

# Age Effects

## IN LEARNING AND JUDGEMENT

BY BOB SKIPPER

**AS WE AGE, OUR ABILITY TO MAKE JUDGMENTS ABOUT THE RELATIONSHIPS BETWEEN EVENTS IN OUR ENVIRONMENT CHANGES. FOR EXAMPLE, WE MIGHT FIND IT HARDER TO ASSOCIATE CERTAIN MEDICATIONS WITH THEIR SIDE EFFECTS. WE MIGHT FIND IT MORE DIFFICULT TO PERCEIVE ASSOCIATIONS BETWEEN EVENTS, WHICH MAY NEGATIVELY AFFECT OUR JUDGMENTS. WHILE OUR WANING ABILITY TO MAKE JUDGMENTS MAY BE A NATURAL EFFECT OF AGING, DR. SHARON MUTTER WANTS TO FIND OUT WHY THESE CHANGES HAPPEN.**

Using a five-year, \$750,000 grant from the National Institute on Aging, Dr. Mutter is looking at the effect age has on basic cognitive processes, such as working memory performance. Working memory is a system for temporarily storing and manipulating information. Dr. Mutter studies how changes in these cognitive processes affect a person's ability to make contingency judgments.

"The goal of my research is to take a closer look at a fundamental kind of judgment that we all make called a contingency judgment," the Western Kentucky University psychology professor said. "A contingency judgment involves detecting and providing a numerical estimate of the relationship between two events. These kinds of judgments underlie important behaviors such as causal reasoning and hypothesis testing.

"When you interact with your environment, you're exposed to certain events, and over a period of time you learn the relationships between these events. Once you've learned these relationships, then you are able to make predictions and judgments. For example, most people have learned that the presence of dark clouds often predicts rain."

Dr. Mutter, who has a doctorate in experimental psychology from George Washington University, said her research has shown that older adults are not as good at learning contingencies between events and using this information to make judgments and predictions.

"We've done several studies looking at older adults' ability to learn contingencies in the environment and have

discovered that they don't seem to be as proficient at it," she explained. One consistent finding is that older adults have more problems with negative contingency judgments than positive contingency adjustments. Negative contin-



Dr. Sharon Mutter

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gencies "require that you notice the absence of information and that seems to be a more difficult thing for older adults to do, so we're trying to figure out why," she said.

"The heart of what we're trying to do right now is figure out why older adults show these changes in their contingency judgments," Dr. Mutter added. "After all, older adults were young once, young adults seem to be doing reasonably well making contingency judgments, so what happens with age that makes this particular kind of learning poorer? These are not huge changes in older adults' performance and they're not changes that make them unable to function. But we are able to measure these changes in the laboratory and now we want to try to understand why they occur."

Some of the cognitive processes being investigated include working memory, especially the ability to do multiple tasks simultaneously, and the ability to learn and remember simple associations between events. These

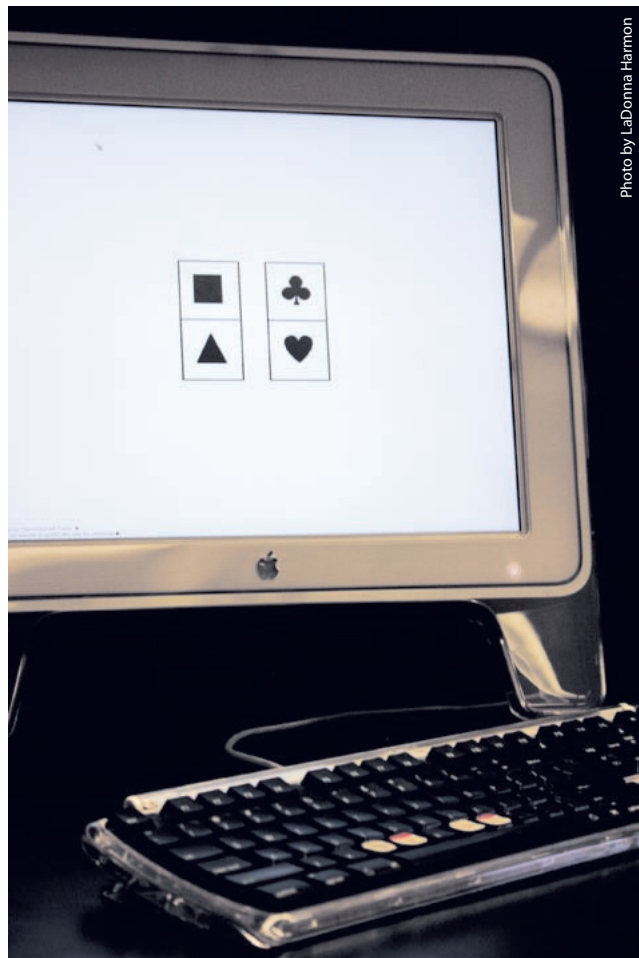


Photo by LaDonna Harmon

One trial of a test Dr. Mutter administers to determine whether people can learn to predict an outcome on the basis of the presence or absence of an undisclosed feature.

investigations are taking place in a series of studies, including two being run by graduate students for their master's theses, and a large-scale correlational study.

In the large-scale study, older and younger adults are given a medical diagnosis task involving a fictional disease. They are given information about patient cases, each with its particular symptoms or lack of symptoms. "They see the symptom and then they're asked to predict whether or not the patient has the disease," she said. The participants are then given feedback as to whether the disease was or was not present.

"So participants are given a series of cases where they are supposed to learn, just like a student in medical school, whether there is a relationship between the symptom and the disease," Dr. Mutter said. "After they have seen all of the cases for a problem, then they have to make a

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contingency estimate (or guess at a patient's outcome)," by expressing a numerical estimate from negative 100 (when the symptom is present, the disease will be absent) to positive 100 (when the symptom is present, the disease will be present).

In addition, Dr. Mutter is giving the participants tests that measure a variety of cognitive functions, including reaction time, working memory, associative learning and memory, vocabulary, and comprehension.

"We want to get a really good picture of young and older adults' functioning in a variety of cognitive areas so that we can see which of those areas mediate the age-related decline in contingency judgment," she said. "It's really a question of what goes into these judgments. Is it reaction time? Is it working memory? Is it general knowledge? What sorts of processes help us learn the contingencies in our environment in a really effective way and are changes in these processes responsible for older adults' difficulties with contingency judgment?"

An investigation of the role of basic cognitive processes in contingency judgment is also the focus of other experiments being conducted in Dr. Mutter's laboratory. In one experiment, young adults' working memory resources are reduced by preloading this memory system with other information to see what effect this has on their contingency learning. "If working memory decline is the source of age differences in contingency judgment, and we reduce young adults' working memory resources while they are learning a contingency, then their judgments ought to look more like older adults' judgments," Dr. Mutter said.

"What we have discovered is that it does seem to be the case that certain aspects of working memory are related to contingency judgment. But other things seem to be important as well. For example, associative memory — that is your ability to remember associations that you've formed

— is also really important. And age-related changes in these cognitive processes don't completely explain the age differences in contingency judgment. There's something else going on and we don't know what that is yet."

While Dr. Mutter said her studies are basic research, there are some practical implications to her work. "I don't

know that we can help older adults completely regain the ability to learn contingency information, because I think it is pretty much a fundamental cognitive change, but what we might be able to do is provide them with an awareness that this change does occur, so that they can be more cautious about their judgments."



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