

# 1 Why an Evolutionary Psychological Approach to Digital Games?

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## **Introduction**

With their growing popularity and the diversification of their audience, the question of what is so appealing about digital games<sup>1</sup> and what motivates players to invest substantial amounts of time and money has become ever more important. The vast majority of social science research on the reasons why people play (specific) games has focused on proximal causes (Tinbergen, 1952, 1963), such as emotional states or momentary motivations (for an overview, see De Grove, Cauberghe, & Van Looy, 2014; Scharkow, Festl, Vogelgesang, & Quandt, 2015). These approaches, however, have not yet delivered sufficient answers to some of the key questions including why men and women play different games; why violent games are so generally appealing; and why adults play digital games, although playing behavior is typically considered to be endemic only to childhood and adolescence. This also extends to research into the effects of digital games. While much of the research on the effects of digital games focuses on short-term processes and proximal causes, taking ultimate causes (and thus, human nature) into account can not only help in understanding why digital games have certain effects on their players (e.g., regarding emotions, attitudes, and behavior) but also what limitations there are to these effects.

A field that can provide some more compelling explanations for the ultimate underlying causes (Tinbergen, 1952, 1963) of the appeal and effects of digital games is evolutionary psychology (Buss, 2016). This branch of psychology has gained a lot of attention in academia in recent years as it can explain some of the basic mechanisms and roots of human experience and behavior by taking into account biological factors and their phylogenetic origins.

Studying digital games through an evolutionary psychology lens expands the scope beyond the limited perspective of what has been called the standard social science model (SSSM; Tooby & Cosmides, 1992) that ignores innate differences as reasons for traits and behaviors in favor of social learning as the primary or even sole mechanism to explain intraindividual change and interindividual differences. More specifically, an evolutionary psychology approach and an integrated causal model (ICM; Tooby & Cosmides, 1992) that considers both proximal and

ultimate causes can aid in uncovering why so many people are fascinated by digital games, and why some play and are affected differently by them than others.

## **Evolutionary Psychology: A Short Primer<sup>2</sup>**

The basic compelling logic of evolutionary psychology (for an overview, see Barkow, Cosmides, & Tooby, 1992; Buss, 2016; Confer et al., 2010; Cosmides & Tooby, 1987, 1997; Pinker, 1997; Tooby & Cosmides, 2005) can be summarized as follows: None of our direct ancestors remained childless. All of them survived long enough to reproduce at least once. Otherwise, we would not have existed. All traits (e.g., behavioral patterns, emotions, and the like) that facilitated their survival and reproduction must, hence, to a certain degree be part of our physical and cognitive equipment as well—at least, if some sort of mechanism of genetic transmission is involved in creating those traits, which, however, is evident (e.g., Plomin, DeFries, McClearn, & Rutter, 2001). By acknowledging this fundamental feature of human nature, evolutionary psychology helps to overcome some of the limitations of the SSSM (Tooby & Cosmides, 1992): Human behavior and experience are not just the result of social learning and other proximal causes, but originate from a brain that is, first of all, a biological organ (like any other organ), and the result of the evolution of our species.

### **The selection of traits**

Evolutionary psychology aims to explain the very existence as well as the specific characteristics of psychological traits (e.g., cognitive mechanisms) as the result of our ancestors' survival (Natural selection; Darwin, 1859) and reproduction (Sexual selection; Darwin, 1871).

Accordingly, such traits are the result of an evolutionary selection process: They exist because they were beneficial to our ancestors' survival and reproduction in the past. Human beings with less-beneficial traits (phenotype) tended not to survive long enough to reproduce, which, over time, led to the underlying gene variants (i.e., their alleles) that code for the respective traits (genotype) to be eliminated from the gene pool. Hence, from an evolutionary perspective, specific traits exist because they evolved to solve recurrent problems of survival and reproduction during human phylogeny (hominization). They enabled those individuals who possessed a respective trait (i.e., a beneficial phenotype) to have children who, in turn, inherited

the alleles (genotype) of the associated phenotype. This principle, first of all, does apply to the human body. Perspiration, for instance, evolved for regulating body temperature. But it does also apply to the human mind. Fear of heights, for instance, protected our ancestors from carelessly playing around on high rocks in danger of collapsing. Feeling butterflies in their stomachs motivated our ancestors to approach the person who caused those feelings, and to start some form of relationship with him or her. Such evolved psychological mechanisms (i.e., evolved sets of behavior; EPMS) can, therefore, be considered special modules for solving specific evolutionary problems dealing with survival and reproduction (Buss, 2016; Confer et al., 2010; Pinker, 1997; Tooby & Cosmides, 2005).

### **Proximate vs. Ultimate Explanations**

Evolutionary psychology adds a specific functional level of analysis to the behavioral and cognitive sciences by providing answers to a set of fundamental questions: What is the function of a trait? For what functional reason did it come to be during hominization? Here, one crucial distinction comes into play, namely the one between proximate and ultimate mechanisms. The proximate level of explanation is the most common one in most social sciences that asks how a certain trait works on an organismic level. It is concerned with mechanisms, for instance, motivational, cognitive, or biological ones (e.g., Genetical, hormonal/endocrinological, or neurophysiological; see Buss, 2016; Confer et al., 2010; Tinbergen, 1952, 1963). The ultimate level of explanation, by contrast, is concerned with the question, why these proximate mechanisms exist in the first place, that is, what their function is (Buss, 2016; Confer et al., 2010; Tinbergen, 1952, 1963). This ultimate ‘why’ perspective can, therefore, be considered the evolutionary perspective itself (Buss, 2016). Dutch biologist and Nobel Prize winner Nikolaas Tinbergen (1963) proposed four questions that represent four levels of analysis within this proximate-ultimate dualism:

#### **Proximate**

- (1) How: How does it work?
- (2) Ontogeny: How does it develop?

#### **Ultimate**

(3) Why: What is its function? What was (and is) its benefit for survival and reproduction (compared to other possible traits/mechanisms)?

(4) Phylogeny: How did it evolve? How did it come to be in the long course of evolution?

These four questions do not exclude one another—instead, all four need to be answered together for a thorough understanding of human behavior. Hence, social scientists might want to incorporate ultimate reasoning into their considerations, if they have not done so already. On the other hand, evolutionary psychologists, while focusing on ultimate reasons, must consider proximate causation as well: Each trait that possesses evolutionary functionality needs a (biological) mechanism that generates the trait to start with (and triggers it later on).

### **Adaptation and Fitness**

Evolution works based on three core principles: (1) variation, (2) selection, and (3) inheritance (i.e., genetic transmission).

There are interindividual differences in practically all traits (1). A substantial portion of this variance is attributable to genetic (i.e., allelic) variance (3), which is called heritability (Plomin et al., 2001). Such interindividual differences in the respective heritable traits cause differential chances of survival; features that help individuals to survive become more common in the next generation of a population and will, thus, accumulate over successive generations. This is what evolutionary scientists refer to as selection (2). This selection of traits will then result in adaptations to the evolutionary challenges which generated the selection pressure under which the individuals with beneficial traits were evolutionarily favored (Mayr, 2001). An adaptation that is part of the human mind is called an EPM, as already referred to above. Apart from adaptations, there are by-products of adaptations as well (Buss, 2016). For instance, the umbilical cord is an adaptation in mammalian species. It does serve an evolutionary purpose. The navel, however, is only a by-product of this adaptation. For psychological or cognitive traits, an appropriate example might be the following: Children are able to acquire their respective mother tongue without any formal instruction simply based on their innate language faculty (Pinker, 1994). The ability to read and write, however, could be considered a by-product of these innate abilities.

A trait that qualifies for an adaptation is fit—or more precisely, alleles are more or less fit and are selected via the trait they are coding for. “Fit” does not refer to physical fitness (although physical fitness might be evolutionarily fit), but to fitness in the sense of adapted or being adaptive. The question always is, whether a trait or a configuration of traits (via the respective alleles or allele configuration) promoted survival and reproduction. Hence, fitness can be defined as the ability of an individual to pass his or her genes on to the next generation, and could be measured by relative reproductive success among individuals (e.g., Fisher, 1915; Dawkins, 1976; Miller, 2000a; Williams, 1966; Zahavi & Zahavi, 1997).

What is fit and what is not depends on the respective environment. In an environment offering high-quality eyeglasses and contact lenses, defective vision is not particularly unfit, but it is easy to envision how unfit it must have been in a long-time-ago hunter-gatherer environment without visual aids. Also, in an environment with an abundance of high caloric nutrition (i.e., in most developed countries today), possessing an efficient assimilative metabolism might cause overweight and, thus, result in negative health effects, which might lower fitness. In an environment of lack or uncertain food supply, as might have been common in the hunter-gatherer past, such a disposition, by contrast, might have been extremely fit. These examples point to another key concept of evolutionary psychology, namely mismatch. If environments change and if they do so faster than adaptations are able to change accordingly, our adaptations might cause behavior that seems inappropriate. One example for a media-related mismatch is the so-called Media equation, that is, the tendency to treat media as if they were real people (Reeves & Nass, 1996). It seems, hence, to be a worthwhile enterprise to take a closer look at the conditions under which the human mind is considered to have evolved.

In general, it is assumed that our cognitive adaptations that create appropriate behavior and experience have evolved over the last few hundred thousand years in the so-called Environment of Evolutionary Adaptedness (EEA).<sup>3</sup> This is not a specific environment but rather a set of environmental (in a broad sense) conditions that constantly occurred during the last few hundred thousand years and presented specific challenges related to survival and reproduction that will be discussed further below.

## **Natural and sexual selection**

There are two general evolutionary processes that create adaptations: Natural selection and sexual selection. Natural selection is the process describing the evolution of traits which promoted survival (Darwin, 1859). This means that individuals—or to be precise their allele configuration and corresponding phenotypes—were not only selected by environmental conditions (e.g., climate), but also by factors related to members of their social group concerning survival (Darwin, 1859; Dunbar, 2007). For instance, cheating might be beneficial (gaining fitness advantages), but avoiding being cheated as well (preventing to suffer from fitness disadvantages), amounting in a tit-for-tat reciprocity or in reciprocal altruism, in which individuals support each other and return such favors on later occasions (Trivers, 1985; also see Velez, this volume). Such adaptations caused by natural selection are considered to be economical (not too costly), reliable (all members normally evolve the trait), and efficient (the trait solves an adaptive problem well; Williams, 1966). This is what, to some degree, distinguishes adaptations caused by natural selection from those caused by sexual selection.

Sexual selection (Darwin, 1871) can be subdivided into intersexual and intrasexual selection. The first refers to the actual mate choice. In almost all mammals, this is female choice, as females have higher obligatory costs (Trivers, 1972) in reproduction (e.g., due to pregnancy and postnatal lactation). For this reason, females evolved to be choosier than males in mate choice decisions. Males, on their side, compete with other males in order to gain access to females. This is referred to as intrasexual selection. It has to be noted that particularly in humans, where investment in children is particularly high (Buss & Schmitt, 1993), men might be choosy too, resulting in what has been termed “mutual mate choice” (e.g., Miller, 2000a). Also, intrasexual competition does not only occur in males, but in females too. Similar to natural selection, each trait that is beneficial for succeeding in intrasexual competition, and, subsequently, intersexual selection (i.e., in actual mate choice, as long as this results in reproduction), will be more frequent in the next generation (Andersson, 1994).

As teased above, there are a few differences between natural and sexual selection: While in the first process, the environment and one’s social group create the selection pressures, in the second process, selection pressures come from (potential) reproductive mates and same-sex rivals. Furthermore, although natural selection needs interindividual variance to act upon, it tends to reduce this variance, as it removes maladaptive forms of traits from the gene pool (e.g., Fisher,

1930). For sexual selection, variance seems to play a slightly different role: Without large variance among individuals, mate choice would not be a real choice. Therefore, scholars have proposed the idea that sexually selected traits should show larger variance among individuals than naturally selected ones. In line with this, sexually selected traits might be more heritable than naturally selected ones (e.g., Miller, 1998, 2000a, 2000b; Miller & Todd, 1998).

Some scholars (e.g., Miller, 2000a; also see Lonergan, Craighead, & Weber, this volume) consider sexual selection as a submode of natural selection. However, following Darwin (1859, 1871), who proposed a theory for natural selection, as well as a theory for sexual selection, and dedicated an entire book to each of these theories, one might as well argue that sexual selection is an evolutionary process distinct from natural selection. Apart from the reasons already outlined above, one major reason for the latter assertion might be that sexually selected traits do not entirely show the same features as those originating from natural selection that were proposed by Williams (1966). For instance, sexually selected traits are not economic, but, in contrast, costly and might decrease chances of survival instead of increasing them (e.g., the peacock's plumage; Zahavi, 1975; Zahavi & Zahavi, 1997). Still, they can be fit if the increase in reproduction outweighs the decrease in survival.

Evolutionary psychologists use sexual selection theory to explain human sex differences. In all mammals, at least in those that show deviation from perfect monogamy, sex differences can be observed. They can be linked to behavior, but also to somatic or life-history traits. And these three dimensions are ostensibly linked with each other. For instance, on average, males are physically more aggressive (behavior), but also bigger and stronger (somatic), and have a higher mortality risk throughout their entire life (life history) than females. Many of such sex differences can be directly predicted from sex-differentiated reproductive conditions, as briefly described above (for further details, see Bateman, 1948; Buss, 2016; Daly & Wilson, 1983; Mealey, 2000; Trivers, 1972). For instance, if females are choosier than males because reproduction is more costly for them, males should be the ones who promote their qualities to be selected as mates (i.e., they perform displays of so-called fitness indicators). In a similar vein, males should then be the ones who compete with one another aggressively in order to gain an edge over their reproductive competitors. Accordingly, sex differences are considered to be, to a substantial degree, the result of human mate choice.

Evolutionary psychological research on human mating has produced a remarkable number of related studies. This research, among others, has shown that across cultures, the mate value or reproductive value of men are mostly linked to their social status, while women benefit in mate choice from being physically attractive (for an overview, see Buss, 2003). Limiting evolutionary psychology to sex differences and mating, however, would be far too narrow: Evolutionary psychology has the potential to explain all sorts of human behavior and experience, including social interaction and cooperation, language, childhood development, morality, mental disorders, motivation and emotions, as well as learning (Buss, 2016).

Over the last years, evolutionary psychological concepts have also been applied to the study of communication, culture, and the media (e.g., Dunbar, Knight, & Power, 1999; Hennighausen & Schwab, 2015; Kock, 2004; Lange, Schwarz, & Euler, 2013; Miller, 2000a; Ohler & Nieding, 2006a). Evolutionary psychological works on video games, however, have remained relatively scarce, although evolutionary psychology might provide answers to some crucial basic questions regarding digital games.

## **Evolutionary Psychology and Digital Games**

Despite its potential for explaining ultimate causes of human motivation, behavior, and experience, and previous applications to other cultural products, there has been surprisingly little research that looks at digital games through an evolutionary psychology lens (see Bertozzi, 2014; Devilly, Brown, Pickert, & O'Donohue, 2017; Mendenhall, Nepomuceno, & Saad, 2010; Mendenhall, Saad, & Nepomuceno, 2010; Ohler & Nieding, 2006b, for notable exceptions). The primer on the basics of evolutionary psychology in this chapter, however, should have made clear why an evolutionary psychology approach on games can be useful to broaden the understanding of the appeal and effects of digital games. This is what this edited volume wants to achieve. More specifically, the aim of this volume is to provide answers that go beyond those offered by research within the SSSM framework to a set of questions that are at the core of psychological and other social science research on digital games, such as Why do people play digital games? (How) Can playing digital games be understood as an adaptive behavior? What are the reasons behind sex differences in the use of digital games? Why are violent games so popular? How and why can behaviors from real life transfer into the game world and vice versa?

As to the questions raised above, evolutionary psychology might give the following answers: Humans—children as well as adults—like to play as this helps to hone their abilities and skills (see the chapters by Liebold, Koban, & Ohler and Brill, Lange, & Schwab in this volume). Women and men play different games because of sex-differentiated selection pressures related to reproduction in our ancestors' past (see the chapters by Melzer and Lange & Schwab in this volume). People, particularly men, like violent games as selection has always forced them to compete with others (especially with other men) for evolutionarily relevant resources (Wilson & Daly, 1985; also see the chapter by Koban in this volume). From an ultimate perspective, violence is a ubiquitous phenomenon and thus also part of human nature, which includes video games (see, for instance, Pinker, 1997, 2002). And there are plenty more games-related questions that evolutionary psychology can help to answer: Why do gamers particularly like open-world games, such as the recent games from the *Grand Theft Auto* series or the sandbox-styled 3D *Super Mario* games where they can try out a variety of solutions for different kinds of challenges (see the chapter by Lang et al. in this volume)? And, in a similar vein, why do they criticize games that are too automated and offer too little opportunities for exploration? Why do so many games employ a save-the-world narrative? Why do so many games use exaggerated character stimuli, such as hyper-feminized Lara Croft from the *Tomb Raider* series or exaggerated baby schema characters, such as many creatures from *Pokémon* or the video game characters Mario and Sonic? Why are games that simulate social life, such as *The Sims*, so appealing? And why do they appeal particularly to female players? (see the chapters by Melzer and Brill, Lange, & Schwab in this volume)

The chapters in this book all focus on different aspects of digital games, but what they all have in common is that they build on evolutionary psychology to broaden our understanding of the appeal and effects of digital games. To provide a comprehensive picture of the potential of using evolutionary psychology to study digital games, the volume is divided into four sections that mirror common areas of games research as well as psychological research in general: (1) theories and methods, (2) emotion and morality, (3) social interaction, and (4) learning and motivation.

In the first section, the chapter by Liebold, Koban, and Ohler (Chapter 2) introduces the fundamental concepts of the evolution of play and discusses the interplay between biological imperatives and a pretend-mode of thinking as the driving forces behind the perceptions and

actions of players. In the following chapter, Brill, Lange, and Schwab (Chapter 3) conceptualize the virtual worlds of digital games as fitness potential landscapes through which players navigate using the evolved functions of their minds. Lonergan, Craighead, and Weber (Chapter 4) lay out the evolutionary foundations of neurophysiological research on digital games with a special focus on pretense play as an EPM that can help in understanding the popularity of entertainment media in general and digital games in particular. In the last chapter of this section, Holz Ivory, Ivory, and Elson (Chapter 5) discuss problems with flexible data analysis and interpretation and what this means for evolutionary psychology research on digital games.

The second section of the book (Emotion and Morality) starts with a chapter by Kivikangas (Chapter 6) that offers an overview of emotion theories and the evolutionary basis of these, and makes suggestions on how they can be used to study the use and effects of digital games. The chapter by Lynch (Chapter 7), then, focuses on one particular emotion, namely fear, and explains the appeal of fear-evoking digital games. This is followed by a chapter on the role of morality in digital games and the experiences of their players (Matthews, Chapter 8) that highlights the importance of altruism for explaining player behavior. The chapter by Ferguson (Chapter 9) presents a somewhat different perspective on morality and digital games by outlining the evolutionary roots of media-based moral panics.

The first chapter of the section on Social Interaction (Velez, Chapter 10) employs an evolutionary psychology approach to explain the dynamics of social interactions in digital games and their effect on prosocial behavior. Waddell and Bailey (Chapter 11) specifically look at player behavior in online games and the question why it is often governed by the same social rules as offline face-to-face interactions. In the final chapter of this section, Poor (Chapter 12) looks at one specific massively multiplayer online role-playing game (MMORPG) and uses concepts and theories from evolutionary psychology in conjunction with big data analysis to highlight the social dynamics of online game communities in terms of group size.

In the section on Learning and Motivation, Breuer (Chapter 13) deals with the topic of digital games and learning and provides an evolutionary psychology perspective on the fundamental coupling of playing and learning in both humans and digital games. Lang, Matthews, Lynch, Almond, Han, and Zheng (Chapter 14) talk about virtual affordances in digital games and, using the example of a popular action game, show how certain attractors that speak to EPMs shape the

behavior of players. Chapter 15 by Lange and Schwab delves into the evolutionary reasons for sex differences in both the production and consumption of video games across the globe. In the next chapter, Melzer (Chapter 16) discusses gender stereotypes in the contents of digital games and what they mean for differences in motivation, genre preferences, and playing styles between men and women. Finally, Koban (Chapter 17) uses concepts and insights from evolutionary psychology to develop an integrated model for explaining the appeal of violent digital games that goes beyond previous models focusing exclusively on proximate causes, for example, wishful identification or competitiveness.

By presenting a wide range of topics and different theoretical and methodological approaches, we hope that this volume will both extend evolutionary psychology research by looking in detail at different aspects and dimensions of digital games as well as digital games research by taking into account biological factors and innate individual differences that are typically ignored by social science. We invite all readers to join us in exploring why and how the psychological mechanisms of our Stone Age minds that evolved in the Pleistocene worlds of our ancestors let us enjoy being digital hunter-gatherers in the virtual worlds of today.

## Notes

<sup>1</sup>Unless explicitly noted otherwise, the terms digital games, video games, and computer games are used synonymously throughout this volume.

<sup>2</sup>As we are aware that not all readers will be familiar with the established terminology of evolutionary psychology, we have decided to provide a glossary with short definitions of relevant terms instead of the usual index at the end of this book.

<sup>3</sup>Merely for didactical reasons, evolutionary psychologists, when entering a discourse with non-evolutionists, use the term “Pleistocene” (or, even more simply, the term Stone Age) instead of EEA. When this vast simplification occurs, one should realize that adaptations evolved in the more abstract EEA and not necessarily in a specific time period.

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