

Research targets memory improvements

December 9 2013

(Medical Xpress)—Forgetting things—whether it's where one has misplaced the car keys or coming home without that gallon of milk—is something that routinely happens to young and old alike.

Sean McCrea and Suzanna Penningroth, both University of Wyoming associate professors in the Department of Psychology, say there are ways people can train, and even bolster, their [memory](#)—which begins to decline in their mid-20s—for such daily activities. This memory is referred to as prospective memory (PM), or memory for completing tasks in the future.

"Prospective memory involves the retention and execution of a delayed intention while performing another task," Penningroth says. "PM tasks are always dual tasks, or even multi-tasks. That is, you always have to remember them while you're doing something else. You have to switch your attention to a cue to act while you're immersed in everyday life tasks. Your life is multi-tasking. Your memory needs a crutch."

And, for that crutch, the researchers suggest two words—"if" and "then"—as a plan that should help teenagers remember to stop and get gas, or senior citizens to take their medication. Using implementation intentions, they should actually say, "If I see the station, then I will pull in" or "if the alarm rings, then I'll take my pill," Penningroth says.

"If there's a cue, then you act," Penningroth says. "I think the big benefit is that it makes your actions automatic. When you're really busy, rather than stop to think what to do, it (cue) automatically triggers the

behavior."

"When you try to remember to do something, you'll always be doing it in the midst of your life," McCrea says. "Daily life is a whole task."

The two (McCrea is the lead writer) have compiled their research in a paper, titled "Implementation Intentions Forge a Strong Cue-Response Link and Boost Prospective Memory Performance."

From 2003-09, McCrea worked with Peter Gollwitzer, a faculty member at the University of Konstanz in Konstanz, Germany. Gollwitzer, whose research focuses on the question of how goals and plans affect cognition and behavior, developed the "if, then" approach to memory.

"This was his idea, but we wanted to compare it to other (memory) strategies," McCrea says of his collaboration with Penningroth. "We combined our interests. I was interested in strategies (for completing goals). She was interested in [prospective memory](#)."

Lab study with students

During the spring and fall of 2012, 93 UW psychology students (60 were female) participated in McCrea's and Penningroth's memory study.

Nearly all of the participants were under age 26. Participants received one hour of credit toward a course requirement. They were randomly assigned to one of three self-regulatory strategy conditions or a control. The conditions were:

- Implementation intention. This is the "if, then" strategy using visual or mental cues to help one remember a future action.
- Rehearsal. This strategy involves rehearsing the cue, the response or both. It uses a "then, if" order of thinking.
- Upward counterfactual thinking. This strategy identifies how

performance on a previous task could have been better executed. For example, "If only I had worn sunscreen, I would not have burned."
— Control group. With this group, the thinking was, "I wonder how my friends would have done on this task?"

The study's main purpose was to compare the effectiveness of the three self-regulatory strategies for strengthening the link between a cue and intended response in memory, and improving PM performance.

To measure PM performance, the three strategies were compared in a laboratory task using a computer. Students in each strategy group were required to press the space bar on their computer as quickly as possible whenever a specific stimulus (in this case, a red circle) appeared above a picture—either an animal or a flower—to be categorized. When only an animal appeared, the students were required to hit the "enter" key. When only a flower appeared, students were required to do nothing.

In a different task, strength of the PM cue-response link was assessed with reaction times to the word "space bar" after the subliminal prime "red."

Comparisons revealed that PM performance improvement was significantly higher in the implementation intention condition than in the control condition, and that the cue-response link was stronger in the implementation intention condition than in the control condition.

"There's something almost magical about putting it in an 'if, then' context," McCrea says. "It not only helps us identify the cue, but also lets us remember what we should do."

The future-oriented, conditional "if, then" format of these plans effectively links the cue and response, which allows retrieval and execution of delayed intentions, Penningroth says.

In contrast, merely considering what one could have done in the past or rehearsing a future intention was not as effective in forging a strong cue-response association in memory or improving PM performance, McCrea says.

Of the students placed in the rehearsal and upward counterfactual thinking groups, McCrea says, "They had marginal (memory) improvement, but the only really reliable benefit was with the 'if, then' phrasing."

"External cues are amazing, but 'if, then' plans are in your head," Penningroth says. "If you don't have a notebook or a Post-It, you can use this technique. It automatically pulls the action to consciousness. It helps college students show up for class on time, go to work and remember a study time."

She adds, "This also is for anyone with declining memory, which happens naturally with age. For middle-aged people who are busy, it will help them."

McCrea presented the paper at the Midwestern Psychological Association's regional conference in Chicago during May 2013, where he says it received positive response. He and Penningroth, along with doctoral student Maurissa Radakovich of Rock Springs, submitted their research to *Applied Cognitive Psychology* for publication, and have been asked by that journal to edit the paper before a final decision is rendered.

"Within cognitive psychology, it's a highly respected journal," Penningroth says.

Provided by University of Wyoming

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