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Project Holly: Can Human-based Behavioral Therapy Help a Chimpanzee?

Ellen J. Ingmanson

If you have ever been the recipient of a vaccine for hepatitis or meningitis, or numerous other medical procedures, you have benefited from research conducted on chimpanzees. It is rare, though, for chimpanzees to have been the beneficiaries of medical research using human subjects. But this is exactly what took place with Holly, a 16-year old female chimpanzee who lives at the Saint Louis Zoo, in Missouri. Holly’s problem was a remarkably common one that humans often experience: she struggled to be fully accepted by her social group. Holly’s dilemma inspired “Project Holly,” in which, since 2009, a team of chimpanzee and human behaviorists have worked to help Holly socially integrate and to draw conclusions from her example. I am privileged to be on Holly’s team. When Project Holly first began, I was somewhat skeptical that we could make a difference in her life. But I love chimpanzees, and the opportunity to do some research with a group and perhaps help them, was irresistible.

My first introduction to Holly was on a CD that Dr. Margaret Bauman, an autism specialist from Harvard Medical School, gave me to view. The Saint Louis Zoo had contacted her with concerns about some of Holly’s behavior, and questions about their possible relationship to autistic behavior in human children. Dr. Bauman has worked with autistic children in the Boston area for many years, but she did not know chimpanzees. I do. I have studied their behavior since the early 1980s, both in captive situations and in the wild. Dr. Bauman and I traded information and shared insights into what we saw on the video and the interdisciplinary collaboration that became Project Holly began.

The behavioral and genetic similarities between humans and chimpanzees have been critical in our understanding of the evolution and ontogeny of human behavior. However, it has been unclear whether chimpanzees experience neural disturbances resulting in behavioral anomalies that parallel those seen more in human children (such as autism). Many captive chimpanzees display behaviors that are sometimes viewed as abnormal and not part of the typical chimpanzee behavioral repertoire. These may be so common, in fact, that they are often considered as “normal for captive chimpanzees.” Many captive facilities have introduced environmental and behavioral enrichment programs in an attempt to improve conditions for the chimpanzees and reduce the incidence of atypical behaviors. In spite of this, these behaviors often persist and may result in health or management issues. Holly’s behavior included rocking, self-plucking, clutching items and tandem walking with a peer. These behaviors did not decrease when Holly entered adulthood, as sometimes occurs with captive chimpanzees. Her caretakers felt that she did not respond well to social signals and was often the “odd-man out” in the social group.

Holly was born in 1998 at a small zoo in Alabama. As is often the case with captive animals, her mother lacked experience in taking care of infants and was considered “rough” with Holly. Concerned for her well-being, Holly’s caretakers removed her from her mother, and in her place substituted care by the human staff. Research on nonhuman primates dating back to the 1960s, such as the rhesus monkey experiments in the Harlow laboratories, has shown that in the absence of a mother, it is better for an individual captive primate to be raised with peers, rather than alone. So, at 3 months old, Holly was sent to the Saint Louis Zoo to join another infant female chimpanzee, Bakhari, who was also being cared for without a mother. The two were
raised together by the Saint Louis Zoo staff and docents until they could be integrated with the other chimpanzees at the zoo.

Upon her arrival at the Saint Louis Zoo, Holly was considered physically well-coordinated and very active, but she did not seem fluid in her movements the way other young chimps are. She did not want to be touched and would always play hard, even when it was not appropriate. In the wild, infant chimpanzees spend most of their first year clinging to their mothers and cuddled in their arms. Holly’s caretakers considered her behavior to be “different” early on, especially when compared to Bakhari, but they attributed it to hand-rearing or just personality differences. By age 1, both Holly and Bakhari were gradually introduced to the larger social group. At age 6-7, Holly was not outgrowing the infantile rocking behavior, and began rocking in a side-to-side, “tick-tock” motion. She continued to be rough in her behavior, and struggled to fully socialize with the group. As a young adult at age 11, Holly continued to display many behaviors that set her apart from the rest of the social group. She plucked her hair, rocked side to side, clutched items or a peer, and often had a glazed, staring expression on her face. She would react inappropriately to social stimuli, and was not well integrated with the group. Meanwhile, Bakhari was melding well with the others.

In June 2009, Dr. Bauman gathered experts in chimpanzee caretaking and behavior, along with human child psychology and development specialists in St. Louis to examine Holly’s situation, and determine if we could provide any help for her. Using rearing and developmental history, video tapes and direct observations, we assessed Holly’s behavior. She clearly engaged in many behaviors that were abnormal and perhaps deleterious to her health and the group’s social functioning. However, we ruled out a chimpanzee equivalent of autism as likely causing Holly’s behavior. The diagnosis of autism in humans is very complex, and often centers on language difficulties. While chimpanzees have very rich communication behaviors, it is not language in the same sense that humans employ. Thus, this human component of autism is simply not present for chimpanzees. During our discussions and observations, alternate explanations to autism emerged emphasizing sensory integration and motor-planning difficulties. Key elements in Holly’s behavior that led in this direction included poor motor fluidity, posture rigidity, lack of restful postures, seeking tactile stimulation, and poor social awareness. The child development specialists, all of whom had no previous experience with chimpanzee behavior, were struck by how similar Holly’s behavior was to the human children with whom they worked. Following this preliminary diagnosis of sensory integration and processing disorder, I began a series of intensive behavioral observations to provide longitudinal data on Holly and her age-peers (Bakhari, Tammy and Utamu) in the group. Each individual’s behavior, social partners, proximity to others, and location within the enclosure were all recorded.

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These observations supported the initial diagnosis focusing on sensory integration and processing. Holly’s interactions with the other group members demonstrate some of the consequences of her difficulties. Bakhari was one of her preferred partners, but unless distressed herself, Bakhari often avoided Holly. Holly’s second choice for a social partner was the younger Tammy, who was 7 years of age at the time of the observations. Holly was able to dominate Tammy and to some extent control her behavior with forced tandem walking. However, I observed that Tammy was gradually beginning to avoid Holly, and spent considerable amounts of time out of proximity to all group members. This appeared to affect Tammy’s normal development within the group. As she avoided Holly, she was also limiting her interactions with all group members.

Holly also had unstable relationships with the older adults in the group. She was very cautious of Hugo, the alpha male, and often avoided him. However, she often visually monitored his behavior from a distance and his movements often precipitated her rocking and tandem-walking behavior. While she seemed to be distressed by Hugo’s presence, Holly also sometimes approached him aggressively (not a good idea for a young female chimp), and did not seem to learn how to interact appropriately with him.

The oldest male in the group, Smoke, often tolerated Holly’s presence. However, Holly did not seem to read subtle social cues from him. While Holly often sat near Smoke, he at times attempted to increase the distance between them. When Holly sat close to Smoke, she sometimes draped her arm over his shoulders. Smoke was observed to gently lift her arm from his shoulders and scoot a few inches away.

The child development specialists, all with no previous experience in chimpanzee behavior, were struck by how similar Holly’s behavior was to the human children with whom they worked. Holly again moved close to him and put her arm on his shoulders. Smoke then repeated the sequence. After several minutes of this, Smoke would quietly stand up and walk away. This type of sequence was observed several times. Holly didn’t seem to get the hint. Her relationships with the other adult females in the group were also difficult. Holly almost never interacted with Rosebud or Beauty, the older matriarchs. Only Mlinzi, who had sometimes mothered Holly when she was younger, consistently associated with her. Holly was often near Mlinzi, and would groom her. Mlinzi was the only chimpanzee in the group who groomed Holly. This was particularly telling, as grooming each other is among the most important chimpanzee social behaviors.

After making these detailed observations, “Project Holly” team members began to devise a plan for therapy. Dr. Teresa May-Benson from the Spiral Foundation in Newton, Massachusetts took the lead for this part of the project. She is an expert in occupational therapy for both children and adults with sensory integration and processing disorders. She used her experience with humans to develop a series of activities that could be used with Holly by the zoo keepers who provide the group’s daily care. This was not easy. Many of the therapeutic interventions used with humans involve close interaction and hands-on activities, such as deep massage. This is not possible with chimpanzees because of safety protocols. While Holly’s relations with other members of her social group were not ideal, separating her would have been extremely stressful, and more likely to exacerbate her problems than help. Thus, all therapy had to be adjusted to be chimpanzee-friendly.

The kinds of activities that Dr. May-Benson developed for Holly focused on different aspects of sensory integration. Some addressed tactile sensory stimulation, while others targeted vestibular, gross motor planning and coordination. At times, Holly had to be coaxed to engage in an activity; if simply provided...
learned from their mothers, siblings, and social group during a long juvenile and adolescent period. A captive chimpanzee would otherwise have no idea of what to eat or where to build a safe nest to sleep each night. Chimpanzees originally came into captivity, though, for our benefit – either for medical research or the entertainment industry. Thus we are now morally obligated to provide these chimpanzees and their descendants with the best lives we can give them.

Our work has just begun. Dr. May-Benson and I are extending the diagnostic and therapeutic protocols developed for Project Holly to other captive individuals, in hopes of helping them, too. Though she would not know it, Holly has opened the door to a research agenda that has a very big scope and holds significant promise for benefiting both chimpanzees and us.

the opportunity to do so, there was no guarantee that she actually would. The other group members also had to be allowed to join in. Tactile activities included providing increased environmental enrichment such as the use of brushes, electronic massagers, water play, corn or rice bins into which they could dip their hands, varied textured materials, and rope pulls. Vestibular activities included bungee swings, hammock swings, and heavy crate pulls.

The zoo staff and ape keepers worked with Holly on these activities over several months. Almost immediately, my behavioral observations began to indicate changes in her behavior. Holly displayed fewer abnormal behaviors, appeared calmer, rested more, and had more positive interactions with the other chimpanzees. More than two years after therapy was initiated, Holly was maintaining some of these positive results. While she still engaged in some of the abnormal behaviors that had originally drawn the chimpanzee and child specialists together in the Holly Project, these behaviors had decreased in frequency and her interactions with the other chimpanzees had improved. She was spending more time grooming with them, and they seemed to avoid her less.

Holly’s behavior in this group of chimpanzees, in addition to the concern for her well-being expressed by the Saint Louis Zoo staff and their initiative to seek help, presented an opportunity to more fully understand the nature of abnormal behavior in captivity, as well as its effects on the individual and the social group. It has also allowed us to consider the relationship between these atypical chimpanzee behaviors and some human neurological dysfunctions. The behaviors and postures observed in Holly are common in children diagnosed with sensory integration problems. This may be the first time a human-based behavioral therapy protocol has been utilized to aid a chimpanzee. Chimpanzees are an endangered species, and those in captivity today cannot realistically be returned to the wild. Their native forest habitat in Africa has been decimated by humans, so there is little “wild” left. Much of chimpanzee behavior is also

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Postscript: Dr. Ingmanson is not affiliated with the Saint Louis Zoo and the opinions expressed above are not intended to represent the Zoo’s policies or practices. She wishes to extend her thanks and appreciation to Margaret Bauman MD, Teresa May-Benson ScD, Ingrid Porton, Terri Hunnicutt, Stephanie Braccini PhD, Martha Weber DVM, John Pruett MD PhD, David Beversdorf MD, Karen Bauman MA and the Saint Louis Zoo for their cooperation, input and help at different phases of the project.