception, originally developed by Kurzban et al. (2001), is providing an evolutionary base for conceiving of race as merely one of many arbitrary and therefore inherently malleable out-group cues.

Conclusions

These five founders of EP as a specific research program have established an evolutionary-based approach to psychological research, which over the last three decades has become part of mainstream psychological science after initially being considered both politically and scientifically suspect. At the same time, there have obviously been many other influential figures in the field who have inspired the development of both evolutionary psychology research and theory, both by challenging and developing the original formulations. As such, the area of study has been influenced by critics, students, and colleagues working around the globe in collaboration and competition.

Cross-References

- ▶ [Adaptation and Natural Selection](#)
- ▶ [Anxiety](#)
- ▶ [Anxiety Cinderella Effect](#)
- ▶ [Cheater Detection](#)
- ▶ [Cinderella Effect, The Controversies in Evolutionary Psychology](#)
- ▶ [David Buss](#)
- ▶ [Environment of Evolutionary Adaptedness](#)
- ▶ [Evolutionary Clinical Psychology](#)
- ▶ [Evolutionary Personality Psychology](#)
- ▶ [Field of Evolutionary Psychology](#)

- ▶ [George Williams](#)
- ▶ [Homicide](#)
- ▶ [Jealousy](#)
- ▶ [Leda Cosmides and John Tooby](#)
- ▶ [Life History Theory](#)
- ▶ [Martin Daly and Margo Wilson](#)
- ▶ [Mate Preferences](#)
- ▶ [Modularity](#)
- ▶ [Reliability, Efficiency, and Economy](#)
- ▶ [Richard Dawkins](#)
- ▶ [Robert Trivers](#)
- ▶ [Sexual Strategies Theory](#)
- ▶ [Sociobiology](#)
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- ▶ [Strategic Modeling](#)
- ▶ [The Adaptationist Program](#)
- ▶ [The Adapted Mind](#)
- ▶ [The Controversies in Evolutionary Psychology](#)
- ▶ [The Extended Phenotype](#)
- ▶ [The Handbook of Evolutionary Psychology](#)
- ▶ [The Selfish Gene](#)
- ▶ [Wason Selection Task](#)
- ▶ [Young Male Syndrome](#)

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