
In Memoriam

A TRIBUTE TO EDITH KAPLAN (1924–2009)

Edith Freund Kaplan was born February 16, 1924, in Brooklyn, New York, to German immigrant parents, Louis and Fanny. She died September 3, 2009, in Massachusetts where she spent the major portion of her career. In the 85 years of her life, she left a legacy and scientific contributions that will live on in the hundreds she personally mentored and, beyond that, in the students of her trainees, who carry the torch, and in the field of brain-behavior study she helped create.

The current spate of interest in the workings of the human brain and the research emerging from functional and structural neuroimaging techniques owes much credit, often unrecognized, to her ideas and pioneering work with brain-injured patients. In the early days of her career, localization of behavior to discrete brain areas, based on the lesion-approach of the continental tradition, was the dominant goal. At that time, neuropsychology was not a recognized field of psychology but rather an interest area shared by psychologists, speech pathologists, neurologists, and psychiatrists, all attracted to this rediscovered and exhilarating frontier.

One of Kaplan's major contributions to the study of behavior was the notion that the end-product of performing a behavioral task was not as informative as the *process* by which that task was completed. What is actually taking place when one is asked a simple question, such as, "What is 15% of 60?" The correct answer means the task is within the patient's abilities, but what does the wrong answer mean? The apparent failure is one of calculation—or is it? Edith Kaplan, based on her earlier work in child development, where a cognitive task evolved to be performed in different ways depending on age, recognized that performing this seemingly simple task was the fruition of multiple complex activities at the level of the brain, including components of attention, working memory, language comprehension, speech production, and numerical aptitude. These fundamental cognitive domains determine the ability to understand the spoken instructions, maintain them in mind, access number facts, manipulate the calculation internally, and provide the verbal solution. Any one of these processes could be selectively impaired, leading to failure to get the correct answer. It seemed to Kaplan that *why* the task was failed was more clinically and theoretically relevant than *that* it was failed. Thus, language comprehension deficits would imply involvement of the left perisylvian regions; working memory deficits would imply a different localization, ranging from prefrontal, to parietal to

cingulate damage; specific dyscalculia would imply yet a different mechanism, perhaps involving the dominant angular gyrus. It was this teasing apart of macroscopic behaviors into their "molecular" components that led to the notion that performance of a complex mental task depended, not on a discrete brain area but rather on the concerted and combined efforts of several brain regions, each specialized in a component process.

These notions were the precursors to modern day theories of large-scale distributed networks and to methods of modern cognitive neuroscience in which studies aim to dissect behavior into its components in order to understand how different brain regions contribute to rapid processing of vast amounts of externally and internally generated behavior. Her basic understanding of this compelling principle led to an entire book about the seemingly simple task of Clock Drawing (Freedman et al., 1994).

One of Kaplan's most widely recognized contributions to the theories of brain-behavior relationships came in 1962 when she published a case report, with the neurologist Norman Geschwind, of a patient with evidence of a "human disconnection syndrome" (Geschwind & Kaplan, 1962). This case, cited as a classic paper in the journal *Neurology* (Geschwind & Kaplan, 1998), came to be studied because Edith's powers of observation caused her to recognize importance in even the most mundane of behaviors.

She happened to observe a patient walking down the hallway, his right hand grasping at objects reflexively as he passed them. She had noted in one of her examinations of the patient that he could not write and she was curious as to whether or not a grasp reflex could account for this deficit. She created tasks to test hypotheses about the underlying deficit that might explain his agraphia. When she asked the patient to write with his left hand, she was astonished to find that, despite the absence of a grasp reflex or other motor deficits in that hand, his writing was aphasic and he also had difficulty executing motor actions to verbal command.

In discussing this case with Geschwind, and in reference to the classic European localizationist literature that he had been reviving at the time, they proposed that these symptoms were evidence of an anatomical disconnection between the motor area of the left hand on the right side of the brain and the language area of the left cerebral hemisphere. The patient's lesion, a consequence of surgical resection of a left frontal tumor, was postulated to have involved the anterior portion of the corpus callosum, which effectively then prevented the motor system for the left hand from accessing the language

systems in the left hemisphere, resulting in agraphia and ideomotor apraxia to verbal command in the left, motorically normal, limb.

In an autobiographical chapter she wrote in 2002, Edith Kaplan characterized her career as being shaped by a series of “serendipitous” events. What she saw as serendipity turned into the creation of a new specialization in psychology, clinical neuropsychology, in the United States. She and several other similar-minded colleagues working simultaneously in this country and throughout the world, paved the way for the development of current professional training and practice standards, academic preparation guidelines, and specialty credentialing for clinical neuropsychology by the American Board of Professional Psychology (ABPP).

One of her major contributions to clinical practice and research was the creation of several standardized neuropsychological test instruments based on the “process approach.” Up to that point in time, standardized tests were number-driven, with little regard for qualification. Recognizing the importance that astute clinical observation could offer to scoring tests and to their interpretation, and having a precise understanding of the fractionation of behavior at the level of the brain, she designed tests that capitalized on these sources of information. The list of tests she has created or to which she has contributed, include, among others, the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1983), Boston Naming Test (Kaplan et al., 1983), Wechsler Adult Intelligence Scale-Revised as a Neuropsychological Instrument (WAIS-RNI) (Kaplan et al., 1991), WAIS and Wechsler Memory Scale revisions (Wechsler, 1997, 1998), Microcog (Powell et al., 1993), California Verbal Learning Test (Delis et al., 1987), the Delis-Kaplan Executive Function System (Delis et al., 2001), and Clock Drawing (Freedman, 1994).

Dr. Kaplan was one of the first to be awarded a diplomate by the American Board of Clinical Neuropsychology, which she helped found. She held many honorific posts in professional organizations, including president of the International Neuropsychological Society in 1979 and of Division 40 (Clinical Neuropsychology) of the American Psychological Association (see Delis, 2010).

Edith Kaplan’s *serendipitous* pathway began when she attended Brooklyn College where she met Heinz Werner, the developmental psychologist who was to have a profound impact on her career. She had conducted a study of word acquisition that was based on her interest in child language development (Werner & Kaplan, 1950, 1952). Her dissertation was a study of how the ability to abstract meaning from words evolves in development. She created a series of sentences, each containing a nonsense word (e.g., “corplum”). In each series, the sentences provided increasing amounts of contextual information to aid the listener in deriving the meaning of the word. For example, the least informative cue was “A corplum is used outdoors,” and a more informative cue was “A corplum is worn on the head.” This test eventually became a subtest on the DKEFS where it discloses not only difficulties in semantic processing but also frontal-executive disinhibition in tendencies to jump to conclusions based on partial information.

When Professor Werner moved from Brooklyn College to Clark University in Worcester, Kaplan accompanied him to continue their work together. At that time, the late 1950s, it was approximately 10 years after Donald Olding Hebb had published his now classic “Organization of Behavior” (Hebb, 1949) with “neuropsychology” in the subtitle, where he expounded on his theory of “reverberating circuits” as an explanation for how the brain encodes new ideas and habits. Other influences on the study of brain and behavior were beginning to dominate psychology in the work of Karl Lashley, Hebb’s teacher, Brenda Milner, and Aleksandr Luria.

Before completing her dissertation, Kaplan took a position in the laboratory of Harold Goodglass at the Boston VA Aphasia Research Center when an opening, serendipitously, became available. Although she had been focused on child language development, she was intrigued by the language deficits that were evident in adults with acquired brain injury. The center had begun to attract a critical mass of individuals who shared an intense focus on learning how the brain was organized to carry out complex cognitive operations. Between 1960 and 1980 the list of investigators and clinicians who populated the center, including those who visited from Europe and beyond, read like a “Who’s Who” in modern cognitive neuroscience, behavioral neurology, aphasiology, and neuropsychology, covering topics from aphasia to amnesia, frontal lobe dysfunction and cognitive development. Some of these individuals who made major contributions to neuropsychological research and theory included Norman Geschwind, Nelson Butters, Laird Cermak, Marlene Oscar-Berman, Howard Gardner, Davis Howes, Martin Albert, Edgar Zurif, Frank Benson, Ken Heilman, Don Stuss, Jean Berko Gleason, Nancy Helm-Estabrooks, and Margaret Naeser, among others.

Edith Kaplan is survived by her beloved granddaughter, Rachel, and son Michael, and by hundreds of indebted colleagues who had the supreme good fortune to have known her and worked and studied with her.

REFERENCES

- Delis, D.C. (2010). Edith Kaplan: 1924–2009. *American Psychologist*, *65*, 127–128.
- Delis, D.C., Kaplan, E., & Kramer, J.H. (2001). *Delis-Kaplan Executive Function System*. San Antonio, TX: The Psychological Corporation.
- Delis, D., Kramer, J., Kaplan, E., & Ober, B. (1987). *The California Verbal Learning Test*. San Antonio: The Psychological Corporation.
- Freedman, M., Leach, L., Kaplan, E., Winocur, G., Shulman, K., & Delis, D. (1994). *Clock drawing: A neuropsychological analysis*. New York: Oxford University Press.
- Geschwind, N., & Kaplan, E. (1962). A human cerebral disconnection syndrome: A preliminary report. *Neurology*, *12*, 675–693.
- Geschwind, N., & Kaplan, E. (1998). A human cerebral disconnection syndrome: A preliminary report. 1962 [Classical article]. *Neurology*, *50*, 1201–1212.
- Goodglass, H., & Kaplan, E. (1983). *The Assessment of Aphasia and Related Disorders*, ed 2. Philadelphia: Lea & Febiger.
- Hebb, D.O. (1949). *The Organization of Behavior*. New York: John Wiley and Sons.

- Kaplan, E., Fein, D., Morris, R., Kramer, J.H., & Delis, D.C. (1991). *The WAIS-R NI*. San Antonio, TX: The Psychological Corporation.
- Kaplan, E., Goodglass, H., & Weintraub, S. (1983). *The Boston Naming Test*. Philadelphia: Lea and Febiger.
- Powell, D., Kaplan, E., Whitla, D., Weintraub, S., Catlin, R., & Funkenstein, H. (1993). *MicroCog: Assessment of Cognitive Functioning*. San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (1997). *Wechsler Adult Intelligence Scale-Third Edition*. San Antonio, Texas: The Psychological Corporation.
- Wechsler, D. (1998). *Wechsler Memory Scale-III*. San Antonio: The Psychological Corporation.
- Werner, H., & Kaplan, E. (1950). Development of word meaning through verbal context: An experimental study. *Journal of Psychology*, 29, 251–257.
- Werner, H., & Kaplan, E. (1952). The acquisition of word meanings: A developmental study. *Monographs of the Society for Research in Child Development*, 15(51).

Sandra Weintraub
Cognitive Neurology and Alzheimer's Disease Center
Departments of Psychiatry, Neurology and Psychology
Northwestern Feinberg School of Medicine
Chicago, Illinois