
Discovering the Importance of Play through Personal Histories and Brain Images

An Interview with Stuart L. Brown

Stuart L. Brown is founder of the National Institute for Play, a California-based, not-for-profit organization dedicated to the notion that play can help transform the lives of individuals, families, schools, and organizations. Trained in general and internal medicine, psychiatry, and clinical research, Brown was a physician in the United States Navy, a fellow in internal medicine at the Mayo Foundation for Medical Education and Research, assistant dean at the Baylor College of Medicine in Houston, chief of psychiatry at Mercy Hospital and Medical Center in San Diego, and voluntary clinical associate professor of psychiatry at the University of California, San Diego, School of Medicine. He has written and lectured about play in numerous public and scholarly forums and has directed, coproduced, or produced several documentaries and learning series about play and similar topics for CBS, PBS, and BBC, including a National Geographic Society program on animals and humans at play and a PBS special titled *The Promise of Play*. His book, *Play: How It Shapes the Brain, Opens the Imagination, and Invigorates the Soul*, appeared earlier this year. In this interview, Brown discusses his passion for neurological research about play, how he came to it by studying animal play and play-deprived humans, and some of what he hopes to accomplish through the National Institute for Play. In *Play* Brown writes that he prefers describing or illustrating play to defining it, but here he concludes with a definition.

A*ERICAN JOURNAL OF PLAY*: Dr. Brown, you practiced medicine in a wide variety of settings for many years, and now you are a full-time advocate for play. Has anyone ever asked you if you are a recovering workaholic?

Stuart Brown: No, not until now. I sprang from pretty playful family roots, and in college I led the life of a carefree jock. I admit, though, that medical school, plus the usual internships and residencies afterward, turned me into something of a worker bee. I suppose my stint as a navy doc contributed as well.

AJP: The navy kept you just as busy as medical school?

Brown: Well, it wasn't exactly a walk on the beach. A new solo doc out at sea beyond emergency air transport can really be *at sea*. My first duty was aboard

an attack transport, the USS *Bexar*. It's decommissioned now, but it was a really slow-moving cargo ship that carried eighteen hundred Marines and four hundred ships' company. I remember one occasion when a serious accident crushed a sailor's skull. He needed neurosurgery, and I'd never performed it by myself before. I operated on the poor fellow while a neurosurgeon on shore helped me through it by radio. Luckily the outcome was favorable for the patient and me, too. It's hard to remember moments like that as anything but work.

AJP: You later did a stint on shore, where, among other duties, you served as a pediatrician. Is that where you started to get interested in play professionally?

Brown: That was at Miramar Naval Air Station just north of San Diego. It's a Marine Corps station now. I was the senior assistant medical officer and practiced general medicine, including pediatrics and OB-GYN. And yes, I saw there that when very sick children were able to play again, it seemed to help them recover. It was quite profound. Even before medical tests would reveal any definitive hopeful change, once they began to play again, you knew they were on the road back. That wasn't the thing that really propelled me into studying play, though.

AJP: Did switching from general medicine to psychiatry lead you to it?

Brown: Indirectly it did.

AJP: Why did you make that change?

Brown: It was a happy confluence of interest and opportunity. Because I particularly enjoyed the diagnostic aspects of medicine, I took an internal medicine fellowship at the Mayo Clinic. After I arrived there, Howard Rome, who later became president of the American Psychiatric Association, urged me to take some elective time in psychiatry. He was a consummate overall diagnostician and an inspiring mentor, and under his tutelage I became increasingly interested in psychosomatic medicine. As I was completing my training, Baylor College of Medicine in Houston offered me the position of assistant dean, and during the transition, I met Shervert Frazier, who had just been appointed chair of the Baylor psychiatry department. He was a Mayo man, too, having trained there in both internal medicine and psychiatry. We hit it off, and he arranged for me to get a year's credit toward the completion of a psychiatry residency. Eventually I became an assistant professor of psychiatry.

AJP: And how did all that led you to the study of play?

Brown: It was connected to an extremely tragic event about a hundred miles west, in Austin. On the first day of August 1966, Charles Whitman, a twenty-five-year-old former Eagle Scout and U.S. Marine—and supposedly a model student—murdered his wife and mother and then carried a trunk full of guns and ammo twenty-five stories up the library tower at the University of Texas. Then, over the course of about three hours, he shot and killed fourteen fellow students and university staff and wounded thirty-one others before being shot to death himself. It was the largest mass murder in United States history up to that time. Texas governor John Connally, who'd been shot by a sniper himself when President Kennedy was assassinated three years earlier, took a personal interest in it. He was adamant about finding out what had motivated Whitman. In addition to being my boss, Frazier was the state director of mental health at the time and a good friend of the governor. Together they decided that no aspect of the killings should be overlooked, and they assigned me to compile the behavioral data for a whole team of expert investigators.

AJP: This was a huge operation then?

Brown: Yes; well funded and well documented. We had a formidable team. We recruited the head pathologist of the Armed Forces Institute of Pathology to examine Whitman's remains. We enlisted a future Nobel laureate in neuroendocrinology to look for traces of abnormal hormonal activity. We even found a graphologist to analyze Whitman's handwritten diaries. But the work of child and developmental psychiatrists proved the most significant. They set out to discover the details of Whitman's life, and they succeeded. Data poured in. It ranged from information on his prenatal climate to drawings he'd made in preschool, his relationships with family members, and how he'd spent his last hours before the shootings. It was a whole life's story from a clinical point of view.

AJP: How difficult was it for such a diverse group of experts to agree on a finding?

Brown: That's the surprising part. Even though they came at the problem from different disciplines, the team agreed—unanimously—on the most striking contributing cause. The facts of the case were stark. Whitman's father was an especially peculiar man—abusive, tyrannical, fanatical, and humorless. He gave his wife a radio-telephone and made her check in when she left the house to go shopping and do other chores, and he beat her when she didn't follow his instructions to the letter. He was even more relentless and domi-

neering with his son. The man couldn't abide any playmates in the house or the yard. In fact, he made sure the boy hardly played at all. Whitman's childhood was as close to playless as any that those of us on the investigating team had ever seen. When we interviewed Whitman's neighbors and former teachers, they reported that he couldn't navigate social situations normally. He was bright and verbal, but he had never developed the ordinary skills of give-and-take. For instance, he was an excellent mimic, but he couldn't initiate action based on his own desires. His childhood left him unprepared to cope with stress, and eventually he exploded.

AJP: Was Whitman an extreme case? Was it anything like the shootings at Virginia Tech in 2007?

Brown: Extreme, yes, but similar in some ways to the Virginia Tech incident and a number of others. The perpetrator in Virginia was socially isolated as a child and bullied by his classmates. The profile of almost all campus shooters seems to include chronic humiliation, a sense of powerlessness, and a set of precipitating stresses either real or imagined. These were present in Whitman, they were present in other murderers I've studied, and ostensibly they were present in the Virginia Tech shooter as well as in those at Columbine and other locations.

AJP: Did you study other murderers?

Brown: After the Whitman study, I became involved in a detailed examination of twenty-six young male murderers in Texas prisons. Working with them began to show that, although we hadn't set out to do so, in studying Whitman we had created what became a model for taking a complete play history. Studying these inmates highlighted how important play is to normal development. Every single one of them lacked typical play experiences. They especially had trouble with the most ordinary play boys engage in—rough-and-tumble. Boys learn how to give-and-take when they play rough. You might say that roughhousing grants them a kind of grace—it's a way they have of making friends and deepening friendships. These murderers had never experienced that type of play, and they missed the learning that came from it. Many had been lonely or abused. They saw threats in social situations. Many had trouble controlling their impulses, and some were bullies. Most people learn civil behavior in childhood, but these men never had. I saw these same patterns in alcoholic drivers killed in auto accidents too—when I led a state-funded, year-long, medico-engineering study of

fatal accidents in Harris County. So I came to believe that play deprivation points out a general problem.

AJP: Did the studies that zoologist Harry Harlow conducted with play-deprived rhesus monkeys at the University of Wisconsin in the 1950s influence your thinking?

Brown: I knew of his work, and so it was in the back of my mind certainly. Harlow had isolated the primates and deprived them of the comfort of their mothers and siblings. They became hostile and withdrawn, banged their heads, and had little or no capacity to interact normally. And even though they were well fed, they were diminished in stature, and their brains were stunted. When Harlow reintroduced them into monkey society, some died from the emotional stress induced by their complete inability to socialize.

AJP: So you came to believe that keeping kids from play has a harmful impact?

Brown: Yes, play deprivation is a kind of emotional and multisensory starvation. We see the tragic evidence of it in the neglected orphans in Romania and Serbia. Remember, we're also primates. When we're deprived of play, we'll suffer in ways similar to the way those laboratory animals suffered. Play is part of our original equipment, but it has to be nurtured to develop. Normally we play. When we don't, something has gone very, very, wrong, and nonplayers will suffer a number of effects.

AJP: Can you provide us some more examples?

Brown: In children who do not play, damage shows up chiefly as a lack of resilience and a shortfall in curiosity. These children also have difficulty regulating appropriate emotions. People who are play deprived tend to be inflexible, especially when something surprising happens. Novelty is unpleasant when you are unprepared for it or when you are missing the spontaneity that helps you enjoy or learn from surprises. Nonplayers operate with a limited repertoire of responses, and they tend to substitute shock, fear, or aggression for surprise. A normal, safe, play-saturated individual will brighten at the opportunity to play some more. But an individual who is play deprived is rigid and easily startled and will react with hostility or withdrawal rather than joy. Humans who suffer a deficit of play have missed the opportunity to train the feelings that make them stronger. I like the way field biologist Marc Bekoff, a former university professor, puts it: play is "training for the unexpected."

AJP: Bekoff is an evolutionary biologist. Do the evolution of humans and our complex culture make us special or set us apart from other species in terms of play?

Brown: Well, yes and no. We are much different from reptiles, for example. They don't have the brain structures to support play. Gordon Burghardt, another evolutionary biologist, has found an Egyptian turtle that appears playful, but generally reptiles don't have the brains for play. Mammals do. Evolution has added a wondrous architecture in those parts of the mammalian brain that lie on top of and forward of the reptilian arrangement. We've still got that old reptilian brain at the back of our heads sitting on top of the spinal column, and it and its immediate connections—the amygdalae and the limbic cortex—are the seat of fear, lust, and anger. But we've got so much more upstairs. Play is complex and voluntary. And so, elaborate play is a mark of mammalian evolution. It's easy to see in real time today. As long as they're secure and well fed, otters will play without stopping, and young dogs will wear themselves out playing. Every week or two, I'll bring a Frisbee to the beach near my house. It's a great way to make friends with a strange dog. They're happy to give me a good workout.

AJP: Are you saying dogs teach humans how to play?

Brown: We already know how to play, of course, but dogs help us remember. We've been playing together with them for thousands of years. Think about how over time we've picked the most companionable and playful ones to breed. So, yes, dogs know us well, and we know them. C. J. Rogers, who's world famous for her study of wolves and is one of our advisers at the National Institute for Play, opened me to the possibility that when we primates left the forest for the savannah, we learned from observing the pack survival behavior of wolves. Our coevolution with wolves and then dogs may well go back a hundred thousand years or more. But to get back to your previous question: certainly humans have been evolving rapidly over the last couple of hundred thousand years, and our survival depended on our ability to adapt. All over the planet, changing environments—such as we're now facing with global warming—tested our creativity. The driving force in our success seems to have been most directly related to our eye for opportunity and our capacity for play and adventure. Play taught us then, and still it teaches us now, to seek out the possible.

AJP: So there is something special about us when it comes to play?

Brown: When you put it that way, yes. Play and ingenuity aren't hard to find in the natural world. Birds are excellent adaptors. And the brightest of them have a capacity for play. Their brains have a structure that functions something like the human cortex. This is especially true of the mimics, the raptors, and the corvids—crows and ravens. They have the brains for play. But if you give the human being a close look, you find that there is in fact something very special about us even among mammals. Our biology designed us for play throughout the life cycle. We play when we're young, and we're still able to play when we're old. Most animals stop playing when they pass through their juvenile stage. As they reach sexual maturity, they vie for mates and try to extend their dominance. And their mature nervous systems are more fixed and less flexible. But we retain the capacity to generate new neurons throughout our lives. We are neotenous—we retain that juvenile ability to play. I've seen people on their death beds still playing.

AJP: You said we are “still able” to play when we age. Do we tend to forget to play as we grow older?

Brown: Too often, yes. But we're still capable of playing, and many who keep at it insist that it keeps them going. Nursing homes and retirement facilities now set out computer games to keep their residents playing and thinking. There is no question that our playing changes as we grow older, though, mainly by becoming more complex. Sometimes it becomes so complex and purposeful that it isn't really playful anymore. When we forget to play or get out of the habit, we get all cranky and rule bound, and couch bound, too. As a clinician, I've seen the negative effects of discontinuing playing all too often. When adults don't play much, the consequences are rigidity, depression, lack of adaptability, the loss of irony, and such. When we're playing, we cultivate all those talents that help us explore a demanding world, and we roll with the punches life throws at us.

AJP: So, then, play is coping—training for the unexpected? And to you, as a clinician, it looks therapeutic?

Brown: Yes and yes. Start with the way play alleviates stress—it lets us blow off steam—and think of the ways play helps us be more sociable. But for a clinician, play isn't just therapeutic, it's diagnostic. I've now conducted more than six thousand play histories in a variety of clinical settings—and outside them, too. Taking a play history helps you learn a great deal about a patient in a short time. You can take an inventory yourself—you don't

need a therapist to do it for you—and you can tell where a deficit in play can make you cranky or irritable or less relaxed.

AJP: Is there a time when play isn't good for you? Is there a dark side to play—like, say, video-game addiction or gang rituals?

Brown: We need to be careful about saying play has a “dark side,” because that is a kind of contradiction, and it's not very useful. There are instances when play drains away. But that is the absence of play rather than play going bad. I'd have to say that gangbangers aren't playing. Gangs are very fragile emotional entities. The hallmarks of belonging include inflexible loyalty, territoriality, and vengeance. Gang members are quick to anger—quick to murder, actually. The slightest thing can set them off. The first thing that social workers who work in gang intervention do is to try to get gang members to promise not “to take a body.” Gangs almost all function with a dominance hierarchy, and the dance of dominance and submission rests on power and violence rather than play. Violence and cruelty aren't play.

AJP: And what about video-game addiction?

Brown: We need to take care here, too. I'm not against video games per se—they're certainly better for you than passive television watching. Even traditional video games are more social than we think—kids often get together to play them—and many of the newer types depend on players interacting with each other online. Plus a lot of the new video games require you to get up and move around. Soon the virtual reality will be much more believable and demanding—that's another thing that's changing. Basically we play because we want to and because we like how we feel when we're playing. But when the games take over, when they are so compelling we can't stop, that's a destructive, addictive thing. When we have no choice about playing or no freedom to refuse play—as in the case of compulsive gambling or obsessive involvement with electronic games—that is a compulsion and no longer really voluntary. So those who have become addicted aren't playing any more, strictly speaking, because it is no longer voluntary.

AJP: Are you saying that video games don't addict players, compulsions do?

Brown: No. To say that is just to evade the issue. Most video games still tend to arouse without allowing physical discharge. Video screens are two dimensional, and they evoke emotion within that two-dimensional environment. Play usually involves our proprioception—our sense of ourselves moving in space—and this sense is rich and pleasurable and offers us a release. That's why we enjoy hiking and climbing trees. And that sense is missing in

electronic games, at least at the present. The easy high the games promise is also somewhat worrisome on its own, because when the joystick calls out a compulsive and driven response, play is gone. It's been drained away. True play can be interrupted—substituted for by some other playful distraction. But videogame addicts are irritable when interrupted. In severe cases, they neglect basic nutrition, sleep, and hygiene. They stay up all night and forget to eat or take a shower. These are the cardinal signs of an addictive disorder. Again, when play ceases to be voluntary, it ceases to be play.

AJP: What about bullies who torment their victims on playgrounds for fun? Are they playing? Is that a dark side of play?

Brown: This one is simpler. The short answer is no. If you take one look at a bully, you know he isn't playing. I said "he," but girls can bully, too, though they tend to injure with cutting remarks rather than fists. A bully doesn't have the open, inviting expression that a player has. He doesn't show the play face that evolution has given us as a universal invitation. When glee is tinged with cruelty, it isn't play. It isn't that the bully—male or female—has gone over to "the dark side," the bully just doesn't get play in the first place. Likely, and I mentioned earlier, he's been abused by uncaring adults and made to feel powerless. A bully may enjoy tormenting his peers, and he may well enjoy power and sadism. But that's not purposeless or joyful, and it's not play for its own sake. A good play session produces joy and optimism. Bullies who are abused at home get no sense that violence is taboo, and they need a special setting and special training to learn social skills. Meantime, we need to kick them off the playground until they're remediated. That said, however, kids who're playing freely and without adult supervision have a way of taking care of a mild or developing bully. If he's not too toxic or dangerous, they will gang up and teach him a lesson.

AJP: You believe kids can look out for themselves?

Brown: Much of the time, yes. Kids mostly solve their own problems. If they're following the lead of hovering parents, they get in the habit of blunting their own reactions to life. But when kids play on their own, they learn to be fast, or cagey, or charming, or funny, or creative in protecting themselves and turning play to their advantage. Kids at play discover their strengths. They learn there are many more choices than running or fighting. All this comes in handy later on, and it's why adults need to stop being "helicopter parents" and let children play. They learn empathy and restraint when they play. If you are wrestling and somebody gets too rough with you, you understand

what that feels like. It hurts, and it's humiliating, and normally it teaches you the subtlety of not hurting and humiliating somebody else. Again, *none* of the murderers I studied joined in normal rough-and-tumble play. Not even one. There was something missing in these violent, antisocial men. They weren't able to learn the boundaries or understand the give-and-take and the mutuality that is experienced in play.

AJP: So play, even rough play, outweighs the risks associated with it?

Brown: Yes, I believe so. But in any case, it's difficult to separate play from risk. If you think about this as a problem in evolutionary biology and why play survived, it may be because play strengthens us and gives us courage. Clever experiments with rats showed that when playful rats were exposed to cat odor, they tended to hide for a time, then venture out again. They would come out even though cats eat rats. But when nonplaying rats were exposed to the same smell of cat threat, they would scurry away and rarely venture out again. They stayed hidden for prolonged periods until they died. Even as civilized people, we can't thrive without assuming some risk. We play because it's fun, but we also like some degree of risk with play because it's enlivening. It's possible to get hurt or even die while playing, but evolution has selected against those who courted excessive risk. They didn't survive to pass on their genes. Of course, people are clever, and they invent skateboards and ski jumps and NASCAR races. Daredevils may actually be attractive as prospective mates, and so the traits survive and are passed on even in civilization. We will always need the kind of gumption that play demonstrates or advertises. It's essential to our well-being both in the short term and over the long haul.

AJP: Do you believe parents have become too cautious or too protective of their children?

Brown: Yes, no question about it. Parents need to monitor risk, true, but monitoring is a balancing act that requires exercising responsibility while allowing kids the freedom they need. We want to keep our children safe, but to remove risk from kids' play is to deny them the opportunity to find their spontaneity and their strength. It's unfortunate that we live in such a fearful culture now. We fear physical risks and lawsuits. We fear we'll leave a child behind if every minute of his or her school day isn't devoted to study. It's very different now from when I was growing up. The political climate feeds the fear, the media feeds the fear, and fear itself feeds still more fear. The problem with fear, other than it's unpleasant, is it makes us averse to risk. Anxiety is contagious.

AJP: Are you saying that when we are fearful, we lose perspective?

Brown: Right. That's the problem—finding perspective while we're afraid. When we're caught in a cycle of fear, it gets in the way of clear thinking. Here's a good example: if you look at emergency room admissions, you'll learn that home bathrooms cause more accidents and are more dangerous than playgrounds. Of course, we also spend more time in bathrooms than we do on playgrounds. Anyway, it's not headline news when somebody falls at home, but let a kid have an accident on the playground, and the headline screams, "Kid Hurt Having Fun." It's not surprising that in this fearful climate lawsuits have outpaced common sense. Real risk and perceived risk are often far apart, but whopping damage awards shape our culture.

AJP: Where does this leave us then?

Brown: It leaves us banning dodge ball in schools and outlawing tree climbing in Girl Scout camps. Schools limit recess time or eliminate it entirely. We keep children inside and make them live like potted plants because we have an exaggerated fear of strangers. There's a self-feeding side to this, too. Food is cheap, and the couch is comfortable. Kids who play less are weaker and heavier and less fit and more injury prone. So we protect them more, and weaken them more, and so on. This is especially true in middle-class suburbs and well-preserved city neighborhoods where pickup games and unsupervised after-school activities have almost disappeared. This is a major loss. No one wants more concussions and fractures, but there is also harm in playing it too safe. Look. It just comes down to this: kids need experience facing and measuring up to all kinds of challenges that are inherent in play, not just the physical ones or the social and emotional ones we talked about earlier. When kids pretend, for example, they're cultivating intellectual challenges that draw on and build their creativity. We have to become better informed about all kinds of play and do a better job of understanding and supporting it.

AJP: That's a good segue into talking about the National Institute for Play. But first, since play histories have been so important in your research, would you tell us a little more about your own?

Brown: My parents were huge supporters of play. Our backyard had a lot of climbable trees and was the neighborhood play center. My mother not only allowed roughhousing, she encouraged it, even when our Illinois winters kept us indoors. Sometimes I think of her as the real founder of the institute. Our family was solid Midwestern Puritan, and my parents sent me

to an evangelical college. But the members of my extended family were sportsmen, jokesters, and game lovers. They managed to compartmentalize church and work and hold open a big place for play. On my father's side, especially, gatherings were always playful. Play helped them get along. Still does, as a matter of fact.

AJP: You specialize in the science of play, but sometimes when you talk about it, you make it sound like a religious experience.

Brown: Perhaps so. To see two young lionesses in a rough-and-tumble play ballet in the Serengeti is, to me, a sacred sight. I feel like I'm looking at something deep and timeless. And to see and hear my three-year-old grandson warble and sing to his stuffed bear, then make the bear seem to moo like a cow, and then laugh uproariously at his own joke, that is a blessed moment, too. So, yes, in some instances there does seem to be something holy that play evokes. It can take us out of ourselves, out of time, and into another realm. Skiing is a good example. Some of my most vivid play memories are skiing with my kids at Vail, Park City, Mammoth, Aspen, Snowbird, and other great places. I've been very fortunate in having those times. Anyway, skiers describe an otherworldly feeling. When you find a harmony with the movement and gain a sense that you are right with defying gravity in all that grandeur around you, you get the feeling that you're outside of time. There is only that moment. You are in a deep, melodic state of play. This is what your biology designed you to be capable of—a deep awareness of your skill and a suspension of conscious direction. There's no difference between acting and reacting. Tennis players and mountain climbers say similar things when they try to put their feelings into words. If this is a feeling for something holy, it's a kind of holiness without theology that you feel in your mind and your muscles.

AJP: Is that what you call a "play state"? If it is, are there various types of play states that correspond to different kinds of play?

Brown: Those are among the questions we're hoping to discover answers for at the National Institute for Play, where we hope to integrate the whole range of disciplines we've been referring to here. Right now I believe there are states of play in humans, and we need to define them much more exactly in order to understand and appreciate the benefits of play more fully. At the institute, we're developing plans for a two-year neuroimaging study of early play as it evolves between mother and infant. Up to now, it's been impossible to assay precisely what is going on in the brain during infant-parent play, because there is so much movement in the play. But now technology

will allow us to image the brain while players are moving. When full funding is in place, our protocols will allow us to observe the brain during play in ways heretofore impossible.

AJP: Do you think neuroimaging is the next frontier of play research? Is that where play research is headed?

Brown: Certainly we're just on the edge of important discoveries. New technology and a flood of interconnected information from evolutionary biology, neuroscience, developmental psychology, and animal-behavior studies now give us a foundation for discovering the very basics of play. Those discoveries will help us develop more ways to derive the benefits of play. The science needs objective data to fill out the clinical evidence for the positive sculpting of brain function. In addition to the infant-parent studies at the institute, we also propose to follow how infants begin more elaborate play as they mature. We want to see what is revealed as they have more complex body, object, and social-play experiences. This is an exciting and original project.

AJP: Is it aimed at finding out what's happening in our brains when we're in a state of play?

Brown: That's right. We have a lot to discover about how the brain acts when we're at play. The brain is amazingly complex, but we're getting better at understanding its architecture. We are also learning things about the neuroendocrine system that would have seemed like science fiction a decade ago. And neurotransmitters are beginning to give up their secrets. Even the channels in the cell membranes and the participation of cells that support neuronal activity are coming under scrutiny. We're getting better at discerning the patterns among and between these various systems and their influence on our feelings and behavior. We know more about serotonin levels and states of depression, and we have begun to understand the role that dopamine plays in reward systems. Neurochemists love glutamate—it's a neurotransmitter that plays a role in memory and learning. We've seen how epilepsy and dream sleep both arise with chaotic firing in a brain region that is next to the brain stem and is called the "pons." And we've seen how play rebounds after animals have been deprived of play for a time. The animal models blend very well with the human condition. This likely tells us that play has specific physiologic patterns, and that it's a basic need, something like our need for sleep.

AJP: So you hope play will become a focus of research in neuroscience the way sleep has?

Brown: I certainly believe that's a good comparison. In the 1940s, sleep was as fully undefined and enigmatic as play. We spend a third of our lives in territory that once was as undiscovered as the dark side of the moon. Now we know a ton about the phases of deep NREM—or non-rapid eye movement—sleep and also about the intervals of REM sleep. When the sleep deprived finally get to sleep, they rebound with exuberant REM sleep the same way play-deprived animals play more intensely when they're freed to play. The EEG or electroencephalogram allowed us to see and measure the patterns associated with sleep. When we used that technology to monitor sleep patterns in animals and humans, we learned about sleep disorders such as narcolepsy and night terrors. We also began to understand the benefits of REM sleep, such as enhancing memory. And what we learned helped us devise treatments and drug therapies for illnesses related to sleep disorder or deprivation. In a similar way, new technologies of brain imaging, new ways to see the processes of neurochemistry, and recent discoveries in neuroendocrine science are likely to help us map those landscapes specific to play. Throughout our lives, cumulatively, we spend years playing, and we need to know more about what's happening when we do.

AJP: What are the practical implications of mapping the states of play?

Brown: Mapping will help us understand the very nature of play, and then we will be in position to better understand how it benefits us and why it's a necessity. We will likely discover how play helps us learn more effectively, how it rewards us with pleasurable feelings, and how it helps us regulate our emotions. We will make better play-related policies in a whole range of human activities. We will make inroads against epidemic childhood obesity, for example, and we will likely find better ways to teach once we understand and acknowledge how important play is to optimal learning.

AJP: One final question. Many studies of play begin with something like: "Play is hard to define." You did it in your new book, *Play*. Authors seem to mean that play takes many different forms. Are you willing to take a stab at a fuller definition of play for us?

Brown: You're putting me on the spot, but how does this sound for now? Play is an ancient, voluntary, inherently pleasurable, apparently purposeless activity or process that is undertaken for its own sake and that strengthens our muscles and our social skills, fertilizes brain activity, tempers and deepens our emotions, takes us out of time, and enables a state of balance and poise.