

Playfighting, playchasing and affiliation in 5 year old children: a contribution to the discussion of functional implications of playbehaviour

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Resumo

Episódios de brincadeira de luta e de perseguição entre crianças de cinco anos foram registrados em vídeo durante períodos de atividade livre no pátio de uma escola infantil em Sheffield, Inglaterra, durante os dois últimos meses do período letivo. Foram realizadas também entrevistas individuais com as mesmas crianças, nas quais as crianças indicavam seus amigos e seus parceiros mais frequentes nessas brincadeiras. Verificou-se que as parcerias mais frequentes (tanto observadas quanto relatadas) eram com crianças consideradas amigas, e menos frequentemente com crianças neutras e não-amigas. Brincadeiras de luta foram particularmente frequentes entre amigos recíprocos. Algumas características dos episódios de brincadeira de luta foram analisadas em relação ao status afiliativo dos parceiros. Episódios de brincadeira de luta em grupo envolveram frequentemente amigos recíprocos. Amigos recíprocos frequentemente atuaram como "aliados" nesses episódios, ao passo que não-amigos atuaram como "opo-

nentes". Aliados tenderam a permanecer juntos ao término dos episódios mais frequentemente do que oponentes. Crianças que obtiveram escores baixos de popularidade no grupo atuaram proporcionalmente mais como oponentes. Os resultados são discutidos em termos de possíveis implicações funcionais das brincadeiras de luta e de perseguição, tais como prática de habilidades, estabelecimento e manutenção de relações afiliativas.

Unitermos: brincadeira de luta, brincadeira de perseguição, amizade entre crianças.

Summary

Episodes of playfighting and playchasing among 5 year old children were video-recorded during free play periods in the yard of an Infant School in Sheffield, U.K., along the last two months of the school term. In addition, measures of friendship and of reported playfighting and playchasing partners were obtained from individual interviews with the same children. It was found that both playfighting and playchasing (either observed or reported) were more frequent with children reported as friends, and less frequent with neutral partners and non-friends. Playfighting was particularly frequent with reciprocal friends. Some characteristics of playfighting episodes were analyzed in relation to affiliative status of the partners. Group episodes of playfighting often involved reciprocal friends. Reciprocal friends often acted as "allies" to each other in group bouts, whereas non-friends were often "opponents". Allies tended to stay together after playfighting bouts more often than opponents. Children with low preference score in the group were also more likely to act as opponents. The results are discussed in relation to the possible functional implications of playfighting and playchasing, such as practice of fighting skills, establishment and maintenance of affiliative relationships.

Key words: Rough-and-tumble play; playfighting; playchasing; children friendships.

Introduction

Playfighting and chasing, or "rough-and-tumble play" (R&T) is a typical form of behaviour throughout the primates (e.g. Symons, 1978; Smith, 1982). Although R&T often occurs between agemates, or partners of similar strength, both playfighting and chasing normally show the characteristics of self-handicapping and restraint; participants do not fight or chase at full strength. This allows friendly play to continue, even between unequally matched partners.

These characteristics of handicap and self-restraint allow for the possibility of cheating in R&T (Fagen, 1981): a participant might take advantage of the "play convention" to actually harm another when they have "consented" to be in an inferior position in a play bout. Such cheating would normally be selected against, as having short term benefits but longer term costs, at least in a stable group (Axelrod and Hamilton, 1981); if an individual cheated, he or she might find it more difficult to get play partners in the future. Cheating might nevertheless be expected in certain circumstances (e.g. in play bouts with strangers; or with individuals rapidly changing in dominance position, as may be particularly likely in adolescence).

Whatever the magnitude of the benefits provided by play (Martin and Caro, 1985), it is generally hypothesised that R&T can provide some benefit to the partners involved. For both non-human and human primate species, the most frequently hypothesised benefits are that R&T may help promote new bonds or alliances; that it may help maintain existing alliances between play partners; and that it may provide practice in fighting or hunting skills, which it resembles in form (Symons, 1978; Smith, 1982; Pellegrini, 1988). The alternative hypothesis that R&T helps establish or maintain dominance relationships in a group seems more applicable to episodes where cheating occurs, since when self-handicapping and restraint operate dominance is not asserted (Symons, 1978).

Data on both choice of playpartners, and on the nature of R&T bouts, are relevant to which of these alternatives are more plausible. For human children, research has consistently shown that R&T is performed preferentially with friends. In a study of 3 and 4 year old children, Smith and Lewis (1985) found that observed play partners for R&T tended to be ranked as highly liked, and that "best friends" participated in a greater number

of R&T episodes than expected by chance. Humphreys and Smith (1987) found that at 7, 9 and 11 years R&T partners ranked each other above chance for "liking", both when the point of view of the initiator and of the recipient of the R&T bout were considered.

In these studies rough-and-tumble play was considered as one global category. In the present study we separate rough-and-tumble into its' two main forms of contact and non-contact play, or playfighting and playchasing (Humphreys and Smith, 1984). We also look at whether R&T partners are reciprocal or unilateral friends; if R&T functions to maintain alliances, children should play especially with reciprocal friends, whereas if it serves to form alliances, it would be more common with unilateral friends.

The hypothesis that R&T improves fighting skills would also be consistent with children choosing (especially reciprocal) friends as play partners, but only if children also chose partners matched for fighting ability. Humphreys and Smith (1987) found that this was not the case at 7 and 9 years, though there was evidence for this at 11 years.

Children might also choose reciprocal friends to lessen the chance of "cheating" in R&T as a means of dominance assertion. There is limited evidence for cheating in non-human primates (Fagen, 1981); several reports on playfighting in young children have found very little evidence of cheating (Smith and Lewis, 1985; Fry, 1987; Humphreys and Smith, 1987), but such instances were reported by Neill (1976) in one sample of 12-13 year old boys. The sociometric status of the children (whether they are popular, controversial, rejected or neglected - Coie et al., 1981) is another relevant factor here. Pellegrini found that R&T seldom led to real fighting in most 5 to 9 year old children, but often did so in children who were sociometrically rejected. The actual nature of the rough-and-tumble bout was however not described in Pellegrini's study, so it is not clear what aspects of the rejected children's R&T bouts led so often to fighting (25% of cases) or whether "cheating" was involved.

Rejected children are often aggressive, Draper and Harpending (1988) and Barkow (1989) have suggested that high aggression may have been selected as an adaptive strategy for some children; specifically, those with low father involvement, who might expect to engage in high male-male competition as an adult. Whether or not this particular adaptive

hypothesis is correct, it may be useful to think of aggressive, cheating kinds of R&T to be a particular developmental pathway for some children only (Smith, 1991).

In this study we relate the affiliative status of play partners to some characteristics of the play bout, specifically whether the bout is group or dyadic; whether, in group bouts, particular dyads act as allies or opponents; the outcome of the bout; and the presence or not of "rough moves" in the bout as an indicator of aggressive or "cheating" R&T.

Material and Methods

The study was carried out during the afternoon play sessions in an Infant School yard, in an urban area in northern England. The initial sample was composed of 72 children (33 boys and 39 girls), aged 4 years 10 months to 6 years 2 months at the beginning of the study, these being three different classes within the school at this age level. The children were in their first two years at school.

Twenty-five video-recorded observation sessions, ten to twenty minutes each, were made by the first author during the last two months of the first term. In each session, at least one scan sample was made across the playground, covering all the children who were present that day at least once, and stopping to follow any episode of R&T that was starting or in progress. These samples yielded information about the proportion of time in playfighting, playchasing or other activities, and on the identity of the partners. The remaining time was used to maximise data on R&T by event sampling (Martin and Bateson, 1986). This gave more detailed and contextualized information on R&T episodes. Conditions were good for event sampling, as all the playground could be viewed at one time; if more than one episode did occur simultaneously, preference was given to recording episodes of playfighting. Most episodes of playfighting were captured during event sampling, but many episodes of playchasing were not recorded, or were recorded only partially.

A sequence of R&T was considered as a single episode if the basic social composition of the playing group remained the same, and if the episode was not interrupted by other activities. Episodes were classed as

playfighting or playchasing, and distinguished from serious fighting, using the criteria described by Humphreys and Smith (1984). Playchasing involves little physical contact (except when a child is "caught" and led to a "prison", or "backhome", or wherever the theme of the game specifies); it usually involved several children, who played the roles of chaser and chased according to a "script"; it often used most of the available space of the playground, but it could also be spatially delimited, for instance according to hopscotch marks in the ground. Playfighting involves close physical contact and ritualized fighting gestures such as pushes, grips, wrestles and martial arts moves and vocalizations; it was usually performed in a delimited space; the duration of the episodes was often very short, while playchasing episodes could last the whole duration of the free play period.

One quarter of all the episodes were classified independently by a second observer; the Kappa coefficient for distinguishing playfighting and playchasing was 0.76. Very few real fights were observed, as expected from the literature: fights are rare in playgrounds (Humphreys and Smith, 1987).

After the observation period, all 72 children were interviewed individually by the first author. Black-and-white head-and-shoulder photographs, size 9x11, were made of all the children in each class. In the first part of the interview, the photos of classmates were spread in front of the child, who identified them, with help if necessary. The child was then asked to point out his or her three best friends, and three children who were not his or her friends, or were liked least. These are referred to as sociometric nominations: reciprocal friends are those who mutually point each other as best friends; unilateral friends are those pointed out by one child, without reciprocity (the child was not chosen as a best friend by the child that he or she chose); neutral partners are those who were not mentioned either as best friends or as liked least; and non-friends are those who were pointed out as liked least. In the second part of the interview, the child was asked to indicate his or her playfighting and playchasing partners, if any. The answers were written by the interviewer in a previously prepared sheet.

Results

Friendship and Play Partners

Reported R&T partnerships and sociometric nominations

Sociometric nominations for friends (reciprocal and unilateral) and non-friends were compared with playfight and playchase partners nominations. This analysis excluded all the children who had not reported any playfighting and playchasing partners, reducing the sample from 72 to 33 children for playfighting, and to 60 children for playchasing. A variable number of nominations (range 1-7, usually 3-4) was obtained from each of these children. Out of a total of 90 mentioned partnerships for playfighting, and 157 for playchasing, 40% and 54%, respectively, were friends.

Nominated playfighting and playchasing partners were more likely to be friends than non-friends. As in Smith and Lewis (1985), chi-square tests were used, taking each possible partner as a unit for analysis. For playfighting, 35 nominated partners were friends, compared to 12 who were non-friends; compared to 75 and 89 respectively of those not nominated as playfighting partners, $(1) = 12.7, p < .001$. For playchasing, 84 nominated partners were friends compared to 15 who were non-friends; compared to 102 and 154 respectively of those not nominated as playchasing partners, $(1) = 57.9, p < .001$.

Observed partnerships and sociometric nominations

The mean proportion of observed playfighting and playchasing was obtained from the scans for 35 children who were present in at least 10 observation sessions. Children who had a minimum of 10 episodes of playfighting ($N=6$) and/or playchasing ($N=6$) were selected to compose two sub-samples, in which frequent play partners were to be identified. The sub-sample for playchasing was obtained directly from the scans. As the incidence of playfighting in the scans was insufficient to fulfil the criterion, individual proportions of playfighting were also obtained from a sample of 60 episodes recorded with event sampling. To check against bias, these proportions were compared to those obtained in the scan samples,

using Pearson's correlation coefficient; individual differences across samples were highly correlated ($r = 0.81$), so a compound sample of partnership data from scan and event samples was used to provide the sub-sample for playfighting.

Frequent play partners were defined as those observed to be played with above the median proportion for the sample. For playfighting, reported friends were much more often frequent partners than not (16 vs 6) compared to others (21 vs 101), ($1 = 30.1$, $p < .001$); for playchasing also, reported friends were more often frequent partners (16 vs 6) compared to others (22 vs 96), ($1 = 27.4$, $p < .001$).

A further analysis was carried out using the frequency of different partnerships. For this, "friends" were subdivided into "reciprocal friends" and "unilateral friends". The mean number of episodes with reciprocal friends, with unilateral friends, with non-friends and with neutral partners were compared with each other, and with the mean over all possible partners, in the two sub-samples of children with a minimum of 10 playfighting or 10 playchasing episodes. Table 1 summarises these results, and those of the related t tests for each comparison which were significant. The mean number of playfighting episodes with reciprocal friends is significantly higher than for unilateral friends, neutral partners or non-friends. Unilateral friends differ significantly from non-friends, but not from neutral partners.

Neutral partners did not differ significantly from non-friends. As for playchasing, the mean with reciprocal friends does not differ significantly from the other categories of partners, but is similar in magnitude to that for unilateral friends, which is significantly higher than for neutral partners and non-friends; also there were significantly more episodes with neutral partners than with non-friends.

Table 1: Mean number of playfighting and playchasing episodes with different types of partners; number of cases (N); and results of related *t* tests.

Mean number of episodes	Overall	Reciprocal friends	Unilateral friends	Neutral partners	Non-friends
Playfighting N	1.30 144	5.16 9	2.13 13	0.95 104	0.83 18
Playchasing N	1.12 142	2.83 8	2.88 14	0.93 102	0.33 18

Related *t* tests:

Playfighting:

reciprocal friends vs. neutral, $t = 7.65$, $p < .01$

reciprocal friends vs. non-friends, $t = 4.55$, $p < .01$

reciprocal friends vs. unilateral friends, $t = 3.06$, $p < .05$

unilateral friends vs. non-friends, $t = 3.42$, $p < .05$

Playchasing:

unilateral friends vs. neutral, $t = 2.69$, $p < .05$

unilateral friends vs. non-friends, $t = 3.59$, $p < .05$

neutral vs. non-friends, $t = 3.15$, $p < .05$

Characteristics of playfighting with friends and with other children

For the 35 observed children who were present in at least 10 sessions, the mean size of group was larger for playchases (4.2) compared to playfights (2.6).

To explore whether other aspects of R&T varied according to friendship status of partner, a sample of playfighting episodes was selected from the video records. Playchasing episodes were not included, as they

were less represented in the event sampling. 54 episodes were selected as having sufficient clarity for detailed analysis. Of these, 28 episodes involved only two children ("dyadic episodes") and 26 involved three or more children ("group episodes", typically 3-5 children).

A "friend" episode was scored if at least one child had reported the partner, or one of the partners in group episodes, as a friend; a "reciprocal friend" episode was scored if the friendship choice was reciprocal, that is, both partners, in dyadic episodes, and at least one pair of children, in group episodes, had named each other among their best friends. Friends featured prominently in both dyadic and group bouts: they were present in 13 out of 28 dyadic bouts, and 17 out of 26 group bouts. However, group bouts particularly often involved reciprocal friends: this was so in 15 out of 26 group episodes, but only 8 out of 28 dyadic episodes. Both reciprocal friendship and friendship in general might be expected more frequently by chance in a larger group; nevertheless, if a chi-square test is applied, the difference between group and dyadic bouts is significant for reciprocal friendships ($\chi^2(1) = 4.74, p < .05$), but not for unilateral friendships.

A second selection of episodes was made, aiming at a sample in which the several possible affiliative relationships would be represented. Only children with a minimum of 10 independent episodes, and who had at least one episode with each of three out of four possible categories of partners (reciprocal friends, unilateral friends, neutral partners and non-friends – no reciprocal non-friends were found in the sample) were included. These will be referred to as "target children" ($N = 6$). This final sample comprised 38 episodes (21 dyadic and 17 group, involving 3-5 children each).

Each episode was then scored separately from the point of view of each child participating, and of his or her relationship with each partner, in the case of group episodes. A dyadic episode, for instance, was scored twice, if it involved two target children, but only once if it involved a target child with a non-target partner; a group episode was described for each target child involved referring to each partner. This procedure was necessary considering that relationships were not always reciprocal (for instance, a target child B could be a friend for the target child A, but not vice-versa). A total of 127 such target-partner episodes were obtained. Analysis were carried out on these target-partner episodes, since the objective was to see which types of target-partner episode were most common. The choice of

children ensured that all contributed approximately equally to the data. Some non-independence of the data must be borne in mind and is in fact unavoidable with data from interacting participants, however analysed.

Each episode was classified in three ways. First, the role of partners was defined as "ally" or "opponent". A partner was classed as an ally if his or her participation involved directing his or her playfight moves against another child or children that the target child was playfighting with; and as an opponent if his or her participation involved directing his or her moves against the target child. For instance, in the episode described below, the target child T was classed as ally relative to D (both boys), and as opponent relative to A and R (both girls).

"D and T, standing side by side, in front of A and R, who are smiling, start walking towards the latter, making faces and menacing noises. T holds A's arm and wrestles, while D keeps groaning to R. R puts her arm forward, keeping D at a distance. A releases herself from T's grip, smiles, and makes faces at him. T turns to R, holds her, D holds her also, A approaches T and strikes him with her arm. T turns to her; they exchange arm strokes, while D pushes R lightly; R steps toward D, D runs away. T runs toward him, they meet and walk away talking to each other, while A and R run side by side in a different direction."

Second, the moves used by the target child were assigned to one of two classes, according to whether they included only wrestling, chasing and ritualized strokes, or also rougher moves such as shoves and punches. Thirdly, the outcome of the episode was classed as together, apart or not known, as in Humphreys and Smith (1987).

A second observer independently classified 45% of the target-partner episodes. agreement by Cohen's Kappa was 0.83, 0.45 and 0.64 for role of partners, moves and outcome, respectively.

The results for the role of partners in episodes as ally or opponent, in relation to affiliative status, are shown in Table 2. Reciprocal friends were allies significantly more often than expected by chance, while neutral partners and non-friends were predominantly opponents; unilateral friends were intermediate ($\chi^2(3) = 43.2, p < .001$). Of the 10 episodes in which reciprocal friends were opponents, 8 were dyadic episodes, where the

partner's role is by definition that of opponent. Considering that reciprocal friends tend to engage more often in group episodes, as suggested by the previous analysis, this indicates that a significant part of playfighting activities between reciprocal friends involved cooperation and alliance.

Table 2: Relationship between affiliative bonds of partners (Reciprocal friends, Unilateral friends, Neutral partners and Non-friends), and role (Ally or Opponent) in playfighting bouts (Number of cases).

	Ally	Opponent	TOTAL
Reciprocal	22	10	32
Unilateral	5	16	21
Neutral	6	55	61
Non-friends	0	13	13
TOTAL	33	94	127

Results of chi-square test: (3) = 43.2, $p < .001$.

In about 20% of the episodes, the outcome could not be reliably assessed. In the remaining 98 episodes, the outcome did not relate significantly to the relationship between partners, but it did relate to role of partners (Table 3): allies tended to remain together after the episode significantly more often than expected by chance, while opponents tended to move apart ((1) = 7.46, $p < .01$).

Table 3: Relationship between role (Ally or Opponent) and outcome (Together or Apart) in playfighting bouts (Number of cases).

	Together	Apart	TOTAL
Ally	17	6	23
Opponent	31	44	75
TOTAL	48	50	98

Results of chi-square test: (1) = 7.46, $p < .01$.

The proportion of episodes in the role of opponent was also analysed in relation to the child's social preference measure (number of positive choices minus number of negative choices received from classmates in the sociometric test; Coie et al., 1982). This analysis was performed on a sample of 9 children: the six target children, plus three others who had at least 6 different partners in the sample of episodes. Using Spearman's correlation coefficient, a significant negative relationship ($r = 0.80, p < .01$) was found between social preference and proportion of episodes in the role of opponent.

Only about 30% of the episodes in which the target child performed the role of opponent involved rough moves such as shoves and punches. The trends suggested by the results (Table 4) are not consistent with the hypothesis of a direct relationship with affiliative status ($(3) = 6.25, n.s.$). Episodes involving rough moves were proportionately less frequent with reciprocal friends than with non-friends, but they were also less frequent with neutral partners than with unilateral friends. A trend toward a negative relationship between social preference measures and the use of rough moves is somewhat more consistently suggested by the data: 18 out of 26 episodes in which rough moves were present involved the two target children who had negative social preference measures; these same two children were involved in 7 out of the 9 episodes in which rough moves were used against a friend.

Table 4: Occurrence of rough moves in Opponent episodes of playfighting, by affiliative relationship.

Rough moves	Yes	No	TOTAL
Reciprocal friends	2	8	10
Unilateral friends	7	9	16
Neutral partners	11	44	55
Non-friends	6	7	13
TOTAL	26	68	94

Results of chi-square test: $(3) = 6.25, n.s.$

Discussion

The results confirm for 5 year old children a general finding from previous studies, that both reported and observed partners for R&T tend to be friends. Furthermore, this has been found independently both for playfighting and for playchasing, with reciprocal friendship being particularly important for playfighting (Table 1).

If R&T functioned to form affiliative bonds, this would suggest that children would select play partners on the basis of whom they want to be friends or form alliances with, and then playfight/chase with them to establish or strengthen this friendship. R&T would then be expected to be particularly common between unilateral friends. The data in Table 1 suggest that this prediction applies better to playchasing than to playfighting: while for playchasing unilateral friends are more frequently played with than neutral partners and non-friends, and do not differ from reciprocal friends, in the case of playfighting reciprocal friends are clearly the most frequent partners.

For playfighting, partners are particularly likely to be reciprocal friends (Table 1). Two hypotheses can account for this. One is that children choose partners who are already friends so as to maintain the friendship/alliance; the other is that they do so to avoid the possibility of cheating or being taken advantage of in the play bout. The data in Table 1 cannot distinguish further between these two hypotheses, but the latter would also predict that play bouts would vary in systematic ways depending on the affiliative status of the play partner, relevant to the various possibilities or likelihood of cheating.

So far as play fighting is concerned, both functions find some support in our results. Firstly, reciprocal friends are particularly often found in group bouts of playfighting. The statistical significance of this in itself is difficult to gauge, but the tendency is more marked than for dyadic bouts, and more marked than for unilateral friends. Because more than two participants are involved, it is generally possible to classify participants as allies or opponents, notwithstanding the primarily friendly nature of the encounter. It is clearly the case that reciprocal friends are most often allies, and indeed almost always so when present in a group bout (Table 2). Allies also tend

to remain together after a bout is over, which suggests that acting as allies enhances the opportunities for strengthening the bond. On the other side, non-friends always acted as opponents.

Social preference scores correlated negatively with participation in the role of opponent. This indicates a relationship between being less liked by many in the group and acting as opponent in playfighting bouts. The use of rough moves appears as a possible factor contributing to this finding. Rough moves, which may be thought to verge on or carry a greater risk of "cheating" in playfighting, were found to occur in about 30% of the playfighting in our sub-sample (Table 4), and were especially marked in the two "controversial" children with low social preference scores, irrespective of friendship status of the partner. Pellegrini (1988) similarly reported that rejected children (who would also have low social preference scores) are particularly likely to move from rough-and-tumble play to real fights.

Although no obvious "cheating" was observed as such in our sample, a possible relation between rough moves and the risk of "cheating" or of moving from play to real fighting is endorsed by the literature. In an interview study with 5-, 8- and 10-year-olds (Smith, et al., 1992) children reported risk of injury, and misinterpretation of accidental injury, among the reasons why a playfight could turn into a serious fight. They were also asked how they would react if a child accidentally hit them hard during a playfight. Most answered that if it was a friend they would do nothing; but, amongst the older children at least, that if it was not a friend they would hit back.

Thus, although it can be thought that playfighting bouts between friends would be less risky, either by being more restrained or being less likely to verge on cheating or intentional injury, it is also possible that in playfights between well-known or affectively liked partners, rough moves, if present, would be less likely to lead to misunderstandings, retaliation, and therefore to serious and more risky interactions. This may explain why the occurrence of rough moves does not covary clearly with affiliative status of partner (Table 4). Indeed, it is possible that rough moves have different functions in playfighting interactions with best friends and non-friends. In the first case, they would provide practice for fighting skills (more than

stereotyped or restrained actions would) in a protected situation; in the second, it could allow for dominance assertion. Further data on a larger sample are needed to place these suggestions on firmer bases.

In summary, so far as playfighting is concerned, the choice of reciprocal friends as partners can be seen as having functional significance as maintaining friendships/alliances. It would also be consistent with avoiding the risk of rough moves turning to serious fighting and injury. There would theoretically be less likelihood of outright cheating in play fights also, but since we did not observe such cheating this aspect of the hypothesis cannot be substantiated.

On the other side, the functions of playchasing bouts may be weighted towards forming new friendships/alliances, since they are often engaged in with currently non-reciprocated friends. The greater possibility of making new friends by joining in playchasing is also exemplified by the larger mean size of group we found for playchases compared to playfights: a child with less strong and reciprocated friendships could find it easier to join in a larger group, which is also engaged in the less intense and less dangerous playchasing activities. This hypothesis could be further investigated by a longitudinal study of playchasing partners and changing friendship nominations.

The functional significance of R&T, and especially of playfighting, may well change through ontogeny (Humphreys and Smith, 1987), moving from being primarily affiliative (establishing and maintaining alliances) to more related to practice of fighting skills in older children. Although there is no direct evidence for playfighting functioning as practice of fighting skills for most children before puberty, different developmental pathways can be envisaged. Most children, up to about puberty, may engage in playfighting mainly as a way of maintaining friendships (obviously, only one of the possible ways of doing so for human children, but an enjoyable and exciting one). However, an alternative pathway for some children may be to use rougher moves in playfighting; this runs the risk of being disliked by other children (low social preference) and of incurring greater risks of injury. The corresponding benefits may be greater practice in fighting skills at an earlier age than usual, perhaps moving into dominance assertion if overt "cheating" in playfights become more common as these children get

older (Neill, 1976; Smith and Boulton, 1990). This latter pathway might correspond to the "high aggressive" strategy, postulated as adaptive for some children by Draper and Harpending (1988) and Barkow (1989). These ideas could be further investigated by specifically looking at choice of play partners, and form of playfighting bouts, in a larger sample of socially rejected or controversial children and over a longer span of time.

Finally, our results suggest that the understanding of the functional significance of behavior in highly social species can be enhanced by the consideration of the social net of relationships in which individuals are embedded (Carvalho, 1993). An insightful indication in this direction is provided by the studies on empathy and on deceiving behavior in primates (e.g. de Waal, 1982; Whiten and Byrne, 1989; Goodall, 1990; Plutchik, 1990).

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