# Early Education and Development

Volume 3 October 1992 Number 4

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## Journal Information

*Early Education and Development* (ISSN 1040-9289) is published quarterly in January, April, July, and October at $95.00 per year (institutional rate) by Psychology Press, Inc., Box 328, Brandon, VT 05733-0328. Second-class postage paid at Brandon, VT. POSTMASTER: Send address changes to *Early Education and Development*, P.O Box 328, Brandon, VT 05733-0328.

***Editorial correspondence*** should be directed to the Editor, Richard R. Abidin, Ed.D., University of Virginia, 405 Emmet Street, Ruffner Hall, Charlottesville, VA 22903-2495.

***Subscription and business offices*** for the Journal are located at 39 Pearl Street, Brandon, VT 05733-1007. The institutional subscription rate (for libraries, schools, agencies, departments, and other multi-user environments) is $95.00 for four quarterly issues. Personal (single-user) subscriptions are available at $49.00 for four quarterly issues. Add $9.00 per year (prepaid in U.S. funds) for non-U.S. delivery. Single copies of available back issues are $22.00 each. Customer service number: 802/247-8312 (Voice and Fax).

*Early Education and Development*
*October 1992, Volume 3, Number 4*



# A Time and a Place for Everything: A Discrete Systems Perspective on the Role of Children's Rough-and-Tumble Play in Educational Settings

Kevin MacDonald
*California State University–Long Beach*

This paper emphasizes the following points regarding the appropriate role of rough-and-tumble play (R & T) in educational settings. (1) There has been an important secular trend toward an increasing importance of adult supervision of children's play. As a result, children's R & T must be considered in the context of social values regarding the expected developmental significance of children's play. (2) R & T is an aspect of evolved systems that propel the children into enthusiastic interaction with their environment and can be reasonably supposed to have several beneficial influences on children's cognitive and social development. (3) R & T can be distinguished from aggression, and adult supervised R & T is potentially an important arena for learning the limits of appropriate R & T. (4) It is suggested that supervised educational settings should be concerned with socializing several discrete systems that underlie children's development, including the present emphasis on socializing children to be able to focus attention, inhibit behavior, and be neat and orderly. However, the purpose of the present paper is to present a case for socializing the systems underlying stimulus seeking, extroversion, sociability, and intellectual creativity as well.

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He entered the church, now, with a swarm of clean and noisy boys and girls, proceeded to his seat and started a quarrel with the first boy that come handy. The teacher, a grave, elderly man, interfered; then turned his back a moment and Tom pulled a boy's hair in the next bench, and was absorbed in his book when the boy turned around; stuck a pin in another boy, presently, in order to hear him say "Ouch!"...

"But as I was saying," said Aunt Polly, "he warn't bad, so to say—only mischeevous. Only just giddy, and harum-scarum, you know. He warn't any more responsible than a colt. He never meant any harm, and he was the best hearted boy that ever was" — and she began to cry.

"It was just so with my Joe — always full of his devilment and up to every kind of mischief, but he was just as unselfish and kind as he could be — " (From *Tom Sawyer*, by Mark Twain [1936; p. 42]; also quoted in Aldis, 1975)

Tom Sawyer obviously enjoyed rough, boisterous play, but we should also remember some of the other adjectives one might apply to Tom — qualities which, I will try to show, can be expected to be associated with an attraction to rough, boisterous play. Tom was also very energetic and enthusiastic, "into everything." He was highly inventive and was adept at quickly thinking up

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Reprint requests should be addressed to the author at the Department of Psychology, California State University–Long Beach, Long Beach, CA 90840-0901.



ways to get out of the myriad difficulties he found himself in. He was also a peer leader — someone who was confident in the presence of others and able to organize group activities. He was also very courageous — a risk-taker and explorer who showed bravery in the face of danger. And he was not one to back down from a fight. To use a psychological term, Tom was an extrovert.

One of the purposes of this paper is to show that even though children like Tom may be a bit difficult for adults to live with at times, there is much about him worth preserving and even encouraging. The second main point is that Tom's personality is really influenced by a variety of discrete evolved systems, so that, for example, in addition to the extroverted qualities just mentioned, the quoted passage indicates that Tom was also "good hearted." The psychological data reviewed here will indicate that being good hearted is not at all incompatible with being extroverted. Nor is being extroverted incompatible with being able to inhibit one's behavior, narrow attention, and diligently develop one's abilities. Indeed, very early in the book, Tom attempts to learn a novel way of whistling, and Twain (1936) comments that "diligence and attention soon gave him the knack of it" (p. 18). The argument here will be that these abilities of focusing attention and diligently pursuing a goal draw on a quite different set of systems than does extroverted behavior.

## The Role of Children's Rough Play in Supervised Childcare Settings

### *Controversies Surrounding R & T in Educational Settings*

It is fair to say that rough-and-tumble styles of play (R & T) are viewed with a great deal of mistrust by professionals in the area of child care. One need only note the following comment from Dr. Benjamin Spock (1963):

> Quite a few fathers find acrobatics, tussling, tickling, playing ogre or wild animal are their most natural ways of having fun with their children. Most children respond enthusiastically and this spurs the fathers on. But child guidance-clinic work shows that, in some cases at least, these games are too stimulating, especially to the young child who is not clear yet about what is real and what is pretend. Some of these activities prove too frightening, others too pleasurably exciting to be wholesome. They should be used with discretion and in small doses. (p. 122)

Rough play has also been controversial in educational settings. For example, Pellegrini and Perlmutter (1988) note that

> One form of play, rough-and-tumble play (R & T) does not typically evoke ... positive responses. Indeed, when we speak about R & T (for example, play fighting and chasing) to parents and educators they usually suggest that we should be discouraging it, not encouraging it. This negative opinion of R & T, especially of play fighting, may stem from the belief that children learn antisocial and aggressive behavior in R & T and that what starts off as play fighting usually escalates to real fighting. Further, children engaging in R & T seem "out-of-control" to adults. (p. 14)

The first thing to note here is that the concern found among preschool teachers about the rough play of children reflects a major shift in the context of children's play. Sutton-Smith (in press) has emphasized the importance of contextual shifts in the regulation of children's play and the fact that adults have often utilized children's play for their own purposes. The present concern with

children's boisterous, aggressive play is a direct result of the fact that children's play is under direct adult supervision to a far greater extent today than even a few years ago. Whereas 20 or 30 years ago children played with other children in a relatively unstructured neighborhood setting and without close adult supervision, today the preschool setting has become a normative environment for a great many children. In the unstructured settings of past times it was reasonable to suppose that children's run-of-the-mill roughhousing and even their fighting did not come under adult purview unless the fighting was serious enough that children would bring it to the attention of adults.

However, within the adult-supervised settings common today, children's boisterous, aggressive play becomes problematic and raises fundamental questions about what type of environments best facilitate optimal development and what roles parents, teachers, and developmental scientists should take in structuring children's environments. However, apart from these very weighty theoretical questions, there are probably several practical reasons why such play is considered suspect by many preschool teachers. Teachers of preschool children are obviously adults, and since they have to work long hours in a child's environment, they presumably prefer an environment that is also livable for them. Quiet, sedentary play is much easier to supervise and certainly results in a more orderly, peaceful classroom that is less fatiguing for the teacher.

In addition, the vast majority of preschool teachers are women, and women are far less likely than men to engage in rough forms of play with children. Thus mothers are far less likely than fathers to engage in physical play with their children (MacDonald & Parke, 1984, 1986). This sex difference is highly salient within the preschool as well, since boys are far more likely than girls to engage in rough, boisterous play (Humphreys & Smith, 1984; Pellegrini, 1988). Female teachers, for a variety of reasons, tend to value nurturant interactions with children and feel more comfortable engaging in quiet, sedentary activities with their charges than chasing and wrestling with them. To a very real extent, the interest in boisterous, aggressive styles of play within the preschool environment pits the play preference of a subset of children, most of whom are boys, against the interests of adults in a peaceful orderly environment.

Since the contextual shift toward increasing adult supervision of young children appears to be an irreversible part of modern life, it is necessary to think about how to shape this context in a manner that optimizes socially valued developmental outcomes and at the same time make the context compatible with teachers' interests in a livable work environment. The idea of shaping the context of development in a manner that "optimizes socially valued developmental outcomes" inevitably raises difficult ethical and ideological issues. The shift from the family as the only important normative context of early development to the family *cum* preschool context is fraught with ideological implications. The preschool context is inevitably a socially regulated context, and this social regulation has typically intruded far more into the school environment than into the family environment. Western societies have typically given parents a wide latitude in rearing their children. There have been notable exceptions, ranging from ancient Sparta to Nazi Germany and the Soviet Union, where parental influences have been deliberately minimized (see MacDonald, 1988). Moreover, as noted by Sutton-Smith (in press; see also Gillis, 1981), organizations such as the scouts have attempted to socialize children by fostering middle class attitudes and preparedness for a military life. Nevertheless, within contemporary liberal democracies, although there is no lack of professional advice on child rearing, there is minimal state regulation of family environments.



This is not the case in the childcare settings. Preschool and after-school programs are licensed by the state and are often accredited by professional societies such as the National Association for the Education of Young Children. Their curricula are highly influenced by social science research, and this research itself can become highly politicized, as witness the recent debate about the effects of day care on children (Belsky & Rovine, 1988; Clarke-Stewart, 1989). The reality is that the social regulation of preschools and the intrusion of adult interests into children's environments are an inevitable result of the increasing importance of nonfamilial environments for young children.

Given this reality, it is expected that the control of childcare settings will involve political processes. Perhaps one of the best arguments that the environment is important in human development is that people appear to be highly motivated to control it. In a liberal democracy, the control of this environment is fair game, and parents and other interested parties actively compete for influence. "Parents clearly recognize the importance of contextual influences in development and try to alter them in what they perceive to be a self-interested manner in order to produce a context of development that is in conformity with their own view of appropriate socialization influences..." (MacDonald, 1988, p. 305).

*The General Developmental Importance of Play*

There is excellent theoretical reason to suppose that the play children engage in does matter (i.e., it is worth controlling). Play is a ubiquitous behavior among animals and is particularly common among large brained species, strongly suggesting that play has an important adaptive role in advanced species. Moreover, there is reason to suppose that the association between play and large brain size is due to the fact that play allows these animals to learn about their world — to develop the skills necessary for adult life. Smith (1982) summarizes evidence that play serves a training function for a wide range of social and cognitive abilities that are essential for adult adaptation, including social communication, social skills (see also Carson, Burks, & Parke, in press; Levenstein & O'Hara, in press; Sutton-Smith, in press), and generalized cognitive skills.

The training function of play implies that plasticity is a central biological adaptation. In a very real sense, without plasticity there would be no purpose

for play, since animals could not benefit from it. In other words, the training hypothesis logically presupposes plasticity. Several writers have noted a trend in evolution toward the development of flexible response capabilities that can be programmed by immediate environmental contingencies rather than by rigid, genetically controlled responses to a few highly salient environmental cues (see Lerner, 1984, for a review).

Play is thus a sort of environment-engagement device ideally suited to a large brained, plastic species. During play an animal places itself in a position to learn about a large array of environmental contingencies and commits physiological and neural resources to particular adaptive demands. Rather than attempting to desi$_{g}$-t an animal that will be able to make an increasing number of stereotypical responses to an increasing number of recurring environmental contingencies, evolution programs the animal to seek out information from the environment.

Regarding the specific functions of R & T, there are several possibilities which are not necessarily incompatible with one another. R & T is social play, and Fagen (1981) has noted that high levels of social play are associated with high levels of social cohesion and sociality (greater group size, group permanence, physical closeness, and cooperation) later in life. Among children, the socialization hypothesis receives support from data indicating that many popular children engage in R & T (MacDonald, 1987; Pellegrini, 1988) as well as data linking R & T with social cooperation (Smith, 1989), communication (especially the encoding and decoding of affective cues; Carson et al., in press; Parke et al., 1989), the regulation of affect (MacDonald, 1987; MacDonald & Parke, 1984), and social-cognitive skills such as role taking (Pellegrini, 1988).

However, research to date also suggests that rough, boisterous play may facilitate the learning of fighting and hunting skills, as found also in the animal literature (Aldis, 1975; Konner, 1972). In addition there is some indication that R & T is a major component of dominance interactions among children (Humphreys & Smith, 1987; Neill, 1976).

*What Kinds of Play Are Socially Acceptable in Supervised Childcare Settings?*

It is thus reasonable to suppose that the play children engage in has developmental implications. The social policy issue is to determine what kinds of play are worthy of inclusion in a nonfamilial childcare setting. I would suggest that there is really only one currently defensible criterion that the parents, children, teachers, and developmental scientists who are the interested parties could agree on, namely, that legitimate forms of play must not result in psychological or physical victimization of children, as would, for example, play resulting in legitimizing aggression and bullying. For example, Smith (1991) reviews evidence that bullying can have long-term detrimental effects on children. In any case, although there may well have been societies that have actively socialized children to engage in aggressive victimization of others (see MacDonald, 1988, chapters 5 and 9), current sensibilities regarding aggression and victimization would certainly prohibit this type of behavior in present-day supervised care settings.



Within the limits of this (negative) criterion, any other form of play that children naturally enjoy would be permissible. The fact is, despite the excellent theoretical reasons to suppose that play does indeed have effects (see previous section), we have only fairly weak and circumstantial evidence for the beneficial effects of any particular kind of play. As a result, our social policy decisions regarding play are necessarily made somewhat in the dark. The vast majority of data on play, including R & T, is correlational and descriptive, and this situation will probably continue for the foreseeable future. Findings that, for example, popular children engage in R & T with parents and peers and that the R & T of popular children can be distinguished from that of rejected children (MacDonald, 1987; Pellegrini, 1988) may be the result of a number of "person" variables, including temperament, which result in different play styles as a result of "niche-picking." The point is that in the absence of a powerful set of findings on all of the developmental sequelae of different play styles, one either accepts something like the negative criterion proposed here, or makes restrictions that are unjustifiable in light of presently available data.

This perspective essentially gives the benefit of the doubt to the playful activities that children mutually and reciprocally enjoy. The situation resembles that of someone who has stumbled upon an exotic, extremely complex spacecraft that he wants to utilize in the future but about which his present knowledge is quite deficient. His best rule would be to tinker with the spacecraft only enough to prevent something that is clearly unacceptable from occurring, such as removing a self-destructing device. Any further tinkering with the spacecraft without more knowledge might well lead to disaster in the future. After all, one might remove something that was necessary for the spacecraft's successful flight.

There is sound theoretical reason to take such a similarly permissive stand with children's play: We have already argued that play would not exist at all unless it influenced development in some manner, and certainly evolution has resulted in children being essentially extremely complex organisms designed to obtain information useful for survival in a difficult world (at least partly via their propensity to play). If we remove the obviously unacceptable styles of play (although even these styles of play may have some evolutionary basis), the remaining styles of play may well turn out to have effects that would be as widely applauded as the negative effects of bullying and aggression are presently condemned.

Within this negative criterion, rough, boisterous play is permissible as long as it does not result in aggression and victimization. There is no question that R & T can be distinguished from aggression and, as indicated above, there are sound theoretical reasons to suppose that (1) play in general has a beneficial function; and (2) there are empirical data compatible with supposing that R &

T in particular is an arena for developing specific social skills related to peer popularity, affect regulation, role taking, fighting, and dominance interactions.

Nevertheless, it would not be surprising if rough, boisterous play were at times and in certain children associated with aggression and even victimization, especially in light of data indicating intercorrelations among all of the GO systems underlying behavioral approach (see following section). Indeed, there has been some support for Fagen's (1981) cheating hypothesis of R & T (Pellegrini, 1992). The cheating hypothesis proposes that children, especially rejected children, may utilize the typically playful nature of R & T in order to victimize others and to exhibit dominance over them. There is also evidence that as children move into adolescence, R & T in general is not only more characteristic of rejected children, but also is positively associated with serious aggression among these children (Ladd, 1983; Neill, 1976; Pellegrini, 1991).

However, even if these findings turn out to be correct, there is no reason to ban R & T altogether. The fact that many popular, socially adjusted children engage in R & T and do so in a nonaggressive, socially skilled manner (MacDonald, 1987; Pellegrini, 1988; Pellegrini & Perlmutter, 1988) indicates that R & T is not the culprit. Since the present issue is whether R & T should be allowed in supervised settings, the solution is that R & T, like other forms of play, should be supervised by adults.

This in turn leads to three points. (1) Anecdotal data (see Smith, 1989) indicate considerable variability in the extent to which teachers tolerate R & T. If R & T is to be made an acceptable part of the supervised educational curriculum, then teachers must be trained to distinguish R & T from aggression and victimization.

(2) The extent of victimization and "cheating" in R & T is likely to be quite low, at least over the long run, since victims would be expected to avoid R & T with victimizers and "cheaters" in the future. From an evolutionary perspective, reciprocity of positively valued interactions is the theoretically expected consequence of prolonged social interchanges that are entered into voluntarily (see MacDonald, 1991). Children, like adults, are not expected to continue to engage in interactions with individuals who victimize them.

(3) Supervised R & T has the potential for providing a therapeutic environment for several types of children. This important point will be returned to below, but the theoretical basis of this point of view is contained in the following section.

## Implications of a Discrete Systems Perspective for Engineering Children's Play Environments

I wish to go beyond the negative criterion proposed above to argue that, given present knowledge, it is reasonable to suggest that a variety of types of play should be actively encouraged in educational settings. The basis for this claim depends on a discrete systems perspective.

Discrete systems theory (DST) encompasses an expanding set of propositions relevant to emotional and personality development as seen in the work of a wide range of theorists (e. g., Bates, 1989; Belsky, Fish, & Isabella, 1991; Belsky & Pensky, 1988; Darwin, 1872; Ekman, 1982; Fox, 1991; Fox & Davidson, 1987; Goldsmith & Campos, 1990; Gray, 1982; Izard, 1971; MacDonald, 1988, 1991, 1992; Malatesta, Culver, Tesman, & Shepard, 1989; Panksepp, 1980, 1989, Plutchik, 1980; Rothbart, 1989; Thayer, 1989; Tompkins, 1962, 1963; Tucker & Williamson, 1984; Watson & Tellegen, 1985). At a basic level, DST proposes that human emotions and temperament trait dimensions reflect a discrete set of biological systems with different evolved functions. In the present case the point is that different discrete systems underlie different styles of play and that there is a societal interest in socializing several of these discrete systems.[1]



Furthermore, DST implies that environmental influences are directed at particular systems, so that, for example, influences directed at the human affectional system may make this system more salient in a child's life but these influences would not directly affect other motivational-emotional systems. (MacDonald, 1991, 1992; see, e.g., Belsky, Fish, & Isabella's 1991 review of socialization influences on temperament systems in infancy). By making an individual more prone to finding intimate relationships with others rewarding, one makes this system more powerful and salient for an individual. However, the affectional system must compete with a variety of other systems, and, more important, the child's relationships with other children can be based on other evolved systems.

The suggestion, then, is that the preschool curriculum should take account of these discrete systems and plan curricula directed at socializing specific systems. In the following, attention will be focused on three evolved systems that, it may be argued, could be the focus of socialization efforts in the preschool. Within the perspective developed here, each of these evolved systems underlies a trait dimension of individual differences studied by temperament researchers and by personality psychologists. Individual variation in these systems has been shown to be heritable in the .5 range (Buss & Plomin, 1984; Digman, 1990). Heritabilities in this range are compatible with considerable environmental influence. Each child is conceptualized as having a unique profile based on his or her standing on these systems, and socialization influences are conceptualized as being directed at specific systems and thereby altering the child's standing on that particular system.

Although there is disagreement on the number of independent biological systems important for socialization, the following will focus on three systems (or sets of systems) that have considerable empirical support from personality

[1] As an example of the application of DST, there is evidence that the attachment system, as a system designed to provide security in the face of threat, is separate from the human affectional system, which functions to facilitate cohesive, psychologically rewarding family relationships and paternal investment in children (MacDonald, 1988, 1992). The human affectional system is viewed as one of several discrete human motivational systems. However, the affectional system is only one human motivational system, and relationships may also be based on competing systems. The result is that human relationships are often compartmentalized. Compartmentalization implies that people can have intimate, affectionate relationships with some individuals (typically family members), and radically different relationships with others, because different biological systems are involved.

studies with adults (e.g., Digman, 1990; John, 1990) as well as with children (Cattell & Coan, 1957; Digman, 1963, 1989; Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981; Kohnstamm, 1991): the GO systems, and two different STOP systems — the behavioral inhibition system and the conscientiousness system.

*The GO Systems*

Zuckerman (1983) and Gray, Owen, Davis, and Tsaltas (1983) propose that two basic, correlated trait dimensions of personality, labeled *sensation seeking* and *impulsivity*, fundamentally involve sensitivity to rewards. Sensation seeking involves attraction to novelty, danger, excitement, sexual variety, and disinhibition, and is phenotypically and genetically correlated with sociability, impulsivity, extraversion, dominance, and aggression (see Eysenck, 1981; Farley, 1981; Fulker, 1981; Zuckerman, 1979). Such a trait dimension emerges as Factor I in the five factor model of personality (Digman, 1990). Similarly, Panksepp (1989) has proposed evolved reward systems as underlying other human appetitive traits, including sensation-seeking, sexual, and foraging behavior. In the developmental literature, Rothbart (1989) has described positive approach as a self-regulatory aspect of temperament; Buss and Plomin (1984) have emphasized the related trait dimension of sociability; Bates (1989) has described sociability and positive emotionality as temperament trait dimensions; and Sigvardsson, Bohman, and Cloninger (1987) find novelty seeking to be a fundamental trait dimension of temperament in children. These trait dimensions have been observed cross-culturally and show an important sex difference (which is predicted by evolutionary theory; see MacDonald, 1988): Males tend to be higher in all of these GO trait dimensions.

Broadly speaking, these systems underlie the child's seeking contact with the environment and, at moderate levels, can be viewed as part of a Piagetian optimal learning device (MacDonald, 1988). These systems provide psychological rewards for interacting playfully with novel stimuli, including other people, and approaching sources of reward. Tucker and Williamson (1984) note a tendency toward diffuse, relatively shallow attention, and holistic thought processes as individuals actively explore the environment. Farley (1981, 1985a, 1985b) notes the associations among sensation seeking, creativity, extroversion, high energy level, preference for complexity and novelty, playfulness, novelty seeking, risk taking, and what he terms "transmutative thinking." Individuals who are adept at transmutative thinking "are exceptionally facile at shifting from one cognitive process to another and at transforming one mode of mental representation into another. They move with greater ease from the abstract to the concrete" (Farley, 1985a, p. 47).

In exploring the environment, children take risks and seek out interesting, exciting, and novel stimulation and other sources of reward. Other children are an important part of this exciting, stimulating environment, and, as emphasized by Buss and Plomin (1984), sociable children actively seek the stimulation and rewards of interacting with others. Developmentally there is a decline in at least some of these systems during childhood and particularly during adulthood — risk taking, impulsivity, neophilia (attraction to novelty), and sensation seeking — and attention becomes more focused as the individuals are increasingly forced to cope with possible sources of threat.



In previous work (MacDonald, 1988, in press), I have proposed that the reward systems underlying parent–child R & T are phenotypically and genetically correlated with the other GO systems described here. Consistent with this perspective, Panksepp (in press) provides evidence that evolved reward systems underly social play in mammals. This interpretation is also consistent with the commonly found sex difference in R & T and sensation seeking: Males engage in more sensation seeking and R & T than females, and this sex difference occurs not only in peer R & T (e.g., Blurton Jones, 1967; Humphreys & Smith, 1984; Pellegrini, 1988) but also in parent–child R & T (both for parents and for children; MacDonald & Parke, 1986).

Phenotypically, such an association makes intuitive sense because R & T involves high levels of rapidly changing social and physical stimulation, often co-occurs with aggression, involves physical risk taking, and is intrinsically rewarding to the participants. At the extreme end of this trait dimension are hyperactive (Attention Deficit Hyperactivity Disorder, or ADHD) children, the vast majority of whom are boys. These children tend to be characterized by underfocused attention and impulsivity (Shaywitz & Shaywitz, 1988), high attraction to reward (Douglas, 1985), seeking very high levels of environmental stimulation (Zentall & Zentall, 1983), aggression toward peers (Hinshaw, 1987), as well as risk taking and R & T (MacDonald, 1988). Correia (1989) found that ADHD children were high on Cloninger's (see Sigvardsson et al., 1987) novelty-seeking dimension.

In addition, the children least likely to engage in parent–child R & T are neglected children (MacDonald, 1987), and Pellegrini (1988) and Coie and Kupersmidt (1983) found that neglected children engage in less R & T with peers than popular or rejected children do. Descriptions of neglected children clearly indicate that they tend to be shy and socially withdrawn (see Berndt & Ladd, 1989, and Coie, Dodge, & Kupersmidt, 1990). In terms of the present treatment, such children are viewed as dominated by the STOP systems described in the following section.

The GO systems, as is the case with all personality dimensions, may be seen as a sort of "good news–bad news" situation: The good news is that a child who is moderately high on these systems eagerly approaches the environment and actively engages it. Such a child is curious and exploratory, enjoys being in the midst of highly stimulating, noisy environments, and is easily motivated by rewards. He or she enjoys being around others and engaging in fast-paced activities in which attention can shift rapidly. Such a child shows enormous energy[2] and enthusiasm, and behaves in an assertive manner with others.

[2] Buss and Plomin (1984) show that activity level is a temperament characteristic. As revealed by factor analytic work in ADHD children, this system also appears to intercorrelate with inattention and impulsivity, and appears to be another of the proposed set of externalizing systems.

Clearly R & T is paradigmatic of the type of play that attracts such a child. At extreme levels, however, as seen in children diagnosed as ADHD, the bad news is that attention becomes so diffuse that the child has difficulty obtaining important information and coordinating his or her activities with others. The child is overly impulsive and aggressive, and becomes socially rejected. As one of many possible examples, Pelham (1990) describes ADHD children who incur peer animosity because they do not pay attention during a baseball game and ruin the activity for everyone.

This good news–bad news situation continues into adulthood. The bad news is that adults formerly diagnosed as ADHD tend to exhibit more antisocial behavior than non-ADHD siblings (Mannuzza, Klein, & Addalli, 1991). However, Mannuzza, Klein, Bonagura, Konig, & Shenker (1988) found that the group of formerly diagnosed ADHD children was bimodal, and that if the sample was restricted to subjects who do not have mental disorders at follow-up, there were remarkably few differences between formerly ADHD children and controls. There were no differences for occupational adjustment, social functioning outside of school, angry behavior, alcohol or drug abuse, and antisocial behavior.

Moreover, Cantwell (1990, 1992) reports that some adults identified as having exhibited the symptoms of ADHD as children went on to achieve high levels of success as entrepreneurs and salesmen, and some had achieved success in the entertainment industry. These individuals exhibited a great deal of drive and an extraordinary amount of energy in pursuit of their goals. They were highly creative individuals who "marched to a different drummer." Their jobs were not characterized by a great deal of routine activity, nor did they require a great deal of precision or attention to detail (as would be the case with individuals high on the conscientiousness system; see below). Instead, their jobs allowed them to work at their own pace and according to their own rules.

This good news–bad news typology is also apparent in Farley's (1981, 1985a) treatment: Individuals high on sensation seeking are overrepresented in prison populations, but sensation seekers who are well socialized are also overrepresented among highly creative people, including highly successful scientists, artists, and entertainers.

Although the exceptionally successful individuals described by Cantwell (1990, 1992) are clearly not typical of ADHD children grown up, they are of great theoretical importance. The GO systems clearly have important adaptive functions for children and adults. The evidence shows that being extreme on these systems is associated with pathology, and this is the case with all of the systems underlying personality described here. Nevertheless, from an evolutionary perspective, it is not surprising that disorders of the GO systems are so prevalent, and especially so among male children and young adults. The GO systems constitute an extremely powerful engine for obtaining resources and interfacing with the environment. Therefore it is not surprising that there is a fairly high level of what population geneticists term *genetic load* associated with the system. Genetic load refers to a situation where genes that are highly adaptive in general



(and therefore maintained in the population) can also actually decrease biological fitness in some situations or for some individuals with particular genetic backgrounds. Genes predisposing individuals, especially males (MacDonald, 1988), to be high on these GO systems clearly can have a very high payoff and will be maintained in the population even if the result is pathology and lowered biological fitness in some, even many, individuals.

One can think of these genes as underlying a high-risk evolutionary strategy. Being high in these systems is a high-risk strategy, but, unlike casino gambling in Las Vegas, it is not a strategy doomed to failure. Some subset of the individuals who are very high on this system will be extraordinarily successful; undoubtedly such individuals were able to sire a high number of offspring during human evolution, especially given the fact that polygyny and large numbers of offspring have typically been the reward of highly successful males in traditional human societies (e.g., Borgerhoff Mulder, 1991). Moreover, given the complex, interactive nature of the biological systems underlying personality, not all, or even most, of the children of these individuals would be expected to be at the pathological extreme for these traits (MacDonald, 1991). However, these genes would have an average effect that would indeed make the offspring of these individuals more likely to be creative, enthusiastic, energetic, neophilic, and highly driven by the prospect of reward. Genes predisposing individuals, especially males (MacDonald, 1988), to be high on these traits will therefore stay in the population at high levels.

It is not surprising, then, that many children enjoy engaging in rough, boisterous, high energy styles of play. Clearly, in designing play environments for supervised settings, prohibiting these styles of play would be like throwing out the baby with the bath water.

*Socializing the GO Systems*

As expected from the foregoing, some very successful individuals have actively socialized the GO systems via rough and boisterous play. Martin (1983) writes the following about bedtime at the White House during the Kennedy years:

> It was 7:30, their usual bedtime, and their father was still at the office. Caroline, and later John, would come down to their father's office to say good night. They would be in their pajamas, ready for a romp. Their father would get on the floor with them, and they would be all over him, jumping up and down, pounding him, all of them laughing, He would laugh with them and relax in a way that he did with no one else. Then the children would go upstairs to bed and he would go back to being President of the United States. (p. 268)

Although this paper does not make detailed proposals on implementing boisterous, active play styles into preschool and after-school curricula (see, e.g., Pellegrini & Perlmutter, 1988; Porter, 1988), a few comments are in order. As indicated above, there must be supervision of R & T to ensure that true aggression and victimization does not occur. Beyond this, there is good theoretical reason that supervised R & T could be an important therapeutic environment for at least two types of children. Indeed, because R & T is highly

pleasurable to many children, it is reasonable to suppose that it could be used as a reinforcer to shape desired behavior (Panksepp, in press), as is the case with any other reward system. As a result, it is theoretically sound to suggest that many children (especially the rejected children most prone to mix R & T with aggression) could be motivated to alter their behavior by the threat of not being allowed to engage in R & T.

The R & T of rejected children tends to lead to aggression (Pellegrini, 1988), and MacDonald (1987) observed that rejected children often became overstimulated and engaged in high levels of approach-withdrawal during R & T with their parents. Similarly, although ADHD children are typically highly attracted to R & T, their play is often characterized by hypersensitivity to stimulation.[3] The proposed solution to these difficulties is not to prevent these children from engaging in R & T. (They will probably engage in R & T anyway as soon as they leave the supervised environment, and then there won't be anyone there to prevent aggression and other inappropriate behavior.) Instead it is proposed that one use supervised R & T as an arena in which to shape socially skilled R & T.

At present we are beginning a pilot study to explore the effects of two types of interventions with children prone to high levels of R & T and aggression. The first type of intervention is a "time out" procedure commonly used as a punishment in educational settings. Children who become aggressive, become overly excited, or engage in temper tantrums would be forced to leave an R & T play group altogether for a period and apologize to any children they have victimized. Repeated violations of these strictures would lead to increasing lengths of deprivation. This type of intervention is expected to be particularly effective in the case of R & T because the activity itself is actively sought out by children. These children are thus expected to be highly motivated to continue engaging in this style of play.

The second type of proposed intervention is a type of cognitive therapy in which the emphasis is on making the child more aware of his or her behavior during R & T.[4] Videotapes would be made of the children playing and then edited to show examples of both appropriate and inappropriate (aggressive) R & T. Each day prior to the free play period, the children would be shown the videotapes and instructed so that they are quite clear on the difference between aggressive R & T and "fun" R & T. This procedure should make the children aware of the pleasurable nature of appropriate R & T and at the same time remind them that there are limits to this style of play.

In a sense there is nothing new about the type of mechanisms utilized in these interventions, since they rely on well established procedures derived from the learning and cognitive traditions in psychotherapy, respectively. However, the important point here is that the R & T behavior which is the focus of the intervention not only is ecologically valid in the sense that it is a type of behavior ADHD children naturally engage in, it is also a type of behavior which is symptomatic of a basic deficit in the social behavior of these children. The goal of these socialization techniques is to develop the ability to engage in highly pleasurable, rewarding social behavior in situations of high affective intensity and arousal, but to do so with an awareness that there is a need to avoid behavior that victimizes and distresses one's play partners. The goal, in short, is to foster R & T that is reciprocally rewarding for all participants.

### *The STOP Systems and Their Socialization*

The psychological manifestation of the need to protect oneself in the face of threat is the behavioral inhibition system (BIS) (Panksepp's 1989 fear-anxiety system), proposed by Gray (1982) as a biological system that responds to perceived threat with behavioral inhibition and the initiation of fight-or-flight behaviors. The affects associated with the BIS are fear, tension, and anxiety. This system is much studied by developmentalists (e.g., Kagan, Reznick, & Snidman, 1989) and may be seen as a manifestation of Factor IV in studies of adult personality (see Digman, 1990). Children whose personalities are dominated by behavioral inhibition are clearly withdrawn and shy (Kagan et al., 1989) — exactly the characteristics of neglected children (Coie et al., 1989; Dodge, Murphy, & Buchsbaum, 1984; Hymel & Rubin, 1985).

A second STOP system is "conscientiousness," a dimension that emerges as Factor III in the five factor model of personality (Digman, 1990). This personality dimension and its links with adult personality dimensions have been relatively neglected by developmentalists despite evidence linking this dimension with academic success (Digman & Takemoto-Chock, 1981). The scales of *neat, careful* (of own work), *persevering,* and *planful* loaded positively on this dimension, while *irresponsible* and *careless* (of property) loaded negatively (Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981). Correlations between high school grades and assessments of this factor performed 6 years previously were in the .50 range. Similar correlations occurred for occupational status assessed when subjects were in their mid-20s. In addition, two recent large-scale Dutch studies, summarized by Kohnstamm (1991) have found evidence for such a dimension in children, with high positive loadings for scales of *conscientiousness,* and high negative loadings for *distractible, hyperactive,* and *untidy.*

[3] Douglas's (1985) findings of strong emotional response and intense frustration to cessation of reward are compatible with the hypothesis that many ADHD children are high in emotional reactivity. Reactivity is viewed as a temperamental trait by a variety of theorists, including Rothbart (1989; see also Rothbart & Derryberry, 1981), Strelau (1989), and Larson and Diener (1987; see also MacDonald, 1988). Although reactivity is a complex trait, the most salient feature of reactivity involves variation in the intensity of reaction to stimulation (Strelau, 1989). Intense reactivity is often included in clinical descriptions of ADHD children. For example, Wender (1987) notes that ADHD children have mood swings and temper tantrums, and they tend to become overexcited during pleasant (i.e., rewarding) activities; Shaywitz and Shaywitz (1988) note that emotional lability often co-occurs with a diagnosis of ADHD. Jacobvitz and Sroufe (1987) found that ADHD children tended to become overaroused during interactions with their mothers early in life. Finally, MacDonald (1988) found that ADHD children exhibit a pattern of high reactivity to stimulation during physical play sessions: Compared with normal children they tend to show more approach/withdrawal behavior and overarousal. MacDonald (1987) found a similar pattern with non-ADHD rejected children. It is a reasonable hypothesis that the extreme emotional lability of many ADHD children is viewed negatively by their peers and contributes to social rejection.

[4] This technique was proposed by Ronald Kotkin of the Child Development Center, University of California–Irvine.

Kohnstamm (1991) suggests that this factor is represented in studies of temperament by measures of persistence and attention span.

Although the main point of this paper is to discuss the appropriate place of rough, boisterous play in childcare settings, it is necessary to balance this emphasis with advocating the need to socialize the STOP systems as well. The STOP systems also have a clear importance and adaptive function for children, and they subserve a wide range of socially valued behaviors. Although, as indicated above, there is a need for further descriptive research in this area, children who have powerful STOP systems are able to inhibit their behavior at appropriate times, delay gratification, approach problems in a reflective, nonimpulsive manner, focus sustained attention on tasks, and evaluate and defuse potential dangers in a realistic, appropriate manner.

There would be little argument that it is entirely appropriate for children to be socialized in these directions, and indeed, this type of socialization predominates in supervised childcare settings. Training for children diagnosed as ADHD is strongly focussed on these goals (see, e.g., Shaywitz & Shaywitz, 1988, for a review), and there is every reason to advocate training of this nature as an important part of the preschool curriculum. Interestingly, there is recognition in the area of interventions with ADHD children that simultaneously socializing the STOP and GO systems is quite compatible. William Pelham at the Western Psychiatric Institute of the University of Pittsburgh, and Ronald Kotkin and James Swanson at the Child Development Center of the University of California–Irvine have developed a technique in which ADHD children are encouraged to engage in boisterous, disinhibited behavior for a few minutes and then to suddenly calm down completely. Such a technique implicitly acknowledges that engaging in disinhibited behavior is a normal, all-too-common feature of ADHD children's behavior, but that being able to control and modulate these bouts of enthusiasm are crucial abilities for any child. An important goal of this socialization technique is to be able to rapidly achieve focused attention and control even when the child is engaged in highly pleasurable, rewarding situations of high affective intensity and arousal.

I would also suggest that children who are not spontaneously predisposed toward engaging in R & T, including many neglected children and many girls, would benefit by being encouraged to engage in this activity. As indicated above, the GO systems underlie much that is socially valued, and neglected and socially isolated children are often unhappy with their situation to the point that some such children become actively rejected (Rubin, LaMare, & Lollis, 1990). Within the discrete systems approach to socialization, the personalities of these children are viewed as dominated by the STOP systems. However, one means of altering this predominance of the STOP systems is to facilitate the GO systems so that these systems become more powerful and more easily recruited during social interaction. Appropriate socialization and elaboration of the GO systems are expected to make the child more prone to the extroverted, assertive, enthusiastic, neophilic, and sociable behavior that these systems subserve.



Indeed, I would propose that a program in which such children are strongly encouraged to engage in supervised R & T would be an ideal therapy for them. Such an intervention program would have to take account of the reluctance of these children to engage in such boisterous activity, at least initially. This type of intervention would demand considerable social skills on the part of the play partner(s). For this reason I would suggest adults as R & T play therapists for behaviorally inhibited or overly conscientious young children. Such adults would have to be trained to be very attentive to the social cues of the child. Training would have to focus on being able to actively encourage R & T while remaining very aware that the child may easily become overstimulated during this type of activity. Stimulation that may be pleasurable to most children may seem threatening and overwhelming to such a child. Therefore, the child must be accorded a major role in regulating his or her own level of stimulation.

Within this stricture, however, the goal would be to maximize expressions of positive affect during play, especially intense laughter. In my experience, an intensely pleasurable level of stimulation can be found for even highly sensitive, behaviorally inhibited children. Whereas average 4- to 6-year-old children typically find intense swinging, chasing, and tickling games highly enjoyable, these behaviorally inhibited children may find more distal, less intense physical stimulation equally enjoyable. For example, it may not be necessary to actually tickle such a child, because the mere indication that the adult intends to tickle the child (as in the classic "I'm going to get you" game) is enough to send the child into paroxysms of laughter. Being aware of individual differences in children's proneness to arousal is central to developing a play session that is pleasurable and rewarding to the child.

## Conclusion

Implicit in the perspective presented here is the view that socialization should be directed at the complete child and that there should be a time and a place for radically different play styles directed at socializing specific evolved systems. I believe that there is broad agreement that a well socialized child is reasonably high on both the GO and STOP systems. Such a child would be highly motivated by rewards AND able to delay gratification. Such a child would be able to enthusiastically approach new situations with interest and confidence AND show fear and avoidance where this is appropriate. Such a child would be able to shift attention rapidly among interesting, novel stimuli AND be able to narrowly focus attention on potentially useful information or dangerous situations. Such a child would enjoy social stimulation and peer companionship AND would also be able to engage in highly focused, solitary attention in nonsocial situations. Such a child would be able to engage in boisterous, disinhibited play without being aggressive AND be able to be persevering, neat, and careful in the appropriate situations.

In a sense, therefore, I am arguing that we can have our cake and eat it too. (I promise there will be no more clichés.) The basic design of the biological basis

of children's personality is finely tuned to be able to both approach the world and engage in enthusiastic interaction with it — and also inhibit behavior and focus attention. Evolution, like a good engineer, designed children with both a powerful engine (the GO systems) and a good set of brakes (the STOP systems). Both are important, and keen attention should be given to socializing both types of systems in a manner that is socially acceptable to parents and teachers. The problems tend to come when there is a lack of balance between these systems, as would occur if one set of systems completely dominated the other. An imbalance in the direction of the STOP systems would result in an overly inhibited, fearful child, unable to join the fun and interface with the world, and/or obsessed with concerns of neatness or overly concerned with pleasing others. However, an imbalance in the direction of the GO systems results in the ADHD child who is unable to focus attention, is highly prone to seeking high levels of rewarding stimulation, and is unable to inhibit impulsive responding and aggression.

Finally, the five factor model includes a further dimension (Factor II) often labeled *agreeableness* (Digman, 1990; John, 1990), and including items related to seeking out and valuing intimate relationships. MacDonald (1988, 1992) has proposed that this system underlies human affectional relationships and is intimately associated with parent–infant attachment. This dimension is also proposed to underlie relationships of close friendship during childhood and is associated with empathy and prosocial behavior, as well as with conformity to adult values.

Individuals who are high on the GO systems are overrepresented among those with antisocial behavior disorder, but it is by no means the case that all such individuals are antisocial (Cantwell, 1990; Farley, 1981, 1985a; Mannuzza et al., 1988). A DST perspective suggests that tendencies towards affection and intimacy will moderate the general tendency toward antisocial, aggressive behavior (MacDonald, 1988, 1992). Consistent with this perspective, Hinshaw (1987) finds that hyperactive-aggressive children tend to have negative, hostile family relationships, but this is not the case for hyperactive children who are nonaggressive.

Although it would appear that the primary socialization of the affectional system is ordinarily performed by parents during infancy, the socialization of this system would also be a reasonable goal for supervised childcare settings. Adult–child relationships in childcare settings based on warmth and affection may be reasonably viewed as having a positive influence on this system, and there would be little disagreement that the facilitation of this system would be a socially acceptable goal for supervised child care.

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