

Seniors Slipping

Gorillas show signs of slower thinking in numbered tasks when they reach senior adult age.

@ Research on the cognitive effects of aging in adult gorillas shows similarities to studies in humans. Further research with gorillas may reveal more about the human aging process.

Adding years to life apparently makes it harder to process larger amounts of quantitative information — even for gorillas.

A recent study showed slower response and poorer accuracy and performance among older adult gorillas who were asked to choose the largest pair of objects from an array of four sets. The results show similarities to studies done in humans, and further research in gorillas may yield insights into the human aging process, researchers say.

The findings — published in the September 2005 issue of the *Journal of Comparative Psychology* — also have implications for the management of captive gorilla populations, say the researchers from the Georgia Institute of Technology, Zoo Atlanta and Emory University's Yerkes National Primate Research Center.

"In recent years, we've focused our research on the innate capacity of gorillas to learn," says Professor Terry Maple, director of the Georgia Tech Center for Conservation and Behavior and director emeritus of Zoo Atlanta. "This study is an important step in understanding how gorillas learn throughout their lives."

Understanding the full implications of these findings for humans will require further research. Though studies in humans have shown age-related declines in other areas of cognition, such as memory and learning, "aging and numerical cognition are relatively understudied in adult humans and non-human primates," says Ursula Anderson, a Georgia Tech Ph.D. student, Zoo Atlanta research associate and lead author of the paper.

"Studies in adult humans — those that are most similar to our work with gorillas — have shown some declines with advancing age in numerical competencies that emerge without schooling in natural contexts, such as determining which of two sets of objects is smaller or larger."

For example, in studies with humans, researchers have asked subjects to identify the number of objects that appear on a computer screen. Older adults have exhibited slower response times, poorer accuracy or both in these studies. Researchers attribute these results to age-related changes in cognitive performance, Anderson explains.

The Georgia Tech study done at Zoo Atlanta revealed slower response times and poorer accuracy among the seniors in choosing the largest pair of grapes from an array of four quantities of grapes. The experiments involved 11 Western lowland gorillas — five young adults ranging in age from six to 13 and six seniors between 37 and 43 years old.

In the first experiment, Anderson and her colleagues offered the gorillas the choice of eating from one to four grapes on one tray or eating from one to four grapes presented on another tray. Only two of the younger and two of the older gorillas selected the larger portion.

"Based on previous research, the gorillas should have selected the larger quantity of grapes if they were able to distinguish the difference in quantities between the two trays," Anderson explains.

"So we thought they just didn't have enough experience with the task."

So in a second experiment, researchers helped the gorillas distinguish between two quantities by changing the rules. In this experiment, gorillas that selected the smaller quantity of grapes didn't get to eat them. After a number of trials, all of the gorillas selected the larger quantity, but it took the older gorillas longer to choose the larger quantity. "This revealed some cognitive slowing with regard to relative numerosness judgment," Anderson says.

The third experiment was more complex. The gorillas had to choose between a pair of grapes on one tray and another pair of grapes presented on another tray with each pair of grapes totaling from one to eight. Again, all of the gorillas chose the larger quantity. And again there was an age difference.

"The older gorillas were significantly slower than the younger ones, and they were less accurate in choosing the larger quantity pair in the series of trials we did," Anderson explains. "The older gorillas chose the larger quantity pair 68

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percent of the time, and the younger ones selected the larger quantity 77 percent of the time. That difference is statistically significant."

As a follow-up to the gorilla study, Anderson and her colleagues conducted similar experiments with Zoo Atlanta's orangutans, though these adroit animals did not need the training researchers provided to gorillas. The aging effects were similar in that older orangutans were less accurate on some tasks. Researchers hope to publish their findings later this year, Anderson says.

Meanwhile, the researchers hope to extend this study to other non-human primates, including monkeys and prosimians. They want to gain insight into both the implications for human aging and the management of captive primate populations.

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ABOVE:
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