

SECTION I

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FOUNDATIONS OF SCHOOL  
NEUROPSYCHOLOGICAL  
PRACTICE

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## CHAPTER 1

# School Neuropsychology: The Evolution of a Specialty in School Psychology

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**R**EFERENCE TO SCHOOL neuropsychology as a specialty area in school psychology first appeared in an article by the senior author of this chapter published in the *Journal of School Psychology* in 1981 (Hynd & Obrzut, 1981). By a coincidence of history, the second author of this chapter was acknowledged in a footnote to that article for his helpful comments on an earlier draft. So once again we are united in articulating why specialization in school neuropsychology is relevant to the practice of psychology with school-age children. At the time our paths first crossed, both of the authors of the present chapter had graduated from doctoral training programs in school psychology and had completed either internships or postdoctoral fellowships in clinical neuropsychology.

Now, more than a quarter of a century later, several hundred school psychologists have received doctorates in school psychology with specialization in neuropsychology, and tens of thousands of practicing school psychologists have attended workshops or continuing education experiences on the neuropsychological basis of childhood learning and behavioral disorders. Yearly convention programs for the National Association of School Psychologists (NASP) regularly have speakers on neuropsychological assessment- and intervention-related issues, one

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entire NASP convention (called Mind Matters) was dedicated to the brain, and books such as this one meet the escalating demand for information about the practice of neuropsychology in the educational environment. Moreover, formation of a Neuropsychology in the Schools Interest Group in the late 1980s, one of several interest groups sponsored by NASP, revealed both the vision and needs of current NASP members. The second author has conducted special training workshops at NASP and on multiple occasions at the National Academy of Neuropsychology annual convention on Neuropsychology for School Psychologists. How has all this come about in such a short period of time?

#### GENESIS OF SCHOOL NEUROPSYCHOLOGY AS A SPECIALTY AREA

As odd as it seems today, there was a time remembered by some still in the profession when there was no universal law that addressed the constitutional rights of those in need of special education services. The passage of PL 94-142 (the Education for All Handicapped Children Act of 1975) changed that, and with the more recent reauthorization of the Individuals with Disabilities Education Act (IDEA), children with special education needs are guaranteed a free and appropriate education aimed at meeting their individual needs. Much has been and will be written about the impact of these public laws; the important point is that for the first time, the educational needs of learners with dyslexia or developmental aphasia were referenced (U.S. Office of Education, 1976) as being a priority for services in the educational environment. Advocates at that time for the use of criterion-referenced or behaviorally based identification procedures argued that these and other learners with neurodevelopmental disorders (e.g., Autism) provided a compelling rationale for the use of improved clinical assessment procedures by school psychologists and an improved knowledge of the biological bases of their difficulties (e.g., Gaddes, 1968, 1969; Rourke, 1976). Essentially, the passage of PL 94-142 in 1975 legitimized viewing learning disabilities and their various forms as neurologically based disorders of developmental origin. Gone was the older perspective that children with learning disabilities suffered from minimal brain damage (MBD) of some sort. From a more conceptual perspective, Gaddes (1969) argued that educators and school psychologists typically viewed actions by children at strictly a behavioral level, often failing to consider the obvious mediation of the central nervous system. He attributed this historically evident perspective (Skinner, 1938) to an aversion by many to consider the fields of neurology and psychology as interrelated. How this aversion was constructed is a complex matter but was likely influenced by the failure of earlier, simplistic models of brain functioning to help children with learning problems, particularly those of Doman and Delacato, the failure of perceptual-motor training to remediate learning deficits, and the use of such amorphous, and inadequate, terminology as MBD to describe many of these children, all of which coincided with the rise of behaviorism as the dominant philosophy of psychology.

How did this historical aversion to appreciate the interactions between the external environment and the central nervous system manifest itself in the training of school psychologists at the time? A survey of the 200 school psychology training programs in the country in 1980 revealed that only 18% of 6th-year certification programs in school psychology required a course in the physiological basis of

behavior (Hynd, Quackenbush, & Obrzut, 1980). At the doctoral level, 41% of the training programs required such a course of their students. However, with the passage of PL 94-142 and with the increased interest in better understanding brain-behavior relationships, the directors of school psychology training programs desired more required coursework in the biological basis of behavior and in neuropsychological assessment for their students. Some 74% of the directors of 6th-year specialist programs and 93% of the doctoral training programs indicated their desire in this regard (Hynd et al., 1980).

While there was clearly a renaissance of appreciation for the importance of understanding the neurobiological basis of learning and behavioral disorders (chiefly in the early 1980s), there was also a concurrent recognition that practicing school psychologists would need to become better informed so they could communicate effectively with parents and health care professionals about increasingly complex, medically involved cases in the schools. It was recognized at the time that the professional preparation of clinical neuropsychologists was wholly inadequate (Craig, 1979), thus underscoring the importance of the role of the school psychologist as the informed consultant in neuropsychology.

Some 25 years ago, the stage was set for school psychologists to develop a better appreciation of how brain-behavior interactions manifest in typical and atypical developmental contexts. Two separate but clearly important endeavors supported this rapidly developing appreciation of a neuropsychological perspective in the schools.

#### NEUROBIOLOGICAL BASIS OF CHILDHOOD LEARNING DISABILITIES AND ATTENTION- DEFICIT/HYPERACTIVITY DISORDER

First and foremost, research began to address the notion of what was the neurobiological basis of learning disabilities. This was an important development because, until the passage of PL 94-142, some well-respected scholars had argued that the neurological correlates of severe learning disabilities would never be understood despite the fact that much of the available evidence supported the view that some disturbance of the central nervous system existed in most children with this diagnosis. The available evidence at that time relied heavily on what might be considered "soft" neurological signs, which are defined as behaviors that exist only under certain circumstances but are thought to reflect neurological dysfunction of some sort. Examples include weak manual preference, reversals of figures on drawing tasks, motor clumsiness, and subtle errors of speech or language.

As it is beyond the scope of this chapter to review the explosion of research that has provided compelling evidence of the neurobiological basis of learning and behavioral disorders, let it be noted that in the past 25 years, multidisciplinary research has supported the following conclusions.

First, evidence supports the view that there are disturbances in the migration of neurons during fetal development in the brains of learners with severe reading disabilities (Galaburda, Sherman, Rosen, Aboitiz, & Geschwind, 1985). These migration errors seem to be associated with the atypical development of the language areas of the brain (Hynd & Semrud-Clikeman, 1989; Hynd, Semrud-Clikeman, Lorys, Novey, & Eliopoulos, 1990). Furthermore these deviations in the normal trajectory of brain development seem to be associated with the memory

and neurolinguistic deficits seen in children with severe reading disabilities (Kibby et al., 2004; Semrud-Clikeman, Hynd, Novey, & Eliopoulos, 1991) and with the deficits observed on tasks assessing perceptual asymmetries (Foster, Hynd, Morgan, & Hugdahl, 2002). Brain imaging research has also supported the view that the brains of children diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD) are characterized by disturbances in the development of typical patterns of brain development in regions subserving behavioral regulation, attention, and impulse control (Hynd et al., 1993). Thus, as advocacy for a neuropsychological perspective in the schools continued over the years, research increasingly provided a rationale for school psychologists to become more informed about the neurological and developmental aspects of severe learning disabilities.

Second, more recent research began investigating how the behaviors associated with severe learning disabilities might be transmitted over generations. If the neurolinguistic deficits commonly seen in reading disabilities, for example, were related to deviations during fetal brain development, it was a reasonable question to ask if there was some genetic influence in this regard.

It had long been observed that severe learning disabilities seemed to run in families (Hinshelwood, 1900; Morgan, 1896). However, it was not until the late 1990s that molecular geneticists turned their attention to the potential heritability of learning disabilities. Research in the past 15 years has revealed that at least two chromosomes (6 and 15) seem linked to severe reading disabilities (Pennington, 1999), with linkage to chromosome 6 being associated with the deficits in phonological decoding, phoneme awareness, and orthographic coding (Olson, Datta, Gayan, & DeFries, 1999). Other recent linkage studies investigating the genetic basis of dyslexia suggest that a specific region on chromosome 15 is important in brain development and maturation and may be related to the functional cellular anomalies observed in this form of severe learning disability (Taipale et al., 2003).

Although there seems to be a strong case for neurobiological differences between typically achieving children and those with severe learning disabilities, possibly of genetic origin, there is also the view that our genetic makeup accounts for only approximately 50% of the variability in human cognitive abilities. The rest of the variance must be accounted for by the environment. This, of course, makes sense, otherwise we could not learn and adapt to our environment and we would rapidly become an extinct species. And, not surprisingly, there is good evidence that functional brain differences in persons with severe reading disabilities vary with the impact of culture and native language (Siok, Perfetti, Jin, & Tan, 2004). Learning from and adapting to environmental demands is an essential attribute, and evidence suggests that the brains of persons with severe learning disabilities can adapt and profit from their remedial experience.

Third, and in this context, neuroimaging procedures have shown quite dramatically that the brains of learners with severe reading disabilities actually change metabolically in response to intervention and that this change is seen both behaviorally and during functional imaging procedures (S. E. Shaywitz et al., 1998). The conclusion is that carefully targeted intervention, based on a sound theoretical and applied rationale, can impact dramatically how the brains of children process aspects of the language code typically impacted in severe learning disabilities (B. A. Shaywitz et al., 2004).

These and other research findings have continued to argue in support of neurobiological research informing educational practice, that there was indeed a neurobiological basis to learning and behavioral disabilities, that genetics were relevant in our understanding about the transmission of learning disabilities but that sound and carefully constructed interventions could indeed offer promise of educational progress.

From the perspective of many school psychologists, the research was impacting our understanding so quickly that opportunities for advanced study in clinical neuropsychology, either through continuing educational experiences or through the pursuit of an advanced degree, was inviting. Concurrently, other health care professionals, including those in the medical profession, began turning to school psychologists to provide more relevant clinical assessments. Advances in neuropsychological assessment of children made this possible. It was in this context that many in the field found arguments in favor of preparing school psychologists in neuropsychology inviting.

### TRAINING SCHOOL PSYCHOLOGISTS IN CLINICAL NEUROPSYCHOLOGY

Recognizing that there was interest among school psychology training directors for the preparation of school psychologists in neuropsychology, Hynd (1981) proposed a curriculum aimed at providing appropriate graduate courses and supervised clinical experiences in clinical neuropsychology for subdoctoral and doctoral students in school psychology. Texas A&M University began offering a specialization strand in neuropsychology in its PhD program in school psychology in 1981 as well.

What was envisioned was not to prepare school psychologists in how to diagnose brain impairment, but rather to prepare school psychologists in clinical neuropsychology to a sufficient degree that they could bring a *neuropsychological perspective* to the increasingly complex medical challenges found in some school-age children. At the time, Hynd (1981) proposed an appropriate sequence of graduate coursework and applied supervised clinical experiences for the preparation of the 6th-year/certification-level school psychologist. This proposal was based on recognition at that time that there was a role and function for subdoctoral professionals. However, reality dictated that there was not enough curricular flexibility in the traditional 6th-year school psychology training program to accommodate all of the necessary coursework and supervised clinical experience. Thus, the more realistic approach was to prepare doctoral-level school psychologists who met standards for professional preparation in both school psychology and clinical neuropsychology. Although this added 1 to 2 extra years to the typical PhD program in school psychology, the approach proved to be both feasible and appropriate considering professional standards at the time (Hynd, 1981).

Still relevant today, projected roles for the doctoral-level school psychologist trained in clinical neuropsychology include the following:

1. Interprets the results of neuropsychological assessment and develops strategies of intervention.
2. Presents recommendations for remediation based on knowledge of scientifically validated interventions.

3. Consults with curriculum specialists in designing approaches to instruction that more adequately reflect what is known about neuropsychological development.
4. Acts as an organizational liaison with the medical community, coordinating and evaluating medically based interventions.
5. Conducts in-service workshops for educational personnel, parents, and others on the neuropsychological basis of development and learning.
6. Conducts both basic and applied educational research investigating the efficacy of neuropsychologically based interventions and consultation in the schools.

So that the doctoral-level school psychologist would meet appropriate training standards, the curriculum and supervised clinical experiences had to reflect recommended training guidelines in school psychology and in clinical neuropsychology. In school psychology, this meant that the curriculum of the training program needed to represent the standards set by both the National Association of School Psychology/National Council for the Accreditation of Teacher Education and the American Psychological Association (APA). Reflecting the work of a task force of the International Neuropsychological Society (INS) and Division 40 (Clinical Neuropsychology) of the APA, training guidelines had been developed in clinical neuropsychology (Bieliauskas & Boll, 1984). Essentially, to add the proficiencies and expertise expected of the clinical neuropsychologist to the preparation of the doctoral-level school psychologist required considerably more coursework in the generic psychology core, including such courses as biological foundations of behavior, neuroanatomy, clinical neuropsychological assessment, psychopathology, developmental neuropsychology, neuropsychological rehabilitation, and an appropriate clinical internship where at least 50% of the time was spent engaged in the supervised duties of a clinical neuropsychologist. Because of required internship experiences in school psychology, students typically had to complete a half to a full year of internship in the school setting and another year in a clinical setting appropriate for training in clinical neuropsychology. Because of the blended nature of the educational and clinical experiences at the time, many of the graduates of programs reflecting this perspective were in many regards better prepared with more relevant coursework in assessment and supervised clinical experience than those trained solely as clinical neuropsychologists. This was to prove the deciding factor in the success of these training programs in the recruitment of students and in the successful placement of students in highly competitive clinical internship sites and professional positions upon graduation.

### **Case Study of a Successful Training Program**

While the senior author to this chapter was at the University of Georgia, a successful model was set in place aimed at preparing doctoral-level school psychologists with expertise in clinical neuropsychology. Part of the challenge in building such a program was that, in addition to appropriate professional standards, the program had to meet departmental requirements, college and university requirements, and state certification and applied licensure requirements for the practice of psychology.

The curriculum was built on an APA-approved PhD program in school psychology, incorporated the INS recommended training standards in clinical neuropsychology, required collaboration with other neuropsychologists on campus, had available practica/internship experiences in child neuropsychology under a licensed neuropsychologist at Medical College of Georgia, and typically required an additional year or two of coursework. Many of the students successfully pursued Association of Psychology Postdoctoral Internship Centers internship sites with a clinical neuropsychology emphasis.

Since 1982, when the program was initiated, over 62 PhDs in school psychology have been granted from the University of Georgia's school psychology program with appropriate specialization in child neuropsychology. The typical PhD program with specialization in child neuropsychology took 5 years to complete (4 years plus the internship, often after entering the program with a master's degree), was a year-round program, and included four to six supervised practica in the School Psychology Clinic and two other supervised practica at the Child Neuropsychology Service Center at the Medical College of Georgia or at the Center for Clinical and Developmental Neuropsychology at the University of Georgia. Most of the students pursued APPIC internship sites, including those at Harvard University, the Kennedy Krieger Institute at Johns Hopkins University, Massachusetts General Hospital, Oklahoma Health Science Center, University of Arkansas Children's Hospital, University of Chicago School of Medicine, University of North Carolina School of Medicine, University of South Carolina School of Medicine, and Vanderbilt University School of Medicine. These internship sites were often embedded in departments of psychiatry, neurology, or pediatrics and were pursued after internship requirements were met in school psychology.

It is a reasonable question to ask: Where have these students gone and what have they accomplished? Nineteen have pursued careers in academia (e.g., University of Texas, University of Rhode Island, University of North Carolina School of Medicine, Texas A&M University, Medical College of Georgia, University of Chicago School of Medicine, Medical College of South Carolina), 18 are in private practice, 15 are in traditional school psychology positions, and 10 are in other allied health settings (e.g., mental health clinics). Such specific data are not available on graduates of the Texas A&M University program, but we know that many are now employed in hospitals and related health care settings and at least one is chief of pediatric neuropsychology at a major pediatric specialty hospital in the southern United States.

The achievements of these individuals are notable and include authoring clinical assessment instruments used by school psychologists and clinical neuropsychologists (e.g., Children's Memory Scale; Cohen, 1998); receiving nationally significant awards, including the Orton Dyslexia Society Dissertation of the Year Award (Margaret Semrud-Clikeman) and the APA Division 16 Lightner Witmer Award (Cynthia Riccio); and receiving Fulbright Fellowships (e.g., Alison Lorys, Finland; Amy Clinton, Colombia; Jason Craggs, Norway).

Other successful training programs have offered similar or alternative approaches to preparing doctoral-level school psychologists in clinical neuropsychology. Included among these are the aforementioned program at Texas A&M University and those at the University of Texas, Ball State University, University of Northern Colorado, University of Utah, and University of Washington. It is clear

that the graduates of these and other programs have contributed significantly to the practice of school psychology and to clinical neuropsychology as well.

### THE CHANGING TIMES

However, national initiatives and training standards for school psychologists and clinical neuropsychologists have evolved significantly in the past quarter-century, and market forces may require a reexamination of how school psychologists may be appropriately prepared in both disciplines. Consider, for example, the many different boards and associations that have input into the professional preparation, licensure, specialty board status, and practice of clinical neuropsychologists. These include (in addition to state-level licensing boards) the INS, National Academy of Neuropsychology, Association for Internship Training in Clinical Neuropsychology, Association for Doctoral Education in Clinical Neuropsychology, Association of Postdoctoral Programs in Clinical Neuropsychology, American Board of Professional Psychology, American Board of Professional Neuropsychology, the Clinical Neuropsychology Synarche, and the newly formed Coalition of Clinical Practitioners in Neuropsychology. Also, in contrast to what Craig found in 1979, there are now over 40 recognized graduate programs that offer appropriate PhD-level training in clinical neuropsychology. Much has happened in regard to both the number of training programs available in clinical neuropsychology and the depth of the training offered at the doctoral and post-doctoral levels. Can the same be said for the profession of school psychology?

Other than a few doctoral-level training programs in school psychology that continue to prepare school psychologists in clinical neuropsychology, it is unfortunate that not as much has changed in the context of the curriculum for preparing school psychologists. Many different employment opportunities continue to exist for the doctoral-level school psychologist prepared in clinical neuropsychology in academia or in medical settings in departments of psychiatry, neurology, and pediatrics, but the need for more in-depth training in neuropsychology among nondoctoral-level school psychologists remains as present as it was when Hynd et al. (1980) surveyed school psychology program directors.

We anticipate that dynamics in the larger profession of applied psychology may have some impact in encouraging 6th-year certification or continuing education programs in school psychology to begin incorporating more specific coursework in the neurobiological basis of behavior. Considering the fact that some states are now licensing rigorously prepared applied doctoral-level psychologists to prescribe medications appropriate to their practice (e.g., New Mexico, Georgia, Louisiana) and the noted success of the Department of Defense Prescribing Psychologist Program, it might be said that the main thrust of most applied psychology programs is increasingly more biomedically oriented. Will school psychologists continue to be prepared in a narrowly defined, behaviorally focused discipline that increasingly separates them from their doctoral-trained colleagues? Considering the demands of currently legislated mandates, this may indeed be the case for many, though not all, practicing school psychologists.

Professions, especially those engaged in clinical activities and those in education, are notoriously slow to embrace change, but they must change if they are to survive. Professions typically have had a considered, meticulous response to proposals for change. This is in part related to the many layers of regulation of such

professions. At least six layers of regulation exist for the profession of school psychology that include regulation through state (and sometimes federal) laws, case law, personal injury and related malpractice litigation, tradition, codes of ethics and professional conduct, and professional standards and administrative rules of practice. Significant changes in a profession must coordinate at all layers of regulation. At present, there is no legal or professional recognition of subspecialties in school psychology. For school neuropsychology to exist, programs must offer training in biologically based systems of diagnosis and intervention coupled with training in schools as systems and the other traditional aspects of school psychology to be conjointly available to those who desire to specialize. Thus, recognition of the need to specialize in school must occur at many levels (and more areas than school neuropsychology will need to be made available), denoting the need for a fundamental change in how we view professional development and education in school psychology broadly.

Professions have a systematic response to change and an inherent need for innovation, slow as it may seem to develop. This response to efforts at fundamental change is a careful and considered response that must be steeped in research. One of the defining principles of the concept of a profession states that there is a body of knowledge that underlies the activities of those engaged in it. In health care and related psychological professions, this body of knowledge is drawn from the sciences that support and accumulate knowledge in the discipline. Thus, change must have a basis in need but also a basis in science: Is there a scientific body (or bodies) of knowledge that support the results of the call for change? Change is the lifeblood of a profession as its science changes, but it is simultaneously a slow, active, and adversarial process. Change cannot be allowed to occur on the basis of faddism, research without replication, or personal persuasion. Rather, change is governed by professional standards and law. Practice, and thus changes in practice, must be based ultimately on strong science.

We view the science of the past 25 years as having demonstrated overwhelmingly the relationship of the brain and neurodevelopment broadly to behavioral development and learning (e.g., samples of this research noted earlier and also reviewed in Reynolds & Fletcher-Janzen, 1997). The science supports the need for having individuals in the schools who understand clinical neuropsychology (neuropsychology being defined as the study of brain-behavior relationships and clinical neuropsychology as the application of the findings of this field of study to individual outcomes). School psychologists, who already receive some training in the biological bases of behavior and who are particularly well trained in psychological testing and assessment, are the natural professionals to take on this role. However, to ensure what amounts to proper patient care, considerable additional doctoral-level training is required, and we have outlined some of the methods for obtaining such a knowledge base in this chapter.

School psychologists are being asked to deal with a broader and broader array of problems in the schools with each redesign of IDEA and with the growing demands for successful schooling for all learners. The knowledge explosion has been tremendous in many areas relevant to school psychology, and not just neuropsychology (e.g., learning systems and environments, public health and the prevention sciences, neurodevelopmental disorders and pediatric psychology, alcohol and drug abuse or the addiction sciences, and pediatric psychopharmacology). We believe it is no longer possible for the school psychologist to master all of

the areas of knowledge needed to function ethically and effectively in so many domains. *The time for the development of specializations in school psychology has come.*

This will require recognition of this need from NASP, from various levels within APA, and, ultimately, from state-level licensing and certification agencies and individual school districts. Some doctoral-level training programs in school psychology have been developing and producing students with de facto specialization for many years, and in some cases, for many decades. When university programs are looking to hire faculty with particular expertise in such areas as consultation, behavioral psychology, or neuropsychology, it is not at all clandestine knowledge that particular programs are contacted and asked about their graduates. We have known for a long time that we cannot train our graduates to equal and effective levels of knowledge and skill in all areas demanded in practice, and we have not done so.

It is time to recognize this process formally and to begin the process of setting professional standards for subspecialty designation in school psychology (and perhaps other areas of professional psychology as well, but that is not our concern here). School neuropsychology exists and school neuropsychologists have been trained for more than 2 decades. It is no fluke that the *Handbook of Clinical Child Neuropsychology* (its third edition now in preparation) is edited by two school psychologists, that the widely adopted text *Pediatric Neuropsychology* (Hynd & Willis, 1988) was coauthored by school psychologists with expertise in clinical child neuropsychology, or that more than one school psychologist has served as president of the National Academy of Neuropsychology and that several school psychologists have held various offices and committee chairships for the Division of Clinical Neuropsychology of the APA (including the office of president). Several school psychologists have served as president and in other capacities on the executive boards of diplomate-granting boards in the field of neuropsychology as well.

## CONCLUSION

There is a long and distinguished history of school psychologists actively being engaged in leadership roles in the profession of clinical neuropsychology. These school psychologists have also been actively engaged in changing the professional landscape of school psychology itself through their leadership in various specialty interest groups such as the NASP Neuropsychology Interest Group, one of the largest such groups in NASP. In this sense, much has changed in the past 25 years, and each profession has profited from the involvement of school psychologists appropriately trained according to standards established by each profession. As has been argued, however, it is time now for the development of appropriate training standards for a new doctoral-level specialty that incorporates the best practices from each profession. In this way, practice will represent the best each profession offers in our effort to understand and help children in need of services.

As a metaphor for the relationship between school psychology, traditionally a behaviorally oriented field, and clinical neuropsychology, the following quote seems appropriate:

The boundary between behavior and biology is arbitrary and changing. It has been imposed not by the natural contours of the disciplines, but by lack of knowledge. As our knowledge expands, the biological and behavioral disciplines will

merge at certain points, and it is at these points of merger that our understanding of mentation will rest on particularly secure ground. . . . Ultimately, the joining of these two disciplines represents the emerging conviction that a coherent and biologically unified description of mentation is possible. (Kandel, 1985, p. 832)

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