When Pressure Is On, Good Students Suffer

By BENEDICT CAREY

At schools across the land, students are engaged in that most secular December ritual, sweating midterm exams. And in a new study of math testing, psychologists are reporting that intense exam pressure is actually more likely to impair the performance of very good students than mediocre ones.

Rushed, worried about pleasing others, these students can lose their most valuable "intellectual asset: short-term or working memory, the ability to keep numbers and thoughts in a kind of holding pattern while focusing on the problem at hand. Motivated students whose working memories are less powerful are less likely to fold under exam pressure, the study found.

The experiment, to be published in the February issue of Psychological Science, adds to a growing understanding of what impairs intellectual performance and in whom, said Dr. Randall Engle, chairman of the psychology department at the Georgia Institute of Technology in Atlanta, who was not involved in the research.

"The finding makes very little sense on one level; the better kids should do better, right?" he said. "But we know from other work that this is what happens on some tasks: You put some extra intellectual load on people with these skills, and their performance just drops off."

In recent years, psychologists have refined the notion of short-term memory, once thought to be a kind of intellectual breadbasket that could hold one, several or many numbers and words depending on its size, it is now described as more like a mental food processor that helps shape ingredients while keeping the mind focused on that task at hand.

People with strong working-memory skills tend to rate high on intellectual aptitude, experts say, because analytical skills and creative thinking depend on this short-term-focused processor.

In the study, Dr. Sian Beilock of Miami University of Ohio and Dr. Thomas Carr of Michigan State University tested the working-memory capacities of 93 Michigan undergraduates, and split them into two groups, a high-functioning working-memory group and a low one.

The students then took two other math tests, under vastly different conditions. One was called a practice test. In the other, the students were told they were part of a team that was depending on them to improve their score in order to win a monetary reward.

The results were striking: the group with high working memory scored about 10 percent better than the others on the low-pressure practice test, but the two groups' scores were about equal when the heat was on to perform. "The main finding is that the environment in which people take a test may diminish its validity," said Dr. Beilock.

Out in the world, or at least in the classroom, some students with good working-memory abilities clearly phase out the effects of the pressure and perform very well. But Dr. Beilock said the study showed how fragile this short-term intellectual machinery was when students were asked not only to concentrate an unwavering mental beam but to fend off dread of failure, a ticking clock and self-doubt.

The students with less working memory are less affected by the pressure because they are probably relying on less taxing techniques to handle problems, the researchers argue. These students may do more extraneous and careful computation; they may see patterns in the problems and apply those; they may guess more often than their peers.

But one of the most effective ways to shield intellectual skills from the swirl of pressure, competition and grade fixation is to make the problem-solving strategies needed to perform well more automatic. "Once a skill has been trained up to a point, the differences in working memory become less important, and you're not as vulnerable," Dr. Engle said.

At schools across the land, they have a word for this technique: studying.