From Society for Neuroscience Conference: The following information is based on posters and talks at the conference, so I am not able to cite research publications for your follow-up. However, an article by Hall, C.T., in *The San Francisco Chronicle.* November 10, 2002, Pg. A8, discusses these findings in laymen's terms.

A. Second Language Learning

It has been suggested that exposing a child to a second language too early could interfere with the brain's language-learning system. However, Kovelman and Petitto at Dartmouth studied bilingual babies and found that they had no problem learning a second language. Furthermore, these children became completely fluent in both languages, whereas children exposed to the second language in grade school didn't become as fluent. They believe that the more exposure to a second language from as early as birth, the better for the child.

B. Help For Us All!!!

Eat your blueberries! Dr. Black and associates at Rutgers found that rats who ate a blueberry-rich diet performed better in a maze than rats who did not. They believe that the blueberries led to an increase in new neurons. Casadesus at Tufts is also researching blueberries and researchers there believe that they can have a powerful effect on cognition. Shukitt-Hale, also at Tufts, found that blueberries improved learning, memory and coordination in older animals. I buy frozen blueberries and sprinkle some on my cereal. Some days I think maybe I should eat an entire bag!

GET YOUR SLEEP!

Presented at Society For Neuroscience, 2002, and published in Neuron, Vol. 35, 205-211, July 3, 2002, "Practice with Sleep Makes Perfect: Sleep Dependent Motor Skill Learning" describes a study by Walker, Brakefield, Morgan, Hobson, and Stickgold at Harvard. They found that sleep, particularly the last part of sleep (not the REM sleep described in other studies), improved motor speed 20% while an equal amount of time awake provided no benefit. This contributes to the body of evidence that suggests that learning can consolidate during sleep. The amount of sleep correlated

significantly with the amount of late night sleep. They conclude: "This finding of sleep-dependent motor skill improvement may have important implications for the efficient learning of all skilled actions in humans." Note that this applies to motor skills learning, they type we would see in sports, music, keyboarding, and so forth.

Those of you who know me, know that my favorite topic is the effect of emotion on learning. Here is more evidence that the emotional climate we create in the classroom can affect out students' test performance. Gray, J., in the Proceedings of the National Academy of Sciences, 2002, reports his finding that watching horror movies or comedies for as little as 10 minutes affected the higher-thinking areas of the brain involving reasoning and intelligence. Exposure to positive or negative emotions, via watching videos, either improved or impaired performance on mental tasks. However, *mild* anxiety improved performance on some tasks, but impaired it on others. Therefore, we can't say that mild anxiety impairs everyone or performance on every task. Research results are never simple, are they? Once again, we need to factor in individual differences, because performance varied according to how *their mood was affected* by the videos. I think that this study can remind us that stronger anxiety in the classroom can impair learning and that positive emotion can be a learning tool that we can all incorporate.

Ken Heilman, one of the leading behavioral neurologists (author of over 400 chapters, articles, and books) visited our lab in December and gave three talks, as well as advising all of us on our research. One of the most important things I learned with regard to education is about the effect of anxiety on performance. He recounted a study in which SAT test scores improved when the students were given an anti-anxiety drug. The implication here is NOT to give students drugs, but to reduce anxiety! ☺ Fortunately, there are ways to do that, as we have discussed in my workshops. Dr. Heilman reminded us of the adage about doing the easy questions first on a test and then going back to the harder ones and this is so that you can reduce your anxiety level at the beginning rather than increasing it by struggling with difficult questions immediately.

However, students don't always take this advice that we offer and sometimes their anxiety from a difficult question does not abate during the rest of the test. How about helping them out with this? I suggest that we build a test much in the same way IQ and some standardized tests are built – starting with easy questions and building to harder ones. This accomplishes several purposes.

First, when a student starts out and finds the answers surprisingly easy, he or she immediately relaxes and thinks that this isn't going to be so bad after all. As they slowly get harder, the student is only incrementally experiencing more difficulty. By the time the hardest questions are reached, the student has achieved a feeling of having accomplished a good deal already.

Secondly, this method of building in easier questions leading to harder ones avoids an arbitrary cut-off, in which knowledge of certain things indicates a pass and lack of knowledge of those specific things indicates failure. Tests never test the complete knowledge of a student, as we must select representative items. However, the items we select become the total representation of that student. I suggest that scaled items would then allow us to establish a true threshold for the student. Students of C caliber, for example, may not be able to succeed on more difficult items but we would see the extent of what they know and at what level the knowledge broke down. On the other hand, surprisingly, according to *The Mind's Eye*, you may find that dyslexic students, and students with other different learning styles, succeed on items of high difficulty, if by this we mean those requiring higher order thinking rather than rote learning or memorizing, and may perform more poorly on basic level skills.

The scope of this is beyond what can be discussed in this newsletter. We have the issue of what do I mean or you mean by more difficult, for one thing. For purposes of this discussion, perhaps instructors could begin a test with some easier questions or arrange their tests in order of difficulty in order to reduce test anxiety and enable students to perform in a manner more consistent with their true abilities. If any of you design a test in this fashion, would you please share it with the others or share your ideas on how you might arrange tasks in ascending difficulty? Please email your comments to me and I will include them in the next newsletter.

Dr. Heilman also gave a talk on creativity in which he stressed the importance of thinking in metaphors. He called it "creativity by metaphor". In my presentations I stress the importance of using metaphor and include suggestions of how to do so. This may jog your memory and encourage you to experiment with metaphor.

Another point made by Dr. Heilman of direct relevance to educators is about the importance of activating as large a network as possible in the brain. The more diverse areas you can activate, the more you (or your students) may be able to see the unifying thread in things. Being able to find a unifying thread is part of Dr. Heilman's definition of creativity. When we present students with rich contexts around a subject we activate larger areas, enhance higher order thinking and may enable students to think more creatively.