

## Original Article

### Evolutionary Psychology in the Modern World: Applications, Perspectives, and Strategies

S. Craig Roberts, School of Natural Sciences, University of Stirling, Stirling FK9 4LA, UK. Email: [craig.roberts@stir.ac.uk](mailto:craig.roberts@stir.ac.uk) (Corresponding author).

Mark van Vugt, Department of Social and Organizational Psychology, VU University Amsterdam, Amsterdam, The Netherlands.

Robin I. M. Dunbar, Department of Experimental Psychology, University of Oxford, Oxford, UK.

**Abstract:** An evolutionary approach is a powerful framework which can bring new perspectives on any aspect of human behavior, to inform and complement those from other disciplines, from psychology and anthropology to economics and politics. Here we argue that insights from evolutionary psychology may be increasingly applied to address practical issues and help alleviate social problems. We outline the promise of this endeavor, and some of the challenges it faces. In doing so, we draw parallels between an applied evolutionary psychology and recent developments in Darwinian medicine, which similarly has the potential to complement conventional approaches. Finally, we describe some promising new directions which are developed in the associated papers accompanying this article.

**Keywords:** applied evolutionary psychology, evolution, human behavior, evolutionary medicine

---

### The Promise of Applying Evolutionary Psychology

Evolutionary psychology is the scientific study of the human mind as a product of evolution through natural selection (Barkow, Cosmides, and Tooby, 1992; Barrett, Dunbar, and Lycett, 2002; Buss, 2005). Although still a relatively young academic discipline, in less than 20 years it has penetrated virtually every existing branch of psychology, including social, organizational, cognitive, developmental, clinical and environmental psychology (Fitzgerald and Whitaker, 2010). As Dunbar (2008) has argued, this is because evolutionary theory is a ‘single seamless framework’ capable of spanning disciplinary

divides. On this basis, Darwin's vision of evolutionary theory providing a new foundation for psychology appears to be finally reaching fruition.

However, while there is no doubting the power of evolutionary theory in helping to explain human behavior, concerted effort to apply this knowledge in practical ways has so far been less evident than one might expect (but see, for example, approaches in Griskevicius, Cantu, and van Vugt, 2012; Roberts, 2012; Roberts, Miner, and Shackelford, 2010; van Vugt, Hogan, and Kaiser, 2008). We believe this is about to change. The renowned psychologist Kurt Lewin once noted that "there is nothing so practical as a good theory." Evolutionary perspectives should therefore have the potential to provide a powerful framework for developing practical applications in many and varied aspects of human behavior and endeavor. A growing community of researchers is interested in pursuing this cause, and with some success as this special issue shows.

This is not to say that evolutionary psychology is going to be the panacea to cure all ailments in the human condition. Researchers in other fields can and do approach the same aspects of behavior and tackle the same issues, without reference to evolution, and meet considerable success in developing interventions that have considerable practical value. In Tinbergen's (1963) terminology, they tend to do this at the *proximate* level of explanation, understanding immediate cause and effect. However, we would argue that insights into the selective forces that shaped behavior in the past (that is, working at the *ultimate* level of explanation), and mismatches between ancestral conditions and those we experience today, provide a fundamentally important context and backdrop to complement and inform such efforts. Full understanding of selection pressures shaping specific behaviors requires consideration of both proximate and ultimate factors (e.g., Nettle, 2011; Tinbergen, 1963).

### **Parallels with the Development of Darwinian Medicine**

We thus take the view that understanding the evolutionary history or likely adaptive value of particular behaviors should be useful in developing novel approaches or in specifying which of a range of possible interventions might have most value in targeting particular outcomes. In this respect, we have argued (Roberts, 2012) that the utility of applied evolutionary psychology in addressing societal issues like tackling prejudice or promoting cooperation (traditionally the reserves of social psychologists or economists) bears close resemblance to the contribution that Darwinian medicine offers conventional medicine. In the twenty or so years following 'The Dawn of Darwinian Medicine' (Williams and Nesse, 1991), the field has contributed enormously to our understanding of human illness and in some cases has transformed it (for recent reviews, see Nesse and Stearns, 2008; Stearns, 2012; Stearns and Koella, 2007; Trevathan, Smith, and McKenna, 2007).

Take, for example, symptoms of nausea and vomiting in pregnancy, which affects up to 90% of pregnant women in some modern societies (Pepper and Roberts, 2006). As epitomized by its epithets 'pregnancy sickness' or 'morning sickness', this was until recently viewed as an illness for which treatment would be desirable. However, according to one functional (ultimate) explanation, these symptoms reflect a classic evolutionary struggle - parent-offspring conflict, or the non-overlapping interests of mother and embryo

(Haig, 1998). Another view is that these symptoms, along with specific aversions to particular kinds of food, arise as an adaptation to avoid ingestion of teratogens and phytochemicals that may harm the health of the mother and foetus (Flaxman and Sherman, 2000). In fact, nausea and vomiting in the first trimester are now viewed as indicative of a healthy embryo, associated with a range of positive pregnancy outcomes (Weigel and Weigel, 1989). The evolutionary perspective has helped to change the perception of this condition, and the old epithets are now considered to be misnomers.

However, in spite of this, acceptance of these insights in conventional medicine has yet to live up to its potential. Researchers often face skepticism or indifference from practitioners, and few medical courses devote more than one or two lectures to evolutionary medicine. It remains the case that most researchers - and there is a rapidly growing number of them - come from an evolutionary background, rather than a clinical one. Even in a field with direct and potentially enormous impact on human health, it seems that it will take time to fulfill its promise and to persuade practitioners of the merits of evolutionarily-informed approaches.

There is an analogy between evolutionary medicine and an applied evolutionary psychology. Despite its promise for transforming our understanding of modern world issues and problems, perhaps especially social problems, the evolutionary approach is sometimes met with antipathy or indifference from colleagues in other branches of psychology and those from sociology, anthropology and the like. Indeed, evolutionary psychology probably suffers this to an even greater extent than Darwinian medicine, which at least has near-unanimous support within evolutionary biology and a developing portfolio of convincing empirical studies (Nesse and Stearns, 2008; Stearns, 2012; Stearns and Koella, 2007; Trevathan et al., 2007). Furthermore, evolutionary psychology arguably lags behind evolutionary medicine in the extent to which a core body of researchers exists that actively seeks and develops applications of their research. With some notable exceptions, concerted effort to apply principle to practice remains patchy. Perhaps this is appropriate to a young discipline, but one would expect that, as it matures, its scope will broaden towards tackling contemporary problems in human society. For this reason, we recently organized a wide-ranging seminar series (funded by the UK Economic Social and Research Council), entitled Darwin's Medicine, with a series of workshops each devoted to an applied evolutionary psychology theme such as philanthropy, sustainability, leadership, and intergroup conflict. Other recent developments include the formation of the Applied Evolutionary Psychology Society ([www.aepsociety.org](http://www.aepsociety.org)) and the publication of a dedicated volume on this topic (Roberts, 2012).

### **The Benefits of Application**

We do not expect, of course, that researchers should focus on application to the exclusion of further development, refinement and testing of evolutionary theory as it applies to human behaviour. Nor do we think that working on application is necessarily for everyone. However, we think it is inevitable that interest in harnessing evolutionary perspectives to address current social and societal issues is set to become much more common. There are at least three reasons why we think this.

The first reason is that many researchers may feel they have a moral imperative to do so. If, as evolutionary psychologists, we claim to have a particularly powerful theoretical framework with which to understand human behaviour, then, as the expression goes, we should be able to ‘put our money where our mouth is’ and put this to good use. A sense that we want to employ our science for good is relevant to any application, insight or perspective

The second reason is more pragmatic. An applied perspective will help to develop the impact of evolutionary psychology research. We live in a society that is increasingly curious and informed about scientific results, and that wishes (and, increasingly, expects) to see the potential benefits of research that they, as taxpayers, effectively fund. Demonstrating how research, theoretical or applied, might lead to practical benefits for society at large is therefore of growing relevance to funding agencies. For example, the National Science Foundation in the US uses the term ‘broader impacts’ as one of its two criteria of merit in judging research proposals (the other being ‘intellectual merit’). In the UK, research councils also incorporate impact as a criterion used in the assessment of funding applications, defining impact as including ‘the demonstrable contribution that excellent research makes to society and the economy’, and includes ways that research may foster global economic performance, increase the effectiveness of public services and policy, and enhance quality of life, health and creativity.

Last but certainly not least, developing applications and practical approaches to specific problems provides an intellectual challenge that is different to, but arguably no less stimulating than theory development. It should not be seen as a ‘soft option’, at least not if it is to be done well. A successful application requires sound knowledge of theory, but because it must also seek to ground theory within the complexity of the ‘real world,’ it also necessitates an ability to test the robustness of effects in a noisy environment and within a broader interdisciplinary perspective (see Buunk and van Vugt, 2007; Klatzky, 2009). Furthermore, this process may throw up unexpected results and generate new questions and directions for research back in the lab, or even suggest that the theory itself requires amendment. In this way, the pathway from theory to application is not unidirectional, but circular. For many, this may be the most persuasive reason to develop applications of their own research.

### **Practical Issues in Developing Applied Perspectives**

Although we believe that applying evolutionary psychology holds great promise, there are some potential caveats. The first is to ensure that we really understand the problem at hand. By this we mean thinking beyond the evolutionary arguments and theory with which we may be familiar to analyze a particular problem within its broader context, carefully considering and incorporating viewpoints and contributions from other disciplines. This may seem trivial and obvious, but consider as an analogy two cautionary tales. One comes from the introduction of non-native species into new habitats, where an apparently straightforward solution to a practical problem can lead to unforeseen new problems. For example, a new predator might be introduced to control a pernicious pest, but the new predator also eats other desirable and non-pest species. Or take another

example from evolutionary medicine. Williams and Nesse (1991) highlight, as one of a number of examples of the importance of evolutionary explanations to augment the ‘treat-the-symptom’ approach of conventional medicine, the way that fever is treated. If fever is an evolutionarily-derived response mechanism to combat bacterial toxins, then treating fever may well be counter-productive; they cite as evidence a study that found longer recovery times from chicken pox in patients treated with acetaminophen compared to those treated with a placebo (Doran, De Angelis, Baumgardner and Mellits, 1989). These examples serve as cautions in thinking about practical applications of evolutionary psychology, and should make us think hard about the context of the issue, although it should not discourage us from engaging with it.

Second, evolutionary psychologists are often accused of arguing that our underlying human nature dictates how things ‘should’ be, that what is natural is good. This argument is known as the *naturalistic fallacy*. Typically, this accusation comes from critics outside the field and is based on misinterpretation of the presented arguments, although it is not unknown for even well-informed researchers to slip into committing this error. Committing the naturalistic fallacy, or of being perceived to, is probably more likely than ever when seeking evolutionarily-informed solutions or applications to practical issues. While it may sometimes be the case that what is natural is in fact good, this is not always the case. In developing applied perspectives on our work, we should bear this in mind, remaining detached from judgments of value and morality.

## **New Directions**

This special issue, entitled “Evolutionary Psychology in the Modern World: Applications, Perspectives, and Strategies,” brings together contributions which introduce new approaches to thinking about application. The contributions vary widely in scope and constitute a very diverse range of interest areas. Fitzgerald and Danner open the issue with a review of how knowledge of evolutionary psychology might inform the design of the workplace environment to the benefit of employee health and happiness. They argue that this would ultimately benefit the employer through increased productivity from the workforce and associated decrease in other costs. Staying within the workplace, Little and Roberts investigate the effects of appearance on success at work. They review recent studies that show how appearance can influence perception of potential employees at interview, discuss the implications of these results in the light of equality legislation and consider cases where discrimination on the basis of appearance might be legitimate and uncontroversial, including the perception of political candidates and influence on voter’s behavior. Petersen and Aarøe also discuss perception of political candidature within an evolutionary framework, within a wider consideration of the ways in which modern mass politics succeeds or fails in eliciting expected levels of engagement given its social nature and our affinity as a social species for social interaction and processes underpinning group dynamics.

Several papers address evolutionary perspectives applied to health and health-related behavior. Buunk, Zurriaga and González examine perceptions of reciprocity and indebtedness in patients suffering from spinal cord injury from the perspective of reciprocal

altruism. They show how, surprisingly, lack of reciprocity from close relatives and partners may affect depression more than non-relatives. Gillette and Folinsbee explore evolutionary approaches to reproductive health, focusing on effects of early menarche on subsequent reproductive health and health of offspring and its implications for public health. Whitehead, Ozakinci and Perrett apply insights from evolutionary psychology, specifically perception of an individual's health through carotenoid-linked skin coloration, and its associated effects on interpersonal judgments, to design a novel intervention to improve dietary health. Finally, Tybur, Bryan and Caldwell Hooper describe ways in which evolutionary perspectives might be used to approach challenges faced by health psychologists. They discuss how evolutionary insights reveal why healthy behavior is less common than we might expect, how individuals differ in this regard and why this matters, and how evolutionary approaches can help to both identify particular target groups and fine-tune interventions in order to maximize effectiveness.

Finally, various articles address evolutionary approaches to other societal issues. Barclay explores the promotion of cooperative sentiment within societies, and describes ways in which new insights into the power of reputation in promoting cooperation and reducing conflict might be harnessed across a range of applied settings. The paper by Ingram, Campos, Hondrou, Vasalou, Martinho and Joinson considers a related theme: how to reduce conflict in children? They describe an evolutionarily-informed game designed to help children learn conflict resolution skills. In a change of tack, Oesch and Miklousic then consider the growth of the modern dating industry and analyze its marketing strategies against the background of recent research on the evolutionary psychology of courtship. Finally, Brooks describes the issue of population-level sex ratio bias in certain countries in the light of parental investment theory. He argues that evolutionary psychology can provide, along with an eye on cultural history and rapidly changing economic circumstances, more detailed understanding of why and how these biases occur, and perhaps a framework for reducing their most severe consequences.

## **Summary**

We have drawn parallels between applied evolutionary psychology and Darwinian medicine, both in their enormous potential for contributing to application and in the uphill challenge both fields face to persuade practitioners of their intellectual and practical value. We also described applied evolutionary psychology as lagging behind Darwinian medicine in terms of persuading even evolutionary-minded researchers in biology (let alone other psychologists, anthropologists and the like) and in being represented by a group of researchers interested in the practical application of their research. However, we anticipate that this may be beginning to change, and we hope that the articles in this special issue provide further stimulus to the nascent field of applied evolutionary psychology.

## **References**

Barclay, P. (2012). Harnessing the power of reputation: Strengths and limits for promoting cooperative behaviors. *Evolutionary Psychology*, 10, 868-883.

- Barkow, J. H., Cosmides, L., and Tooby, J. (Eds.) (1992). *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press.
- Barrett, L., Dunbar, R. I. M., and Lycett, J. E. (2002). *Human evolutionary psychology*. Basingstoke: Palgrave Macmillan.
- Brooks, R. (2012). "Asia's missing women" as a problem in applied evolutionary psychology? *Evolutionary Psychology*, 10, 910-925.
- Buss, D. M. (2005). *The handbook of evolutionary psychology*. Hoboken: Wiley.
- Buunk, A. P., and van Vugt, M. (2007). *Applying social psychology: From problems to solutions*. London: Sage.
- Buunk, A. P., Zurriaga, R., and González, P. (2012). Does theorizing on reciprocal altruism apply to the relationships of individuals with a spinal cord injury? *Evolutionary Psychology*, 10, 818-829.
- Doran, T. F., De Angelis, C., Baumgardner, R. A., and Mellits, E. D. (1989). Acetaminophen: More harm than good for chicken pox? *Journal of Pediatrics*, 114, 1045-1048.
- Dunbar, R. (2008). Taking evolutionary psychology seriously. *The Psychologist*, 21, 304-306.
- Fitzgerald, C. J., and Danner, K. M. (2012). Evolution in the office: How evolutionary psychology can increase employee health, happiness, and productivity. *Evolutionary Psychology*, 10, 770-781.
- Fitzgerald, C. J., and Whitaker, M. B. (2010). Examining the acceptance of and resistance to evolutionary psychology. *Evolutionary Psychology*, 8, 284-296.
- Flaxman, S. M., and Sherman, P. W. (2000). Morning sickness: A mechanism for protecting mother and embryo. *Quarterly Review of Biology*, 75, 113-148.
- Gillette, M. T., and Folinsbee, K. E. (2012). Early menarche as an alternative reproductive tactic in human females: An evolutionary approach to reproductive health issues. *Evolutionary Psychology*, 10, 830-841.
- Griskevicius, V., Cantu, S., and van Vugt, M. (2012). Evolutionary basis for sustainable behaviours. *Journal of Public Policy and Marketing*, 31, 115-128.
- Haig, D. (1993). Genetic conflicts in human pregnancy. *Quarterly Review of Biology*, 68, 495-532.
- Ingram, G. P. D., Campos, J., Hondrou, C., Vasalou, A., Martinho, C., and Joinson, A. (2012). Applying evolutionary psychology to a serious game about children's interpersonal conflict. *Evolutionary Psychology*, 10, 884-898.
- Klatzky, R. L. (2009). Giving psychological science away. *Perspectives on Psychological Science*, 4, 522-530.
- Little, A. C., and Roberts, S. C. (2012). Evolution, appearance, and occupational success. *Evolutionary Psychology*, 10, 782-801.
- Nesse, R. M., and Stearns, S. C. (2008). The great opportunity: Evolutionary applications to medicine and public health. *Evolutionary Applications*, 1, 28-48.
- Nettle, D. (2011). Flexibility in reproductive timing in human females: Integrating ultimate and proximate explanations. *Philosophical Transactions of the Royal Society B*, 366, 357-365.
- Oesch, N., and Miklousic, I. (2012). The dating mind: Evolutionary psychology and the

- emerging science of human courtship. *Evolutionary Psychology*, 10, 899-909.
- Pepper, G. V., and Roberts, S. C. (2006). Rates of nausea and vomiting in pregnancy and dietary characteristics across populations. *Proceedings of the Royal Society B*, 273, 2675-2679.
- Petersen, M. B., and Aarøe, L. (2012). Is the political animal politically ignorant? Applying evolutionary psychology to the study of political attitudes. *Evolutionary Psychology*, 10, 802-817.
- Roberts S. C. (2012). *Applied evolutionary psychology*. Oxford: Oxford University Press.
- Roberts S. C., Miner, E. M., and Shackelford, T. K. (2010). The future of an applied evolutionary psychology for human partnerships. *Review of General Psychology*, 14, 318-329.
- Stearns, S. C. (2012) Evolutionary medicine: Its scope, interest and potential. *Proceedings of the Royal Society B*, 279, 4305-4321.
- Stearns, S. C., and Koella, J. C. (2007). *Evolution in health and disease* (2<sup>nd</sup> ed.). Oxford: Oxford University Press.
- Tinbergen, N. (1963). On aims and methods in ethology. *Zeitschrift für Tierpsychologie*, 20, 410-433.
- Trevathan, W. R., Smith, E. O., and McKenna, J. J. (2007). *Evolutionary medicine and health: New perspectives*. New York: Oxford University Press.
- Tybur, J. M., Bryan, A. D., and Caldwell Hooper, A. E. (2012). An evolutionary perspective on health psychology: New approaches and applications. *Evolutionary Psychology*, 10, 855-867.
- van Vugt, M., Hogan, R., and Kaiser, R. (2008). Leadership, followership, and evolution: Some lessons from the past. *American Psychologist*, 63, 182-196.
- Weigel, R. M., and Weigel, M. M. (1989). Nausea and vomiting of early pregnancy and pregnancy outcome: A metaanalytical review. *British Journal of Obstetrics and Gynecology*, 96, 1312-1318.
- Whitehead, R. D., Ozakinci, G., and Perrett, D. I. (2012). Attractive skin coloration: Harnessing sexual selection to improve diet and health. *Evolutionary Psychology*, 10, 842-854.
- Williams, G. C., and Nesse, R. M. (1991). The dawn of Darwinian medicine. *Quarterly Review of Biology*, 66, 1-22.