Altruism in Animal Play and Human Ritual

Garry Chick
College of Health & Human Development Penn State University 801 Ford Building University Park, PA 16802; gchick@psu.edu

"These good acts give pleasure, but how it happens that they give us pleasure? Because nature hath implanted in our breasts a love of others, a sense of duty to them, a moral instinct, in short, which prompts us irresistibly to feel and to succor their distresses." Thomas Jefferson, letter to Thomas Law Poplar Forest, June 13, 1814

1. Introduction

Altruism is generally defined as the selfless concern for the wellbeing of others or, in the case of nonhuman animals, as behavior that appears to be detrimental to the survival of a given individual but which may contribute to the survival of others. Calls by social prey species that warn others of the approach of predators, for example, are often regarded as altruistic in that they may help the majority of animals survive while simultaneously drawing the attention of the predator to the individual giving the warning. Animal play and human ritual are areas that are not commonly considered to involve altruism but closer inspection may be warranted. I will argue below that play is the context wherein animals first exhibit, and learn, altruism and that it is displayed by some, although perhaps not all, participants in a ritual form common in Latin America.

Numerous efforts have been made to explain animal play. While there is general consensus on what is and what is not play, there is far less agreement on what motivates play. For example, play has been described as a means to rid organisms of excess energy, a way of learning about one's environment (including others of one's species), a form of practice of adult behaviors by juveniles, and a mechanism for maintaining optimal levels of arousal. Each of these may have some merit but all are, at best, proximate explanations. For example, why should play be needed to get rid of excess energy or maintain optimal arousal when the evolution of homeostatic mechanisms to do the same things would seemingly not involve some of the negative features of play? Play, it turns out, is dangerous. Animals at play waste valuable energy and expose themselves to injury or predation. Moreover, in social play, animals in the context of play fighting commonly seem to "lose" to others on purpose. Is this behavior, seemingly detrimental to one individual but advantageous to another, a form of altruism?

Similarly, some forms of human ritual appear to be selfless, at least to some extent. For example, in many villages in Latin America, festivals honoring saints in local Catholic pantheons are sponsored, organized, and funded by community members. Such a sponsorship is commonly known as a *cargo,* the Spanish term for "burden." And, in fact, many of these are major burdens, in terms of money and time, for sponsors. Why do individuals participate in them? Various explanations have been offered, including that the *cargo* system acts as an

economic leveling system, but why individuals would choose to be "leveled" is unclear (e.g., Nash 1958). The system may also function as a means by which villagers can acquire prestige (e.g., Cancian 1965). Indeed, those who hold the highest *cargos* in their villages typically are accorded elder status with decision-making power. However, of the many who participate in the system, only a few ever make it to the top.

An alternative explanation is that *cargo* holding is an example of altruistic service to the members of one's community, much as social play may contribute to the well-being of groups while having potential or real harmful effects for individuals. The purpose of this paper is to explore the issues of animal play and human ritual as possible examples of altruistic behavior.

2. Why Play?

Darwin (1936:448 [1871:448]) wrote, "Happiness is never better exhibited than by young animals, such as puppies, kittens, lambs, &c., when playing together, like our own children." Ethnologist and animal lover Marc Bekoff (2003, p. 929) characterizes play in terms of "Five S's:" "Spirit, Symmetry, Synchrony, Sacredness, and Soulfulness." For Bekoff, symmetry and synchrony refer to the mutual agreement of playing animals to trust each other, thus preventing rough-and-tumble play from morphing into genuine fighting. He regards this trust as sacred. This sacred agreement between or among playing animals to trust that everyone will continue to play and not cross the line into aggression is what I will deal with here.

In a keynote address to The Association for the Study of Play in 1998, I asked the question "What is play for?" I asked the question because none of the extant theories of play seemed to me to answer the question either entirely, in some cases, or satisfactorily, in others. Some, such as the surplus energy theory or the preparation theory, have obvious weaknesses. The former fails to explain why animals will play until near collapse and, perhaps more important, why animals would have such a thing as "surplus energy" in the first place. The latter fails to explain why many animals, dogs, people, and others, remain playful as adults, long after they should have already "prepared" themselves for life. Other, more recent, theories, such as the optimal arousal theory and the competence-effectance theory, have similar problems. Why has a safer way to regulate arousal not evolved given play's many hazards? Feeling a need to have an effect on things seems to anthropomorphize animal play and "adultomorphize" children's play. Why have such a need?

Another difficulty with surplus energy, preparation, relaxation, catharsis, psychoanalytic, stimulus-response, arousal seeking, competence-effectance and other traditional theories of play (cf. Ellis 1973) is that all deal with proximate, but not ultimate, causal explanation (Chick, 2001). As noted by Goldsmith (1991:7), "Proximate cause has to do with the characteristics of the organism that one can see—characteristics that are the final expression of the genetic program (the genotype) that is present in the fertilized egg from which the organism grew." Ultimate cause, however, "… is the province of the evolutionary biologist who is interested in the historical origins of genotypes. … [I]t was Charles Darwin's

contribution to bring ultimate causation to center stage and make evolutionary explanations of "why" a respectable, in fact necessary, part of science." We must remember, however, that proximate and ultimate explanations are complementary, not contradictory or either-or (Goldsmith 1991).

Play is Important

In my address to The Association for the Study of Play,[1] I attempted to provide an ultimate, and hence evolutionary, explanation for play. Explanations of ultimate causation of play (e.g. Lewis 1982; Poirer 1982; Smith 1982) that invoke natural selection have not been especially successful, however. For play to be selected, at minimum, long-term benefits must outweigh immediate costs. While long-term benefits might include such things as learning necessary adult skills or establishing social rank, why should adult animals continue to play after these have already been accomplished? Hence, the problem with invoking natural selection to explain play is that play should, in fact, be selected against, not for. Play is, in an immediate sense, both dangerous and useless. A player can get injured, eaten by a predator, or waste time and energy that could better be devoted to survival tasks. It is therefore not surprising that, of all of the species of animals on the planet, very few play. On the other hand, among mammals, play is ubiquitous and it occurs among some birds, possibly some reptiles (Burghardt 1998), and perhaps even cephalopods (e.g., the octopus [Service 1998]). While play among mammals, where we know it best, is much more common among juveniles than adults, it does occur among adults, as well. Adult play might be regarded as a residual from adolescence but that explanation is not very satisfying.

I began my argument by making the obvious claim that play must be important for something simply because it is so common among mammals, in particular, and its frequency seems to correlate positively with such things as longer life spans, relative size and complexity of the neocortex.[2] Play, as mentioned earlier, also seems to be most common among juveniles who are in their most rapid stage of cortical development, and involves behavior patterns adapted from other contexts (e.g., fighting, fleeing, feeding, and mating). Finally, and at the risk of anthropomorphization, play seems to be fun (Chick 2001). So, play is important. The problem is that there is really very little evidence to support the generally hypothesized functions of play, such as skill development, social bonding, learning, cognitive development, problem solving skills, or the development of behavioral plasticity (Bekoff and Byers 1981; Fagen 1981; Smith 1982, 1995). Indeed, Fagen (1981) points out that, in some cases, play follows the mastery of some skills, rather than preceding it. So, it may be that play is not adaptive in the traditional natural selection sense of the term.

Playfulness in Mate Preference

I proposed that play and playfulness may be artificially or sexually selected, rather than the results of natural selection. Darwin (1859) devoted a substantial portion of his *Origin of Species* to artificial selection, drawing on his knowledge of pigeon breeding, in particular. If humans are interested in breeding animals or plants with certain characteristics, we breed

those who already have more of those characteristics than other members of species. Fast flying pigeons tend to have offspring that are also fast. That humans engage in artificial selection of each other is not at all far-fetched. All that we have to do is be somewhat discriminatory among those with whom we mate. To the extent that characteristics, both physical and behavioral, are related to genotypes, we can move those characteristics in desired directions on the basis of who we mate with. Sexual selection also probably plays a part. Darwin (1859) proposed that sexual selection is of two varieties: competition (mostly among males) and choice (most exercised by females). That humans engage in sexual selection, of both types, is hardly newsworthy. Both males and females compete for mates in numerous ways. We display wealth, status, beauty, and other presumably desirable characteristics and, ultimately, fight, if necessary. We also lie, cheat, and otherwise attempt to deceive by "putting our best foot forward" while hiding undesirable characteristics. Clothing, makeup, and certain behavior patterns are used to deceive potential mates as well as rivals. We artificially select dogs and cats to be playful, so why shouldn't we select each other?

If, as I hypothesized in 1998, play and playfulness are things that humans seek in prospective mates, then it should be possible to test this proposition by asking informants to evaluate the characteristics that they regard as desirable in a mate.[3] Buss (1989, 1993) and others (e.g., Buss and Barnes 1986; Hill 1945; Hudson and Hense 1969: McGinnis 1958) have already done this, asking individuals to rate or rank characteristics they seek in a prospective mate. Unfortunately, play and playfulness have never been included among those characteristics. Hence, in an ongoing study, my colleague Careen Yarnal and I asked samples of college undergraduates (individuals who are certainly interested in mating behaviors) to rate a list of characteristics in terms of their desirability in an individual with whom they would consider having a long-term relationship. We used many of the same characteristics as Buss (1989) and Buss and Barnes (1986) which, in turn, were derived from earlier studies of mate preference and selection (Gough 1973; Hill 1945; Hudson and Henze 1969; McGinnis 1958). Buss and Barnes (1986) used self-reports about backgrounds and on several standard psychological tests,[4] spouse reports, interviewer ratings, and a vocabulary test as an index of verbal ability. One of the psychological tests, the Marital Preferences Questionnaire (MPQ, Gough 1973) had 76 items that were designed to represent a wide range of possibly desirable or undesirable characteristics in a potential mate. Informants were asked to rate traits, such as *adaptable, dominant, frugal, good cook, intelligent, physically attractive,* and *witty*, on a 5-point scale that ranged from very undesirable to very desirable. For a second part to their study, Buss and Barnes (1986) selected 13 characteristics, based partly on factor analyses of the original 76 items of the MPQ and partly on a review of the literature. They then asked a sample of 100 undergraduates (50 males, 50 females) to rank order these 13 characteristics from most to least desirable in a "potential mate or marriage partner." The 13 characteristics were: *kind and understanding, religious, exciting personality, creative and artistic, good housekeeper, intelligent, good earning capacity, wants children, easygoing, good heredity, college graduate, physically attractive, and healthy.*

Three items differed significantly by gender. These were *physically attractive* (with males ranking that characteristic more important in a potential mate), *college graduate* (with males ranking that characteristic more important in a potential mate), and *good earning capacity* (with females ranking that characteristic more important in a potential mate).

In a pilot study, I used Buss and Barnes's 13 items but added *playful* and *sense of humor* with a small sample of undergraduate students as part of an exercise in a research methods class. Because there were 15 items in my list, I was concerned that it would be unwieldy for informants to rank order them, so I asked the 47 undergraduates to rate the desirability of the items in "someone with whom you might have an enduring relationship that may include long-term partnership, marriage, and children" on a scale of 1 – 10 with 1 indicating that the characteristics was "not at all desirable" and 10 that the characteristic was "extremely desirable."

Since Buss and Barnes had their informants rank order the 13 items in their study while I had my informants rate 15 items, the two sets of results cannot be compared in any direct or unambiguous way. However, it is possible to rank order the 13 common items from the two studies and then show where *playful* and *sense of humor* fit in comparison to the other items.[5]

Table 1. Means (and rank orders) of mate preferences by gender from Buss & Barnes (1986) and Chick, adding Playful and Sense of Humor.

Characteristics	Buss and Barnes		Chick	
	Males (N=50)	Females (N=50)	Males (N=23)	Females (N=24)
Kind and understanding	2.43 (1)	2.08 (1)	8.91 (1)	9.33 (1)
Sense of Humor	---	---	8.61 (2)	9.00 (2)
Playful	---	---	8.13 (6)	8.67 (3)
Exciting personality	2.63 (2)	3.28 (2)	8.17 (5)	8.17 (7)
Intelligent	3.78 (3)	3.44 (3)	8.30 (4)	8.42 (6)
Physically attractive	4.04 (4)	6.26 (6)	7.96 (7)	6.67 (9)
Healthy	5.49 (5)	5.84 (5)	7.39 (8)	7.58 (8)
Easygoing	5.67 (6)	5.72 (4)	8.50 (3)	8.58 (4.5)
Creative	8.33 (8)	7.56 (7)	6.83 (9)	5.92 (13)
Wants children	8.01 (7)	8.82 (10)	6.70 (10)	8.58 (4.5)
College graduate	9.41 (9)	7.94 (8)	6.04 (11)	6.50 (10)
Good earning capacity	9.92 (11)	8.04 (9)	3.43 (15)	6.42 (11)
Good heredity	9.71 (10)	10.34 (11)	3.65 (13)	6.33 (12)
Good housekeeper	10.22 (12)	10.56 (12)	4.17 (12)	5.50 (15)
Religious	10.24 (13)	11.12 (13)	3.52 (14)	5.92 (14)

Buss and Barnes (1986) asked students to rank order characteristics starting with the most desirable, so *kind and understanding* ranked first for both males and females while I asked students to give the highest number (on a 1 – 10 scale) to the characteristic they regarded as most desirable. Hence, the numerical order of the means for Buss and Barnes' informants and for mine is reversed although the rank orders correspond directly. Correlations of the means from Buss and Barnes' and my data (with the means for *sense of humor* and *playful* treated as missing) are given in Table 2.

Table 2. Correlations of the means for 13 personal characteristics from Buss & Barnes (1986) and Chick.

	Males (Buss and Barnes)	Females (Buss and Barnes)	Males (Chick)
Females (Buss and Barnes)	0.934		
Males (Chick)	-0.657	-0.648	
Females (Chick)	-0.766	-0.777	0.589

These correlations are relatively strong and all are significant at the 0.01 level suggesting that the undergraduates in the two studies viewed the characteristics in a relatively similar fashion. It is therefore likely that, had Buss and Barnes included *sense of humor* and *playful* in their list of characteristics, their results would have been similar to mine. In turn, this means that having a sense of humor and being playful are characteristics that undergraduates at least claim to seek in a mate or long-term partner, supporting my contention in my 1998 address that we may have artificially selected ourselves for playfulness.[6]

Play and Altruism

Bekoff (2003) has observed that cheaters among infant coyotes, those that bite aggressively rather than "pulling their punches" during play, are less likely to be chosen as play partners by others. Those who play by the rules are much more likely than cheaters to get others to play with them. Other observations indicate that, during play, activities such as role-reversal and self-handicapping occur. Role reversal is a situation when a dominant animal assumes a more passive stance that would not occur during actual aggression. Dominant animals would not choose to roll onto their backs during a real fight but often do so during play (Bekoff 2003). Self-handicapping is similar. In self-handicapping, animals "pull their punches" by biting less vigorously, or otherwise acting clumsily in what Miller (1973) called "galumphing."

Bekoff's (2003) explanation for careful use of play signaling, self-handicapping, and role reversal is that animals at play are having fun in a relatively safe context but also are learning rules about how they should behave with respect to others. How hard can they bite, how rough can they play, in a fashion still acceptable to others? As Roberts and Sutton-Smith (1962) claimed more than 40 years ago, Bekoff suggests that play is a context in which social skills can be learned with minimal penalties for breaking rules. Breaking similar rules in real life can carry major consequences. Among humans, these can range from a disapproving look to execution. For Bekoff, play "speaks to the evolution of social morality" (2003, p. 931). For

social animals, cheating may lead to shunning or exclusion, which may, in turn, jeopardize the cheater's opportunity for survival and reproduction. Years ago, Trivers (1971) provided the theory and Axelrod (1984) the evidence to solve the problem of reciprocal altruism. In social animals, training for reciprocal altruism appears to begin in play.

Play and Social Morality in Humans

In 1969, Stuart Brown was a member of a team of researchers directed by then-governor John Connally of Texas to determine why Charles Whitman entered the University of Texas Tower on August 1, 1966, with a high powered rifle and killed 16 people and wounded 31 before being killed himself. The multidisciplinary group, consisting of pathologists, toxicologists, neuroanatomists, graphologists, sociologists, anthropologists, and others, reconstructed Whitman's life in detail based on interviews of family members, teachers, and his family physician, the examination of childhood drawings, medical and military records, his diaries, school records, home movies, photographs. According to Brown,

> The task force concluded that the conditions which led to his violent and tragically destructive behavior were set in motion early by specific family experiences, which included much physical and emotional abuse, playlessness, paternal over-control, practice with weapons, and other factors, these recurring repeatedly through his life. … We interpreted the final violent and suicidal acts as being triggered by his sense of powerlessness, humiliation and entrapment. His inability to find coping techniques through play, humor, safe reciprocal friendships and other distancing and stress-lowering habits were striking findings agreed upon as extremely significant by our team. We had originally expected to discover a brain tumor and drugs as primary causal agents, but our intensive investigation weighted abuse and playlessness as *the* major factors placing him and his future victims at risk (1998, pp. 247-248).

Brown and Lomax (1969) then studied the cases of 26 young males whose only crime was homicide and who had been convicted two years or less before the study. They compared these individuals with matched samples of other young males and found that significant physical abuse had occurred in 90% of those convicted of murder and, unexpectedly, that 90% had also experienced play deprivation and/or major play abnormalities. Less than 10% of the members of the non-homicidal groups had experienced either physical abuse or play abnormalities (Brown 1998). During this study of young murderers, Brown was also the principal investigator of a multidisciplinary project involving the sequential examination of all fatal auto accidents in Harris Country, Texas, during one year. The team used similar interview and other data as in the murderer study. While individuals involved in fatal auto accidents did not exhibit any significant evidence of childhood physical abuse and, as expected, 70% of the cases involved alcohol, the play histories of drivers killed in auto accidents were very similar to those of the murderers and different from those of control group members. Brown concluded that these studies consistently showed that "normal play behavior was virtually absent throughout the lives of highly violent, anti-social men

regardless of demography" (1998, p. 249). While Brown speculated that abuse and play deprivation take devastating tolls on women, he and others did not study sufficient numbers of women to generalize about the effects of play deprivation on them.

The same may be true of our closest animal relatives. In 1975, Jane Goodall observed that one of the chimpanzees in Gombe, Passion, killed and ate the infant of another chimp, Gilka, and shared the meat with her own daughter, Pom. The two continued to kill and eat infants for two years. According to Goodall, both Passion and Pom had been mothered ineffectively and had played abnormally as infants and adolescents. Between 1974 and 1978, only one of the ten infants born to the chimpanzees at Gombe survived. Passion and Pom killed and ate five for certain with three others probable. The attacks stopped only when Passion and Pom both gave birth themselves (Goodall 1979).

Play seems to be important, based on the evidence presented above, in terms of mate selection among humans, the development of altruism in social animals, and a correlate of the lack of play among playful animals, both human and non-human appears to be antisocial behavior. That play is important is difficult to dispute because of its ubiquity among mammals; that it appears to have a significant role in the development of altruism provides a strong reason for that ubiquity.

3. WHY RITUAL?

Human culture, defined as socially transmitted and shared information, generally in the forms of beliefs and values, can be roughly divided into its utilitarian and expressive aspects. The former deals with making a living and raising a family while the latter gives meaning to much of the former as well as to life in general. Rituals, if defined as organized and generally repetitive sets of symbolic acts designed to communicate meaning, are important parts of expressive culture. Rituals can be both sacred and secular. In religious contexts, ritual usually involves an effort to communicate, and influence, supernaturals. Rituals are used to remove sin, bring rain, grow crops, heal the sick, get politicians elected, make graduations memorable, unite couples in marriage, and get sports events underway, among others.

One relatively well-studied set of ritual events, the *cargo* (Spanish for "load" or "burden") or *fiesta* (Spanish for "festival") system, has taken place in much of Latin America since the 16th century. The *cargo* system is an important religious (and now often secular) system that consists of a set of more or less hierarchically organized offices, generally held for the duration of one year, wherein community members sponsor and administrate events based on the local religious calendar (Carrasco 1961; Cancian 1965, Chick 1981, 1989, 2001, Dewalt 1975). In some cases, individuals alternate between holding religious and secular political offices while, in others, the religious and political systems are distinct. In San Rafael Tepatlaxco, a community of approximately 1,050 in the state of Tlaxcala, Mexico, where I did field research in 1977-80, the religious and the political systems were separate. I will describe the system, as it existed when I was there, below. Most of the systems in traditional communities in Latin America are similar in both structure and, most likely, in function.

The rule of thumb in San Rafael Tepatlaxco was that if there was an image of a saint in the village church, then a festival must be sponsored in the honor of that saint during the year. However, not all festivals were created equal. Some, such as the festival in honor of Saint Rafael, the patron of the village, were very elaborate (and expensive). The festival of Saint Rafael lasted for two weeks in October. The festival in honor of the Virgin of Guadalupe, the patron saint of Mexico, was also very elaborate and lasted for a week in December (the national celebration falls on December 12). These two festivals were sponsored and organized by three men each. The *mayordomo* was always an older, experienced hand at festival sponsorship and he was aided by two assistants, the *devoto* and the *topile*. Collectively, the group was referred to as *mayordomos* and the sponsorship itself, the *cargo*, was termed a *mayordomía.* Twelve other saints were honored with festivals but all of these were considerably less elaborate than those of Saint Rafael and the Virgin of Guadalupe. Two individuals, the *mayordomo* and the *devoto* constituted the *mayordomos* for each of these smaller festivals, which ranged from a 3-day celebration for *la Vírgen Purísima* to nothing more than a dinner with a few guests for *San Gabriel.*

While, in many Mesoamerican and other Latin American communities, the *mayordomos* themselves supported the festival with their own money, in Tepatlaxco, most expenses were defrayed through donations collected from community members (and the visiting anthropology student). So, while the *cargo* system has been described in the anthropological literature as a "leveling system" whereby resources are redistributed among community members (e.g., Nash 1958), this was not quite the case in Tepatlaxco because of the support from community members. Nevertheless, the *mayordomos* spent considerable time and effort on organizing the festivals. Cancian (1965) claimed that the *cargo* system acts as a stratifying mechanism that separates the community into multiple levels of social status through the award of prestige to *cargo* holders. He claimed, as well, that *cargo* holding legitimized difference in wealth that already existed, leading to community homeostasis and internal accord. This explanation is dubious for Tepatlaxco for, while wealth and status distinctions were evident, there was no obvious correlation between wealth and status in the community or between wealth and *cargo* service.

Why did villagers spend so much time and effort on the *cargo* system? It might have been an economic leveling system in some places but that clearly was not true in Tepatlaxco. The sponsorship of festivals in honor of saints certainly had religious aspects. Community members in Tepatlaxco were nearly all Roman Catholics (there were two families of Protestants in the village, as well), and in their Catholicism the saints were intermediaries to God. Hence, propitiation of the saints was important. However, given the range of activities that were held during the festivals, including sports, games, dances, feasting, parades, the consumption of vast quantities of alcohol (generally in the forms of beer, brandy, and *pulque*, the local beverage fermented from the sap of the *maguey* or agave cactus), the construction of elaborate *alfrombras* (depictions of religious scenes on the church floor made from flower petals), in addition to masses and other religious events, the *mayordomos* also were the primary providers of community-wide recreation in the village (Chick 1991). It was pretty

obvious that most of these activities had little to do with religious devotion. But they did clearly involve community involvement and service.

That the *mayordomos* garnered some measure of prestige and community influence—especially from sponsorship of the higher ranked *cargos*—doesn't make their activities any less selfless. Indeed, as I showed in a 1989 paper, there were three types of individuals (men) in the village, two of whom participated in the system and one who did not. The latter group consisted largely of men who were involved in daily, weekly, or longer period migrant labor. Individuals might commute (by bus) daily to nearby villages or towns or to the large city of Puebla, some 20 km. distant. Others would commute to Mexico City or other cities on a weekly basis while still others participated in seasonal migration to places such as Veracruz for agricultural work. Many of the older men of the village had participated in the *bracero* program in the 1950s and early 1960s and had been to places like Texas, Arizona, and Kansas but also to Illinois and Michigan (where they picked sugar beets). These men sometimes told me that they would like to participate in the *cargo* system but could not because of their work situation. Others, older individuals or those who were still participating, sometimes claimed that those who used their work as an excuse to avoid *cargo* service were simply lazy or not community minded.

Two groups of individuals did participate. The men in both of these could be distinguished by their patterns of *cargo*-holding. One group held offices in a pattern generally concordant with the hierarchical organization of the offices. That is, they began their *cargo* careers with relatively low ranking, cheaper, and less onerous offices and successively held higher ranked offices until they completed the highest office in the system. They then became village elders and wielded substantial decision-making authority, especially with respect to the *cargo* system itself. Individuals in the second group often held as many offices as those who went on to become elders but, instead of holding successively higher offices, they muddled around in the lower and middle levels of the system, sometimes holding higher offices, sometimes lower, and sometimes on the same level as their previous office. We could argue that the non-participants and the elder status seekers were acting selfishly in their own ways but it would be very difficult to do that with respect to the muddlers.

Moreover, members of the two Protestant families in the village commonly participated in the *cargo* system despite the fact that the *mayordomías* were held to honor Catholic saints. Their participation had nothing to do with religious devotion; their participation was not going to save their souls, at least in their minds. A couple of the Protestant men told me that they participated because Tepatlaxco was their village, their home, and the others who lived there were their friends and community members. So their service in Catholic festivals (and in construction projects on the [Catholic] church in the village) made complete sense to them as a contribution to their community and its members. In turn, the Protestant families were treated well, if occasionally with a bit of suspicion, and were regarded as integral members of the community.

Kurzban and Houser (2005:1803) suggest that humans come in three types with respect to cooperation. First, there are cooperators, "who contribute to generating group benefits at a cost to self." Second, there are "free-riders, who do not incur these costs." Finally, there are "reciprocators, who respond to others' behavior by using a conditional strategy." They conducted an experiment consisting of multiple players, in groups, in a computer simulation wherein players allocated tokens to individual and group exchanges in order to gain points. Kurzban and Houser termed those who contributed little most of the time to the pooled exchanges free-riders. Those who contributed a great deal most of the time were cooperators and those who contributed an amount that was about equal to that of others were reciprocators or "conditional cooperators." The authors based their inferences about their informants' types by a plot of each player's contributions compared with the average contribution observed before the player made his or her contribution. Cooperator's contributions were well above the 45° line on the plot while free-rider's contributions were well below the line. Reciprocators' contributions clustered near the 45° line. Kurzban and Houser found 17 of their 84 informants (20%) to be free-riders, 11 (13%) to be cooperators, 53 (63%) to be reciprocators, and 3 to be unclassifiable according to their criteria.

Kurzban and Houser (2005) feel that their findings support the idea of multiple and stable behavioral types that vary in terms of willingness to cooperate in group contexts. Their results corroborate results from social psychology where researchers classified people as competitors (motivated to get better payoffs than others), cooperators (motivated to contribute to group welfare), and individualists (motivated to serve their own interests) (e.g., Komorita and Parkes 1995) and experimental economics where people were found to be "spiteful" (competitors), "altruistic" (cooperators), and "payoff-maximizing" (individualists) (e.g., Cason et al. 2004).

I suggest that these characterizations fit the three types of interactions with the *cargo* system that I observed in Tepatlaxco from 1977-80. Those who completely avoided participation in the system might be termed "free-riders" as they often enjoyed the fruits of the system (i.e., the festivals and associated activities) but contributed nothing to it. Those whose "*cargo* careers" closely paralleled the hierarchical organization of the system and passed the highest office, thus becoming village elders, were individualists who maximized their payoffs. Those who I termed "muddlers" above participated intermittently but seemed to do so in order to contribute to the community. As such, they were cooperators or *altruists*.

I collected the *cargo* careers of 60 individuals from the local church records. The names of *cargo* holders were recorded each year, beginning in 1920 when Tepatlaxco achieved *Pueblo* status and henceforth held *mayordomías* separately from Santa Ana Chiautempan, the local municipal seat. The data are relatively complete although the books for three years (1947, 1949, and 1951) were missing. I was able to partially complete the lists of officeholders for these years from the records of other years. Additionally, data for several of the lowest ranking *cargos*, the *Mayordomía del Santo Entierro*, the *Mayordomía del Divino Rostro*, and the individual days of the Holy Week were often not recorded. Hence, I excluded these from my analyses.

Twenty-seven of the 60 individuals had achieved the status of elder in Tepatlaxco; that is, they had passed the highest office in the community, that of *fiscal* (the *fiscal* is the chief officer of the *fiscalía,* the lay governing body of all religious activities in the village). These men had held between 5 and 11 (mean = 6.95, SD = 1.68) offices. Of the remaining 38 individuals, 2 had reached the second highest level of the hierarchy (the *Mayordomo de San Rafael*), 8 had reached the third highest level (*Mayordomo del Niño Dios*), 13 had reached the fourth level (several offices) and 10 the fifth (several offices). It should be pointed out that several of the individuals who had not reached the highest office still had the opportunity to do so. I did not gather data to determine who failed to hold any offices.

So, 45% of the 60 individuals had *cargo* careers that could be regarded as competitive; that is, they were motivated to surpass the efforts of others in the system, while 55% were cooperators in that they seemed to participate in order to advance the welfare of the community. Since I could not determine the number of non-participants, the percent of "free-riders" cannot be calculated. While the 45%-55% ratio of competitors and cooperators seems to differ from the 63%-13% of reciprocators and cooperators that Kurzban and Houser (2005) found in their sample, the contexts these data represent were very different. Since I chose to ignore *cargo* careers of individuals who had held fewer than 5 offices, and since none of the competitors had held fewer than 6 offices, it's certain that more than 55% of the individuals who participated at all in the system were cooperators, or *altruists.*

It is impossible to determine whether the *cargo* system engenders altruism or merely allows it to be exhibited by those who are already altruistic. My guess would be the latter. However, I was surprised to find instances where individuals who had already attained elder status in Tepatlaxco (an elder is known by the Nahuatl term *tiaxca*) held additional *cargos,* often at relatively low levels in the system. When I asked about this behavior, several of them explained to me that no one was now willing to take on those *cargos* and, therefore, someone had to do so to keep the system working properly. So, even those who I classified as competitors above became cooperators when the system that supplied their status was endangered.

4. SUMMARY

Social animals learn pro-social behavior in the context of play. The evidence discussed above suggests that we have selected ourselves to be playful and that non-human animal play commonly involves altruism and may be instrumental in learning to be altruistic. Of the people who participated in the *cargo* system I studied in Tepatlaxco in 1977-80, slightly more than half appeared to do so for largely selfless reasons. In the past, before Tepatlaxco had easy access to the outside (prior to 1954, it was connected to Santa Ana Chiautempan only by footpath while, in 1980, several busses per day traveled the 14 miles up and down the mountain from Chiautempan to Tepatlaxco) community members were surely much more interdependent and cooperative behavior was more important than in recent years. So, the

extent to which participation in the *cargo* system involved both altruistic behavior and the learning of such behavior was on the decline in 1977-80 and has continued since.

The role of purely biological factors as opposed to behaviors expressed, such as engaging in play and ritual behavior, is beyond the scope of this paper. However, I would like to note that it is likely that neurotransmitters, such as dopamine, and hormones, such as oxytocin and vasopressin, have functions in the development of prosocial and altruistic behavior. Rilling and his colleagues (2002:395) used functional magnetic resonance imaging (fMRI) to scan the brains of 36 women while they played an iterated Prisoner's Dilemma Game and found that "Mutual cooperation was associated with consistent activation in brain areas that have been linked with reward processing: nucleus accumbens, the caudate nucleus, ventromedial frontal/orbitofrontal cortex, and rostral anterior cingulated cortex." As it turns out, these brain areas, which are also activated by pleasurable things such as desserts, beautiful faces, sex, and "recreational" drugs (e.g., cocaine), are rich in dopamine, a neurotransmitter associated with the brain's reward system. Oxytocin, a hormone that initiates birth contractions in mammals and is produced during breastfeeding, stimulates maternal behavior in females and bonding between mothers and offspring. Virgin female rats will display maternal behavior when infused with oxytocin while the infusion of antibodies that neutralize oxytocin prevents mother rats from nursing their pups (Pedersen et al. 1992). Both oxytocin and vasopressin apparently have roles in other prosocial behaviors, as well, such as pair bonding, and overlap areas rich in dopamine (Bartels and Ziki 2000; Wang and Aragona 2004).

I was unable to find any research suggesting that either play or ritual behavior affects dopamine or oxytocin levels but that may be because no one has ever looked into the possibility of such relationships.

5. NOTES

1. Later published in *Play and Culture Studies* 3:3-25.

2. The relatively recent recognition that many birds exhibit complex cognitive behavior, often comparable to presumably "higher" animals, such as chimpanzees, suggests that "bird brains" are more capable than previously thought. Since bird brains are quite different structurally from mammalian brains, this statement may not hold true outside of mammals.

3. It is possible, of course, that people's actual behavior may differ. That is, the traits that they claim to prefer may not be those that figure most prominently in actual mates. (cf. Pérusse 1994).

4. Buss and Barnes (1986) used all or parts of the Marital Preferences Questionnaire (Gough 1973), the California Psychological Inventory (Gough 1957), the Eysenck Personality Questionnaire (Eysenck and Eysenck 1975), the Interpersonal Adjective Scales (Wiggins 1979), the Interpersonal Dependency Scales (Hirshfield et al. 1977), the EASI Temperament

Scales (A. H. Buss and Plomin 1975), the Personal Attributes Questionnaire (Spence and Helmreich 1978), the Public and Private Self-Consciousness scale (Fenigstein, Scheier, and Buss 1975), and the General Vocabulary Test (Gough and Sampson 1974).

5. My colleague Careen Yarnal and I are currently analyzing data from a replication of this study with a 28 item list and a much larger sample of undergraduates.

6. In a recent study, Bressler and Balshine (2006) found that undergraduate women evaluating men, but not men evaluating women, found humorous individuals as preferred partners for relationships.

6. REFERENCES CITED

Axelrod, R.
1984 *The Evolution of Cooperation*. New York: Basic Books.

Bartels, A. and S. Zeki
2000 The neural basis of romantic love. *Neuroreport* 11:3829-3834.

Bekoff, M.
2003 Minding animals, minding Earth: Old brains, new bottlenecks. *Zygon* 38:911-941.

Bekoff, M. and J. A. Byers
1981 A critical reanalysis of the ontogeny of mammalian social and locomotor play: An ethological hornet's nest. In, *Behavioral Development: The Bielefeld Interdisciplinary Project* (K. Immelmann, G. W. Barlow, L. Petrinovich, and M. Main, eds.). New York: Cambridge University Press. Pp. 296-337.

Bohnert, P., S. L. Brown, J. P. Smith, and A. D. Pokorny
1968 *Drivers Who Die: A Multidisciplinary Report*. Washington, D.C.: U. S. Department of Transportation, Grant F-I 1-6798.

Bressler, E. R. and S. Balshine
2006 The influence of humor on desirability. *Evolution and Human Behavior* 27:29-39.

Brown, S. L.
1998 Play as an organizing principle. In, *Animal Play: Evolutionary, Comparative and Ecological Perspectives* (M. Bekoff and J. Byers, eds.). Cambridge, UK: Cambridge University Press. Pp. 243-259.

Brown, S. L., and J. Lomax
1969 *A Pilot Study of Young Murderers*. Austin, TX: Hogg Foundation annual report.

Burghardt, G. M.
1998 The evolutionary origins of play revisited: Lessons from turtles. In, *Animal*

Play: Evolutionary, Comparative and Ecological Perspectives (M. Bekoff and J. Byers, eds.). Cambridge, UK: Cambridge University Press. Pp. 1-26.

Buss, A. H. and R. Plomin
1975 *A Temperament Theory of Personality Development.* New York: Wiley Interscience.

Buss, D. M.
1989 Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences* 12:1-49.
1993 *The Evolution of Desire.* New York: Basic Books.

Buss, D. M., and M. Barnes
1986 Preferences in human mate selection. *Journal of Personality and Social Psychology* 50:559-570.

Cancian, F.
1965 *Economics and Prestige in a Maya Community*. Stanford, CA: Stanford University Press.

Carrasco, P.
1961 The ladder system in Mesoamerica. *American Anthropologist,* 63:318-334.

Cason, T. N., T. Saijo, T. Yamato, and K. Yokotani
2004 Non-excludable public goods experiments. *Games and Economic Behavior* 49:81-102.

Chick, G.
1981 Concept and behavior in a Tlaxcalan *cargo* hierarchy. *Ethnology* 20:217-228.
1989 Expressive and instrumental components of participation in a Tlaxcalan *cargo* hierarchy. In, *The Content of Culture: Constants and Variants. Studies in Honor of John M. Roberts* (R. Bolton, ed.). New Haven, CT: HRAF Press. Pp. 441-454.
1991 Acculturation and community recreation in rural Mexico. *Play and Culture* 4:185-193.
1998 What is play for? Invited keynote address presented at the annual meeting of The Association for the Study of Play, St. Petersburg, FL, February 18-22.
2001 What is play for? Sexual selection and the evolution of play. *Play and Culture Studies* 3:3-25.

Darwin, C.
1859 *On the Origin of Species.* London: Murray.
1936 *The Descent of Man and Selection in Relation to Sex.* New York: Random House. (originally 1871).

Dewalt, B. R.
1975 Changes in the *cargo* systems of Mesoamerica. *Anthropological Quarterly* 48:87-105.

Ellis, M. J.
1973 *Why People Play.* New York: Prentice Hall.

Eysenck, H. J. and S. B. G. Eysenck
1975 *Manual of the E.P.Q.* London: Hodder & Stoughton.

Fagen, R.

1981 *Animal Play Behavior.* New York: Oxford University Press.

Fenigstein, A., M. F. Scheier, and A. H. Buss
1975 Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology* 43:522-527.

Goldsmith, T. H.
1991 *The Biological Roots of Human Nature.* New York: Oxford University Press.

Goodall J.
1979 Life and death at Gombe. *National Geographic* 155:592-621.

Gough, H. G.
1957 *Manual for the California Psychological Inventory.* Palo Alto, CA: Consulting Psychologists Press.

Gough, H. G.
1973 Personality assessment in the study of population. In, *Psychological Perspectives on Populations* (J. T. Fawcett, ed.). Palo Alto, CA: Science & Behavior Books. Pp. 329-353.

Gough, H. G., and H. Sampson
1974 *The General Vocabulary Test.* Institute of Personality Assessment and Research, University of California, Berkeley.

Hirshfield, R. M., Klerman, G. L., Gough, H. G., Barrett, J., Korchin, S. J., and Chodoff, P.
1977 A measure of interpersonal dependency. *Journal of Personality Assessment* 41:610-618.

Hill, R.
1945 Campus values in mate selection. *Journal of Home Economics* 37:554-558.

Hudson, J. W. and L. F. Henze
1969 Campus values in mate selection: A replication. *Journal of Marriage and the Family* 31:772-775.

Jefferson, T.
2005 To Thomas Law Poplar Forest. The letters of Thomas Jefferson: 1743-1826. The moral sense. *From revolution to reconstruction … and what happened afterwards.* http://odur.let.rug.nl/~usa/P/tj3/writings/brf/jefl230.htm, 9:03 pm, 12 February 2005. (originally 1814).

Komorita, S. S., and C. D. Parkes
1995 Interpersonal relations: Mixed-motive interaction. *Annual Review of Psychology* 46:183-207.

Kurzban, R., and D. Houser
2005 Experiments investigating cooperative types in humans: A complement to evolutionary theory and simulations. *Proceedings of the National Academy of Science* 102:1803-1807.

Lewis, M.
1982 Play as whimsy. *Behavioral and Brain Sciences* 5:166.

McGinnis, R.

1958 Campus values in mate selection. *Social Forces* 36:368-373.

Miller, S.
1973 Ends, means, and galumphing: Some leitmotifs of play. *American Anthropologist* 75:87-98.

Nash, M.
1958 *Machine Age Maya: The Industrialization of a Guatemalan Community.* New York: Free Press.

Pedersen, C. A., J. D. Caldwell, G. F. Jirikowski, and T. R. Insel (editors.)
1992 *Oxytocin in Maternal, Sexual and Social Behaviours.* New York: Annals of the New York Academy of Sciences.

Pérusse, D.
1994 Mate choice in modern societies: Testing evolutionary hypotheses with behavioral data. *Human Nature* 5:255-278.

Poirier, F. E.
1982 Play—immediate or long-term adaptiveness? *Behavioral and Brain Sciences* 5:167-168.

Rilling, J. K., D. A. Gutman, T. R. Zeh, G. Pagnoni, G. S. Berns, and C. D. Kilts
2002 A neural basis for social cooperation. *Neuron* 35:395-405.

Roberts, J. M., and B. Sutton-Smith
1962 Child training and game involvement. *Ethnology* 1:166-185.

Service, R. F. (editor)
1998 Random samples: Suckers for fun. *Science* 281:909.

Smith, P. K.
1982 Does play matter? Functional and evolutionary aspects of animal and human play. *Behavioral and Brain Sciences* 5:139-184.
1995 Play, ethology, and education: A personal account. In, *The Future of Play Theory* (A. D. Pellegrini, ed.). Albany, NY: SUNY Press. Pp. 3-21.

Spence, J. T., and R. L. Helmreich
1978 *Masculinity and Femininity: Their Psychological Dimensions, Correlates, and Antecedents.* Austin: University of Texas Press.

Stanfey, A. G., J. K. Rilling, J. A. Aronson, L. E. Nystrom, and J. D. Cohen
2003 The neural basis of economic decision-making in the Ultimatum Game. *Science* 300:1755-1758.

Trivers, R.
1971 The evolution of reciprocal altruism. *Quarterly Review of Biology* 46:35-57.

Wang, Z., and B. J. Aragona
2004 Neurochemical regulation of pair bonding in male prairie voles. *Physiology and Behavior* 83:319-328.

Wiggins, J. S.
1979 A psychological taxonomy of trait-descriptive terms: The interpersonal domain. *Journal of Personality and Social Psychology* 37:395-412.