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"The Mind and the Brain and Dementia"

by

Paul E. Schulz, MD.

HPS President Jack Agee presented the speaker, Paul E. Schulz, MD, Professor and Vice Chair for Quality Assurance Director, Memory Disorders and Dementia Clinics Director, Neuropsychiatry and Behavioral Neurology Fellowship at The Mischer Neuroscience Institute of The University of Texas Health Science Center at Houston, and Memorial Hermann Hospital-TMC. Dr. Schultz received his medical degree at Boston University and interned at the Boston VA Hospital. He came to Houston for a residency at Baylor College of Medicine and stayed on in Houston to pursue his interests in Alzheimer's disease, fronto-temporal dementia with or without ALS dementia, and memory disorders of cognition and behavior. He is board certified by the American Board of Psychiatry and Neurology.

Dr. Schultz argued that the mind and the brain are closely related but are not the same thing. Symptoms of neurological disorders often are evidenced by changes in thinking, behavior, and mood. Crucial to effective treatment is accurate diagnosis in a target environment rich in possible causes. Early diagnosis of disease makes a big difference in outcomes. His discourse included advances in this important field.

Dr. Schultz has had a lifelong interest in how people think, behave, and interacts. Thus, he was delighted to find a career in medical research in neuropsychiatry, a field he still finds fascinating after 30 years. In college, he was particularly struck by Descartes' famous thesis, "I think; therefore, I am" and its application to the understanding of who we are. For in the case of dementia each part of this structure can be altered. The brain alters our perception (what we see); it feeds the mind (who we feel we are); and it alters what the mind concludes (what we think). Thus, Dr. Schultz concludes, we all live in slightly different worlds and are connected through our interactions, on which the brain has a great effect.

The brain is not a passive participant in what we see. Viewing a scene on a screen, I may see two different shades of gray, or the two shades can change to one, or one can stand out differently from the background but can be altered by removing the background. The question thus becomes, “How can we trust what we see? Background lighting affects how we see images. We see different colors in different lights. The brain adjusts colors to “help” us see better, which leads to the question whether there are other processing differences among us. We know that partial scenes can be altered. What about full scenes? Dr. Schultz showed a picture on a screen that could be interpreted by the brain variously as a young lady looking right or an old lady looking right. The brain makes the difference. A similar scene could be interpreted by the brain as part of a man looking straight or as a man looking right. Dr. Schultz also brought to mind Escher’s famous staircase, which can be seen to be leading either up or down in an endless progression. The conclusion is, for Dr. Schultz, inescapable: the brain interprets what it thinks it is seeing. But, this being so, can we trust what the brain tells us?

Dr. Schultz asked us to compare a full picture of a camel with fragments in order to consider whether the brain “helps” with fractions of images. He also pointed to the “Thatcher Illusion,” showing on the screen two identical portraits of Margaret Thatcher, but reversed as to each other. One picture was correct, the other horrid. He demonstrated that moving the normal picture to the right and rotating it changes the image from normal to abnormal and vice versa. The reason for this is that photographer has flipped the image and the brain has corrected for this by flipping the elements of the image and abstracting what does not fit.

Normal people see the world through a brain that helps us see it better. The brain makes assumptions and changes the raw material of perception. As the abnormal brain does this too, the abnormal brain raises the question whether functions localize to the brain and reside in specific spots. In addressing the question whether the brain can be understood, Dr. Schultz referenced germ theory. This theory was first proposed in the mid-1500’s and gradually gained credence through scientific discoveries. The success of this project over time raises the question whether the brain can be understood too. Dr. Schultz pointed to the rise of phrenology in the early 1800’s. In perception we are unaware of the localization of functions. Phrenology, however, proposed the thesis that the brain localizes.

In the 1870's, the French scientist Paul Broca began the study of aphasia, i.e., a loss or impairment of language function shown by a patient who, following a traumatic brain injury, had lost the faculty of speech except for a single syllable yet had not lost the faculty of comprehension or the ability to communicate by gestures. At autopsy of the patient following his death, Broca discovered a large lesion in the left pre-frontal cortex of the brain, an area now known "Broca's area." Subsequent studies by Broca showed that a center for speech production in the brain was localized in Broca's area in the left prefrontal cortex. The expressive aphasia arising from injury to that area of the brain is now known as "Broca's aphasia."

Shortly after Broca localized language production to the left pre-frontal cortex, however, Karl Wernicke found that many patients with an intact left frontal lobe still had language difficulties, although different from those involved in Broca's studies. He determined that the area of the brain responsible for language comprehension was the left parietal cortex, located under the ear in the temporal lobe. This area, "Wernicke's area," is responsible for connecting symbols to their referents and for the access and manipulation of words. Injury to this area results in a patient's having a semi-nonsensical babble now known as "Wernicke's aphasia."

Another important step in the discovery of the functioning of the brain was enabled by an explosion in 1848 that drove a tamping iron through the frontal lobes of the brain of Phineas Gage, a railroad construction foreman who was packing explosives into a rock when the accident occurred. Gage lived and continued to function with no apparent sensory, motor or gross cognitive deficits, but his behavior changed. Before the accident he had been hard-working and responsible. After the accident he could not be given his job back. He became irresponsible and very impulsive, would say inappropriate things, and would not think. "I think, therefore I am" requires that one think about oneself. Gage's case raised the question whether "I am" still exists if we do *not* think about it. And it raised the further question: Do other people ever lose the "I" or "you," or is the "you" important?

The German philosopher Martin Heidegger posited that we are “beings in the world, not just in our own heads.” In other works, our identity is not just that “I think” but is composed of all the things around me. Hence the question, “What if I lose me?”

There are certain types of delusional syndromes. One of these is Delusional Misidentification Syndrome. It can be illustrated by a man 48 years old, who awoke feeling that his left arm was missing. He could see it but could not control it. He then had the delusion that his doppelganger was behind him. This man had a very specific brain lesion. A change made in his brain from a stroke led him to think there were two of him.

A similar syndrome, Capgras Syndrome, present in some Alzheimer’s disease and related dementia patients, produces the delusion that a familiar person or place has been replaced by an identical interloper. Similarly, Reduplicative Paramnesia is the delusional belief that a place or location has been duplicated so that it exists in two or more places simultaneously or it has been relocated to another site. The Fregoli Delusion is the delusion that different people are in fact a single person who changes appearance or is in disguise. It is often associated with paranoia, in which the person with the syndrome believes that he or she is being persecuted by the person in disguise. From these different syndromes, Dr. Schultz concludes that the concepts of “I,” “you,” and location are all malleable.

The question thus becomes whether this matters to Descartes’ or Heidegger’s theory of being. What happens to the “I” when memory changes? For Locke, a person knows who he is through the ordered flow of experiences. For Pope John Paul II, in his last book, *Memory and Identity*, memory and identity come from the same place, absolute being.

Dr. Schultz illustrated the problem by reference to examples. A 60-year-old patient of his cannot remember a single word of a sentence after five minutes. He remembers nothing from 30 seconds ago to 2009. His disorder is progressive. He recognizes his daughter or the doctor as long as they are talking, but he lacks a distinct sense of “I” and denies having a problem. There is no continuity of

memories. In his case, the hippocampus is not working. But to the person with this condition there is no problem. His sense of a self is very solid.

Another patient, a 70-year-old attorney brought in by his wife and office manager, said inappropriate things to the doctor, including, “You run this courtroom like a dictator!” He uses poor judgment about clients and started playing the lottery every day after volunteering to take the office money to the bank. He had a very complex system with more than \$100,000 in it. This patient had atrophy of the frontal lobe. At first the only changes were in behavior and judgment. From his point of view, he had nothing wrong with him; others did not understand. However, from here, it was a small change to a person who was no longer himself and was unable to handle finances and the like. Dr. Schultz posed the question: What would *we* do in the same circumstances when others thought we had dementia and we “knew” we did not?

A patient who had surgery had delusions, got better, and was released. He then began to have visions. He would sleep in a hotel because he thought people were watching him. He needed to evade them to get there. He was convinced his wife was having an affair. He would see signs in the yard that people were trying to break in. He would see people who disappeared when his wife came. He had a lot of brain atrophy. At the time of Dr. Schulz’s address to the Society, this patient was on antipsychotic medications and at home, but he knew people were still out there. He also thought his wife was having an affair even though he investigated and found only a shadow on the chair that he had interpreted as a man’s head. He was not as bothered by his visions once he was on medications, but the visions were still there.

Dr. Schultz concludes that the most robust thing in dementia is the “I” part even when the “think” and “am” are gone. He reiterated: the brain alters what we see. The mind is “I” part, but the brain tells us different things that are altered by the brain. We live in somewhat different worlds, and the brain has a big impact on this.

In response to questions, Dr. Schultz stated that the brain affects the mind but that he does not know whether the mind is *in* the brain. He also stated that we know

things about learning and memory, but we do not know how they fit in the big picture.