

Great Ape TRUST OF IOWA

For more information, contact:

Al Setka
Director of Communications
Great Ape Trust of Iowa
515.243.3580
515.720.7430 (mobile)
asetka@greatapetrust.org

Rumbaugh and team publish new theory of learning and behavior

*Salience theory offers perspective of how learning
takes place and generates new behaviors called 'emergents'*

Des Moines, Iowa – January 14, 2008 – The capacity of apes to learn the meanings of arbitrary symbols, to adapt them to two-way communication and to meet novel challenges is significantly greater than for any other primate species other than human beings, according to new scientific findings recently published as the lead paper in the respected *International Journal of Primatology*.

[Dr. Duane M. Rumbaugh](#), a scientist *emeritus* at Great Ape Trust of Iowa, was the lead author of the paper, [A Salience Theory of Learning and Behavior: With Perspectives on Neurobiology and Cognition](#) (Vol. 28, No. 5, October 2007; pages 973-996). Co-authors are Dr. James E. King of the University of Arizona at Tucson; Dr. Michael J. Beran and Dr. David A. Washburn, both of the Language Research Center (LRC) at Georgia State University, where Rumbaugh was affiliated before coming to Great Ape Trust in 2004; and Dr. Kristy L. Gould of Luther College in Decorah, Iowa.

Their findings offer a substantially new perspective of learning and behavior based heavily on the past half-century's research with primates, with emphasis on the great apes and their advanced intelligence and language skills. The salience theory is a

NEWS RELEASE

new perspective of how learning takes place across species and generates new behaviors called “emergents.”

Emergents embrace all forms of cognition of animal life: their abilities to acquire concepts, to learn insightfully, to make and use tools, to learn the basic dimensions of language, and in other ways to manifest advanced intelligence.

“The salience theory is intended to help us understand how it is that animals quite frequently learn far more than what can be accounted for on the basis of specific training with conventional reinforcement, and also how and why individual differences prevail among apes,” Rumbaugh said. “What is learned is not necessarily constrained by training.”

For example, chimpanzees and bonobos exposed to ape-language research at the LRC and, later, bonobos at Great Ape Trust, learned to use arbitrary symbols to represent items, to categorize them symbolically, and to communicate about them in their absence. They learned symbols by observation, and came to comprehend syntax of human speech, according to Rumbaugh.

Rumbaugh’s breakthrough in ape-language research occurred with Lana, a chimpanzee and the first non-human primate to communicate with symbols. Using a computer joystick, she could control the cursor so as to count out sets of items to match the numerical values assigned in a series of trials. Learning to count as part of this exercise was an emergent behavior, Rumbaugh said.

Probably the best example Rumbaugh and his scientific colleagues found of emergents occurred when a rhesus monkey was trained only to use its foot, and never its hand, to use a joystick to control a cursor to catch an erratically moving target on a computer monitor. After six months when the monkey had finally mastered the task, it was then for the first time allowed to use either a foot or a hand to perform it.

“Immediately it used its hand, though it had never had a single reward for doing it,” Rumbaugh said. “It had had tens of thousands of rewarded trials to use a foot, but never a hand. Now, the monkey shifted 100 percent to a hand and, even more surprisingly, it was better right off with its hand than it had ever been with its foot.

NEWS RELEASE

“Thus, it had learned about the task and its principles, and was not deterred by prior training to use only a foot,” he said. “Stimulus-response-rewarded training did not constrain what it had learned. We were very surprised.”

Traditionally, behaviorists have described the behavior of animals as responses to stimuli or as behaviors under the control of discriminative stimuli or contexts – for example, reinforcers, punishers or the absence of either. They also believed that reinforcement acts on the response – that is, the behavior – and not on the organism. In the salience theory research, Rumbaugh and his colleagues advance an opposing view that species’ brains are uniquely designed to perceive and relate stimulus events that are contiguous, salient and relevant to their specific adaptation.

“Animals’ behavior frequently is far richer and more creative than their specific and reinforced training should support,” he said. “The salience theory circumvents many constraints of other perspectives that are based on stimulus-response-reinforcement-habit models. It is intended to unify behavior from instincts through cognition and creativity.”

The official journal of the International Primatological Society, the IJP publishes peer-reviewed, high-quality original articles featuring primates. The Journal also gathers laboratory and field studies from such diverse disciplines as anthropology, anatomy, ethology, paleontology, psychology, sociology and zoology.

Rumbaugh, who has been acknowledged as one of the most important 20th century contributors to the field of comparative psychology, has presented the salience theory numerous times over the last year, including as a keynote address at the International Association for Cognitive Education and Psychology at the University of Tennessee. He also presented the salience theory to the distinguished departments of psychology at Rutgers University, the University of South Carolina and Georgia State University, as well as at the Midwest Psychological Association in Chicago and the Mind of the Chimpanzee Conference at Lincoln Park Zoo in Chicago.

Rumbaugh’s research career spans a half-century and includes some 270 publications, books and educational films. His development in 1971 of a computer-monitor keyboard has helped sustain research with chimpanzees, bonobos and orangutans to determine if they can acquire language in the same way children learn.

NEWS RELEASE

He was named the 2006 Distinguished Primatologist by the American Society of Primatologists, and in 2005, he was awarded the D.O. Hebb Distinguished Scientific Contributions Award by the Executive Committee of Division 6 of the American Psychological Association. The award is named for Donald O. Hebb, a distinguished comparative psychologist and neuroscientist of the 20th century, and it honors a psychologist selected for their distinguished theoretical and empirical contributions to basic research in neuroscience and/or comparative psychology.

(Dr. Duane Rumbaugh can be reached at drumbaugh@greatapetrust.org.)

GREAT APE TRUST BACKGROUND

Great Ape Trust of Iowa is a scientific research facility in southeast Des Moines dedicated to understanding the origins and future of culture, language, tools and intelligence. When completed, Great Ape Trust will be the largest great ape facility in North America and one of the first worldwide to include all four types of great ape – bonobos, chimpanzees, gorillas and orangutans – for noninvasive interdisciplinary studies of their cognitive and communicative capabilities.

Great Ape Trust is dedicated to providing sanctuary and an honorable life for great apes, studying the intelligence of great apes, advancing conservation of great apes and providing unique educational experiences about great apes. Great Ape Trust of Iowa is a 501(c) 3 not-for-profit organization and is certified by the Association of Zoos and Aquariums (AZA). To learn more about Great Ape Trust of Iowa, go to www.GreatApeTrust.org.

####

Insights Through Collaborations with Apes