Chapter 3
The Significance of Ethological Studies: Playing and Peeing

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Abstract The ease of observing and reliably identifying dogs makes them prime candidates for ethological and observational studies of a wide variety of behaviors including social play, social dominance, social organization, and urination patterns. In this chapter I discuss research on social play behavior and urination/scent-marking patterns. Through long-term observational studies, we have catalogued the behaviors of play, including play requests, communication of intentions, and arbitration and negotiation of "fair play." Using this behavioral category as a model, we can discuss questions of the evolution of morality and social justice. Similarly, by detailed study of scent-marking behavior, we can deduce the evolutionary history of different patterns of elimination. Finally, a systematic ethological approach is contrasted with the casual-observational approach of popular literature on dogs.

3.1 Introduction

Domesticated dogs are fascinating mammals. We created them in our own image, often favoring traits that compromise their health and longevity, and they also vary greatly in size, shape, mass, color, coat, personality, and behavior (see also Duffy and Serpell, this volume). And, because they are easy to observe and to identify reliably in various environments, dogs are wonderful candidates for ethological and observational studies that are concerned with a wide variety of behaviors including social play, social dominance, social organization, and urination patterns and olfactory communication.

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In this essay I focus on research on social play ("play") behavior and also write briefly on urination/scent-marking patterns to show how much we have learned from detailed ethological studies of our 'best friends'. Not only have we learned much about the nitty–gritty of details of what dogs do when they play (for example, how they ask another dog to play, how they announce their intentions, and how they apologize and forgive transgressions against the rules of 'fair play'), and why different patterns of elimination may have evolved; we have also generated some theories about the evolution of social behavior and moral sentiments, and begun to answer 'big' questions about such areas as moral behavior, fairness, peace, and social justice in animals. Fair play is tightly linked to the evolution of social tolerance, social reciprocity, individual fitness, and peaceful relationships among group-living animals. The study of play in dogs involves non-invasive research that can readily be conducted in dog parks and in various non-captive settings, generates results that can be used to enrich the lives of individuals, and provides information that can be used to more fully understand and integrate dogs and other canids into society. Careful observations from 'citizen scientists' can also help us along. We also can learn a lot about human play from studies of various canids.

The popular literature abounds with books about dogs perpetuating myths about behavior that are based on casual observations rather then on detailed systematic studies still prevail. This is most unfortunate because dogs' cognitive and emotional capacities do not have to be embellished to make them more interesting or alluring (Bekoff 2007, 2013a, b). Nor ought the study of dogs be only to learn more about how they compare to other animals, such as nonhuman primates. In fact, because the wide diversity of extant canids share a common heritage, they lend themselves nicely to studies in which dogs are compared to wild relatives such as wolves and coyotes. No longer pushed aside as not worth studying because they are 'mere artifacts', dogs are wonderful subjects for a wide variety of non-invasive studies including the use of functional Magnetic Resonance Imaging (fMRI) (Berns 2013).

3.2 Observing Animals: There are no Substitutes

There are no substitutes for careful observation and description: this stage of study is critical for the generation of experiments, models, and theory. The wide-ranging and comparative importance of ethological investigations was highlighted in 1973 when three ethologists, Konrad Lorenz, Niko Tinbergen, and Karl von Frisch (for his work on "bee language") jointly won the Nobel Prize in Physiology or Medicine "for their discoveries concerning organization and elicitation of individual and social behaviour patterns" (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1973/). Each keenly observed animals, devised novel and often incredibly simple experiments, and offered useful and enduring theories concerning the evolution of behavior. Lorenz also stressed that behavior was not only

something an animal "did", but also something an animal "had": a structure (similar to a bodily organ) or behavioral phenotype on which evolution could operate.

In my studies I take a strongly evolutionary and ecological approach using Niko Tinbergen's (1951, 1963) integrative ideas about the questions with which ethological studies should be concerned: namely, evolution, adaptation, causation, and ontogeny (development and the emergence of individual differences). Concerning the tendency of some scientists to overlook the importance of ethological and detailed observational studies, Tinbergen (1963) noted, "… we might forget that naïve, unsophisticated, or intuitively guided observation may open our eyes to new problems. Contempt for simple observation is a lethal trait in any science, and certainly in a science as young as ours." Tinbergen (1963) also claimed, "[b]ecause subjective phenomena cannot be observed objectively in animals, it is idle to either claim or to deny their existence." So, in his view, for example, while we cannot really know that animals find play to be enjoyable, they just might. Tinbergen did not claim that animals do not have emotional lives. To this end, Gordon Burghardt (1997) suggested adding "subjective experience" to Tinbergen's scheme. (For further discussions about how Tinbergen's ideas can be applied to behavioral studies in general see Kappeler et al. 2013 and Barrett et al. 2013, and to cognitive ethological inquiries in particular, see Jamieson and Bekoff 1993).

With this framework in mind, we can ask, concerning play: why did play evolve; how does it promote survival value and reproductive fitness and allow individuals to come to terms with social situation in which they find themselves; what causes play; how does play develop; and what is the experience of animals in play—the emotional side of play. As time has past studies of play have become much more detailed and theoretically driven and a chronology of this progress can be found in Bekoff (1974a), Symons (1978), Fagen (1981), Bekoff and Byers (1981, 1998), Burghardt (2005), and Pellis and Pellis (2010). This essay is not meant to be a review of the field. However, it does show that detailed observations of social play, a behavior tossed aside because it was a waste of time to study, can inform the development of "big theories" in a number of different areas.

3.3 What Is this Thing Called Play?

What is play? The deceptively simple question has troubled researchers for many years. A well-received definition of social play developed with John Byers (Bekoff and Byers 1981; for further discussion see Burghardt 2005) is "social play is an activity directed toward another individual in which actions from other contexts are used in modified forms and in altered sequences." Our definition centers on what animals do when they play—the structure of play—rather than on possible functions of play. Nonetheless our definition of play could in some instances be problematic in that it would seem to apply, for example, "to stereotypical behaviors such as the repetitive pacing or excessive self-grooming sometimes

evinced by caged animals" (Allen and Bekoff 1997). It is difficult to see how to state a non-arbitrary restriction on the range of behaviors that may constitute play (Colin Allen, personal communication). Gordon Burghardt's (1997) later characterization of play as having five criteria attempts to do this. He notes that "Playful activities can be characterized as being (1) incompletely functional in the context expressed; (2) voluntary, pleasurable, or self-rewarding; (3) different structurally or temporarily from related serious behavior systems; (4) expressed repeatedly at least during at least some part of an animal's life span; and (5) initiated in benign situations" (2005, p. 382).

During play, actions may also be changed in their form and intensity and combined in a wide variety of unpredictable sequences (Bekoff and Byers 1981; Burghardt 2005). In juvenile chimpanzees the unpredictability of play increases compared to infants, and indeed the play sessions are more complex and variable in pattern use (Cordoni and Palagi 2011). In polecats, coyotes, and American black bears biting in play fighting is inhibited when compared to biting in real fighting (Bekoff 2004b). Clawing in bears is also inhibited and less intense (Henry and Herrero 1974), an example of 'self-handicapping' that is observed in many diverse species. Play among bears also is non-vocal, and biting and clawing are directed to more parts of their playmates' body during play than during aggression.

Play sequences may also be more variable and less predictable than those performed in 'true' predation or aggression, for example, because individuals are mixing actions from a number of different contexts. Because there are more actions for individuals to choose from it is not surprising that sequences are significantly more variable (Bekoff and Byers 1981; Hill and Bekoff 1977), which is to say that it is more difficult to predict which actions will follow one another during play than, for example, during real predation or aggression during which sequences of motor patterns are more highly structured. When dogs, coyotes, or wolves play one might see sequences of "biting, chasing, wrestling, body slamming, wrestling, mouthing, chasing, lunging, biting, and wrestling, whereas during aggression it would be more likely to see threatening, chasing, lunging, attacking, biting, wrestling, and then one individual submitting to the other" (Bekoff 2005, p. 125). Young canids do not show gender differences in play (Bekoff 1974b; Biben 1983).

In the wild, animals do not spend a lot of time engaging in social play. However, this does not mean that it is not important to play. Much animal play also is spontaneous in that it is common to see two animals sniffing the ground or walking about and then begin to play when they cross one another's path or bump into one another. The amount of time and energy that young mammals devote to various types of play is usually less than ten percent of their total time and energy budgets (Bekoff and Byers 1998). For example, in captive adult wolves the amount of play is about nine percent of the total time budget (Cordoni 2009). In most species play occurs mainly during infant and juvenile life. Adults do engage in social play but usually less so than the young of their species (for a notable exception, see Palagi 2006).

3.3.1 A Rearview and Prospective View of Social Play

Early in my career, many colleagues, especially fieldworkers, told me forthrightly that it was a waste of time to study play behavior. Some people also told me that "real" ethologists do not study dogs because they are artifacts—merely "creations of man"—and we cannot really learn much about the behavior of wild animals by studying them. In the 1970s, it seemed that only veterinarians and those people interested in practical applications of behavioral data studied dogs. Indeed, at two meetings in 2013, this historical mistake was revisited and soundly rejected, and the present volume shows just how important studies of dogs truly are.

Concerning play, some people thought of it as a wastebasket into which behavior patterns that were difficult to understand should be tossed, or that understanding play was not important for researchers interested in behavioral development (Lazar and Beckhorn 1974), whereas others, including my Ph.D. mentor, Michael W. Fox, realized that play was essential to normal social, cognitive, and physical development and that people just had not taken the time to study it in detail (for discussions about possible functions of play see Bekoff and Byers 1981; Burghardt 2005; Palagi et al. 2004; Palagi 2011; Pellis and Pellis 2010; Spinka et al. 2001). One reason why studying play has been difficult is because it is a hodge-podge or kaleidoscope of lots of different activities from various social contexts including predatory, mating, and agonistic behavior (Bekoff 1972), and it takes a lot of time to learn about the details of this behavior. For example, it can take many hours to conduct frame-by-frame analyses of as little as 10 min of play captured on video, but these sorts of analyses are essential to gaining an understanding of this behavioral phenotype.

In order to get the ball rolling on detailed comparative systematic studies of play, I organized a symposium that centered on play (Bekoff 1974a). I also began detailed studies focusing on what animals do in play that have now lasted more than four decades. My studies of play are based on careful observation and analyses of videotape. I watch tapes of play one frame at a time to catalogue the animals' behavior and determine how they exchange information about their motivations, intentions, and desires to play.

Following ethological traditions, my first step was to develop a lengthy and detailed ethogram—a list of actions (Bekoff 1972, 1974b). A completeness analysis was performed that showed that we had noted the fifty or so actions that were most used and the probability of adding a new, as yet unobserved action, was extremely low. Data were collected using direct observation and filming, some of which at had no obvious connection to the then scanty extant theories about the evolution and development of play. However, over time, the *zeitgeist* changed and many data found homes as new hypotheses and theories materialized.

One example of the relevance of play to other cognitive and evolutionary questions is the obvious fact that play is a voluntary and cooperative behavior. As such, it is linked to the development of social skills and animals learning 'right' from 'wrong': a process that is important in the development of fairness and moral

sentiments (Bekoff 2004a; Bekoff and Pierce 2009; Cordoni and Palagi 2011; Dugatkin and Bekoff 2003; Pierce and Bekoff 2012), as well as social justice (Brosnan 2012; Pierce and Bekoff 2012). By studying play we may be able to learn about what may be going on in an individual's mind, what they feel, what they are thinking about, what they want, and what they are likely to do during a social encounter. By using play and other special contexts (such as greetings, courtship, or ritualized fighting) to communicate about relationships, animals can convey intentions and emotions and negotiate and re-negotiate the terms of a relationship while minimizing the risk of injury or misunderstanding (Ward and Smuts 2007).

My early research focused on the importance of "bows" in the initiation of play, conveying the message "I want to play with you" (Bekoff 1974b, 1977a). In dogs, coyotes, and wolves, bowing takes the form of crouching on their forelimbs, raising their hind ends in the air, and often barking and wagging their tails. At the time, I did not yet see how they were related to how canids punctuate play sequences and tell others, in essence, "I am going to bite you hard but it is still play" or "I am sorry I just bit you so hard, please forgive me" (Bekoff 1995). What I and others have found is that bows rarely occur outside of the context of social play, and occur throughout play sequences (although they are most commonly are performed at the beginning or towards the middle of playful encounters). And, of course, bows have to be seen by other dogs. In her research on play in dogs, Horowitz (2009) discovered that play signals were "sent nearly exclusively to forward-facing conspecifics while attention-getting behaviors were used most often when a playmate was facing away, and before signaling an interest to play." The play bow is a highly ritualized and stereotyped movement resembling Modal Action Patterns (Barlow 1977). Bows are highly stereotyped, distinctive, and recognizable—but not identical, as Fixed Action Patterns are (Bekoff 1977a). There also are auditory (play sounds such as play panting), olfactory (play odors), and tactile (touch) play signals (Bekoff and Byers 1981; Burghardt 2005; Fagen 1981; Horowitz 2009; Pellis and Pellis 2010).

In my own research I did not look at play bouts as having been 'won' or 'lost' mainly because they were not in any obvious way related to an individual's position in the social hierarchy, in the leadership of their group, or of their social status with the individual with whom they were playing. Burghardt (2010) also noted that there were not individual winners and losers in play. Comparative research has shown that play may be important in the development of motor and physical training, cognitive/motor training, or in the development of other social skills. However, it is difficult to generalize about possible functions of play across species. For example, play fighting (also called 'rough-and-tumble' play) does not appear to be important in the development of motor training for fighting skills in laboratory rats (Pellis and Pellis 2010).

Play also may serve a number of functions simultaneously, for example, socialization, exercise, practice, cognitive development, or training for the unexpected (Spinka et al. 2001), the last theory being based on the kaleidoscopic (unpredictable) nature of play sequences. Play may also have an "anxiolytic effect" by reducing anxiety during tense situations (e.g. pre-feeding time) and

preventing escalation to an aggressive encounter. For example, chimpanzees, bonobos, and juvenile gorillas show an increase in social play during pre-feeding periods compare to other times (Palagi et al. 2004, 2006, 2007). No matter what the functions of play may be many researchers believe that play is provides important nourishment for brain growth and helps to rewire the brain, increasing the connections between neurons in the cerebral cortex. (For more information on comparative studies about brains and play see Lewis and Barton 2006; Pellis and Pellis 2010; Graham 2010, and Graham and Burghardt 2010).

I did not see at the time how individual patterns of play could be related to the development of social bonds and individual dispersal patterns (Bekoff 1977b) or to evolutionary questions about individual reproductive fitness (Bekoff 2004a; Bekoff and Pierce 2009). And, while I focused on visual signals I did not pay attention to how dogs sought attention from others using vocal signals. In the late 1990s I had the pleasure of helping to train Alexandra Horowitz as she began her work on visual attention and play (Horowitz 2002, 2009). I am thrilled that I and others persisted in studying this behavior because now it is clear that detailed studies of play can inform the development of "big theories" concerning the evolution of social behavior, fairness, cooperation, moral behavior, cognitive capacities (including whether animals have a "theory of mind"), and individual survival and reproductive fitness (Bekoff and Pierce 2009; Pierce and Bekoff 2012).

3.3.2 Fair Play

For instance, based on extensive research, we have discovered the potential relevance of play to the development of morality. Dogs practice what we call 'fair' play, whose four 'rules' are "Ask first, be honest, follow the rules, and admit when you're wrong" (Bekoff and Pierce 2009). When the rules of play are violated and when fairness breaks down, so does play (Pierce and Bekoff 2009, 2012)—and not just among dogs. For example, in juvenile chimpanzees, it has been observed that some play sessions escalate into serious aggression and, interestingly, during these sessions, no play signals (play faces) were performed (Giada Cordoni, personal communication). Dogs and other animals keep track of what is happening when they play; so, too, should researchers.

Relatedly, play bows also are honest signals, a sign of trust. There is little evidence that social play is a manipulative activity (Bekoff and Pierce 2009). Play signals are rarely used to deceive others in canids or other species. Deceptive signaling is so rare that I cannot recall seeing more than a few occurrences in thousands of play sequences. Cheaters are unlikely to be chosen as play partners because others can simply refuse to play with them and choose others. My long-term field research on coyotes living in the Grand Teton National Park, near Jackson, Wyoming (summarized in Bekoff and Wells 1986), has shown that coyotes who do not play fairly—who invite others to play and then try to dominate them—often wind up leaving their pack because they don't form strong social

bonds with other individuals. We also discovered that they suffer higher mortality than those who remain with others. This is a good example in which the data we collected on social play and the dispersal patterns of identified individuals did not make sense to us at the time, however as ideas about fair play emerged they took on significance. The message from research on captive and wild canids is clear: don't bow if you don't want to play. The field data show nicely how the study of the development of play in captive animals that are virtually impossible to gather in the wild can inform what is happening in the wild. (This is not an endorsement of keeping animals in captivity.)

In domestic dogs there is little tolerance for non-cooperative cheaters. Cheaters may be avoided or chased from playgroups. There seems to a sense of what is right, wrong, and fair. For instance, while studying dog play on a beach in San Diego, California, Alexandra Horowitz (2002) observed a dog enter into a play group and interrupt the play of two other dogs. The interloper was chased out of the group and when she returned the playing dogs stopped playing and looked off toward a distant sound. One of the players began moving in the direction of the sound and the interloper ran off following their line of sight. The playmates resumed their game. In rats as well, fairness and trust are important in the dynamics of playful interactions. Sergio Pellis (2002) discovered that sequences of rat play consist of individuals assessing and monitoring one another and then fine-tuning and changing their own behavior to maintain the play mood.

There also are trade-offs in play that help to maintain fair play. Animals engage in two activities that help create an equal and fair playing field: self-handicapping and role-reversing. Self-handicapping (or 'play inhibition') occurs when individuals perform behavior patterns that might compromise them outside of play (Bekoff and Byers 1981; Horowitz 2009). For example, individuals of many species will inhibit the intensity of their bites, thus abiding by the rules and helping to maintain the play mood.

Role-reversing occurs when a dominant animal performs an action during play that would not normally occur during real aggression. For example, during play, a dominant coyote or wolf would not roll over on his back during fighting, but would do so while playing. In one study, Bauer and Smuts (2007) discovered that role-reversals are not always necessary, but they do facilitate play. Giada Cordoni (2009), while studying captive wolves, discovered that "rank distance between conspecifics negatively correlated with play distribution: by playing wolves with closest ranking positions tested each other for acquiring information on skills of possible competitor and gaining hierarchical advantage over it." Young crab-eating foxes, maned wolves, and bush dogs do not show stable hierarchies (Biben 1983). In their study of third-party interventions in play between littermates of dogs Ward et al. (2009) discovered that littermates "use interventions opportunistically to practice offence behaviours directed at littermates already behaving subordinately." These interventions may help structure dominance relationships among littermates.

In many species individuals also show play partner preferences and it is possible that these preferences are based on the trust that specific individuals place in

one another or because it is more fruitful for an animal to test its cognitive and physical skills with a particular partner or because it is useful for strengthening the social relationship with a particular partner (Cordoni and Palagi 2011; Palagi and Cordoni 2012). Because social play cannot occur in the absence of cooperation or fairness, it might be a "foundation of fairness" (Bekoff 2004a).

The highly cooperative nature of play has evolved in many species, so there are a number of questions that need to be asked and answered. For most of these questions the database remains scanty. These include: Why might animals continually keep track of what they and others are doing and modify and fine-tune play on the run, while they are playing? Why might they try hard to share one another individual's intentions? Why do animals carefully use play signals to tell others that they really want to play and not try to dominate them? Why do they engage in self-handicapping and role-reversing? Why do animals behave fairly? By "behave fairly" I mean that animals "often have social expectations when they engage in various sorts of social encounters the violation of which constitutes being treated unfairly because of a lapse in social etiquette" (Bekoff and Pierce 2009).

I have also stressed that social morality, in this case behaving fairly, is an adaptation that is shared by many mammals (Bekoff 2004a). By behaving fairly young animals acquire social and other skills they will be needed as they mature into adults (Allen and Bekoff 1997). Without social play individuals and social groups would lose out (Antonacci et al. 2010; Cordoni and Palagi 2011). Morality evolved because it is adaptive, because it helps animals, including humans, survive and thrive in particular environments. And, there is no reason to assume that social morality is unique to humans (Bekoff and Pierce 2009; Brosnan 2012; de Waal 2013; Sussman and Cloninger 2011). "Uncooperative play" is impossible, "an oxymoron, and so it is likely that natural selection weeds out cheaters, those who do not play by the accepted and negotiated rules" (Bekoff 2005).

3.3.3 Future Research: Play and the Ethology of Peace

Detailed observations of social play, a behavior tossed aside because it was supposedly a waste of time to study, can inform the development of "big theories" including those about the evolution of morality. Studies of play also inform theories about the evolution of peaceful behavior (Gray 2014; Verbeek 2008). Furthermore, Niko Tinbergen and renowned field workers including Hans Kruuk and George Schaller (e.g. Schaller and Lowther 1969) have suggested looking to the social carnivores for gaining insights into the evolution of social behavior in humans.

Mammalian social play is a good choice for a behavior to study in order to learn more about the evolution of fairness and social morality, even in humans. This is not to say that animal morality is the same as human morality. If one is a "good"

Darwinian, it is premature to claim that only humans can be empathic and moral beings.

So, where are we? Play is a voluntary activity and individuals have the right to quit when they have had enough or want to do something else (Gray 2014). I still stand by what I have written before (Bekoff 2004a), "Social play may be a unique category of behavior because inequalities between players are tolerated more so than in other social situations. Play cannot occur if individuals choose not to engage in the activity and the equality (or symmetry) needed for play to continue makes it different from other forms of seemingly cooperative behavior such as hunting and care giving. This sort of symmetry, or egalitarianism, is thought to be a precondition for the evolution of social morality in humans" (see also Bekoff and Pierce 2009; Ciani et al. 2012).

Social play is a category of behavior about which we now know quite a bit, but there still is much we have to learn about the details of playful interactions in most of the species in which play has been observed. Much of what we already know about the development, evolution, and social dynamics of play has come from detailed comparative research on domestic dogs and their wild relatives and this information and the methods of study can also be used to learn more about play in other nonhuman animals and the need for "wild play" in human animals (Bekoff 2012). Studying play is challenging and exciting and I hope that additional detailed studies from a wide variety of species will be forthcoming. These data are essential for coming to a further understanding of the evolution of play across diverse species, how ecological variables influence the development of play in individuals of the same species, and how an individual's playful experiences or the lack thereof influence his or her future behavior.

3.4 Ethological Studies of Urination Patterns

The importance of ethological studies is also highlighted in inquiries about urination patterns. I was very surprised four decades ago to discover, when someone asked me some very basic questions about urination patterns of free-running, unrestrained dogs including gender differences in marking rates, what stimuli trigger urinating or scent-marking, and whether seeing another dog urinate stimulated others to do so, sniffing patterns, ground-scratching, and responses to "yellow snow", that there were not any detailed data. There still are not. Based on enduring myths especially in the popular literature about why dogs pee, it was simply assumed that urinating meant scent-marking—although Devra Kleiman (1966) and others pointed out that this is not necessarily so because dogs and other animals do "simply pee." Earlier studies had described in detail the postures dogs use and some general patterns of urination (see Bekoff 1979a and references therein), however little else was known especially about free-running dogs.

To fill the knowledge gap my students and I studied urination patterns in two populations of free-running dogs, one on the campus of Washington University in

St. Louis, Missouri and the other in and around Nederland, Colorado (Bekoff 1979a). Twenty-seven males and Twenty Four anestrous females, all individually identified, were observed. Marking was distinguished from merely urinating in that the urine was aimed at a specific object or area (it had "directional quality", Kleiman 1966) and generally less urine was expelled during marking (see also Palagi et al. 2005; Palagi and Norscia 2009). We also scored the frequency of occurrence of what we called the Raised Leg Display (RLD) that occurred when a dog raised his leg but did not deposit any obvious urine.

The results of this study can be summarized as follows (Bekoff 1979a). Males marked more than females and at a higher rate (males, 71.1 % of urinations; females, 18 %); males ground-scratched significantly more than females after marking and males did it significantly more when other dogs could see him do it (Bekoff 1979b); both males and females marked at the lowest rate in areas in which they spent the greatest amount of time; seeing another male mark was a strong visual releaser for urine marking by males; sniffing did not invariably precede marking by either males or females; the RLD appeared to function as a visual display; and males performed the RLD significantly more frequently when other males were in sight. We concluded that the RLD might be a ploy by which one male gets another male to use his urine because the RLD was a strong visual releaser or trigger for urination by other males. We also concluded then, and the same conclusion obtains now, that we need to pay more attention to the visual aspects of the postures (see also Palagi et al. 2005; Palagi and Norscia 2009) and behavior patterns involved in the deposition of scent, in this case urine. What has been accomplished by observing dogs can serve as a model for studying other species.

3.4.1 What can we Learn from Yellow Snow?

The study of urination and sniffing patterns can also inform ideas about "bigger" questions about cognitive capacities. Various studies have shown that some non-human Great apes, an African elephant, bottlenose dolphins, orcas, and European magpies show "self-recognition", sometimes called "self-awareness" and "self-consciousness", using what is called the "mirror test". Paul Sherman and I (2004) labeled various senses of self as "self-cognizance". In general, in the classic mirror test developed by Gordon Gallup (1970) (for further discussion see Gallup et al. 2002) that has been used, with revisions, on individuals other then land animals (for details about research done on dolphins see Reiss 2011), individuals are habituated to a mirror, anesthetized, and a mark is then placed on their forehead using an odorless dye. When the animal wakes up they are tested to see if the make self-directed movements to the mark. If they do this it is taken as support for self-recognition, self-awareness, or self-consciousness. Individual (but not all) chimpanzees, an elephant, and magpies have passed the mirror test with a good deal of exposure, however, researchers disagree about just what the self-directed

movements mean and if the mirror test is really a valid measure of "self-awareness", and they also are concerned with a lack of replication in studies in different laboratories.

A detailed discussion of the mirror test and what it means is beyond the scope of this essay. But what is important is that dogs and wolves do not pass the mirror-test. Michael Fox and I tried to use this method in the early 1970s and tried to publish the negative results, but the paper was repeatedly rejected because of the results were negative. Our negative result, of course, did *not* mean that dogs did not have the capacity for self-cognizance, only that perhaps the mirror test was not the good test to use.

The mirror tests depends on a visual stimulus and for a long while I wondered if perhaps a test using olfactory cues could be designed to see if dogs could discriminate self from others. Once again, following up on Tinbergen's (1951) stress on the importance of conducting simple field experiments I decided to use urine-soaked snow—"yellow snow"—to see if dogs discriminated their own urine from that of others.

To investigate the role of urine in eliciting urinating and marking, in a pilot study that took place over five winters when there was snow on the ground (Bekoff 2001) I moved urine-saturated snow from place-to-place to compare the responses of an adult male domestic dog, Jethro, to his own and others' urine. What I found was that Jethro spent less time sniffing his own urine than that of other males or females, and that while his interest in his own urine waned with time it remained relatively constant for other individuals' urine. Jethro infrequently urinated over or sniffed and then immediately urinated over (scent-marked) his own urine. He marked over the urine of other males more frequently than he marked over females' urine. He clearly had some sense of "self": a sense of "mine-ness" but not necessarily of "I-ness" (Bekoff 2001).

Clearly, as with the study of play, a "simple" ethological approach to urination patterns produced very interesting and useful preliminary results. These data are foundational for the development of hypotheses about, for instance, why animals pee the way they do and where they choose to do it, and the generalizability of the patterns that have been observed in dogs needs to be assessed in other animals.

3.5 Back to Basics: The Ethological Approach and Watching Animals

It is easy to see that the ethological approach is invaluable to the study of animal behavior. Many of the papers in the symposium I organized (Bekoff 1974a) provide excellent examples of just how important it is to watch animals carefully and to develop detailed ethograms. Watching animals is not merely 'stamp collecting' as some pejoratively called it years ago (Jamieson and Bekoff 1993), nor is it just for those interested in natural history or bird watching. We need to know what

animals do in order to be able to generate relevant and valid models and theories and explain why animals do what they do. This essential role of ethological inquiries is not as highly prized as it was in the early days of ethology and observational studies are often dismissed as unwelcomed hangovers from the past when natural history accounts were popular even among researchers. Let us hope that funding becomes available for these sorts of foundational studies because in so many areas of animal behavior we really need to go back to the basics, in this case detailed accounts of what animals do in social encounters or when they are on their own. Without these sorts of detailed data attempts to develop wide-ranging, some might say grandiose hypotheses and theories, are similar to trying to build a house without a suitable foundation. The ideas and the home might last for a while but sooner or later someone is going to have to go back to building a firm foundation. Ethological studies do just this.

Furthermore, they are the foundation for important insights about not just behavior but animal experience. Despite some lingering and rapidly declining skepticism about whether or not other animals are conscious or experience deep and enduring emotions (summarized in Bekoff 2013b), it is now time to stop ignoring who these animals really are and to stop pretending that we do not know that they are indeed conscious and feeling beings who experience a wide range of emotions (Bekoff 2013a, b). The minds of other animals are not "all that private" so as to make impossible to know what they want, need, and feel. And, there is no doubt that dogs and other animals love to play and deeply enjoy it. They voluntarily seek it out relentlessly, take certain risks, and will play to exhaustion and seek out playmates with very little rest.

We must also make every effort to use this information on their behalf. Indeed, in July 2012 a group of renowned scientists met at Cambridge University and finally declared that animals are truly conscious and produced a long overdue document they called the Cambridge Declaration on Consciousness (2012). They wrote, "Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates." They could also have included fish, for whom the evidence supporting sentience and consciousness is also compelling (Braithwaite 2010).

Although we really have known for a much longer period of time that other animals are conscious, perhaps this highly publicized declaration will be helpful for radically improving animal well being. We can only hope this declaration is not merely gratuitous hand waving. I have proposed a Universal Declaration on Animal Sentience (Bekoff 2013a) that expands the Cambridge Declaration and also notes that we must factor sentience into the decisions we make about how we treat other animals.

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