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Evolutionary Psychology's Next Challenge: Solving Modern Problems Using a Mismatch Perspective

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As acceptance of evolutionary perspectives in mainstream psychology grows, it becomes increasingly pertinent to ask what evolutionary psychology can do to solve real-world problems and better our lives. Answers to this important question will more than likely require an understanding and application of the evolutionary mismatch framework. This powerful framework suggests that many of our contemporary problems—ranging from diabetes and depression to low fertility and sustainability—stem from a mismatch between our evolved psychological mechanisms, which are designed to be adaptive in ancestral contexts, and modern environments, which present novel stimuli that these mechanisms are not well suited to handle. By providing a better understanding of the functions of our evolved mechanisms and how they are incompatible with modern environments, the mismatch perspective can help with the generation of more enlightened and effective strategies to tackle modern problems than would otherwise be the case. We describe this perspective and discuss its potential efficacy and promise.

Public Significance Statement

This paper describes evolutionary mismatch – a process that likely underlies many of the problems that humans face in the modern world. As discussed, human minds are not designed for and thus, not well-suited to handle, modern environments. Accordingly, solving the various problems of the modern world will require researchers and policymakers to understand mismatch and to how work around it.

Keywords: evolutionary mismatch, mismatch, evolutionary psychology

Evolutionary psychology has come a fairly long way—its practitioners are no longer getting buckets of water dumped on them when

giving talks (Segerstråle, 2000) or being accused of supporting right-wing, authoritarian regimes (Tybur, Miller, & Gangestad, 2007). Although not all journal editors and reviewers are open to the brilliance of evolutionary psychology and its ability to subsume all branches of psychology and link them with other disciplines such as biology and anthropology (Kenrick, 1995), an impressive amount of evolutionary psychology articles have indeed made their way into mainstream journals in recent decades. With so much evolutionary psychology research being published, it sure does seem that people outside the field are no longer doubting

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whether evolutionary psychology is valid. With this greater acceptance in place, what questions are being asked about evolutionary psychology? One particularly important question is this: What can evolutionary psychology do for us? That is, what can knowledge about evolutionary psychology do for the real problems that individuals, organizations, and societies currently face?

Fortunately, this is a question with which evolutionary psychologists are familiar. Indeed, researchers have long been pointing out that by understanding the ultimate, evolved functions of our psychological mechanisms, we are better able to understand problems—such as why we eat foods that are bad for us—and address them (e.g., Andrews, Bharwani, Lee, Fox, & Thomson, 2015; Fitzgerald & Danner, 2012; Griskevicius, Cantú, & van Vugt, 2012; Yong & Li, 2018). Moreover, insights into the various problems that are increasingly being encountered by modern humans are already being researched in one broad area of the field: evolutionary mismatch.

Evolutionary Mismatch

As can be gleaned from the literature (e.g., Giphart & van Vugt, 2018; Kanazawa, 2004; Sbarra, Briskin, & Slatcher, 2018; Tooby & Cosmides, 1990), evolutionary mismatch deals with the consequences of psychological mechanisms functioning in environments that are different from (mismatched to) those for which the mechanisms were designed. Specifically, our psychological mechanisms have evolved to process particular types of environmental input to produce adaptive output in the form of thoughts, feelings, and behaviors that increase survival or reproduction in ancestral contexts. Mismatch occurs when, due to rapid technological change, the mechanisms are now facing inputs that are either absent or substantially different (Li, van Vugt, & Colarelli, 2018). As the classic computer science adage goes, garbage in, garbage out: When a process is wrought with faulty input, the output will be faulty. Hence, a key insight for understanding how to address undesired thoughts, feelings, and behaviors is to appreciate that these are the products of evolved processes that have largely remained unchanged for potentially millions of years but are now

being triggered by environments that have significantly changed.

An oft-cited mismatch example concerns food preferences (Eaton, Eaton, Konner, & Shostak, 1996). Modern people struggle with their diets, ingesting too much sugar, fat, salt, and calories, resulting in obesity, diabetes, heart disease, and other problems (though some people struggle with eating too little, which is another mismatch issue). A primary reason for this is because in ancestral environments, sugar, fat, salt, and calories occurred only naturally and were in short supply. Thus, tastes evolved to the point that people prefer and eat these things without restraint, and their metabolic and other physiological systems evolved to process them in relatively low, naturally occurring amounts. Due to technological advancements, however, modern food is loaded with sugar, fat, salt, and calories; therefore, food-preference mechanisms now induce people to eat more than their physiological systems are designed to handle, leading to a variety of health problems, ranging from tooth decay to obesity and diabetes (see Figure 1 for an illustration and further examples). Although consciously overriding taste mechanisms' penchant to choose such foods is possible, for many people it may be necessary to completely remove unhealthy processed foods (e.g., those overloaded with refined sugar and grains, fat, salt) as choices.

This is not to say that all discomfort is due to mismatch, because the output of normally functioning mechanisms also often takes the form of distress or discomfort (e.g., feeling pain after touching a hot plate; Buss, 2000). Rather, the point is that mismatch often results in maladaptive output, and the degree to which discomfort or undesirable behaviors is encountered in the modern world may be largely due to mismatch.

Modern Problems

Modern problems (typically those occurring since the advent of agriculture but especially in the digital era), however, are not limited to just food intake. Indeed, issues at the individual level include addiction to TV, social media, pornography, video games, smartphones, alcohol, drugs, gambling, and material goods (Fremuth et al., 2008). Children everywhere face attention deficit and hyperactivity issues (Jensen et al., 1997). People are more dissatisfied

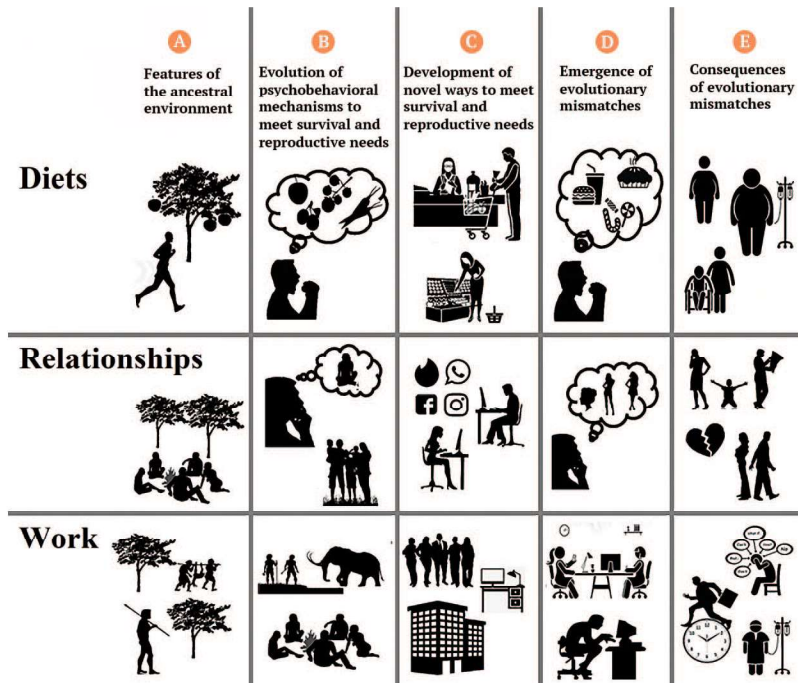


Figure 1. Illustration and examples of the emergence and consequences of mismatch. See the online article for the color version of this figure.

with their appearance, job, and life in general (Sirgy, 1998; Yong, Li, Valentine, & Smith, 2017). Numerous individuals report having fewer close friends and being more stressed, lonely, depressed, insecure, and anxious (Kavanagh & Kahl, 2018; Li & Kanazawa, 2016) and having difficulty sleeping (Buss, 2000). They also have trouble getting into and maintaining relationships and marriages (Apostolou, 2015). Topics covered by the self-help industry suggest that people need assistance with things as basic as drinking enough water and making friends. At the organizational and societal level, we encounter employee job dissatisfaction, burnout, and turnover (Shirom, 2010). People in some countries are producing more children than they can maintain (Pimentel, 2012), but in an increasing number of others, they are not reproducing enough to maintain local populations (Yong, Li, Jonason, & Tan, 2019), thereby leading to a lack of support for aging populations (McDonald, 2007). At the world level, there are problems of pollution, global warming, sustainability, and threats of nuclear war (Griskevicius et al., 2012). On top of all this,

worldwide initiatives on well-being and happiness (e.g., Cullen, 2011; Patel et al., 2008) and an expanding psychopharmaceutical industry suggest that the problems we are facing are not trivial to human psychology.

Much research on these problems often focuses on proximate causes and solutions, which typically involve throwing technology at the symptoms. Although this can temporarily alleviate discomfort, it may further compound the underlying problems or result in undesirable side effects. For example, antidepressants are often used to treat low or depressive mood. By flooding the brain with serotonin or other neurotransmitters, the drugs may help to boost mood temporarily and artificially. Mood regulation systems, however, seem to be designed to maintain an equilibrium state that is calibrated to self-perceived circumstances (e.g., a relationship breakdown should make one feel unhappy, at least temporarily). Thus, upon detecting excesses of serotonin, appropriate mechanisms downregulate the ability to produce serotonin and continue to do so until the overall level of serotonin is back down to where it would be if

there were no drugs involved. Moreover, if the drugs are removed, then an individual is left with fewer neurotransmitters than when the antidepressants were first introduced (Andrews et al., 2015; Andrews, Thomson, Amstadter, & Neale, 2012). It is important to note that at that point the individual's ability to naturally produce the neurotransmitters may be compromised (El-Mallakh, Gao, & Roberts, 2011), much like with bodybuilders who engage in long-term use of steroids and subsequently their bodies lose their ability to produce natural doses of testosterone.

Mismatch-Informed Solutions

To better understand modern problems and how to address them, we need to identify how psychological mechanisms function—what inputs they are designed to process and what decision rules they follow. Of importance, researchers need to also identify how inputs that mechanisms evolved to process have changed and what impact those changes have on the mechanisms' output.

Increases in population density constitute one example. Ancestrally, humans lived in small villages comprising 100–150 kin and close others (Dunbar, 1992). Today's contemporary environments of cities and modern towns are thousands of times larger, which may overload psychological mechanisms that were designed to calibrate around individuals in one's tribal village and assess competition for limited resources accordingly. Moreover, because our person perception mechanisms aren't particularly adept at distinguishing between virtual individuals and real people (Gutierrez, Kenrick, & Partch, 1999; Kanazawa, 2002), the seemingly unlimited number of virtual individuals encountered electronically only adds to the perceived number of people in one's environment (Yong et al., 2017). Hence, mechanisms that rely on assessing the quantity of people in our environments, such as those involved in same-sex competition, will be affected. For instance, the copious amounts of social comparison triggered by images of formidable and attractive individuals presented on social and mass media are likely to cause many viewers to come up short in self-assessments. As such, it is no wonder why greater usage of social media is associated

with greater levels of self-dissatisfaction and depression (Lim & Yong, 2019).

Once we have a handle on what is mismatched and the functioning of psychological mechanisms that are relevant to a modern problem, it then becomes clearer how that problem might be addressed. For example, insights from mismatch in population density may also be applied to the problem of low fertility. The birthrate in modern, developed countries such as Singapore and Japan has reached as low as 0.8 per couple, reflecting ultralow fertility, which creates a host of societal issues such as aging populations (McDonald, 2007). For some time, this has been regarded as an economic problem by population researchers and policymakers. A seemingly reasonable response adopted by many countries is to offer economic incentives, such as tax cuts and "baby bonuses," to encourage procreation (e.g., Dunn, 2003; Langridge, Nassar, Li, Jacoby, & Stanley, 2012). However, this approach neglects the underlying evolved mechanisms that influence people's desire for children and attitudes toward dating and marriage, which can be mismatched to modern, urban social environments that are too crowded and competitive (Yong et al., 2019).

From a life history strategy perspective (e.g., Stearns, 1992), overcrowding and intense social competition cause people to prioritize resource competition and status attainment over mating and reproduction (Ellis, Figueredo, Brumbach, & Schlomer, 2009; Sng, Neuberg, Varnum, & Kenrick, 2017). That is, when population density is perceived as high, psychological mechanisms likely induce inhabitants to perceive that there are not enough resources to sustain offspring, despite there being objectively abundant resources available in safe and stable modern societies. Indeed, research has shown that people in crowded and economically competitive urban areas perceive fewer opportunities for resource acquisition, are more preoccupied with materialism and gaining status, and are more cynical toward marriage and children (Li, Patel, Balliet, Tov, & Scollon, 2011; Yong et al., 2019). In turn, a growing number of people in stressful and crowded cities are dating less, marrying later (or not at all), and having fewer children (Iwasawa, 2004; Sng et al., 2017).

Economic incentives, which attempt to directly influence undesired behaviors, have proven to be ineffective (Guest, 2007; Langridge et al., 2012),

but this is not too surprising, because they ignore the evolved mechanisms responsible for reproductive preferences, such as timing and offspring quantity. With a better understanding of evolved processes, we may find that policies and interventions are more effective if they are aimed at reducing people's perceived level of density and competition, stress, and concern for status caused by competition. By targeting specific parts of psychological mechanisms for reproductive preferences, interventions may achieve greater success working with, rather than against, the mechanisms that underlie reproductive motivation.

Conclusion

In summary, a careful consideration of the adaptive function of our evolved mechanisms, and how they are mismatched in novel environments, is at the core of any enlightened solution to problems, modern or otherwise. Only through an appreciation of how we function can we know how to harness our nature to foster interventions that produce desired outcomes. More broadly, as the field of evolutionary psychology continues to mature, it becomes more and more fitting to ask what lies ahead. With an increasingly higher number of problems surfacing in the modern world, we believe that "What can evolutionary psychology do for us?" is a good question and that evolutionary mismatches and how to handle them will be parts of the answer.

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