

divide the task into several parts and take multiple images. They then subtract the images of simpler tasks from the most complicated to isolate a "pure mental act" and obtain an image of how a specific task or emotion activates the brain. This subtraction method works fairly well in simple situations—such as using a finger tapping task as a motor control for a task involving decisions made by finger taps. The multiple subtractions become unreliable, however, when used in an attempt to isolate high level mental functions such as how the brain interprets the meaning of words as opposed to speech sounds. According to Deutsch, this is because the subtractions are based on untested assumptions of how complex mental operations break down into simpler steps.

"There's no question that many of the images that appear in scientific journals are highly manipulated data," said Deutsch. "They may capitalize on chance differences that fit the investigator's hypotheses." This means that subtle differences, say, between the way men's and women's brains are activated during emotional tasks can lead to exaggerated conclusions.

These subtracted and manipulated images do not mean that the findings are false, but they should be considered when the study's authors write about the possible implications of their findings in journals. Instead, researchers sometimes take liberties when explaining how their results could be applied in the clinical world. "These studies are very preliminary," said Henry N. Wagner, Jr., MD, professor of medicine, radiology and environmental sciences at The Johns Hopkins Medical Institutions in Baltimore. "Blood flow and glucose metabolism studies can only show the general area of where the brain is activated and tell researchers where to look further. The media and some of the researchers themselves are taking giant leaps by saying the results can explain how the brain functions. They are taking complicated multifactorial systems and oversimplifying them."

On the flip side, some neuroscientists claim the new brain imaging research—whether exaggerated or not—is actually old hat. "I have yet to see any findings that are truly surprising or deviate much from what has been shown over the past 100 years by neuropsychology," said Deutsch. For instance last December, a highly publicized study from Yale University, which used functional MRI to assess the brain activity of men and women performing rhyming tasks, found that men use only one region in the left side of the brain, whereas women use a much wider area on both sides. "Sex differences in the lateralization of the human brain have been documented in clinical studies of female stroke patients who lose less

of their language ability than male patients," he said, "although it is nice to have it demonstrated in a functional scan."

The major problem with brain imaging studies is that there is so much data generated in each experiment that it is often difficult for researchers to sort out the true patterns from the artifacts. "Researchers thus tend to disregard data that do not fit with scientific theory and to keep the findings that do," Deutsch said. The dilemma? Scientific findings are supposed to lead to new theories not be molded to fit existing ones.

What to Do with the Findings

Although functional brain imaging is still in its earliest stages, the accuracy and specificity of PET brain measurements are constantly improving: There may come a point when PET scans are reliable enough to assess a person's intelligence, job performance and emotional states. Brain scans have already become widespread in courtrooms for criminal and product liability cases (see page 12N). Who's to say that the scans won't become a litmus test to measure the spatial abilities of would-be pilots, or to weed out learning-disabled children from regular classes or even to alter our beliefs that men and women are capable of performing the same jobs equally well?

"I'm always wary of using science for a political agenda, especially if the agenda outpaces the science," said Wagner. "Researchers who extrapolate from simple measurements of blood flow to explain complicated phenomenon are inviting the danger that their preliminary observations will become statements of fact to advance someone else's ideas." Some recently published pop-science books are already claiming that male brains are not as easily distracted by superfluous information and that women may be less able to separate emotion from reason.

Gur, however, points out that suppressing human curiosity to find out how the brain works is also dangerous. He recounted an incident where his wife, psychiatrist Raquel Gur, MD, gave a talk to medical students about sex differences in brains. A group of women asked her to stop publicizing the work saying that they were afraid women would lose the professional gains they have made over the last 20 years if researchers asserted that the sexes are not the same. "I would hope that as we understand sex differences better, we can understand each other better as men and women," he said. One can only hope that a new understanding of the brain does not advance old stereotypes.

Deborah Kotz

NEWS BRIEF

The Nuclear Regulatory Commission (NRC) has a new leader at the helm: As of July 1, Shirley Jackson, PhD, will serve as chairman. The U.S. Senate confirmed Jackson in April, and she was sworn in as a commissioner of the NRC on May 3 before being named chairman by President Clinton.

Before coming to the NRC, Jackson was

a physics professor at Rutgers University and served as a theoretical physicist at AT&T Bell Laboratories. She was also a member of the board of directors of Public Service Electric and Gas Company, and a member of the Institute of Nuclear Power Operations Advisory Council.

With three vacant commissioner posts due to the recent departure of Commissioner E. Gail DePlanque, the NRC is still left without a quorum. Clinton nominated Dan M.

Berkovitz last January for a commissioner post, but his nomination has stalled in the Senate Environment and Public Works Committee. Eight of the committee's nine Republicans wrote a letter to Clinton last month urging him to withdraw the nomination because they think Berkovitz "would impose burdensome regulations" on the industry with no public benefit. As for the other openings, no nominations have been forthcoming as of presstime.