The Value of Studying Occupation: An Example With Primate Play

Wendy Wood

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The purpose of this article is to demonstrate the value of a constraint-free study of occupation to occupational therapy. Constraint-free study refers to interdisciplinary scholarly inquiry that seeks to generate a deep understanding of how important occupations influence adaptation and health. Drawing on knowledge from animal behavior, anthropology, evolutionary biology, psychology, and primatology, primate play is discussed. Such knowledge enhances understanding of therapeutic play contexts and of play's integrative impact on occupational performance. Moreover, a robust understanding of vital occupations, such as play, empowers practitioners, thereby reducing the profession's vulnerability to external forces that diminish its economic and political position in the health care market. Precedents within and outside occupational therapy are described whereby control over the acquisition of basic knowledge has proven to be beneficial. It is concluded that both occupational therapy and occupational science will strongly benefit from their shared commitment to understanding the complexities of occupation.

The defining feature of occupational science is its commitment to studying occupation, a phenomenon other academic disciplines have at times addressed but have not centrally and systematically investigated (Clark et al., 1991). Occupations have been defined by Clark et al. (1991) as chunks of activity that are named in the lexicon of human culture, that are characterized by active participation, and that hold personal and sociocultural meaning. For example, downhill skiing and writing a paper are occupations, whereas repetitively flexing and extending one's knees or holding a pen, although embedded in skiing or writing, are not. The purpose of this article is to argue on behalf of the value of occupational science's constraint-free study of occupation to the occupational therapy profession. By constraint-free study, I mean inquiry that, although casting its net beyond service delivery as now known and practiced, may also include service delivery. Such inquiry seeks to generate a multifaceted and deep understanding of important occupations as they have developed over evolutionary and ontogenetic time and as they are expressed within naturalistic contexts. Constraint-free study is thus necessarily interdisciplinary in nature, weaving salient pieces of literature, research, and scholarly discourse from diverse academic disciplines and applied professions into a cloth of occupation.

In the present article, the occupation of play will be discussed. I will specifically examine the play of nonhuman primates with respect to questions of ontogeny, or life span development, and phylogeny, or evolutionary history. I have chosen to examine play because by most accounts, it constitutes a major category of human occupation and one with which occupational therapists have traditionally concerned themselves. The central focus will be on the relationship of play to adaptation during both ontogeny and phylogeny. This focus embraces the core mission of occupational science—understanding the form, function, and meaning of occupation and its relationship to adaptation (Clark et al., 1991). It also emanates directly from a question that lies at the heart of clinical practice: How do particular occupations, and in this case play, facilitate adaptation (Wood, in press)? A feedback loop is accordingly in place between occupational science that, as one of its missions, seeks to provide relevant knowledge for practitioners and occupational therapy and that, as its central mission, seeks to help persons with disabilities effectively adapt so that they might live meaningful and satisfying lives.

To demonstrate the value of a constraint-free inquiry on play, I will first describe primates and their play. Next,
I will provide an overview of nonhuman primate play during ontogeny and phylogeny. With this foundation in place, I will address the important relationship between the play of nonhuman primates and their capacities for adaptation. Finally, the value of this study of play to the profession of occupational therapy will be discussed. Before proceeding, however, two caveats are in order: (a) Because my study of play is delimited to nonhuman primates, it is obviously incomplete. Nevertheless, it is hopefully sufficiently broad to demonstrate the value of a constraint-free study of occupation to practice. (b) Because only one of many possible examples of occupational studies is pursued, care should be taken not to generalize the limitations of this particular study to the science of occupation as a whole.

Primates and Their Play

Primates are an order of mammals consisting of approximately 200 currently surviving species that possess an evolutionary history of up to 40 million years (Zihlman, 1982). The order of primates is divided into four main branches: prosimians; New World monkeys; Old World monkeys; and hominoids, which consists of apes and humans (Jolly, 1985). Morphological and behavioral data, in addition to recent DNA analyses, have confirmed that nonhuman primate species most closely related to humans consist of the apes followed in decreasing order of relatedness by Old World monkeys, New World monkeys, and prosimians. Chimpanzees and bonobos, both species of apes, possess less than 99% DNA similarity to humans and thus represent the most closely related nonhuman primate species to ourselves (Zihlman, 1982).

Because primate play has proven difficult to define, researchers in animal behavior have often relied on descriptions of the typical overt motor patterns involved in play to advance its study. The use of such a structuralist approach to play rests on the view that play exists as a distinct category of behavior that is amenable to objective study because of its distinguishing motor characteristics (Loizos, 1978). Loizos, a theorist in the structuralist tradition, has argued that one of the most striking aspects of play is that it incorporates motor patterns that, although similar to those used in other contexts, are divorced from the motivations typically apparent in those contexts. Using motivational criteria in conjunction with analyses of motor patterns, Loizos distinguished play activities from their source activities, that is, those nonplay behaviors that the play resembles. For example, a young chimpanzee might playfully fight a partner one moment and then, for no apparent reason, abruptly start to self-groom. Although the motor patterns used in the play fight mimic those used in an actual fight, in comparison, they are quite fragmented secondary to the divergent motivations underlying playing versus fighting. Fragmentation of motor patterns is one example of overt motor qualities of play that structuralists use to distinguish play from nonplay. Other qualities of motor patterns regarded as indicative of play include exaggeration, reordered or incomplete motor sequences, and the use of highly specialized play signals that communicate playful intentions. Examples of these signals include the open mouthed and comic play face, panting, and gamboling (Symons, 1978).

Although the structuralist approach to describing play sidesteps some important definitional issues, it is useful for analyzing nonhuman primate play during ontogeny and phylogeny. From structuralist criteria, three kinds of playful activities in which primates commonly engage are locomotor play, social play, and object play. The following ontogenetic overview is concerned with what these kinds of play typically look like and how they typically emerge, develop, and change during the life span.

Ontogeny and Play

Locomotor play is ubiquitous among all primate species during maturation (Jolly, 1985; Smith, 1982). It is readily observed on the basis of its inherent motor patterns of dangling, twisting, and turning from overhead objects and of somersaulting, jumping, leaping, running, and crawling (Smith, 1982). Nonhuman primate infants demonstrate their earliest locomotor play within the limits of their mothers’ reaches. As skill develops, they gradually extend their play into the larger social and physical environs. Because locomotor play provides a medium through which the motor proficiencies of nonhuman primates emerge, it is often referred to as mastery play (Jolly, 1985). Not surprisingly, therefore, locomotor play diminishes in frequency with approaching adulthood and the development of mature motor skills.

Social play is also ubiquitous among all primate species. As a major category of nonhuman primate play, it is often divided into two subcategories: play fighting (or rough and tumble play) and play chasing (Burton Jones, 1976; Jolly, 1985; Smith, 1982). Among nonhuman primates, play fighting typically relies on those motor patterns involved in serious encounters with adversaries, such as grabbing, biting, wrestling, hitting, rolling with, or mounting. In addition, poking and tickling accompanied by audible laughter is frequently observed in chimpanzees. Play chasing involves the motor patterns of running and leaping at high speeds, climbing, falling, and...
exploration (play's close cousin) has accordingly been viewed as promoting self-direction, an ability to play and engage in inquisitive exploration, and the capacity to direct environmental changes, thereby placing the locus of control within the individual before they are able to use these objects to crack open nuts or extract termites from termite mounds (Goodall, 1986; Matsuzawa & Sugiyama, 1991).

Motor patterns that characterize object play are those typically involved in complex sequences of manual manipulation as they are applied to inanimate materials and objects. Object play is often integrated into both social and locomotor play (Jolly, 1985; Smith, 1982), but unlike these two kinds of play, it is not ubiquitous across the primate order. Yet, for those nonhuman primates who engage in it (particularly capuchin monkeys, orangutans, and chimpanzees), object play is notable for the high levels of concentration and fascination that it typically commands (Jolly, 1985). Immature chimpanzees often fit object play into a developmental sequence of exploration, play, and work-related applications (Vandenberg, 1978). Before object play begins, unfamiliar objects are first explored to ascertain their properties. Once exploration is satisfactorily completed, object play may ensue. After both long and short play periods, objects may subsequently be used as tools and incorporated into plans with instrumental goals. For example, after brief periods of exploring and playing with sticks, captive chimpanzees have spontaneously used the sticks, sometimes even joining them together, to create ladders to gain access to desired locations (Menzel, 1976; Schiller, 1976). Additionally, wild chimpanzee infants and juveniles play with stones and grass stems for 4 to 5 years before they are able to use these objects to crack open nuts or extract termites from termite mounds (Goodall, 1986; Matsuzawa & Sugiyama, 1991).

Regardless of the kind of play undertaken, attention is directed toward changes that an individual nonhuman primate produces through his or her own movements. Play thus allows primates to direct environmental changes, thereby placing the locus of control within the individual primate. The ability to play and to engage in inquisitive exploration (play's close cousin) has accordingly been regarded as direct evidence of subjective well-being among nonhuman species (Wemelsfelder, 1993). Indeed, as anyone who has observed play between two or three laughing chimpanzees can attest, the play of nonhuman primates, like that of humans, not only promotes self-direction, but also has every appearance of being fun (Jolly, 1985).

Environmental Influences During Ontogeny

Despite its prevalence, the play of nonhuman primates is not irreplaceable. Both environmental and physiological factors affect whether play will emerge at any given point in time. Most fundamentally, play is extinguished whenever physiological needs for subsistence or survival become paramount (Dunbar, 1988; Dunbar & Dunbar, 1992). Play is also suppressed within environments that are tense or unsafe; it tends to emerge within environments that are emotionally reassuring and familiar (Dolhinow & Bishop, 1970). Environmental opportunities also influence the kinds of play that unfold. Wild monkeys and apes who lack playmates are more likely to engage in solitary locomotor play or, if the necessary aptitudes exist, in solitary object play. Yet, if playmates are abundant, solitary play is often diminished in lieu of social play (Goodall, 1986, 1990; Jolly, 1985). Inquisitive exploration and its frequent merger into play are also promoted by environments that are sufficiently variable as to offer constant sources of novelty (Wemelsfelder, 1993).

Phylogeny and Play

Phylogenetic examination of play assumes that the five core propositions of Darwin's theory of evolution are essentially correct:

1. Evolution as such, or the theory that the world is old and that both it and its organisms are steadily changing and transforming
2. Common descent, or the theory that all organisms ultimately go back to a single source of life
3. Multiplication of species, or the theory that organic diversity has occurred either through the splitting of one species into daughter species or by the budding of geographically isolated founder populations into new species
4. Gradualism, or the theory that evolutionary change unfolds gradually and not through sudden productions of entirely new species
5. Natural selection, or the theory that genetic variation enables new generations to arise that are particularly well adapted to their ecological niches (Mayr, 1991).
Phylogenetic examination of the play of nonhuman primates seeks to understand the history of how play changed over the enormous span of evolution to what it is today among surviving primate species. To a large degree, the phylogenetic history of play is positively correlated with important evolutionary trends that characterize the evolution of the primate order from the more primitive and oldest prosimian group to the more complex and recent hominoids. Generally speaking, these trends suggest that as the phylogenetic status of individual species increases, that is, as it approaches an increasing degree of genetic relatedness to humans, so too does the overall complexity and flexibility of play.

One evolutionary trend characterizing the order of primates, that of progressively prolonged life periods, led to lengthened durations of immaturity (Jolly, 1985). Bruner (1976) proposed that these longer primate childhoods were managed through more frequent and complex kinds of play. Bruner supported this idea on the basis of much research suggesting that in contrast to the rigidly fixed play of prosimians, the play of great apes (particularly chimpanzees), as well as humans, is notable for the remarkably creative and flexible ways in which diverse patterns of behavior are combined. Moreover, the play of New World and Old World monkeys generally assumes more intermediary positions of complexity and flexibility (Bruner, 1976; Dolhinow & Bishop, 1970). A transformation in the management of immaturity during evolution is suggested, whereby increasing phylogenetic status accompanied increasingly more complex forms of play (Bruner, 1976; Dolhinow & Bishop, 1970). A similar correlation exists between play’s phylogenetic history and two other evolutionary trends: (a) progressively greater reliance on binocular vision and (b) progressively more sophisticated manipulation abilities (Jolly, 1985). Through the development of binocular vision and precise manipulative abilities, close examination of objects became possible in the primate order. The ability to examine and manipulate objects closely promoted the emergence of more sophisticated visuo perceptual abilities and object play.

Progressively larger and more complex brains (Jolly, 1985) is another evolutionary trend characterizing the primate order that directly relates to the phylogenetic history of play. A direct correlation exists between the respective size and complexity of the brains of apes, Old World monkeys, New World monkeys, and prosimians, particularly as related to memory and learning capacities, and the relative sophistication and variability of their play (Dolhinow & Bishop, 1970). Given that humans possess the largest and most complex brain, as well as one that supports language and abstract thought, it is not surprising that humankind evidences the most sophisticated play of all primates (Dolhinow & Bishop, 1970).

Partly because of these evolutionary trends, symbolic play, or play that involves abstract representations of phenomena, eventually emerged in the primate order. Although debate exists concerning how or when true symbolic play emerged, there is general consensus that, if not symbolic play itself, then certainly its necessary preadaptations preceded the emergence of human beings (Smith, 1982). Preadaptations are defined as any “previously existing anatomical structure, physiological process, or behavior pattern that makes new forms of evolutionary adaptation more likely” (Wilson, 1980, p. 319). A basic preadaptation to symbolic play is the ability to distance oneself cognitively from an immediate activity or event, as described by Vandenberg (1978):

Lower species tend to get swept into the reality of the playful activity, turning what started out as play into a serious activity. That higher species are able to engage in a playful rendition of serious activity without taking the activity seriously implies that they must be able to... "distance" themselves from the behavior. (p. 733)

Drawing on this ability to distance oneself psychologically is the ability to maintain conscious pretenses of things that are not real, a higher order preadaptation to true symbolic play (Jolly, 1985). Observations of pretense and of explicit and sometimes elaborate deceptions that involve pretense among Old World monkeys and apes have been amply documented (Byrne & Whiten, 1988; de Waal, 1989; Goodall, 1986; Hayes, 1976; Jolly, 1985). Given that chimpanzees have also demonstrated capacities for symbolic abstractions and thought (Fouts, 1989; Matsuzawa, 1989; Savage-Rumbaugh, Romski, Hopkins, & Sevcik, 1989), the biological readiness for true symbolic play appears to exist among chimpanzees.

This evolving capacity for symbolic play has had potentially enormous implications for human cultural adaptation. In addressing the evolutionary importance of play to occupational therapy, Vandenberg and Kielhofner (1982) argued that behavioral diversity and innovation generated through play enhanced the chances of long-term survival of primate species. Moreover, imitation of playful innovations led, in some cases, to the establishment of new cultural patterns among both nonhuman and human primates. As expressed by Vandenberg and Kielhofner, “the apparently inefficient play that takes apart and recombines the time-worn meanings and behaviors of a culture actually spawns the ideas and behaviors that serve as prototypes for new behavioral adaptations” (p. 22). The emergence of true symbolic play radically in-
creased the potential range of behavioral combinations and recombinations with which an individual primate could experiment. Symbolic play thus promoted behavioral innovation and served as a potential medium for cultural adaptation. It is therefore not surprising that Huizinga (1950), a germinal play theorist, posited that play provided one of the main bases of human civilization and culture. As evidence of his position, Huizinga cited the permeation of play in society’s great archetypal activities, particularly language, myth, and ritual.

Environmental Influences During Phylogeny

As just discussed, the phylogenetic history of primate play is correlated with the development of evolutionary trends that characterize the primate order. These trends supported the emergence of intelligent object play, made the eventual emergence of symbolic play possible, and, consequently, positioned play to become an important medium of behavioral innovation and cultural adaptation. Yet phylogenetic status is not the sole influence on the kind of play any given primate species generally demonstrates. As with play’s ontogeny, the environment figures prominently into play’s phylogeny, particularly with respect to the kinds of diverse adaptive requirements it historically imposed on different species and, consequently, on how they typically play (Dolhinow & Bishop, 1970; Vandenberg, 1978). To cite only one of several possible examples, gorillas, although quite closely related to humans genetically, do not demonstrate the kind of sophisticated object play one might expect on the basis of genetic endowment alone. It has been hypothesized that because the use of tools to obtain food is unnecessary in the veritable salad bowls in which gorillas live, they, as a species, were not environmentally pressed to develop complex object play (Vandenberg, 1978).

Adaptation and Play

The prevalence of primate play during ontogeny and phylogeny certainly suggests that play must be important. Nevertheless, play presents a conundrum concerning its adaptive benefits: Given that play is generally lacking in immediate survival value or goal-related rewards, why do primates persist in playing so much? Indeed, play stands apart from other major categories of primate activities such as obtaining food, eating, building shelters, investigating dangers, or defending territories, which confer obvious, if not relatively immediate, adaptive advantages. Moreover, play’s remarkable prominence throughout countless millennia of primate life is not adequately explained by the fact that it is often fun. Rather, if play did not provide important adaptive advantages to those who played frequently and well, it most likely would have fizzled out eons ago in the primate order (Dolhinow & Bishop, 1970).

Examination of how play relates to adaptation over both evolutionary and ontogenetic spans of time helps to explain the conundrum. Adaptation from an evolutionary perspective draws from the theory of natural selection and is concerned with how a behavior influences the survival and reproductive success of living organisms (Wilson, 1980). In comparison, adaptation from an ontogenetic perspective is concerned with the development of vital, species-typical skills over the course of an individual primate’s life span. In that phylogenetic history represents the accumulation of countless generations of lives, a relationship clearly exists between these two levels of adaptation. Three hypotheses concerning the adaptive benefits of play in primates thus are applicable to both levels of adaptation. A more rigorous standard of scientific evidence is mandated, however, when applying evolutionary, as opposed to ontogenetic, criteria of adaptation to these hypotheses. The first two hypotheses are thus most strongly supported with respect to ontogeny, whereas the third has received strong support with respect to both ontogeny and evolution.

One, play has been hypothesized to serve as a medium for the development of generalized cognitive abilities and, in turn, for the generation of behavioral innovation required by tool use and other instrumental behaviors (Smith, 1982). With respect to evolutionary criteria of adaptation, there is debate concerning whether adequate evidence truly exists to support the notion that the play of nonhuman primates was pivotal in the evolution of tool-using capacities among hominoids. With respect to ontogenetic criteria of adaptation, however, much evidence exists of the developmental transformation of object play into tool-using abilities among wild and captive chimpanzees (Goodall, 1986; Matsuzawa & Sugiyama, 1991; Menzel, 1976; Schiller, 1976). Moreover, the generation of cognitive flexibility and behavioral innovation through play has also been documented among Old World monkeys (Kummer & Goodall, 1985).

Two, play has been hypothesized to serve as a medium through which monkeys and apes develop necessary social skills for competent adult functioning within their respective primate societies (Smith, 1982). From an evolutionary perspective, this hypothesis would predict that nonhuman primates that develop exceptional social skills through play are more likely to survive and reproduce.
than those that do not. Although debate again exists concerning whether adequate evidence exists to support this prediction (Smith, 1982; Symons, 1978), there is strong consensus concerning play's social value during ontogeny. Harlow and Harlow's (1962) classic studies of rhesus monkeys revealed, for example, that consistent opportunities for peer play were even more important than maternal contact if developing monkeys were to develop adult social competencies. Harlow and Harlow found that through peer play, patterns of dominance and aggression were progressively refined until they became adult in form and functioned to preserve cohesiveness within the social group. Lancaster (1976) similarly argued that play parenting prepared immature monkeys and apes to become effective parents as adults. Other studies have documented how social play can help to rehabilitate older monkeys and apes by promoting development of grooming, conflict resolution, mating, and mothering skills (Fritz, 1989; Novak & Harlow, 1975; Suomi & Harlow, 1976). In essence, one way in which play facilitates social development is by enabling players to mature emotionally and, particularly, to learn how to control and direct their emotions within a social context that is constantly in flux and not completely predictable.

Three, play has been hypothesized to serve as a medium for practice in competitive encounters that arise during fights with peers and confrontations with predators or prey (Groos, 1978; Smith, 1982). This hypothesis was first proposed by Groos in 1898 who wrote:

> Now we see that youth probably exists for play. Animals cannot be said to play because they are young and frolicsome, but rather they have a period of youth in order to play, for only by so doing can they supplement the insufficient hereditary endowment with individual experience, in view of the coming tasks of life. (Groos, 1978, p. 75)

Groos's practice theory of play, as it is now termed, presumably addressed locomotor and social play. Strong evidence in support of this theory has prompted its acceptance with respect to both evolutionary and ontogenetic criteria of adaptation. For example, Symons (1978) concluded from his study of play among immature rhesus monkeys that small differences in motor proficiency that had accrued through play were sufficient to be crucial in natural selection. In a wide review of animal research, Smith (1982) similarly argued that locomotor and social play provided practice for competitive encounters in addition to general physical training and conditioning, with adaptive benefits in both ontogenesis and evolution. From a review of the primate literature, Jolly (1985) concluded that locomotor and social play served as the medium through which nonhuman primates developed critical motor proficiencies during ontogeny.

**Discussion: The Value of a Constraint-Free Study of Occupation to Occupational Therapy**

**Practical Applications**

Because occupational therapists are grounded in the realities of daily life and clinical practice, they have long believed that play is a powerful instrument of child development. A large body of research with human children has agreed with this viewpoint through findings that support various theories of how play influences development (Rubin, Fein, & Vandenberg, 1983). Primatological research not only provides additional empirical support of much of this research, it offers considerable authority in doing so. This authority is due to its comparative perspective on some 200 different primate species, which optimally positions researchers to evaluate both evolutionary and ontogenetic processes of adaptation as they pertain to play. A comparative primatological perspective of how play promotes adaptation therefore adds considerable credibility to practitioners' claims that play is an indispensable therapeutic tool.

Most fundamentally, the primate record suggests that play is a powerful instrument of development precisely because its effect on the player is deeply multidimensional. In other words, play has a remarkable capacity to generate simultaneous development and integration of many component areas of occupational functioning traditionally recognized as vital by occupational therapists. From research of monkeys and apes, we thus have strong evidence that play supports cognitive and social development, symbolic communication, motor planning or praxis, sensory integration, and constructional skills at the same time that, if locomotor in nature, it promotes physical conditioning. Play provides a venue for learning how to direct and express emotions that may be associated with aggression or elicited in interactions with others, thus promoting vital emotional development in social species. Play furthermore supports the expression of curiosity, eliciting behavioral flexibility and innovation by so doing. It is clinically important that play prompts efficient development of these diverse aspects of occupational functioning in a generally enjoyable and intrinsically motivated manner.

The primate record may also be interpreted as providing concrete direction with respect to how play might be provided therapeutically. To begin, it speaks to the kind of therapeutic context that must be created if play is to serve as an effective therapeutic modality. Play flourishes in environments that are experienced by the players them-
selves as familiar, safe, and nonthreatening. Primatological research thus supports those practitioners who design naturalistic clinic spaces within institutions, who provide treatment in the home, or who work within community habitats that are particularly conducive to play. Both play and exploration are brought out by environments that allow for some novelty and for diverse opportunities for self-expression. The primate record may thus be interpreted as discouraging rigidly structured activities as well as clinical programs that constantly recycle the same-old round of activity options. Because play by its very nature cannot be produced on demand, the locus of control for action must be placed within the player. Research with monkeys and apes thus speaks loudly and clearly that time must be allotted not only for play to emerge within any given treatment session, but for rapport and trust to develop between therapists and those patients who might benefit from playing. Rather than use professional authority to ensure quick compliance with prescribed activities, time allotted for play to emerge is time likely to be paid with considerable therapeutic dividends. All these considerations are relevant with respect to the use of play as a therapeutic medium and to the design of research studies on play's therapeutic efficacy.

The primate record may also be interpreted as prompting occupational therapists to support playful approaches to other activities not typically regarded as play, including the delivery of therapy itself. A playful attitude on the part of the therapist, when appropriately applied, can reduce patients' anxiety and sustain their participation in difficult activities. Nurturing patients' playful attitudes might make difficult tasks, such as managing medications after memory loss or operating a tenodesis splint, inherently less onerous and intimidating. Therapeutic play activities may similarly facilitate the acquisition of skills in tasks like these that are more commonly thought of as falling within the realm of work or of instrumental activities of daily living. The use of such playful approaches would draw on the adaptive power of play simultaneously with the delivery of enjoyable therapy experiences.

Knowledge of Occupation Is Power

Knowledge of vital occupations such as play can empower practitioners not only with respect to practical applications such as those just discussed, but also with respect to the political arena in which occupational therapy is practiced. Such knowledge fortifies practitioners as they embrace and advocate for the therapeutic value and necessity of occupation, thereby reducing the profession's vulnerability to external forces that seek to control how occupational therapists will be educated, how occupational therapy will be practiced, and under whose authority. It is well documented that occupational therapy historically has had to contend with, and continues to be confronted with, such external forces (Colman, 1992; Gritzer & Arluk, 1985; Yerxa, 1995). Moreover, Gritzer and Arluk (1985), both sociologists, provided strong evidence that in response to some of these forces, occupational therapy as a profession largely did not exert control over its position in the health care market in the later half of this century. They attributed this failure in large part to confusion over professional identity and subsequent lack of a clear understanding and definition of the profession's commodity.

This confusion may be illustrated with the example of play and its close cousin, leisure. Vandenberg and Kielhofner (1982) proposed that the profession's early concern with play progressively eroded, as did its therapeutic applications of play, largely because of embarrassment wrought by years of practice within medical settings where “serious behavior and highly technical tools of the physician rank highest as symbols of prestige” (p. 20). Florey (in press) similarly claimed that over occupational therapy's relatively brief history, many practitioners across diverse practice arenas nearly dropped play altogether from their treatment repertoires in reaction to disliking the pejorative label of play ladies. Florey's (1989) comprehensive review of pediatric topics in occupational therapy textbooks and journals from 1977 to 1988 further revealed that even when play (and other purposeful activities) continued to be used, practitioners focused intervention almost exclusively on sensory, motor, and neurodevelopmental goals. Hence, the emotional and social development of children, two vital aspects of maturation that primate research has conclusively demonstrated are developed through play, were not adequately addressed. It is not surprising, therefore, that occupational therapy's position and role in child psychiatry is currently compromised (Florey, 1989).

With respect to leisure, history suggests that media abandoned by occupational therapists have been embraced by others. Florey (in press) wrote, "Whole professions have been constituted on what occupational therapy has discarded. We have dropped most of the creative arts from our practice....Now we work with colleagues from...Dance Therapy, Art Therapy, Music Therapy, and Recreation Therapy." In sum, the diminution of occupational therapy's involvement in child psychiatry and the emergence of new professions claiming particular authority with respect to play and leisure have sizably narrowed occupational therapy's place in the health care
market. The profession's control over its destiny has, in turn, been greatly weakened. Of relevance here are Reilly's comments that

[Occupational therapy] won't be put out of business by any budget change or any miscalculation from any other group or any kind of neglect on the part of society. It will be because we are not out practicing in the field to realize the enormous nature of the work that we do. Our failure to appreciate what we do for patients will be the cause of our disappearance. (Reilly & Cox, 1980)

If occupational therapists are to value what they do and, therefore, both hold their ground and flourish in the political arena of health care, then they need to know as much as they possibly can about those occupations with which the profession defines its essential domain of concern. For this reason, it would be a grave mistake to constrain occupational therapy's domain of research solely to applied scientific inquiry as Mosey (1992, 1993) has proposed. Such constraints would have the unfortunate consequence of rooting the profession's future in the rapidly shifting sands of change in health care. History has shown that occupational therapy has not controlled these changes on a consistent, or even an intermittently substantive, basis. In essence, without a comprehensive body of knowledge concerning vital occupations, occupational therapy would not be in a strong position if the health care system is transformed radically, perhaps even to the point of deciding that the profession is neither relevant nor necessary. Although clinical research is vital, a broader base of scholarly inquiry consequently is also essential. It is important to consider what occupational therapy's economic position and political status within the medical hierarchy would be today had practitioners' embarrassment over their use of play and their readiness to abandon the creative arts been supplanted by knowledge of play's extraordinary role in primate development, adaptation, and culture. Indeed, Gritz and Arluke (1985) have argued that one of the most efficacious strategies used by subordinate professions to gain control over their destiny within the health care market is to demonstrate the value of their field's knowledge. By so doing, presumed entitlements to authority claimed by professions both asserting dominance over occupational therapy and seeking dominance over occupational therapy can be credibly challenged and countered.

Control Over Knowledge and Theory Development

Carlson and Dunlea (1995) have argued that rather than passively waiting “for scattered knowledge on occupation to develop from essentially disinterested outside disciplines...[occupational therapy] can exert a positive influence on its own destiny by sponsoring its own acquisi-

tion of relevant basic information” (p. 75). There are precedents from many disciplines demonstrating that control over the acquisition of knowledge through broad-ranging scholarly inquiry has led to considerable new knowledge and theories, some with important practical applications. Using just the example of primate research, several such precedents are apparent. In anthropology, Goodall's (1986) research of wild chimpanzees emanated from the field's keen commitment to generating knowledge about the behavior of early humans. Goodall's discovery that chimpanzees used tools rocked traditional anthropological boundaries between humans and animals, prompted research into tool-using behaviors among different populations of chimpanzees, and eventually informed new theories concerning the development of both chimpanzee and human culture (Savage-Rumbaugh & Lewin, 1994; Wrangham, McGrew, de Waal, & Heltne, 1994). Psychology has historically been committed to generating knowledge about learning and the development of intelligence. Kohler's (1925) classic studies with captive chimpanzees (which very much included study of play) were guided by this commitment and eventually succeeded in effectively challenging key behaviorist tenets of learning theory. A new era of gestalt psychology emerged with practical applications to the fields of education and psychotherapy. Also guided by an interest in the development of human intelligence, interdisciplinary linkages have recently been forged among animal behavior, anthropology, biology, psychology, and cognitive science in the emerging field of cognitive ethology. Cognitive ethologists have examined the consciousness of nonhuman species, particularly that of higher monkeys and apes, and its relevance to the evolution of human intelligence (Byrne & Whiten, 1988; Cheney & Seyfarth, 1990; Griffin, 1992). In linguistics, a field centrally concerned with language development, studies with chimpanzees and bonobos have illuminated processes of symbol and lexical acquisition and, thereby, the biological foundations of cognition and learning (Fouts, 1989; Gardner & Gardner, 1989a, 1989b; Savage-Rumbaugh et al., 1989; Savage-Rumbaugh & Lewin, 1994). Interventions developed through this research are now being used to elicit communicative and interactive skills in children and young adults with severe mental retardation who are otherwise unable to develop symbolic communication (Savage-Rumbaugh & Lewin, 1994).

Such precedents of scholarly inquiry that in some small part have relied on primate research are also to be found in occupational therapy. Ayres's (1974) eventual support of the use of enriched therapeutic environments for sensory integrative disorders was influenced by her
comprehensive review of research on the neurologic substrates of behavior in both humans and animals. Enriched environments have since become standard fare in sensory integrative practice; their therapeutic value has been supported by research with infant rhesus monkeys (Schneider, Kraemer, & Suomi, 1991; Schneider, Moore, Suomi, & Champoux, 1991). In addition, Reilly’s (1974) commitment to generating knowledge concerning the link between occupation and human development deeply affected practice. This commitment guided her broad ranging study of play and exploratory behavior in both human and nonhuman primates and influenced development of the occupational behavior frame of reference (Reilly, 1962, 1969, 1974). The Model of Human Occupation grew, in part, from occupational behavior and thus was shaped by the breadth and depth of Reilly’s original scholarship (Kielhofner & Burke, 1985). In sum, several generations of practitioners have now benefited from the work of Ayres and Reilly, two scientists who sought answers to specific questions about human activity and, as the result of the knowledge they had gleaned, profoundly influenced practice for the better.

The precedents discussed in this article provide strong evidence that disciplines that direct their own development of knowledge directly benefit from valuable new insights and theories—some of which prompt paradigmatic shifts in thinking and some of which prompt important practical applications. These precedents also provide evidence that basic and applied scientific inquiry often flow one into the other, with varying degrees of overlap and interaction. This confluence of basic questions with applied concerns ultimately enriches both.

Summary
The purpose of this article was to demonstrate the value of occupational science’s commitment to a constraint-free study of occupation to the profession of occupational therapy. Using the example of primate play, the play of nonhuman primates was described through the lenses of evolutionary biology, psychology, and primatology. Immediate practical applications to occupational therapy addressed component areas of occupational performance on which play has both a developmental and an integrative effect and considerations of therapeutic contexts and approaches. It was proposed that lack of knowledge concerning vital occupations, such as play, on which occupational therapy defines its domain of concern sorely diminishes the profession’s control over its destiny. Conversely, because knowledge of occupation is power, it can advance occupational therapy’s authority in the medical hierarchy and position in the health care market. Finally, it was argued that constraint-free study guided by an identified focus grants control over the acquisition of knowledge to those academic disciplines and applied professions that pursue such inquiry. Paradigmatic shifts in thought, important new theories, and effective practical applications often follow.

In closing, the interface of occupational science and occupational therapy may be thought of as a sort of estuary, a geographic area where rivers meet oceans. Estuaries dynamically mix up qualities of both land and sea and by so doing, sustain remarkable levels of biological activity and diversity. Similarly, because both occupational science and occupational therapy are vitally committed to the construct of occupation, it is reasonable to expect that both will be enriched by those estuaries of inquiry and practice where they meet.

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