Psicologia USP
ISSN: 0103-6564
ISSN: 1678-5177
Instituto de Psicologia da Universidade de São Paulo

Otta, Emma
Brincar na perspectiva psicoetológica: implicações para pesquisa e prática
Psicologia USP, vol. 28, núm. 3, Setembro-Dezembro, 2017, pp. 358-367
Instituto de Psicologia da Universidade de São Paulo

DOI: 10.1590/0103-656420160122

 http://dx.doi.org/10.1590/0103-656420160122

Psychoethological perspective on play: implications for research and practice

Emma Otta*

Universidade de São Paulo, Instituto de Psicologia, Departamento de Psicologia Experimental. São Paulo, SP, Brasil

Abstract: This study focuses on play from a psychoethological perspective and examines the implications for research and practice. Over the past decades, children are provided with more educational opportunities and more access to adult-led activities, albeit suffering a severe lack of self-directed play. This fact is worrying when we consider the indications in animal models that self-directed play is important for the development of the social brain and emotional self-regulation. This essay represents an invitation-justification for children to recover opportunities for natural play, of which they have been deprived. The more we know about play, the more suitable the opportunities we can offer them will be. We need to conduct further research on this topic, in an intellectual environment that enables collaboration between ethologists, psychologists, educators, and neuroscientists, promoting a bidirectional interaction between theory and practice.

Keywords: playing, social brain, development, emotion, nature.

Introduction

This essay deals with the act of playing from the psychoethological perspective and examines the implications of this approach for research and practice regarding a topic that I think is overlooked in the academic field. The term "psychoethological approach" was coined by Walter Hugo de Andrade Cunha – a pioneer of ethology in Brazil (Cunha, 1965, 2004) – and disseminated by those who followed his inspiring proposal (Arcieri, 1995; Ardans, 1996; Ades, 1998; Lencastre, 2010; Lucena & Pedrosa, 2014). Lancastre (2010) points out that psychoethology is the search to conciliate the biological study of behavior with psychological activity. Ades (1986, 1987) believed that psychoethology was an integrated approach to basic behavioral processes, approximating ethology (and behavioral ecology) and experimental psychology, which were developed by means of historically separated paths. This approach has the following programmatic points: 1) selection of ecologically relevant behaviors (functional systems) as an initial focus of analysis; 2) learning as an adaptive phenomenon taking place within functional systems, 3) study of interspecific differences within an ecological reference framework, (4) complementary role of field and laboratory studies, in reciprocal heuristics. Based on this approach, in agreement with Ades (1986, 1987) regarding to its advantages as a generator of research and source of subsidies for a general theory of animal behavior, and inspired by the manifest of Brazilian ethology (Cunha, 1965), I present an invitation-justification for the study of play behavior.

* Corresponding address: emmaotta@usp.br

The reason of the ethologist, fascinated by the observation of behavior

What is my reasoning for suggesting the study of the playing behavior of animals? The simplest answer I could give is based on the fascination of observing spontaneous behavior that is free from artificial boundaries. It is fun to watch and think about behavior. Reading reports of naturalistic observations that often continue for several years is thought-provoking. I chose two examples to invite readers to think about this topic based on reports of observations made by ethologists: (a) playing with sticks and (b) playing with stones.

The first example was extracted from an article from Kahlenberg and Wrangham (2010), which begins with the question: "*would chimpanzees use sticks as if they were dolls?*" In their study, throughout 14 years of observing the behavior of chimpanzees at Kibale National Park in Uganda, the authors recorded over 100 episodes with chimpanzees carrying sticks as if they were dolls. It is interesting to note that this behavior was not observed in other communities, raising the possibility that the chimpanzees were copying a local behavioral tradition. Some episodes were brief, and lasted only a few minutes, but others were longer, lasting more than one hour. The chosen pieces of sticks were different – larger and wider – than the narrow and thin pieces used as tools in the context of termite foraging. Qualitative observations are presented. Some young chimpanzees carried sticks to their nest and slept with them and, on one occasion, the authors observed that the chimpanzees had built a separate nest for the stick. Kakama (8 years), traveling with her pregnant mother, got a piece of stick and carried it for hours, treating it as if it were a baby (e.g., made a nest and put the stick in it). Four months later, two research assistants, who were not

aware of the incident, observed a similar behavior from the same individual, who collected another piece of stick. They called it "Kakama's baby toy". In another event, the chimpanzee was observed carrying another stick, even beating it as if it were "beating on a baby's back", while its mother carried its sick brother. The researchers also noticed young chimpanzees playing a version of "airplane", laying on their backs with their "stick" and swinging it with arms raised. Mothers play like this with their infants.

The second example was extracted from a set of articles by Michael Huffman (Huffman, 1984; Huffman & Quiatt, 1986; Nahallage & Huffman, 2007, 2012) about play with stones in four groups of *Macaca fuscata* in captivity and in 11 groups in the wild. This form of play consists of repetitive handling of stones: scattering and gathering, rolling from one hand to another, hitting one stone against another with a clacking noise, crashing them into the substrate, rubbing, throwing, dropping them in the water, washing, wrapping with leaves, using a stone as grooming tool, running and throwing. Some episodes were brief (less than a minute), but others were long (20 minutes). This behavior was first observed in Arashiyama as an innovation of a juvenile female, which then spread to other young monkeys and infants of the group. The transmission of this behavior in form of tradition was observed over 25 years, as these individuals became parents and transmitted stone-play to their own offspring. These are only two examples to introduce the topic and to invite readers to reflect on the playing behavior of animals, on the reason to study it, and on the possible value of a comparative approach.

"Hard" Science versus "Light" Science: Disqualification of play as a research topic by the "serious" man

Although ethologists study the act of playing and their conclusions are reported in several books (Bateson & Martin, 2013; Bekoff & Byers, 1998; Burghardt, 2005; Pellegrini & Smith, 2005) and review articles (Burghardt, 2010; Graham & Burghardt, 2010), this topic of study has been overlooked when compared to others in reference works in the field. Despite the universality of play in animals and humans, observed in children in different cultures (Gosso, Otta, Morais, Ribeiro & Bussab, 2005; Meirelles, 2007), there are those who consider it a frivolous and even harmful activity. A review of these points of view can be found in Burghardt (2005). In his book, he mentions that those who interpret play as negative consider it a waste of time and think it may lead people to neglect study and work and even lead to delinquency, game, and crime.

Regarding animal behavior, it is possible to verify that textbooks, such as the classic *Animal Behavior* by John Alcock (2013), which is in its 10th edition, do not include chapters on play, although they do include chapters on development. One reason for the relative neglect of play in the academic field is the apparent lack of seriousness of this behavior in its proximal manifestations or functions. Maybe scientists, including ethologists, evolutionary psychologists, and neuroscientists, see play as a nonserious subject and, therefore, not important for study.

The renowned neuroscientist Jaak Panksepp, who coined the term "affective neuroscience" in 1992, commented on the reaction of the audience to a presentation of his study on play in rats and ultrasonic vocalizations displayed in playful context (Panksepp, Siviy, & Normansell, 1985; Panksepp & Burgdorf, 2003; Panksepp, 2007b):

> When I first presented our work on rat "laughter" . . . at a NIMH symposium in 1998, . . . there was not a single question from a seemingly stony-faced audience of neurobehaviorists. One of the organizers of the meeting took me aside after my session and essentially said, "This research is wonderful. It could be used as a simplified model for positive emotions the way classical conditioning of freezing and startle potentiation is used to study fear… but would you please call it something other than laughter." I replied, "Yes I could, but then I might be lying, for we do believe this response may be the ancestral source of infantile laughter." It is a pity when dedicated scholars are discouraged from considering the affective dimensions of brain functions in their study of animal behavior and that they are routinely and strongly encouraged to restrict their discussions to mere behavioral descriptions and learning theory terminologies. (Panksepp, 2005, p. 67)

I contacted Jaak Panksepp in 1998, and started to follow his work ever since (e.g., Panksepp, 1992, 1998; Panksepp & Biven, 2012). He was Emeritus Professor at the Department of Psychology of Bowling Green State University and of Washington State University[1]. I read the book "Affective Neuroscience: The Foundations of Human and Animal Emotions" with much interest, and used it in the "Motivação e Emoção" discipline, which César Ades and I taught for over 30 years on the undergraduate course in Psychology at the Institute of Psychology of University of São Paulo, since it is in line with the psychoethological approach that guides us. I remember my conversations with César (Otta, 2012, 2015) about the research showing that rats 'laugh' – emitting 50-kHz ultrasonic vocalizations (<0,3 s) that the human ear cannot identify, but that can be recorded with equipment and submitted to sonographic analysis – in positive affective situations, such as play (Burgdorf & Panksepp, 2001; Burgdorf, Kroes, Moskal, Pfaus, Brudzynski, & Panksepp, 2008; Knutson, Burgdorf, & Panksepp, 1998; Brudzynski & Pniak, 2002), mating (Burgdorf et al., 2008), in response to abusive drugs – e.g., amphetamine – (Burgdorf, Knutson, Panksepp, & Ikemoto, 2001; Thompson, Leonard, & Brudzynski, 2006), and

1 Dr. Jaak Panksepp, known worldwide as the proponent of Affective Neuroscience, passed away on April 18, 2017

anticipation of rewards (Burgdorf, Knutson, & Panksepp, 2000). They also whine – emitting 22-kHz ultrasonic vocalizations (>0,3 s) – in negative affective situations, such as encounter with a predator (Blanchard, Blanchard, Agullana, & Weiss, 1991), defeat by a conspecific (Thomas, Takahashi, & Barfield, 1983), withdrawal of drugs such as alcohol, benzodiazepines, opiates, and psychostimulants (Covington & Miczek, 2003; Vivian et al., 1994), and anticipation of aversive stimulation (Choi & Brown, 2003; Lee, Choi, Brown, & Kim, 2001). The 50-kHz ultrasonic vocalizations express a positive and appetitive state, and serve as affiliative social signals, while the 22-kHz ultrasonic vocalizations express a negative and aversive state, and serve as a sign of alarm. Having this possibility, rats self-administer playbacks of the 50-kHz vocalizations and avoid playbacks of the 22-kHz vocalizations (Burgdorf et al., 2008). Parsana and Brown (2012) found that 22-kHz and 50-kHz ultrasonic vocalizations are associated with opposite behavioral responses and with the activation or deactivation of the amygdala.

Play as a research topic in the light of the whys of ethology: adding a fifth level of analysis

I remember that, in addition to being a renowned ethologist, César Ades liked to play. At the Memory Center of IPUSP, today the Museum of Psychology, we have several photographs of him (Figure 1). He brought his playful spirit to the classroom and to all his activities. Exploration and play were topics of his classes and research (Ades, 2000, 2012; Gomide & Ades, 1989). In the pictures below, he appears giving an interview in his office, in a scientific congress, and also in a week of freshmen students of the undergraduate course in psychology of USP, with the mascot of the athletic group and during a sack race.

Figure 1. Memories of professor César Ades, researcher and playmate
Source: Museum of Psychology of Instituto de Psicologia of Universidade de São Paulo.

Having the model of César, I was surprised when I first saw the recommendation "Don't smile until Christmas!" (Ryan, 1972). Teachers should start the school year with a serious and uninviting expression regarding the close interaction, the purpose being to maintain the order in the classroom. With César, I learned that, on the contrary, one can smile and laugh in the classroom, and I also learned that the act of playing is a topic worthy of research in the academic field. I think he also encouraged some of my colleagues who studied the play of capuchin monkeys (Resende & Ottoni, 2002), dolphins (Spinelli, Nascimento, & Yamamoto, 2002), mice and hamsters (Vieira & Sartorio, 2002), and Neotropic cormorants and striated herons (Sazima, 2008). However, there are still few studies on animal playing behavior in Brazil. This is not a usual topic in courses on animal behavior, and it is also an unusual topic in the congresses of the field. This is a theme to be (re)discovered!

In a research conducted with Paula Gomide, César showed that activities will tend to be perceived more likely as play than as work if children engage in these activities voluntarily. If preschoolers receive rewards for playing with toys on the playground, they will spend less time engaged in these activities than if their only motivation is the intrinsic pleasure of the activity (Gomide & Ades, 1989). Paradoxically, the willingness to play is reduced by external rewards. If the children are free to choose, their engagement with the activity increases, especially

if their skill on a challenging task improves with practice (Bateson, 2005; Deci & Ryan, 1980).

According to Spinka, Newberry and Bekoff (2001), playful behavior allows animals to develop motor and emotional responses to unexpected events in which they experience a sudden loss of control, thus becoming more versatile. To obtain *"training for the unexpected",* the authors suggest that animals actively seek and create unexpected situations in play by *self-handicapping*; that is, they actively put themselves in disadvantageous positions and situations. Play is made up of sequences in which those involved quickly alternate between well-controlled movements, such as those used in "serious" behavior, and movements that result in a temporary loss of control. This alternation between control and loss of control that characterizes *self-handicapping* generates cognitive demands and a complex emotional state that Spinka, Newberry and Bekoff (2001) call "having fun". This, of course, is an inference of emotional state indicated by quotation marks. Interested readers can find discussions on inferences of emotional states from behavioral observations that propose the replacement of anthropodenial for critical anthropomorphism (Bekoff, 2006; Burghardt, 2005; Waal, 1997, 1999, 2011; Panksepp, 2011).

The whys of Ethology can be formulated about play, with the proposal of a fifth level of analysis (Burghard, 2005), in addition to the four whys originally formulated by Tinbergen (1963): *Cause* – What are the internal and external processes that lead to the performance of playful behavior? *Ontogeny* – How does the act of playing develop during the life of the individual? *Adaptive function* – What are the consequences of play for an animal? *Phylogeny* – How did play evolve from nonplay and what was its evolutionary history? A fifth level of analysis (Table 1) was added by Burghard (2005)

> Tinbergen left out one group of phenomena in his four aims: the emotional, experiential, or phenomenological aspects of behavior. He did so because he was trying to gain the acceptance of ethology in a behavioristic Zeitgeist (spirit of the times) in American and European academic psychology . . . The denial of subjective factors did not have an immediately detrimental effect on most ethological research and probably was salutary: There was so much basic work to be done in describing and analyzing the myriad behavior patterns and diversity in courtship, predation, and social organization. One outcome, however, was to ensure that play remained a topic largely neglected by researchers who wanted to be considered "hard" rather than "soft" scientists. In order to rectify the omission of an animal's "private experience" in the study of behavior, I have promoted a fifth aim to supplement Tinbergen's four aims . . . . The case for doing this is not repeated here, but new methods, including brain imaging, neuroendocrinology, neurochemistry and pharmacology . . . have led to a greater need to incorporate such issues in ethology and psychology. (pp. 13-14)

Table 1. Five levels of analysis of ethology applied to play

Level of analysis	*Description*
Cause	Internal and external factors underlying behavior
Ontogeny	Patterns and processes of behavior change throughout the development
Adaptive Function	Contribution of behavior to the survival of individuals and groups, reproductive and inclusive fitness
Phylogeny	Historical patterns of behavioral change across generations and taxa
Private experience	Subjective experience. Heterophenomenology.

Source: Adapted from Burghardt, 2005

Burghardt (2005) proposes five criteria to characterize play: *incomplete functionality* – The behavior is not completely functional in the way or the context in which it is expressed, including elements that do not contribute to current survival. In fact, it is hard to see functionality when one observes a *Macaca fuscata* individual who spends 20 minutes scattering and gathering stones (Huffman, 1984); *motivational state* – The behavior is spontaneous, voluntary, pleasurable, rewarding by itself, and autotelic; *play differs from strictly functional expressions of behavior* – It is structurally or temporally different from the related serious behaviors: incomplete (with inhibited or absent final elements), exaggerated, clumsy, premature. That is, it involves modified behaviors regarding the form, sequence, or target, considering its serious counterparts; *the behavior is repeated* – the behavior is performed repeatedly, in a similar way, but not rigidly stereotyped, during at least part of the animal's lifespan; (5) *Motivational field* – The behavior is initiated when the animal is in a "relaxed field" – e.g., the animal is not under stress of physical danger, disease, adverse weather conditions, social instability, or intense competitive systems (e.g., fear).

There is evidence that the risk of predation indicated by cat odor suppresses play in juvenile rats (Hubbard, Blanchard, Yang, Markham, Gervacio, Chun-I, & Blanchard, 2004; Siviy, Harrison, & McGregor, 2006). Panksepp (1998) showed that this suppression was specific, only found when he placed cat hair in the space where the juveniles were playing, but not when he placed dog hair on same spot. Siviy (2010) concludes that play seems to be resilient in the face of adversity in juvenile rats. It is as if the brain had evolved to see an adaptive advantage in stopping play when there is risk of predation, but, after the risk

passes, the juveniles resume playing, as if the brain did not see an adaptive reason to continue maintaining feelings of fear and anxiety. However, we may be wrong about what is a threat and predict a suppression of play when no suppression occurs. This is what Stuart Brown (2009) shows with a remarkable sequence of photos of a bear and a dog playing, in a time of food shortage. Instead of becoming prey, the dog, much smaller than the bear, turned out to be a partner in a long and apparently relaxed play bout. In this case, a *playful mood* rather than a *serious mood* predominated. The bear behaved in accordance with the principles described by Mark Bekoff and Jessika Pierce (2010) in their article entitled "The ethical dog". It considered the ability of its partner, creating and maintaining a relationship of equality, which involves: (1) *Role reversal* – a dominant animal performs an action during play that normally would not occur during real aggression, and the weaker animal can "attack"; (2) *Self-handicapping* – the stronger animal does not bite its play partner as strongly as it would be able to, nor plays so vigorously as it could; (3) *Meta-communication* – an animal seems to recognize that its partner is simulating and indicates that it is also simulating. Besides stances, there is a playful face that signals that a particular behavioral sequence is playful and not aggressive.

Interestingly, Palagi and Cordoni (2012) showed that the social play of bonobos (*Pan paniscus*) and common chimpanzees (*Pan troglodytes*) is similar when they are infants. However, during the juvenile period, the play of bonobos is less frequently transformed in aggression, it lasts longer, and may involve more than two partners simultaneously. As adults, bonobos continue to play, but chimpanzees do not, which is probably due to the difference in social tolerance between the two species (Palagi, 2006; Palagi & Cordoni (2012).

PEXE OXEMOARAI: invitation-justification to reevaluate our priorities

I invite you now to think about our own species, from the context of the psychoethological perspective presented above. I share Peter Gray's (2011a) point of view that human children were designed by natural selection to acquire culture by self-managed play and exploration. If we think about hunter-gatherer children (Gosso, 2004; Gosso et al., 2005), we find out that they have to acquire a huge amount of knowledge to become efficient adults in their culture. However, the adults do not guide the education of children or tell them what to do. Children are free to play and explore everything from morning until evening. They acquire the skills of their culture and consolidate this knowledge whilst playing in groups of children of various ages, performing culturally valued activities. The Parakanã boys from Paranowaona village, in the state of Pará, play "Tekatawa", the night meeting in which the men discuss the affairs of the tribe. The following example was taken from the doctoral thesis of Yumi Gosso (2004), which was developed under my supervision. I used the title of that thesis, PEXE OXEMOARAI, which means "let's play?" in Parakanã, as the subhead of this final section of my article. "Tapiawa (four years old, M) uses a piece of bamboo to smoke and says it is a 'petyma' (cigarette). He smokes and passes the cigarette to Suruapa (four years old, M). He crosses his legs and asks for the cigarette back from his playmate" (Gosso, 2004, p. 63-64).

Although adults do not supervise their activities, as they do in the cities, Parakanã children know what they do and replicate the model in their imaginative plays. They actively mirror and rebuild the values and habits of the social group in which they are inserted (Morais & Carvalho, 1994). According to Gosso, Morais and Otta (2007), when compared with Parakanã children, who have the opportunity to observe what their parents do, urban children are more unaware of their parents' activities. During her master's research, based on the observation of preschool children at a private school in São Paulo, Morais (1980) reports on boys' play, namely picking up their car, going out to work, and then coming back.

I recommend the TED Talk by Peter Gray entitled "Decline of Play",[2] in which he deals with children's reduction of opportunities for play in urban environments. Even without having all the opportunities that a child has in the context of the hunter-gatherer way of life, he acknowledges that in the America of the 1950's he had a childhood with a lot more freedom to play than children have today. In recent decades, the free play of children has considerably decreased, while the time and priority given to education and adult-led activities has increased. This is due to greater fear parents have about children›s safety preventing them from playing outside alone. In addition, an educational policy that focuses on reading, writing and arithmetic stands out, to the detriment of physical education and arts, which steals away children's natural opportunities for playing (Panksepp, 2007).

Gray (2011b) argues that this reduction of opportunities to play is associated with an increased risk of pathology in children, adolescents, and young adults: anxiety, narcissism, feelings of helplessness, depression, and suicide. This can be correlated with the feeling of loss of control that children develop regarding their lives. We can distinguish *internal locus of control* – the individuals perceive a causal relationship between their own behavior and the rewards they get – and *external locus of control* – the individuals do not see a connection between their actions and the consequences (Lefcourt, 2014; Rotter, 1966). Along with this line of reasoning, the locus of control can be modified by experience, and the change in the human way of life results in major changes in the beliefs that individuals develop regarding their control over the events of their life. The reduction of self-managed play and exploration has an important role in this sense, thereby increasing the incidence of individuals with external locus of control.

2 Decline of Play http://www.youtube.com/watch?v=Bg-GEzM7iTk

Another issue that we must address in this context is the increase in the diagnosis of attention deficit hyperactivity disorder (ADHD) at an alarming rate, which is associated with the prescription of psychostimulants, which are highly efficient at increasing the focus of attention and reducing behavior problems in the classroom, but whose developmental effects on the growing brains are not adequately characterized (Barbaresi et al., 2002; Breggin, 1999; Faraone, Sergeant, Gillberg, & Biederman, 2003; Panksepp, 1998, 2008; Visser, Bitsko, Danielson, Perou, & Blumberg, 2010).

A comic strip by cartoonist William B. Watterson (2008), known by his social criticism, makes us think about childhood with Calvin, a six-year-old boy, and his tiger, Hobbes. For people in general, Hobbes is only a stuffed animal, but for Calvin he is an imaginary friend, with whom he lives his adventures. In one of the strips, in the first (and third) panels, Calvin appears writing on a piece of paper and saying to Hobbes, who appears at his side: '*What? Oh, sorry. I wasn't listening. Look, I really need to finish this'.* In the second (and fourth) panels, Calvin remains focused on his task of writing, but Hobbes gets small at his side. That is, the tiger becomes a mere stuffed animal. We could think that a child under the action of psychostimulants is as Calvin, who does not see his imaginary friend inviting him to play. His attention is fully focused on the school task.

Researchers are using rough-and-tumble play (RTP) in rats as an animal model, with the aim of contributing to a better understanding of the action mechanism of the drugs used in the treatment of ADHD. Several researchers, including Beatty, Dodge, Dodge, Whike, and Panksepp (1982), Beatty, Costello, and Berry (1984), and Vanderschuren, Trezza, Griffioen-Roose, Schiepers, Van Leeuwen, De Vries, and Schoffelmeer (2008), have found a dose-dependent RTP suppressant effect of methylphenidate in juvenile rats. Rats treated with this drug make less play invitations and are less responsive to the invitations of others, although the drug does not affect their locomotive or exploratory activity.

Jaak Panksepp (2007b) states that use of psychostimulants leads children with ADHD to play less and become more like adults. This would take place because psychostimulants promote neocortical activation, and the neocortex inhibits all *primary-process emotional* urges (Liotti & Panksepp, 2004). Primary playful urges are a subcortical birthright of animals but *children's rights to play* are *constrained* in urban societies (Panksepp, Siviy, & Normansell, 1984). Animal models have shown that play is essential for the development of the social brain (Pellis & Pellis, 2007; Pellis, Pellis, & Bell, 2010) and that psychostimulants used to treat ADHD are among the most powerful drugs to reduce play ever discovered (Beatty et al., 1982; Beatty et al., 1984).

We may think that many children with ADHD, currently medicated with psychostimulants, are only normal kids who have excessive unfulfilled desires to play. What we can ask ourselves is whether ADHD symptoms would decrease with a supplementation of play. According to Jaak Panksepp (2007b), the more the children can engage in natural play during their initial development, the sooner and more thoroughly will they develop the regulatory functions of the frontal lobes that will allow them to inhibit impulses, enabling them to "stop, look, listen & feel", in other words, to develop executive skills that promote a focus on goals, forethought, and flexibility. Panksepp (2007b) reports that he has made informal efforts to evaluate this. At the Memorial Foundation for Lost Children, in Bowling Green, Ohio, he has been advising parents of children with ADHD to dedicate a special effort to engage in daily periods of relaxed and funny rough-and-tumble play with their children. The parents' feedback about this daily supplementation of play has been positive.

Peter Gray (2011b) and Jaak Panksepp (2007b) warn us that we have a problem and both propose the same general solution: to give play back to children's lives. Peter Gray (2011b) speaks of the need to reevaluate priorities, to develop social networks of neighbors, and create safe spaces filled with adventure. Jaak Panksepp (2007b) calls these spaces *play sanctuaries*, inspired by Plato's *Republic* [section IV], which dealt with the importance of free play to young children, essential for them to become well conducted and virtuous citizens. It is up to us to use creativity to bring Plato's *play sanctuaries* to our time. This proposal is in line with the invitation-justification of this essay: to allow children to recover the nature that has been removed from their lives. The more we know about play, the more appropriate the opportunities we can offer children will be. We need to conduct further research on this topic, in an intellectual environment that enables collaboration between ethologists, psychologists, educators, and neuroscientists, thereby promoting a bidirectional interaction between theory and practice that can quickly translate research results into practice. Practice can also give valuable insights for further research and help us to refine our research hypotheses.

Brincar na perspectiva psicoetológica: implicações para pesquisa e prática

Resumo: Este ensaio trata do brincar a partir da perspectiva psicoetológica e examina implicações para a pesquisa e a prática. Ao longo das últimas décadas, crianças vêm ganhando oportunidades de escolarização e atividades dirigidas por adultos, mas perdendo oportunidades de brincadeira livre autogerenciada. Isto é preocupante, considerando as indicações de modelos animais de que a brincadeira social autogerenciada é importante para o desenvolvimento do cérebro social e da capacidade

de autorregulação de emoções. Este estudo representa um convite-justificativa para que as crianças recuperem oportunidades de brincadeira natural das quais vêm sendo privadas. Quanto mais conhecermos sobre o brincar, mais adequados seremos nas oportunidades que poderemos oferecer a elas. Precisamos de mais pesquisa sobre este tema na academia, num ambiente intelectual que facilite a colaboração entre etólogos, psicólogos, educadores e neurocientistas, promovendo interação bidirecional entre teoria e prática.

Palavras-chave: brincar, cérebro social, desenvolvimento, emoções, natureza.

Approche psycho-éthologique du jeu : de la recherche à la pratique

Résumé: Cet article se concentre sur le jeu dans la perspective psycho-éthologique et examine les implications pour la recherche et la pratique. Au cours des dernières décennies, les enfants reçoivent plus de possibilités d'éducation et activités dirigées par des adultes, mais souffrent d'un grave déficit de jeu autogéré. Cette situation est particulièrement préoccupante compte tenu des indications de modèles animaux que le jeu social autogéré est très important pour le développement du cerveau social et d'autorégulation émotionnelle. Ce texte est une invitation/justification pour promouvoir des occasions de jeu naturel pour les enfants. Plus on connaît les fondamentaux de jeu, le plus approprié seront les opportunités que nous pouvons offrir à nos enfants. Nous avons besoin de toute urgence davantage de recherches sur ce sujet, dans un environnement intellectuel qui facilitent les collaborations entre les éthologues, les psychologues, les éducateurs et les neuroscientifiques, et la promotion d'une interaction bidirectionnelle entre la théorie et la pratique.

Mots-clés: jouer, cerveau social, développement, émotion, nature.

El juego desde una perspectiva psicoetológica: implicaciones para la investigación y la práctica

Resumen: Este ensayo trata del juego desde el punto de vista psicoetológico y examina implicaciones para la investigación y la práctica. A lo largo de las últimas décadas, los niños han recibido oportunidades de escolarización y actividades dirigidas por adultos, pero han perdido oportunidades para el juego libre y autogestionado. Lo que resulta preocupante, teniendo en cuenta las sugerencias de los modelos animales de que el juego social autogestionado es importante para el desarrollo del cerebro social y de la capacidad de autorregulación emocional. Este artículo es una invitación/justificación para que los niños recuperen oportunidades para el juego natural del que han sido privados. Cuánto más sepamos acerca del juego, más éxito tendremos. Necesitamos más investigación sobre este tema en la academia, en un ambiente intelectual que facilite la colaboración entre los etólogos, psicólogos, educadores y neurocientíficos, para promover una interacción bidireccional entre la teoría y la práctica.

Palabras clave: juego, cerebro social, desarrollo, emociones, naturaleza.

References

Ades, C. (1986). Uma perspectiva psicoetológica para o estudo do comportamento animal. *Boletim de Psicologia*, *36*(85), 20-30.

Ades, C. (1987). Notas para uma análise psicoetológica da aprendizagem. *Boletim de Psicologia*, *37*(86), 24-35.

Ades, C. (1998). Psicoetologia do cuidado paterno. In M. J. R. P. Costa & V. U. Crornberg, *Comportamento materno em mamíferos: bases teóricas e aplicações dos ruminantes domésticos* (pp. 31-51). São Paulo: Sociedade Brasileira de Etologia.

Ades, C. (2000). Os bichos também brincam. *Ciência Hoje das Crianças*, *13*(100), 17-19.

Ades, C. (2012). Notas sobre o brincar. *TransFormações em Psicologia* (Online), *4*(1SPE), 65-77.

Alcock, J. (2013). *Animal behavior: an evolutionary approach*. Massachusetts: Sinauer Associates.

Arcieri, J. B. C. (1995). As práticas da neonatologia sob o enfoque psicoetológico das relações pais-bebê. *Pediatria*, *17*(4), 170-173.

Ardans, O. (1996). A perspectiva etológica do estudo do comportamento. *Psicologia Revista*, (2).

Barbaresi, W. J., Katusic, S. K., Colligan, R. C., Pankratz, V. S., Weaver, A. L., Weber, K. J., . . . Jacobsen, S. J. (2002). How common is attention-deficit/hyperactivity disorder? Incidence in a population-based birth cohort in Rochester, Minn. *Archives of Pediatrics & Adolescent Medicine*, *156*(3), 217-224.

Bateson, P. (2005) The role of play in the evolution of great apes and humans (2005). Play in hunter-gatherer society. In A. D. Pellegrini & P. K. Smith (Eds.), *The nature of play: great apes and humans* (Cap. 11, pp. 13-253). New York: The Guilford Press.

Bateson, P., & Martin, P. (2013). *Play, playfulness, creativity and innovation*. Cambridge University Press.

Beatty, W. W., Costello, K. B., & Berry, S. L. (1984). Suppression of play fighting by amphetamine: effects of catecholamine antagonists, agonists, and synthesis inhibitors. *Pharmacology Biochemistry & Behavior*, *20*(5), 747-755.

Beatty, W. W., Dodge, A. M., Dodge, L. J., Whike, K., & Panksepp, J. (1982). Psychomotor stimulants, social deprivation and play in juvenile rats. *Pharmacology Biochemistry & Behavior*, *16*(3), 417-422.

Bekoff, M. (2006). *Animal emotions and animal sentience and why they matter: blending* "*science sense*" *with common sense, compassion and heart* (pp. 27-40). London: Earthscan.

Bekoff, M., & Byers, J. A. (Eds.). (1998). *Animal play: evolutionary, comparative, and ecological perspectives*. Cambridge: Cambridge University Press.

Bekoff, M., & Pierce, J. (2010). The ethical dog. *Scientific American Mind,* 21(1), 16-17.

Blanchard, R. J, Blanchard, D. C., Agullana, R., & Weiss S. M. (1991). Twenty-two kHz alarm cries to presentation of a predator, by laboratory rats living in visible burrow systems. *Physiology and Behavior*, *50*(5), 967-972.

Breggin, P. R. (1999). Psychostimulants in the treatment of children diagnosed with ADHD: Part II: adverse effects on brain and behavior. *Ethical Human Sciences and Services*, *1*(3), 213-241.

Brown, S. L. (2009). *Play: how it shapes the brain, opens the imagination, and invigorates the soul*. New York: Avery.

Brudzynski, S. M., & Pniak, A. (2002). Social contacts and production of 50-kHz short ultrasonic calls in adult rats. *Journal of Comparative Psycholo*gy, *116*(1), 73-82.

Burgdorf, J., & Panksepp, J. (2001). Tickling induces reward in adolescent rats. *Physiology & behavior*, *72*(1), 167-173.

Burgdorf, J., Knutson, B., & Panksepp J. (2000). Anticipation of rewarding electrical brain stimulation evokes ultrasonic vocalization in rats. *Behavioral Neuroscience*, *114*(2), 320-327.

Burgdorf, J., Knutson, B., Panksepp, J., & Ikemoto, S. (2001). Nucleus accumbens amphetamine microinjections unconditionally elicit 50-kHz ultrasonic vocalizations in rats. *Behavioral Neuroscience*, *115*(4), 940-944.

Burgdorf, J., Kroes, R. A., Moskal, J. R., Pfaus, J. G., Brudzynski, S. M., & Panksepp, J. (2008). Ultrasonic vocalizations of rats (Rattus norvegicus) during mating, play, and aggression: behavioral concomitants, relationship to reward, and self-administration of playback. *Journal of Comparative Psychology*, *122*(4), 357-367.

Burghardt, G. M. (2005). *The genesis of animal play: testing the limits*. Cambidge, MA: Mit Press.

Burghardt, G. M. (2010). The comparative reach of play and brain: perspective, evidence, and implications. *American Journal of Play*, *2*(3), 338-356.

Choi, J. S., & Brown, T. H. (2003). Central amygdala lesions block ultrasonic vocalization and freezing as conditional but not unconditional responses. *Journal of Neuroscience*, *23*(25), 8713-8721.

Covington, H. E. III, & Miczek, K. A. (2003). Vocalizations during withdrawal from opiates and cocaine: possible expressions of affective distress. *European Journal of Pharmacology*, *467*(1-3), 1-13.

Cunha, W. H. D. A. (1965). Convite justificativa para o estudo naturalístico do comportamento animal. *Jornal Brasileiro de Psicologia*, *1*(2), 37-57.

Cunha, W. H. D. A. (2004). Sobre as respostas de pânico de formigas diante de uma coespecífica esmagada: contribuição para uma psicoetologia do medo. *Revista de Etologia*, *6*(2), 133-140.

Deci, E. L., & Ryan, R. M. (1980). The empirical exploration of intrinsic motivational processes. *Advances in Experimental Social Psychology*, *13*, 39-80.

Faraone, S. V., Sergeant, J., Gillberg, C., & Biederman, J. (2003). The worldwide prevalence of ADHD: is it an American condition. *World Psychiatry*, *2*(2), 104-113.

Gomide, P. I. C., & Ades, C. (1989). Effects of reward and familiarity of reward agent on spontaneous play in preschoolers: a field study. *Psychological Reports*, *65*(2), 427-434.

Gosso, Y. (2004). *Pexe oxemoarai: brincadeiras infantis entre os índios Parakanã* (Tese de Doutorado). Instituto de Psicologia, Universidade de São Paulo, São Paulo.

Gosso, Y., Morais, M. D. L. S., & Otta, E. (2007). Pretend play of Brazilian children: a window into different cultural worlds. *Journal of Cross-Cultural Psychology*, *38*(5), 539-558.

Gosso, Y., Otta, E., Morais, M. L. S., Ribeiro, F. L., & Bussab, V. S. R. (2005). Play in hunter-gatherer society. In A. D. Pellegrini & P. K. Smith (Eds.), *The nature of play: great apes and humans* (Cap. 11, pp. 213-253). New York: The Guilford Press.

Graham, K. L., & Burghardt, G. M. (2010). Current perspectives on the biological study of play: signs of progress. *The Quarterly Review of Biology*, *85*(4), 393-418.

Gray, P. (2011a). The evolutionary biology of education: how our hunter-gatherer educative instincts could form the basis for education today. *Evolution: Education and Outreach*, *4*(1), 28-40.

Gray, P. (2011b). The decline of play and the rise of psychopathology in children and adolescents. *American Journal of Play*, *3*(4), 443-463.

Hubbard, D. T., Blanchard, D. C., Yang, M., Markham, C. M., Gervacio, A., Chun-I, L., & Blanchard, R. J. (2004). Development of defensive behavior and conditioning to cat odor in the rat. *Physiology & Behavior*, *80*(4), 525-530.

Huffman, M. A. (1984). Stone-play of Macaca fuscata in Arashiyama B troop: transmission of a non-adaptive behavior. *Journal of Human Evolution*, *13*(8), 725-735.

Huffman, M. A., & Quiatt D. (1986). Stone handling by Japanese macaques (Macaca fuscata): implications for tool use of stones. *Primates*, *27*(4), 413-423.

Kahlenberg, S. M., & Wrangham, R. W. (2010). Sex differences in chimpanzees' use of sticks as play objects resemble those of children. *Current Biology*, *20*(24), R1067-R1068.

Knutson, B., Burgdorf, J., & Panksepp, J. (1998). Anticipation of play elicits high-frequency ultrasonic vocalizations in young rats. *Journal of Comparative Psychology*, *112*(1), 65-73.

Lee, H. J., Choi, J. S., Brown, T. H., & Kim, J. J. (2001). Amygdalar NMDA receptors are critical for the expression of multiple conditioned fear responses. *Journal of Neuroscience*, *21*(11), 4116-4124.

Lefcourt, H. M. (2014). *Locus of control: Current trends in theory & research*. Abingdon: Psychology Press.

Lencastre, M. P. A. (2010). Etologia e psicologia evolutiva: perspectivas evolutivas para a psicologia clínica. *Psychologica*, *1*(52), 149-192.

Liotti, M., & Panksepp, J. (2004). Imaging human emotions and affective feelings: Implications for biological psychiatry. In: Panksepp, J. *Textbook of Biological Psychiatry* (pp.33-74). Hoboken: John Willey & Sons.

Lucena, J. M. F. D., & Pedrosa, M. I. (2014). Stability and change in the construction of shared routines in playgroups. *Psicologia: Reflexão e Crítica*, *27*(3), 556-563.

Meirelles, R. (2007). *Giramundo e outros brinquedos e brincadeiras dos meninos do Brasil*. São Paulo: Terceiro Nome.

Morais, M. L. S. (1980). *O faz-de-conta e a realidade social da criança*. Dissertação de Mestrado, Instituto de Psicologia, Universidade de São Paulo, São Paulo.

Morais, M. L. S., & Carvalho, A. M. A. (1994). Faz-de-conta: temas, papéis e regras na brincadeira de crianças de quatro anos. *Boletim de Psicologia*, *44*(100-101), 21-30.

Nahallage, C. A., & Huffman, M. A. (2007). Age-specific functions of stone handling, a solitary-object play behavior, in Japanese macaques (*Macaca fuscata*). *American Journal of Primatology*, *69*(3), 267-281.

Nahallage, C. A., & Huffman, M. A. (2012). Stone handling behavior in rhesus macaques (*Macaca mulatta*), a behavioral propensity for solitary object play shared with Japanese macaques. *Primates*, *53*(1), 71-78.

Otta, E. (2012). In Memory of César Ades (1943-2012): the legacy of psycho-ethology. *Revista de Etologia*, *11*(1), 3-10.

Otta, E. (2015). Reflections on a footnote: implications for the study of emotions in animals. *Psicologia USP*, *26*(2), 286-295.

Palagi, E. (2006). Social play in bonobos (Pan paniscus) and chimpanzees (Pan troglodytes): implications for natural social systems and interindividual relationships. *American Journal of Physical Anthropology*, *129*(3), 418-426.

Palagi, E., & Cordoni, G. (2012). The right time to happen: play developmental divergence in the two *Pan* species. *PLoS ONE*, *7*(12), e52767.

Panksepp, J. (1992). A critical role for "Affective Neuroscience" in resolving what is basic about basic emotions. *Psychological Review*, *99*(3), 554-560.

Panksepp, J. (1998). *Affective Neuroscience: the foundations of human and animal emotions*. New York: Oxford University Press.

Panksepp, J. (2005). Affective consciousness: core emotional feelings in animals and humans. *Consciousness and cognition*, *14*(1), 30-80.

Panksepp, J. (2007a). Neuroevolutionary sources of laughter and social joy: modeling primal human laughter in laboratory rats. *Behavioural Brain Research*, *182*(2), 231-244.

Panksepp, J. (2007b). Can PLAY diminish ADHD and facilitate the construction of the social brain? *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *16*(2), 57-66.

Panksepp, J. (2008). Play, ADHD, and the construction of the social brain: should the first class each day be recess? *American Journal of Play*, *1*(1), 55-79.

Panksepp, J. (2011). Cross-species affective neuroscience decoding of the primal affective experiences of humans and related animals. PLoS One, *6*(9), e21236.

Panksepp, J., & Biven, L. (2012). *The Archaeology of mind: neuroevolutionary origins of human emotion*. New York: W. W. Norton & Company.

Panksepp, J., & Burgdorf, J. (2003). "Laughing" rats and the evolutionary antecedents of human joy? *Physiology & Behavior*, *79*(3), 533-547.

Panksepp, J., Siviy, S., & Normansell, L. A. (1984). The psychobiology of play: theoretical and methodological perspectives. *Neuroscience and Biobehavioral Reviews*, *8*(4), 465-492.

Panksepp, J., Siviy, S., & Normansell, L. (1985). The psychobiology of play: theoretical and methodological perspectives. *Neuroscience & Biobehavioral Reviews*, *8*(4), 465-492.

Parsana, A. J., Li, N., & Brown, T. H. (2012). Positive and negative ultrasonic social signals elicit opposing firing patterns in rat amygdala. *Behavioural Brain Research*, *226*(1), 77-86.

Pellegrini, A. D., & Smith, P. K. (Eds.). (2005). *The nature of play: great apes and humans*. New York: Guilford Press.

Pellis, S. M., & Pellis, V. C. (2007). Rough-and-tumble play and the development of the social brain. *Current Directions in Psychological Science*,*16*(2), 95-98.

Pellis, S. M., Pellis, V. C., & Bell, H. C. (2010). The function of play in the development of the social brain. *American Journal of Play*, *2*(3), 278-296.

Resende, B. D., & Ottoni, E. B. (2002). Brincadeira e aprendizagem do uso de ferramentas em macacos-prego (*Cebus apella*). *Estudos de psicologia*, *7*(1), 173-180.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*(1), 1-28.

Ryan, K. (Ed.). (1972). *Don't smile until Christmas: accounts of the first year of teaching*. Illinois: University of Chicago Press.

Sazima, I. (2008). Playful birds: cormorants and herons play with objects and practice their skills. *Biota Neotropica*, *8*(2), 259-264.

Siviy, S. M. (2010). Play and adversity: how the playful mammalian brain withstands threats and anxieties. *American Journal of Play*, *2*(3), 297-314

Siviy, S. M., Harrison, K. A., & McGregor, I. S. (2006). Fear, risk assessment, and playfulness in the juvenile rat. *Behavioral neuroscience*, *120*(1), 49-59.

Spinelli, L. H. P., Nascimento, L. F., & Yamamoto, M. E. (2002). Identificação e descrição da brincadeira em uma espécie pouco estudada, o boto cinza (*Sotalia fluviatilis*), em seu ambiente natural. *Estudos de Psicologia*, *7*(1), 165-171.

Spinka, M., Newberry, R. C., & Bekoff, M. (2001). Mammalian play: training for the unexpected. *Quarterly Review of Biology*, *76*(2), 141-168.

Thomas, D. A., Takahashi, L. K, & Barfield, R. J. (1983). Analysis of ultrasonic vocalizations emitted by intruders during aggressive encounters among rats (*Rattus norvegicus*). *Journal of Comparative Psychology*, *97*(3), 201-206.

Thompson B., Leonard K. C., & Brudzynski, S. B. (2006). Amphetamine-induced 50 kHz calls from rat nucleus accumbens: a quantitative mapping study and acoustic analysis. *Behavior and Brain Research*, *168*(1), 64-73.

Tinbergen, N. (1963). On aims and methods of ethology. *Zeitschrift für Tierpsychologie*, *20*, 410-433.

Vanderschuren, L. J., Trezza, V., Griffioen-Roose, S., Schiepers, O. J., Van Leeuwen, N., De Vries, T. J., & Schoffelmeer, A. N. (2008). Methylphenidate disrupts social play behavior in adolescent rats. *Neuropsychopharmacology*, *33*(12), 2946-2956.

Vieira, M. L., & Sartorio, R. (2002). Análise motivacional, causal e funcional da brincadeira em duas espécies de roedores. *Estudos de Psicologia*, *7*(1), 189-196.

Visser, S. N., Bitsko, R. H., Danielson, M. L., Perou, R., & Blumberg, S. J. (2010). Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children–United States, 2003 and 2007. *Morbidity and Mortality Weekly Report*, *59*(44), 1439-1443.

Vivian, J. A., Farrell, W. J., Sapperstein, S. B., & Miczek, K. A. (1994). Diazepam withdrawal: effects of diazepam and gepirone on acoustic startle-induced 22 kHz ultrasonic vocalizations. *Psychopharmacology*, *114*(1), 101-108.

Waal, F. B. M. (1997). Are we in anthropodenial? *Discover*, *18*(7), 50-53.

Waal, F. B. M. (1999). Anthropomorphism and anthropodenial: consistency in our thinking about humans and other animals. *Philosophical Topics*, *27*(1), 255-280.

Waal, F. B. M. (2011). What is an animal emotion? *Annals of the New York Academy of Sciences*, *1224*(1), 191-206.

Watterson, W. B. (2008). *Calvin e Haroldo*. Recuperado de http://iconoclastia.org/2013/03/07/brasil-dispara-no-vicio-induzido-pelos-pais-na-droga-da-obediencia-ritalina/

Received: 08/22/2016
Reviewed: 01/26/2016
Approved: 05/11/2017