### Turning Perceptions and Mental Images Into Ideas

**EVOLED POTENTIALS**

**Perception is the critical bidirectional interface between external and internal reality, between the world around us and our mental image of it.**

**Richard J. Caselli, M.D.**

**by Mary Ellen Schneider**

This is the third chapter in our creativity story. Creativity is an intentional process in which we try to change what is into what should be (as is well illustrated by the research described in each of our issues). In February, we considered the importance of motivation, and this month we turn to perception.

We perceive what is before us, but much of what we perceive is only the part that our mind is prepared to perceive. In 1851, Henry David Thoreau noted that astromers were better served in their quest to define planets, galaxies, and other heavenly phenomena by insightful and experienced perception than by the power of their telescope. Perception can create an indirect interface between external and internal reality, between the world around us and our mental image of it.

Motivationally relevant stimuli drive our behavior. They constitute an existing state and imagine a desired state. Some desired states are conceptually simple and based upon the restoration of a biological set point such as hunger and thirst. Those we generally assign to the realm of creative behavior are less directly linked to a biological set point such as hunger and thirst. Those we experience as the power of their telescope.

Mental imagery arises from these regions as actual perception (Brain Res. 2004;20:226-41), and damage to these brain regions results in a unique pattern of synaptic facilitation. Synchronous imaging reflecting in- put to a facilitated group of neuronal pathways, resulting in a unique pattern of synaptic facilitation, resulting in a unique pattern of synaptic facilitation. PET scans of people observing a unique pattern of synaptic facilitation, resulting in a unique pattern of synaptic facilitation. PET and functional MRI activation patterns are similar between perceived images and mental imagery, but they are not identical. The reduced clarity and vividness of mental images compared with perception may reflect a reduced role for primary visual regions in mental imagery; different neuronal subpopulations for each, or another explanation (Psychol. Bull. 2003;129:723-46).

Mirror neurons, initially described in monkeys, encode a form of motor imagery reflecting intention rather than an actual movement. Evidence for mirror neurons in humans comes from several sources, including PET scans of people observing other people mimicking their actions, electrical recordings of brain activity in epileptic patients, and the effects of imagined and observed imitated behavior on the intrinsic excitability of the brain (Exp. Brain Res. 1996;111:246-52). An implication of the ability to recognize movement patterns is our ability to generate signals that are understood by the sender and the receiver. If I wave my hand in a way that you recognize, then we both understand I am waving hello. In a similar way, a shared symbol system based upon sound may have contributed to the evolution of language (Nat. Rev. Neurosci. 2001;2:661-70), which in turn has allowed humans to pass on knowledge from generation to generation.

Imagining what another person is thinking or feeling is another type of mental imagery, called theory of mind. The role of sensory and motor imagery substrates (including mirror neurons) in theory of mind is debated (Trends Cogn. Sci. 1998;2:493-501), but theory of mind is nonetheless important for creative behavior, because if I imagine a course of action that will impact others, it will benefit me to know how it might make them feel. We can even combine different modalities: a dragon that moeles or a fish named Nemo that talks. What we envision draws from the repository of what we have stored, but what we choose to imagine depends on prefrontally mediated attentional systems that, in turn, are motivated by our internal state, our perceived needs, the state of the world around us, our own abilities, and other factors. The relative reward of different contingencies depends on our state of need so that conjured images have a reward value within the context of present circumstances. Our prefrontal attentional network directs our sensory regions to conjure images relevant to our needs (Cereb. Cortex 2001;11:260-6), which allows us to plan a course of action to create what should be. How we formulate and execute that plan will be our next consideration.

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**Funds from Federal EHR Incentive Programs Now Available**

BY MARY ELLEN SCHNEIDER

A new federal initiative offering bonus payments to physicians who successfully implement electronic health records launched in early January, and signs indicate it could help spur adoption of the technology.

Officials in the Office of the National Coordinator for Health Information Technology recently released two surveys showing that more than 40% of office-based physicians and 80% of hospitals plan to seek federal incentives for the adoption and use of EHRs under Medicare and Medicaid.

The incentive programs offer payments to physicians for using health information technology (HIT) to improve patient care. The federal government recently issued regulations detailing how physicians and hospitals can meet standards for so-called “meaningful use” of the technology. Physicians who meet the criteria are eligible to receive up to $44,000 over 5 years under the Medicare program or up to $63,750 in 6 years under the Medicaid program, totaling, for hospitals could receive millions of dollars, according to the Centers for Medicare and Medicaid Services (CMS).

The survey of office-based physicians, conducted by the Centers for Disease Control and Prevention, found that 41% plan to achieve meaningful use and seek federal incentive payments. Of those, about 80% said that they plan to enroll during the first stage of the program, this year or next.

A separate survey, conducted by the American Hospital Association, found that 81% of hospitals plan to achieve meaningful use and apply for incentive payments, with about 85% enrolling in the same time frame.

While the federal government has promoted these incentives for more than a year, it was uncertain whether physicians would choose to participate.

Officials from the American Academy of Family Physicians said that while they do not have concrete data, informal polls of their members show high interest in the incentives. Dr. Steven Waldren, director of the Center for Health IT at the AAP, reported that health centers who attended lectures on meaningful use at the group’s annual meeting last fall, about 80% reported that they currently use an EHR in their practice and about 90% said they plan to try to achieve meaningful use this year.

It’s a biased sample, Dr. Waldren said, but it still paints a picture. “What it kind of tells us is that there are a lot of doctors out there, especially those that have adopted the technology, [who] are trying to figure out how to be meaningful users in 2011.”

The big question is how many physicians will be able to convert their interest in the program into the ability to achieve meaningful use of EHRs, he added.

Dr. Waldren said most physicians will be able to meet the current thresholds for functions like electronic prescribing, which are outlined in the meaningful use criteria. However, the greatest challenge will come in capturing and reporting that data to the government, he said.

Dr. Waldren recommended that physicians seek out the Regional Extension Centers set up by the federal government. These centers have been established in each state, and are specifically charged with aiding small practices, primary care physicians, and those working in underserved areas. But he also cautioned that expertise may vary by center.