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The contribution of play fighting to social skills development
Contribuţia jocurilor de luptă la dezvoltarea competenţelor sociale

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Abstract

The theory of evolution and subsequent developments are based on the assumption that the body adapts and evolves by natural selection, under pressure from the physical and the social environment. These adjustments are designed to address issues vital to the survival of the individual and the species. In recent years there have been many studies on different species of mammals that have tried to highlight the "survival value" or adaptive value of play fighting.

Play fighting is a form of behavior in which partners compete with each other to gain an advantage. Behavior during play fighting largely resembles the behavior in a real fight, where partners encounter, push and pull down onto the ground, trying to get into a position whereby to control or to dominate the opponent. In the play, unlike the fight, movements are exaggerated and performed at a lower intensity, muscles being somewhat less tensed, and certain actions that can cause injury to the partner are inhibited or modified, while offensive-defensive roles will be reversed quite frequently.

Play fighting can be considered a type of evolutionary adaptation designed to facilitate those experiences that will shape the cognitive-emotional development necessary for living in social communities. Play fighting during childhood has an important contribution to the development of the neural mechanisms involved in accurate judgments about the self and others, which are designed to lead to success in social interactions.

Keywords: play fighting, social skills, evolutionary adaptation

Rezumat

Teoria evoluţionistă şi dezvoltările ulterioare sunt fondate pe presupunerea că organismul se adaptează şi evoluează, prin selecţie naturală, sub presiunea mediul fizic şi social. Aceste adaptări sunt menite să răspundă unor probleme vitale pentru supravieţuirea individului şi a speciei. În ultimii ani au fost întreprinse numeroase cercetări pe diferite specii de mamifere ce încearcă să evidenţieze „valoarea de supravieţuire" sau valoarea adaptativă a jocurilor de luptă.

Jocul de luptă reprezintă o formă de comportament în care partenerii concurează unul cu celălalt pentru a obţine un avantaj. Comportamentul din timpul jocului de luptă se aseamănă în bună măsură cu comportamentul din lupta reală, în care partenerii se lovesc, se împing şi se doboară pe sol, în încercarea de a ajunge într-o poziţie prin care să-şi controleze sau să-şi domine oponentul. În joc, spre deosebire de luptă, mişcările sunt exagerate şi efectuate la o intensitate mai redusă, musculatura este ceva mai puţin tensionată, anumite acţiuni care pot provoca rănirea partenerului sunt inhibate sau modificate, iar rolurile ofensiv-defensiv vor fi destul de frecvent inversate.

Jocul de luptă poate fi considerat o adaptare de tip evolutiv, concepută pentru a facilita acele experienţe ce vor sta la baza dezvoltării cognitiv-afective necesare traiului în colectivităţi sociale. Jocurile de luptă din perioada copilăriei au o contribuţie importantă la dezvoltarea mecanismelor neuronale implicate în judecăţi acurate cu privire la sine şi la ceilalţi, ce sunt menite să conducă la succes în interacţiunile sociale.

Cuvinte cheie: jocul de luptă, competenţe sociale, adaptare evolutivă.

Introduction

The evolutionary approaches to human or non-human behavior can be fully understood only in relation to (a) the mechanism explaining the mode of production and ontogenetic development of behavior and (b) the adaptive value of behavior and the contribution of these adaptations to increasing inclusive fitness (Tinbergen, 2005; Burghardt, 2005). The first part provides an explanation of how these traits or behaviors create a certain effect, and the second explains why these behaviors were favored during evolution (Confer et al., 2010; Scott-Phillips et al., 2011). The value of adaptive behavior or "survival value" as it was called by Niko Tinbergen concerns the contribution to increasing the chances of survival and reproduction. As shown by Tinbergen (2005), some animals have a number of behaviors that are difficult to understand. These animals perform a series of strange rocking movements that precede the transition from stillness to movement or transition from movement to immobility. Many of the characteristics of these animals are adaptations that help them camouflage in the living environment, and these motions will be adapted

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to the purpose of avoiding capture by predators that require stimulation by movement in order to detect and track the prey (Tinbergen, 2005). The adaptive value of behavior will be derived from the consequences that arise from these manifestations or from the effects produced by the deprivation of experiences that make these changes possible, but it is not always obvious which functions these behaviors serve.

In recent years there have been many studies on different species of mammals that have tried to highlight the functions of play fighting and their role in development. In the case of our species, these manifestations of play were largely neglected (Pellegrini & Smith, 1998), although this form of play best qualifies for the study of behavioral genetic predispositions (Smith, 2010; Burghardt, 2005). On the other hand, play fighting exhibits the greatest similarity in behavior between humans and other species, especially primates (Aldis, 1975; Burghardt, 2005). The findings related to the functions they perform and the effects of deprivation in animals can bring some clarification necessary to understand the importance of play fighting for normal development in childhood and the consequences of educational policies of deterrence significantly manifested in recent years, which otherwise cannot be appreciated.

Play fighting and social skills development

In humans, play fighting develops around the age of two, in the context of parent-child interactions, a short time before the child engages in free interaction with peers. This playful behavior can contribute, around the age of four, approximately 8% of parent-child interactions (Pellegrini & Smith, 1998; Smith, 2010).

Once children enter the preschool years, they open themselves to interaction with persons from outside the family environment and especially, to interaction with peers (Shaffer & Kipp, 2010). At this age, children allocate significant time to exploring certain ideas and experimenting various strategies to be used in obtaining various social benefits (Kostelnik et al., 2012). As children interact with each other, they learn how to approach a large variety of social situations and how to build skills that will ensure a good adaptation to the living conditions in the communities to which they belong. Kostelnik et al. (2012) consider that in order to develop an adequate level of social competences, children need numerous opportunities for engaging in interactions, especially with peers.

Social competences refer to a person's skills and abilities used to get along with others and adapt to the unexpected situations that may occur in a social context. Social skills are closely related to emotional regulation, which is demonstrated by the fact that children who are able to control their emotions will be more successful in social interactions, and are often regarded as Social-Emotional Competence (Rose-Krasnor & Denham, 2009).

Even if we cannot talk about a definition agreed to by all researchers, it can be affirmed that social competences include "all the social, emotional, and cognitive knowledge and skills children need to achieve their goals and to be effective in their interactions with others" (Kostelnik et al., 2012). The most important social, emotional and cognitive skills for children include: approaching others positively; recognizing emotions in themselves and others; showing a capacity to empathize; giving and receiving emotional support; interacting nonverbally with other children using smiles or other behavior; communicating ideas and needs; adjusting behavior to fit varying social situations; showing interest in others; cooperating and helping others; negotiating and compromising with others appropriately; expressing frustration and anger effectively, without escalating disagreements or harming others; reconciling after a conflict, etc. (Kostelnik et al., 2012).

In the preschool years, the principal forms of interactions occur during play, and play fighting and chasing represent between 3% and 5% of the total playing time. After this age, playful behavior can show a very wide variation due in particular to cultural aspects. The peak of these types of play manifestations will occur between the age of 6 and 10, when they can represent between 10% and 17% of the time allocated to play (Smith, 2010; Pellegrini & Smith, 1998; Rubin et al., 2006).

Most researchers that used data from playgrounds and other naturalistic settings where boys and girls played together found considerable gender differences in play fighting, with boys playing more often and rougher than girls (LaFreniere, 2013; Scott & Panksepp, 2003). However, the few studies that group children into the same gender situations found modest differences between boys and girls in overall play behaviors and the frequency of play fighting and chasing (Scott & Panksepp, 2003).

This gender segregation in play arises in humans around the age of 3 years (Smith, 2010) and can be widely observed in natural settings. The preference of boys and girls for companions of the same gender can be largely explained by genetic and cultural differences. Many researchers generally agree that boys are genetically predisposed toward higher levels of anger, aggression and oppositional behavior (Montgomery et al., 2007) and exhibit greater overt competition for resources, territory, skillfulness at tasks, status, and power compared to females (Schneider et al., 2011). During childhood, male interactions consist of more direct physical challenges and rougher forms of play and risk-taking behaviors (LaFreniere, 2013; Schneider et al., 2011). LaFreniere (2013) found that from the perspective of many girls, these sex-typed behaviors are all good reasons to avoid the groups of boys. Even if girls like to engage in play fighting and chasing or participate in combat sports, most females avoid direct physical challenge and prefer to compete through more indirect or subtle means (Schneider et al., 2011).

Some developmental psychologists, such as Hartup (1996) and Maccoby (1998), consider that sex differences in social behavior and peer relationships in childhood reveal that male and female "cultures" appear to differ in many ways (LaFreniere, 2013). Differences in parenting styles or adults' understanding of which types of behaviors are suitable for boys and which are appropriate for girls and differences in peer cultures within sex-segregated peer groups may enhance the development of different interests and skills in boys and girls (Barbu et al., 2011). In many cultures, boys are encouraged by adults to take especially competitive behavior and expect the girls to mostly manifest cooperative behaviors. On the other hand, educators and other professionals involved in education have a tendency to see competition as "something harmful

that can lead to negative consequences for the children's psychosocial development, whereas cooperation is described as competent social behavior that entails many positive consequences" (Schneider et al., 2011). Studies that assess cooperation in play may conclude that girls are more socially precocious than boys, and boys can eventually catch up in the case of normally developing children (Barbu et al., 2011), which is quite normal if we think that girls of this age have a better physical and cognitive development than boys.

In modern societies, there may be a decrease in gender stereotypes among parents and educators with a higher level education and socio-economic status (Smith, 2010). In a very interesting research conducted in United Kingdom and Italy, Carvalho et al. (1990) assessed the children's own perceptions of gender appropriateness for five common playground activities: play fighting, play chasing, real fighting, football, and rope skipping. The authors found a general trend, in both the UK and Italy, for the degree of gender stereotyping to decrease with age. A startling finding was that rough-and-tumble play and football, seen as typically masculine activities, were reported by more and more girls to be "for both equally," which perhaps reflects an increase of opportunities and activities for females in modern societies (Smith, 2010).

Some studies examining the associations between strategies used to access a desired resource and sociometric status have suggested that children that use both competition and cooperation are more popular among their peers (Hawley, 2007; Schneider et al., 2011). In fact, most situations involving social interactions are not clearly defined as competitive or cooperative, and many may in fact contain elements of both competition and cooperation (Schneider et al., 2011). In light of such recent data and conceptual advances, Schneider et al. (2011) argue that "contemporary thinking has shifted toward a more balanced approach in which the socially competent child is seen as one who can shift appropriately between competition and cooperation, rather than someone who always cooperates".

Play fighting represents a form of behavior in which the partners compete with each other in order to obtain an advantage, but this form of behavior also involves a degree of cooperation meant to ensure the continuation of play and reduce the risk of escalation in real fight. This ambiguity present in play fighting provides an opportunity to make subtle judgments in order to determine the course of action and allow participants to adopt a flexible behavior in relation to the partner's status and actions (Pellis et al., 2010; Pellis & Pellis, 2011).

Anthony Pellegrini shows that the most popular children tend to engage in more social play and suggests that the experience gained in play fighting makes them more able to solve social problems (Pellis et al., 2010; Pellis & Pellis, 2011). Brown (1998) shows that people who are deprived of such playing experiences may encounter difficulties in emotion regulation, which may affect the ability to understand the rules of conduct imposed by living in certain social communities and the ability to find workable solutions to stressful life situations they might experience (Mendizza & Pearce, 2003).

Bekoff (2002) believes that during social play, while they are having fun in a relatively safe environment, the protagonists learn those basic rules or patterns of behavior that are acceptable to others, namely how to manage any conflicts that may occur or how roughly they can interact. Laursen & Pursell (2009) ascertain that socially maladapted children have great difficulty in anticipating and avoiding conflicts, mostly due to a lack of capacity to manage conflict constructively. According to these authors, there is considerable evidence linking individual differences, aimed at regulating emotional and social skills, to behavior in conflict.

Thus, it is claimed that some of the features of play fighting raise problems similar to those encountered during interactions with peers and hence to those regarding conflict resolution, and as such playing experience will reflect positively on emotion regulation and social competence (Bekoff, 2002; Pellis & Pellis, 2006). Despite this evidence, or the existence of a close link between play experience and social skills, there is no evidence of a direct or causal relationship between the two. It can be stated that children with social skills are simply more playful or that such skills facilitate the play. To bring some clarification, several researchers have sought to test this relationship, which led to a series of studies that propose different approaches.

Most research focuses on the consequences that occur as a result of deprivation related to gaming experiences. Experiments have been conducted in the laboratory to control the interactions between the partners and the total time length of the play; the research subjects are usually laboratory rats that lend themselves quite well to this type of experiment because they have a relatively short period of growth and development and although the play is frequently musculoskeletal, it occurs primarily in the context of social play, such as pursuit; so, when they meet other rats, the animals will inevitably engage in some play fighting. Therefore, if rats are isolated in the juvenile period, they will be especially deprived of the opportunity to engage in this play fighting (Pellis & Pellis, 2011).

Studies in rats by Einon et al. (1978) show that play fighting is an essential component of social experience during the juvenile period (Pellis & Pellis, 2006; Pellis & Pellis, 2007). During the day, rat pups will engage in play for about one hour. Juvenile rats that were raised in social isolation, but were left in the company of another neighbor for an hour a day, did not show the same weaknesses as mature rats raised in total social isolation. However, when rat pups spent one hour daily in the company of an adult female who rarely engaged in the play, they exhibited the same weaknesses as adult rats raised in total social isolation. Similarly, rats reared with drugged partners who are thus prevented from behaving playfully, will present at maturity the same development abnormalities as rats reared in total social isolation (Pellis & Pellis, 2006; Pellis & Pellis, 2011). These findings show that the development of social relations involves play relations rather than simple social contacts (Pellis & Pellis, 2006; Graham & Burghardt, 2010).

Depriving rats of opportunities to engage in play with peers in a critical period of development may cause some permanent social deficits regardless of later social stimulation, and can have a major impact on the number and quality of social interactions in adulthood (van den Berg et al., 2004).

Van den Berg et al. (1999), after a series of tests on rats reared in groups or in isolation, show that this form of social play can be indispensable for the development of coping mechanisms that will deal with stressful situations in the social environment. The two groups of rats, after being subjected to strong social stress by being placed in a cage with a dominant male, will present significant differences in the response behavior. The rats reared in isolation, when faced with this form of territorial aggression, have an exploratory behavior causing the resident male to attack, unlike those in the control group, which reduce their activity or remain immobile for a long period of time. In addition, rats reared in isolation require a significantly longer time to adopt a submissive behavior, which may lead to a higher number of attacks. On the other hand, the confrontation with the male resident causes an increase in plasma levels of corticosterone, adrenaline and noradrenaline, and adrenaline and corticosterone concentration levels are significantly higher in the group of rats reared in isolation. By comparing the results regarding behavior and the data derived from the analysis of hormone deprivation, it can be found that playing in the juvenile period does not reduce the impact of the resident male's presence, but rather causes an ability to choose appropriate response strategies (van den Berg et al., 1999). Furthermore, when rats reared in groups are given the chance to escape the dominant male's presence through access to a platform located above, they will seize this opportunity, while rats reared in isolation fail to do so (Pellis & Pellis, 2011). After removal of the dominant male, rats reared in groups, but not those raised in isolation, return to play or mutual care activities that are known to reduce the effects of stress. These differences in behavior between the two groups are highlighted by hormonal changes. In rats reared in groups, the level of corticosterone can increase rapidly under stressful conditions, but will dissipate just as rapidly compared to rats reared in isolation, in which it remains elevated for a longer time period (van den Berg et al., 1999; Pellis & Pellis, 2006).

Similarly, rats reared in a home with a partner, but separated by a wire mesh that allows contacts, sniffing, and even mutual cleaning, will not be able to compensate these social deficiencies later (Pellis & Pellis, 2006). Pellis et al. (2007) observed that these rats, even if they manage to achieve all these socially relevant behaviors, will find it difficult to coordinate their movements with those of their partner. Other researchers have noted that rats reared in isolation fail to adjust the intensity of response to the behavior of their partners or are unable to control the stress generated by the contact with these (Pellis et al., 2005). This inability to coordinate movements and adapt to the partner is a type of defect that appears to be specific to rats reared in isolation, which did not have enough opportunities to engage in play fighting with congeners (Pellis & Pellis, 2007).

The importance of play fighting for social skills development will be emphasized by the finding that it takes a relatively short time period for the lack of playing opportunities to affect the development of social skills and a much longer time period of isolation for other cognitive skills to be affected (van den Berg et al., 2004; Bell et al., 2010; Pellis & Pellis, 2011). Therefore, the absence of adequate social experiences and the lack of opportunities to play may not only affect the neurological development of the individual, but may have persistent effects despite further attempts of rehabilitation (Baarendse et al., 2013; van Kerkhof, 2012).

The expression of a complex behavior, such as playing, involves a wide range of neuronal circuitry. However, more and more researchers have come to see play fighting as a vehicle that brings a strong influence in the region of the prefrontal cortex (PFC) and amygdala, because in these regions some of the most profound neuronal transformations during the juvenile period and adolescence occur (Bell et al., 2010; Pellis et al., 2010; Pellis & Pellis, 2011; van Kerkhof, 2012; Baarendse et al., 2013). Surgical removal of the cortex shortly after birth does not prevent rat pups from engaging in play (Panksepp, 1998) and will not affect the expression of those behavior patterns that make up the different sequences of play, which means that the play will be an expression of some subcortical nervous systems (Pellis et al., 2010). However, numerous studies looking at the effects of cerebral substance damage on behavior reveal that these rats fail to modulate their behavior during development and that they fail to adapt their behavior to the peculiarities of gender or social status of the partner (Bell et al., 2010; Siviy & Panksepp, 2011), deficiencies that are comparable to those of rats raised in social isolation (Pellis & Pellis, 2011). Moreover, a restriction of cortical damage to the prefrontal cortex (PFC) seems sufficient to produce the same deficiencies in social behavior as if rats were deprived of gaming experiences with others (Bell et al., 2010; Pellis & Pellis, 2011).

In an experiment where the main interest was related to neural changes that occur under the influence of different growth conditions (i.e., with an adult female, with a neighbor or with three other fellows), Bell et al. (2010) show that the various different gaming experiences will influence neural development in the orbitofrontal cortex (OFC) and the medial prefrontal cortex (mPFC). The orbitofrontal cortex (OFC) will mainly be affected by the experience with multiple partners and does not seem to be influenced by the content of interactions between partners. The operation of the orbitofrontal cortex (OFC) was associated with the ability to distinguish between different play partners by the fact that rats that were deprived of opportunities to play, or have suffered damage of the OFC, have their own difficulties in identifying partners. In contrast, the medial prefrontal cortex (mPFC) will be modified depending on the type of interactions in which they engage. Animals reared together with adults show the same neural morphology as animals reared in isolation or with drugged partners. The operation of the medial prefrontal cortex (mPFC) was related to proper sequencing and coordination of movements with the response of the partner, which in time will lead to the diversification and refining of behavior. This finding is supported by the finding that rats who suffered injuries to the mPFC will use less complex defensive strategies than their normal peers in the course of playing (Bell et al., 2010).

These studies suggest that different regions of the prefrontal cortex fulfill distinct functions in relation to social behavior, but this does not exclude the fact that these functions serve a broader context of information processing and decision making, the so-called executive functions.

Given the complexity and unpredictability of social interactions, it is possible that these regions may have a clear contribution to shaping behavior according to previous experiences and some indices of the social environment (van Kerkhof, 2012; Bault et al., 2011; Coricelli & Nagel, 2009). Recent neuroimaging research showed that the medial prefrontal cortex (mPFC) is involved in this vast mentalizing neural network, designed to produce successful behaviors in social interactions (Coricelli & Nagel, 2009; Bault et al., 2011). The activity of the mPFC and the other structures that make up this network is linked to the calculation of the error for the expected behavior of others, the uncertainty in the strategy of the others and to strategic thinking in competition with others (Bault et al., 2011; Coricelli & Nagel, 2009). The orbitofrontal cortex (OFC) appears to be involved in evaluating social information, and OFC damage or manipulation of this information may lead to changes in the expression of aggressive behavior (van Kerkhof, 2012). Kerkhof (2012) found that during social play neural activity in the medial prefrontal cortex and orbitofrontal cortex is correlated with activity in the amygdala.

The amygdalian nucleus or "amygdala" is a subcortical neuronal structure located in the medial temporal lobe of each hemisphere (Kolb & Whishaw, 2009), involved in assigning emotional value to milestones and social or environmental events (Trezza et al., 2012; Sander et al., 2003). The better known role of the amygdala is the amplification or modulation of negative emotional states (anxiety and aggression), but the implication of this structure in modulating the expression of positive emotional states becomes increasingly clear (Sander et al., 2003; van Kerkhof, 2012). This is also confirmed by the finding that an impaired amygdala leaves the individual with no response to the emotional significance of an event (Kolb & Whishaw, 2009).

Comparative studies have shown a close correlation between the prevalence of social play and the size of the amygdala, meaning that species that spend more time playing will have a larger amygdala (Pellis et al., 2010). In addition, amygdala lesions are associated with a reduction in play-related manifestations (van Kerkhof, 2012; Pellis et al., 2010). The role of the amygdala in the modulation or expression of playful behavior, although not well-known, is probably achieved through the positive emotional value of playing (Siviy & Panksepp, 2011). Recently it was shown that the amygdala is the neural region where endocannabinoids induce a growth in play manifestations (Trezza et al., 2012), but methylphenidate (Ritalin), a substance that reduces neural activity in the amygdala, also has an adverse effect (van Kerkhof, 2012). Interestingly, the same substance – methylphenidate, may cause an increase in motivation for playing, but this effect will be dependent on dopamine (van Kerkhof, 2012). Additionally, methylphenidate administered locally in the amygdala facilitates learning induced by an "evidence-reward" paradigm, which suggests an increase in sensitivity to relevant cues in the environment (Tye et al., 2010). Tye et al. (2010) provide extensive evidence that dopamine plays an important role in the formation of both appetitive and aversive associations, and identify a potential mechanism by which the increase of dopamine in the amygdala modulates synaptic plasticity.

Through the role it plays in assessing emotionally relevant cues, it can be assumed that the amygdala is involved in establishing the neural architecture in the frontal cortex. In this way, play fighting makes an important contribution to shaping the nervous structures involved in decision making in social interactions (Baarendse et al., 2013) and lays the foundation for those manifestations of reciprocity in social relations (Pellis et al., 2010). Based on these findings, it can be said that during social play, these regions of the frontal cortex are involved in processing information relating to the partners and their behavior, the development of assessments regarding the value of the interaction and selection of an appropriate behavioral response (van Kerkhof, 2012; Bault et al., 2011).

Conclusions

1. Play fighting can be considered an evolutionary adaptation designed to facilitate those experiences that will shape the cognitive and emotional development necessary for living in social communities. Childhood play fighting is undoubtedly among the most important contributors to the development of the neural mechanisms involved in accurate judgments about the self and others, aimed at successful social interactions**.**

2. Play fighting during childhood is the ideal situation for learning about interpersonal relationships and for finding the appropriate balance between competition and cooperation that enables maintaining good social relations. Play fighting may allow finding and experimenting different strategies in order to gain access to resources and achieve a high social status.

3. Educational policies meant to discourage play fighting, manifested more significantly in recent years, come in contradiction with the results of an increasing number of pieces of research. Therefore, a change of strategy is required, at least at the level of preschool and primary education, by ensuring numerous opportunities for engaging in play, especially during breaks and during activities of an unstructured nature. Play fighting during this period can bring other benefits: it ensures an environment for a vigorous level of physical activity and engenders a highly contagious joyful disposition.

Conflicts of interest

Nothing to declare.

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