Marrying Differential and Evolutionary Psychology

Background: Traditionally, evolutionary psychology has been focussing on explaining universal psychological mechanisms. It has been assumed, that natural selection is favouring **one optimal value** for all fitness-relevant characteristics or traits, removing all but the highest fitness variant in any relevant gene. Thus, it has been argued that "heritable variation in a gene generally signals a lack of adaptive significance" (Tooby & Cosmides, 1990, p. 38). I am going to present two papers (Nettle, 2005, 2006) that challenge this universal perspective and point out evidence that the extend and significance of genetic variation has been underestimated.

Main research question: *Why does variation persist?*

Introduction: Both papers rely on the same assumptions. Nettle acknowledges that human psychological mechanisms are largely universal and species-specific, but argues that there is evidence for heritable variation in important traits and underlying systems that cannot be considered functionally superficial. Consequently he concludes that **there is no unconditionally optimal value** for any given trait, but that personality traits should rather be seen as dimensions of trade-off of different costs and benefits.

Aims: *Paper I* (Nettle, 2006) has two main purposes: First, Nettle aims to review evidence for ubiquitous heritable variation in animal populations to demonstrate ways in which fitness relevant heritable variation can persist. Secondly, he wants to introduce a framework of costs and benefits of the Big Five dimensions that should serve as a basis to generate testable empirical predictions about the evolution of personality.
In *paper II* (Nettle, 2005), predictions about the costs and benefits related to Extraversion are empirically tested. The hypotheses are:

1) Extraversion will be positively associated with mating and the attainment of other fitness relevant resources.
2) Extraversion will be associated with increasing risk of physical illness or injury.
3) Extraversion will be negatively associated with parenting effort and, hence, offspring well-being.

Methods:
Paper I: Nettle first describes evidence of heritable variation in animal behaviour and then applies these findings to the evolution of human personality, assuming that variation in human as well as in animal behaviour is at least partly a result of trade-offs.
Paper II: A number of questionnaires has been administered online, including basic demographics, work, socioeconomic status in adulthood and family of origin, siblings, health, marital and relationship history, children, and self-ratings on a number of five-point scales (e.g. interest in sex). A set of items from Goldberg's International Personality Item Pool was used to assess Extraversion. This measure is similar, but not completely identical with the more commonly used NEO-PI-R (r=.73 or .94 after correcting for attenuation due to unreliability). The sample size was reasonable (545 British adults) and the age range was relatively big (range 18–78, mean 39.51 years), which is an important requirement for research on long-term reproductive strategies. Either correlation analysis or ANOVA and t-tests have been conducted. Taking into account the importance of sex difference in the evolutionary context, data was analysed separated by sex and for the overall sample.

Main Results: In *paper I*, Nettle builds up evidence for persisting heritable variation in important traits and concludes that there are 3 main reasons (other than mutation): trade-offs and spatiotemporal variability in the optimal value (fluctuating selection), possible status- and frequency dependent selection and the polygenetic structure of traits. In addition, he develops a framework of testable predictions of costs and benefits of different levels of the Big Five personality dimensions (see p. 628, table 1).
Paper II: High Extraversion was associated with interest in sex and the lifetime number of sexual partners, but had no effect on the number of children – leaving the answer to the first hypothesis unclear. However, there are findings favouring the second hypothesis, with extraverts being hospitalized more frequently than introverts. No direct evidence has been found in support for the third hypothesis, as

Extraversion was not associated with either time spent with children or children's health in the overall sample. Despite the lack of evidence, Nettle argues that the high extraverts are more likely to change partners which increases the risk for step parenting and could therefore have negative effects on children well-being. In general, effect sizes range from small to medium.

Strengths and weaknesses: Nettle provides a good introduction into the controversy between evolutionary and differential psychology. I especially liked that he starts his review *(paper I)* with findings from nonhuman populations. In at least some animal populations evolutionary processes work faster, can be relatively easily manipulated and have directly observable outcomes – which makes it easier to study evolutionary changes. On the other hand, some of the conclusions he draws about the evolution of human personality are of rather speculative character. However, Nettle admits this himself and points out that the main goal was more to inspire future research, than to give the ultimate answer.

Paper II makes an effort to compensate the lack of empirical evidence. It should be positively mentioned that effect sizes are reported for all significant findings, which is particularly helpful for the evaluation of the practical importance of these results. Nevertheless, there are several critical aspects. First, the three investigated hypotheses are not very explicitly formulated or answered. Throughout the result section it is not always clear which criterion belongs to which hypothesis. Moreover, the self-developed questionnaire is not further explained, thus, the reader doesn't know how the criteria (e.g. ambition) has been assessed. Only some descriptives (mostly those of significant criteria) are given, means and sample sizes are not always reported. I find that really unfortunate as one cannot conclude whether nonsignificant results might be due to reduced power because of small group sizes. Furthermore, some conclusions drawn from the data are rather speculative or wrongly imply causality. For instance, Nettle states that "the extravert's interest in sex is also confirmed, and this has effects across the life span which are relevant to reproductive success" (p.370). The higher reproductive success must not necessarily be a result of higher interest in sex, but could also be due to better mating opportunities as a result of higher social skills (or other reasons). Even though no direct evidence was found for reduced parenting efforts, Nettle argues that this would have been the case in an ancestral environment – which is rather speculative as well.

Contribution: Though several weaknesses have been noted, both papers are of great merit in the sense that they inspire(d) important future research. Nettle stresses the significance of heritable variation in human personality, contributing to the development of a more holistic perspective on human evolution. Moreover, he develops a useful framework of costs and benefits of different trait-levels that can serve as a good starting point for the generation of empirical hypotheses.

Questions:
Are there any possible confounds that should be considered when testing trade-off hypotheses in modern societies?
What are the advantages/disadvantages of investigating evolutionary processes in modern human, non-modern human and nonhuman animal populations?
How could status- and frequency dependent selection occur in modern societies?

References:

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