

Dance Memory: Studying how the mind remembers physical movement

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Ruth Day studies how dance students, professional dancers and even audiences remember physical movements.

Human memory - taking in information, storing it and retrieving it accurately - is key to a variety of crucial decisions made in medicine or law and physical movements like dance.

Cognitive scientist Ruth Day wants to understand it better.

"I see people who are doing well but not well enough," she says. "Maybe they prescribe or dispense the wrong drug. Maybe they can't remember what they've just seen."

Or maybe a dancer twirls to the left when all the other dancers are going right.

Day wants to understand cognitive processes in the everyday world and give people techniques to improve their [memory](#), whether to reduce medical mistakes or to increase enjoyment of a dance performance.

"People need cognitive tools," says Day, director of both the Medical Cognition Lab and the Memory for Movement Lab in Duke's Department of Psychology and Neuroscience. "Just because you can't do something well now doesn't mean you can't learn to do it better later."

This summer, she is mounting an ambitious effort to study how audiences perceive and remember dance performances during the American Dance Festival (ADF), June 10-July 24 at Duke and at the Durham Performing Arts Center. "During a dance performance, you're seeing something wonderful -- it's like a stream that flows by, but then it's gone," she says. "If people can remember it better, they can continue to appreciate it later."

Day has studied memory for dance inside and outside of ADF to understand the different types of cues that dancers use to learn and remember choreography. She has also studied how martial artists, aerobics instructors, and musicians learn and remember sequences of movement.

After performing hundreds of lab experiments, class observations, surveys and interviews, Day found that dancers use three basic types of cues to remember movements: words, visual images and movement-based cues.

Words include names for movements (e.g., run-run-LEAP), counts (e.g., 1-2-3), and nonwords (dee-dee-DAH). Visual cues include an image

of the dancer's own body, the teacher demonstrating the movement and everyday images such as walking on hot sand. Movement-based cues include rhythm (but not actually counting) and the feeling of the movement, called kinesthetic feedback.

There's no right or wrong strategy, Day says, but certain strategies work better in certain situations and the more memory tools a dancer has, the better. "The end goal is not memory in and of itself, but to get past the learning and worrying about it -- to do the movement well and enjoy it," she says.

Day's research with professional dancers at ADF has found that companies use different naming practices. Pilobolus, the company famous for making incredible shapes with human bodies, explicitly names the different shapes -- "shooting seagulls," "fat gnomes" -- to facilitate conversation and memory. The Merce Cunningham company, on the other hand, discourages dancers from labeling dance moves with words, which the company sees as limiting.

She also has found that if there is a mismatch between a dancer's preferred memory cues and those used by a particular dance company, the dancer's tenure with that company may be shorter and less satisfying.

Day, who says she danced before she walked, first became interested in cognitive aspects of dance at age 6 when she noticed that some students in her ballet class were better at remembering the choreography than others.

Her interest was rekindled as an adult, when she made her first foray into modern dance while on the faculty at Yale University. In the studio, Day could perform the moves but struggled to remember them.

"The music would start and the other students were moving, and I was

not," Day recalls. "I got stepped on a lot."

She finally realized the problem: unlike ballet, most moves in modern dance do not have names, and Day's habit of making up her own names was slowing her down. As a language-based person, she discovered she was more successful learning tap dance, where every step has a name -- flap, ball-change, shuffle.

Gerri Houlihan, a professional dancer, teacher and choreographer who has taught at ADF for 25 years, says she uses kinesthetic feedback. "People invariably ask, 'How do you remember all the steps?' My connection is very much about music. I can remember dances that I've danced or choreographed in the past incredibly well if I have the music available. The minute I hear the music, this flood of movement comes back."

Houlihan says Day's research has illuminated her teaching. "I really try to make sure I cover as many different approaches to learning movement as I can because I'm much more aware now of how diverse people's ways of approaching movement are."

ADF Co-Director Jodee Nimerichter says Day's research and teaching have done wonders for the program. "She's been such a valued member of our community, we named her our Cognitive Scientist in Residence this year."

Day's current project on audience memory is supported by Dance/USA with funding from the Doris Duke Charitable Foundation to increase audience engagement. Out of the nine projects funded nationwide, Day's is the only one focusing on research and audience cognition.

Day is also offering multiple free workshops this summer, where participants will hear about her research and learn tips for watching and

remembering dance performances. Those who want even more involvement are invited to come to a memory enhancement program in Day's lab.

"It's an incredible joy to be able to study something as interesting and challenging as [dance](#), to understand how cognitive processes play out in the real world," Day says. "I can't say how much I appreciate ADF being here. They have been wonderful to me and it's a fantastic opportunity."

She's also working on a book called "Memory for Movement" that will pull together the results of all her movement research. "The book will provide a better understanding of cognitive processes in human movement," she says, "and it will help people perceive, remember and enjoy [movement](#) activities better."

Provided by Duke University

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