



Emotions Head to the Right

The brain of Phineas P. Gage represents a sort of landmark in medical history. In 1848, a poorly-timed excavation blast sent a large tamping iron or crowbar exploding upward through the left side of Gage's head. Within several minutes, however, the wounded man was sitting up and talking. He eventually recovered almost complete physical health. The fact that Gage survived at all is amazing. But an even more important aspect of the case is probably the information it provided on the functioning of the human brain. After the accident, Gage was a changed man. J. M. Harlow, who treated Gage, described him sometime after the accident: "The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities, seems to have been destroyed." He goes on to describe the formerly well-liked and quiet Gage as fitful, irreverent, profane, impatient, obstinate and capricious.

Gage's case, like incidents of brain damage before and since, suggests that the left and right hemispheres of the brain may have different functions. Using somewhat more elegant methods, researchers continue to differentiate between the functions of the hemispheres, and are doing so with more and more specificity. In the Oct. 17 *SCIENCE* a group of researchers from Harvard present data supporting the hypothesis that "the right hemisphere has a special role in emotion in the intact brain." The work was done by Gary E. Schwartz, Richard J. Davidson and Foster Maer.

One relatively simple and increasingly popular method of measuring hemispheric activity has to do with lateral eye movement (LEM). Looking to the right, for instance, is indicative of left hemisphere activity. When a question is asked, a person will often glance slightly to the left or right before answering. Research has shown that right looking (left hemisphere involvement) is usually associated with verbal and sequential processes and behaviors such as writing a letter or reflecting on a verbal question. The right hemisphere is usually associated with spatial tasks such as a block design test or reflecting on a spatial-picture question, and musical tasks such as identifying instances of a particular theme in an unfamiliar musical selection. The Harvard team now suggests that the right hemisphere also plays a role in the regulation of emotional processes. (This might explain Gage's emotional reactivity following the loss of part of his left hemisphere.)

What Schwartz and his co-workers did

was ask their subjects four types of questions: verbal-nonemotional questions (such as, What is the primary difference between the meanings of the words "recognize" and "remember"?), verbal-emotional questions (What is the primary difference between the meanings of the words "mischief" and "malice"?), spatial-nonemotional (On the face of a quarter, does the face of George Washington look to the right or to the left?) and spatial-emotional (When you visualize your father's face, what emotion first strikes you?).

The subjects, who did not know that the experiment had to do with eye movement, were watched as they answered each question. All LEM's were recorded and, as expected, right LEM's were associated with verbal questions while left LEM's most often followed spatial questions. This tends to confirm the hypothesis that verbal questions will elicit greater relative left hemispheric activation. The overall effect for emotional versus nonemotional questions by left versus right LEM's was also highly significant, say the researchers. There were fewer right LEM's on the emotional questions than on the

nonemotional questions and also significantly more left LEM's on the emotional versus nonemotional questions. This confirms that, on the average, emotional questions elicit more right hemispheric activation than do comparable nonemotional questions.

"We find," say the researchers, "that questions requiring both spatial and emotional processing result in accentuated right hemispheric activation, whereas questions demanding both verbal and nonemotional processes result in the greatest left hemispheric activation. The remaining two types of questions (verbal-emotional and spatial-nonemotional) fall predictably in between."

Additional research, they conclude, distinguishing between different classes of emotions and types of affective tasks, as well as utilizing other measures of hemispheric involvement (such as the EEG), should more precisely localize this phenomenon and the variables affecting it. In the meantime, they say, the results of this experiment provide new support for the hypothesis of a special role for the right hemisphere in regulation of emotional processes. □

Capital for alternative energies

Of all the world's increasingly scarce commodities, none is in shorter supply than venture capital, so many businessmen complain. The problem is particularly acute for companies trying to develop alternative energy technologies, for many of these—including solar-electric generators and ocean thermal plants—require enormous investments to get started, though the essentially "free" energy then makes them very cheap to operate. Now President Ford has submitted to Congress some legislation aimed at helping overcome the problem by setting up a special Government lending corporation.

The new corporation would be called the Energy Independence Authority (EIA) and it would make loans up to \$75 billion at any one time to private industries seeking to finance alternative energy schemes that would help remove America's dependence on foreign oil. The EIA is the brainchild of Vice President Nelson Rockefeller, who set up similar ventures in New York when he was governor. The money would be raised by selling bonds, partly to the Treasury Department and partly to the public. EIA would automatically go out of business in ten years if

its authority were not renewed.

In submitting the legislation, Ford said the EIA would help overcome the "excessive delays" that might otherwise have dragged out development of such energy alternatives as solar power, synthetic fuel and shale-oil extraction. This "new partnership between the private sector and the Federal Government" would make it easier for businesses to accept the "risks" involved in undertaking the new projects, he said.

Congress may see things differently, however. Already some criticism has been expressed that the proposed legislation would just provide taxpayers' money to big corporations, allowing them to gain control of the new energy sources at little risk to themselves. (Much of the pioneering work, especially in solar heating, has been done by very small companies.) With Congress coming under increased pressure to come up with its own energy program, such criticisms are likely to take their toll, and the President is reportedly having trouble even getting a floor-sponsor for the bill. The only prognosis that can be offered with any certainty is that the whole energy issue is likely to become even more politicized very shortly. □