Application of a Competency Model to Clinical Neuropsychology

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Professional competencies in psychology have received significant attention as education and training standards have been increasingly framed in the context of behavioral, knowledge-based, and attitudinal learning outcomes. We first review the development of the specialty of clinical neuropsychology and describe the establishment of educational and training guidelines in the specialty, including their most recent update (Hannay et al., 1998). Competency initiatives in professional psychology over the last decade are then summarized. Specialties in professional psychology have delineated education and training guidelines and are beginning to incorporate competency-based approaches to describe advanced and specialized abilities that build on generic, core, foundational and functional psychology knowledge, skills, and attitudes. Following the model of France et al., (2008), we apply the Assessment of Competency Benchmarks framework to describe specific competencies required for specialty practice in clinical neuropsychology.

Keywords: clinical neuropsychology, competency, professional psychology specialties

"Neuropsychology" has been used to describe both a field of scientific inquiry and a specialty practice area within professional psychology (Adams, 2002; Boake, 2008). Clinical neuropsychologists assess, diagnose, and provide treatment to individuals who have developmental or acquired injury/illness involving the central

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nervous system and associated organ systems. Such disorders include genetic abnormalities, congenital problems, traumatic brain injury, stroke, tumors, central nervous system infections, neurotoxic exposures, metabolic diseases, neuropsychiatric illness, and degenerative diseases of the brain. Many medical disorders (e.g., cardiac, hepatic, or renal disease, cancer, endocrine dysfunction) or medical treatments (e.g., major organ transplantation, chemotherapy treatment, polypharmacy) can affect neuropsychological functioning through complex metabolic channels. Advances in medical treatment increase longevity at both ends of the life cycle, with associated neuropsychological consequences. In geriatrics, increased life expectancy brings an exponential increase in dementia risk, and the number of older individuals suffering from degenerative brain disorders is expected to triple by 2050 (Alzheimer's Association, 2011; Centers for Disease Control & Prevention, 2011). In pediatrics, medical advances have insured that children with complex or chronic health conditions that affect the central nervous system are increasingly surviving into adulthood with significant special needs. Consequently, understanding the behavioral expression of brain dysfunction, a critical role of neuropsychology, will continue to be needed in the ongoing medical management, rehabilitation, and intervention of a range of individuals across the life span. Clinical neuropsychological examination can be required for diagnosis, patient care and planning, treatment planning and remediation, treatment evaluation, research, and forensic applications (Lezak, Howieson, Loring, Hannay, & Fischer, 2004). Neuropsychologists also play a critical role in educating patients, families, communities, and policymakers about neurological, psychological, and neuropsychological conditions (Tranel, 2008).

As a field of inquiry, the scientific study of brain–behavior relationships has roots in the 19th century, as European physicians

described behavioral syndromes and their associated brain pathology (Geschwind, 1965a, 1965b; Halstead, 1947; Meier, 1992). Beginning in the 1940s and 1950s and continuing today, neuropsychologists have been among the world leaders in the study of brain–behavior relationships. The relative insensitivity of intelligence tests to brain injuries and the need for more "process-pure" cognitive measures prompted the development of quantitative neuropsychological tests, beginning with the Halstead Neuropsychological Battery (Halstead, 1947). The following decades saw increasing clinical applications of neuropsychological tests to assessment of executive functions, language disorders, memory, and other cognitive domains relevant both to clinical care and research.

Together with their colleagues in behavioral neurology, clinical neuropsychologists were instrumental in establishing the International Neuropsychological Society (INS) in 1966. Lacking at that time an American Psychological Association (APA) division to address professional issues in neuropsychology, the INS served in 1977 as the first venue for the discussion and development of educational and training guidelines in professional neuropsychology. Three years later (1980), the Division of Clinical Neuropsychology (Division 40) was established within the American Psychological Association (APA), and in 1982, the Board of Trustees of the American Board of Professional Psychology (ABPP) recognized the recently formed American Board of Clinical Neuropsychology (ABCN) as a specialty board within ABPP and charged the ABCN with establishing eligibility criteria and competency-based examination procedures for board certification in the specialty (Meier, 1992).

In 1996, clinical neuropsychology became the first new specialty to be recognized by the APA Commission for the Recognition of Specialties and Proficiencies in Professional Psychology (CRSPPP) beyond the traditional specialties of clinical psychology, counseling psychology, and school psychology. Clinical neuropsychology petitioned successfully for continued recognition as a specialty in 2003 and 2010. The formal definition of the specialty is as follows:

> Clinical neuropsychology is a specialty in professional psychology that applies principles of assessment and intervention based upon the scientific study of human behavior as it relates to normal and abnormal functioning of the central nervous system. The specialty is dedicated to enhancing the understanding of brain–behavior relationships and the application of such knowledge to human problems.

This public description is available on the APA CRSPPP and the Council of Specialties in Professional Psychology (CoS) websites (American Psychological Association, 2010; Council of Specialties in Professional Psychology, 2012).

Clinical neuropsychology as a specialized area of knowledge and practice has intradisciplinary and interdisciplinary roots. The specialty evolved in conjunction with advances in the clinical neurosciences and behavioral neurology as well as in the discipline of psychology (physiological psychology, cognitive/experimental psychology, measurement, assessment). The science and application of brain–behavior relationships can be linked to three pathways: advances in neuroscience, physiological and cognitive psychology; application of quantitative and qualitative neuropsychological principles and procedures; and implementation of a syndromal approach to understanding neurobehavioral

impact of central nervous-system dysfunction or lesions (Meier, 1992). The practice of clinical neuropsychology has expanded to encompass applications that address psychological and behavioral consequences of a range of changes in brain functioning that can arise across the life span.

Clinical neuropsychology can be differentiated from general professional psychology and other psychology specialties by its focus on understanding brain–behavior relationships as manifested within social/cultural contexts. There is overlap with other health-service specialties, in terms of foundational and functional competencies, but in clinical neuropsychology, there is a specific focus on neurobehavioral constructs and applications. Assessment, intervention, and consultation are framed in this approach. Neuropsychologists assess brain-related factors that affect functioning across domains of behavior, and often are called upon to distinguish contributions of mood and cognitive problems to overall presentation in neurological as well as psychiatric disorders.

History of Education and Training Guidelines in Clinical Neuropsychology

As indicated above, the INS established a Task Force on Education, Accreditation, and Credentialing in clinical neuropsychology in 1977. As reported by Adams (2002) and Meier (1992), findings of the task force were published in newsletter form in 1981, and again in 1984 when endorsed by American Psychological Association (APA) Division 40. Prior to the development of these guidelines, training in clinical neuropsychology varied in quality and quantity across programs (Boake, 2008). The INS–Division 40 Guidelines for doctoral, internship, and postdoctoral training programs were eventually published in journal form (INS, 1987), and served as a general yardstick by which formal training programs could be constructed and evaluated. According to the guidelines, internship programs should devote at least 50% time in neuropsychology and at least 20% time in general clinical training. Completion of the internship was said to meet minimal qualifications to practice clinical neuropsychology, and postdoctoral training was intended for development of advanced competence in clinical neuropsychological practice, with at least 50% time devoted to supervised clinical experience and at least 25% time in research. Postdoctoral training was described as typically lasting for at least two years and was directed toward achieving board certification.

Recognition of clinical neuropsychology as a specialty brought increasing interest and diversity to the field, giving rise to a recognition that multiple education/training experiences and pathways at the predoctoral, internship, and postdoctoral levels could contribute to the development of competencies in neuropsychology. Recognizing such diversity and variability led to the need for a more integrated model of training, culminating in the Houston Conference on Specialty Education and Training in Clinical Neuropsychology, held in September, 1997. The Planning Committee for the Houston Conference solicited participant applications via the APA Monitor and letters to members of APA Division 40, the National Academy of Neuropsychology (NAN), and to the directors of doctoral, internship, and postdoctoral training programs (Houston Conference, 1998). Of those who applied, 37 clinical neuropsychologists were selected to reflect diversity in practice settings, education and training models, subspecializations, senior-

ity level, culture, geography, and ethnic/cultural diversity. Five other delegates attended as representatives of the sponsoring organizations, which included NAN, APA Division 40, ABCN, the American Academy of Clinical Neuropsychology (AACN), and the Association of Postdoctoral Programs in Clinical Neuropsychology (APPCN). The format and size of the program was fashioned after those of previous successful conferences producing consensus documents (Belar et al., 1993; Belar et al., 1989).

The policy statement from the Houston Conference on Specialty Education and Training in Clinical Neuropsychology (Hannay et al., 1998) remains the last major update of education and training guidelines in clinical neuropsychology. The Houston Conference Policy Statement calls for components of specialization to occur incrementally at doctoral, internship, and postdoctoral training levels (Hannay et al., 1998). Doctoral education provides generic psychology and clinical core as well as the foundations of neuropsychology. The internship completes general clinical training and extends training in neuropsychology, and the postdoctoral residency provides advanced education and training intended to achieve competence in the specialty of clinical neuropsychology. Houston Conference Guidelines specify that training in the specialty is rooted firmly in the scientist–practitioner tradition and, in contrast to the earlier INS–Division 40 Guidelines, that a 2-year postdoctoral residency is required. The policy statement makes reference to competency-based education and training, and knowledge and skill areas are broken down into several domains and subdomains.

Four "core knowledge" areas are delineated in the Houston Conference guidelines: "generic psychology core," "generic clinical core," "foundations for the study of brain–behavioral relationships," and "foundations for the practice of clinical neuropsychology." Likewise, five skill domains are articulated, some considered part of "generic clinical skills" and some considered unique to clinical neuropsychology. Skills domains include "assessment," "treatment and interventions," "consultation," "research," and "teaching and supervision," but there are no clear indications of which skills describe general clinical skills and which are specific to clinical neuropsychology. Competencies expected of the entry-level neuropsychologist are described fairly broadly in exit criteria for postdoctoral residencies and include:

> Advanced skill in the neuropsychological evaluation, treatment and consultation to patients and professionals sufficient to practice on an independent basis; advanced understanding of brain–behavior relationships; scholarly activity, for example, submission of a study or literature review for publication, presentation, submission of a grant proposal, or outcome assessment (Hannay et al., 1998).

Formal evaluation of the degree to which these competencies have been attained is expected to occur in the postdoctoral residency program.

Competency Initiatives in Professional Psychology

Formulation of the Houston Conference guidelines came at a time when professional psychology as a whole was beginning to pay closer attention to competency-based approaches to education and training. Much continued development has taken place since the Houston Conference policy statement was published. A major event in what has become known as the "competency movement"

in professional psychology was the 2002 Competencies Conference: Future Directions in Education and Credentialing, which aimed to address the core competencies expected of graduates of professional education and training programs in psychology (Kaslow et al., 2004). Among several articles published as a result of the conference, the "cube model" for competency development in professional psychology (Rodolfa et al., 2005) describes a three-dimensional matrix, including foundational competency domains, functional competency domains, and stages of professional development. Foundational competency domains include those areas of knowledge, skills, attitudes, and values that serve as the foundation required of all psychologists, whereas functional competency refers to broadly defined activities of professional practice (i.e., what psychologists "do"). Stages of development are critical in the building of competencies, which in the cube model begin at the doctoral level and include lifelong learning through continuing education. In 2004, APA's Board of Educational Affairs (BEA) established the Task Force on the Assessment of Competencies in Professional Psychology Education, Training, and Credentialing, resulting in a final report in 2006 (American Psychological Association, 2006; Kaslow et al., 2007). The report noted that both general and specialty foundational and functional competencies must be evaluated in a comprehensive competency assessment. The report also called for more collaboration among constituency groups in creating coherent strategies for evaluating competencies. The Council of Chairs of Training Councils (CCTC) proposed an initiative to further delineate specific benchmarks of competencies across the training sequence and a work group was authorized by the APA Board of Educational Affairs to address this. In 2006, the Assessment of Competency Benchmarks Work Group met and developed a document that identified 15 core competency areas at three developmental levels—readiness for practicum, readiness for internship, and readiness for entry to practice (Fouad et al., 2009).

The recognized specialties in professional psychology have begun to apply competency models to evaluating training outcomes in their specialties. Oxford University Press is publishing a book series on specialty competencies (Packer & Grisso, 2011; Stanton & Welsh, 2011), and further volumes are forthcoming. The foundational/functional approach to competencies has been applied to rehabilitation psychology (Hibbard & Cox, 2010). Clinical-health psychology sponsored a summit meeting to revise education and training guidelines in the specialty and used the cube model of core competency domains (Rodolfa et al., 2005) and the assessment of competency benchmarks framework (Fouad et al., 2009) to delineate expected competencies of the entry-level clinical-health psychologist (France et al., 2008). In the current article, we use the France et al., approach as a model to similarly describe the competencies required of practicing clinical neuropsychologists, but we have incorporated subsequent developments in the field in framing these competencies. Consistent with the approach of France et al., although we refer to the "competency cube," we do not address the third axis (specific stages or sequence in acquisition of competencies), as our focus is on entry-level specialty practice.

Professional psychology-competency initiatives, as supported by the APA Board of Educational Affairs, have continued to develop in two ways: (a) refining and adapting the core competency domains, and, (b) identifying assessment tools for measuring attainment of competencies through the training sequence. A competency assessment toolkit for professional psychology has been

developed that reviews assessment techniques and provides a resource for psychology education and training and credentialing (*http://www.apa.org/ed/graduate/competency.aspx*). The Competency Benchmarks in Professional Psychology have been revised to reduce redundancy, improve consistency, and to be more useful for educational programs (American Psychological Association, 2011b). The current revision is organized under six overarching clusters: the foundational clusters include professionalism, relational, and science; functional clusters include application, educa-

tion, and systems (American Psychological Association, 2011a). The revision preserves the core competencies within this new organizational scheme and adds the additional competency of evidence-based practice under the "application" cluster. We elected to incorporate this revision because it provides a clearer organizational structure and emphasizes the scientific basis of psychology practice.

As described above, the 1997 Houston Conference policy statement employed broad strokes in outlining the knowledge base and

Table 1

Foundational Competencies Unique to Clinical Neuropsychology but Common Across Functional Domains

The clinical neuropsychologist	
Cluster/Foundational domain	Competency
Professionalism	
Professionalism	• demonstrates professional identity as a clinical neuropsychologist; understands the unique contributions of neuropsychology to different contexts.
	• demonstrates awareness of the roles of clinical neuropsychologists, and how those roles vary across practice settings and assessment/intervention contexts.
Individual and Cultural Diversity	• integrates knowledge of diversity issues in neuropsychological assessment, research, treatment, and consultation (e.g. health disparities, language differences, educational level, cultural context, literacy, individual differences).
	• understands and appreciates how cultural, linguistic, disability, and other demographic/socioeconomic factors affect the process and outcomes of neuropsychological assessments and the application of normative data and interpretations in specific populations.
Ethical, legal standards and policy	• applies ethical concepts and demonstrates awareness of legal issues relevant to the professional activities of clinical neuropsychologists across practice settings, including healthcare, research, school, military/veteran, industry, and forensic (e.g., criminal, personal injury, disability determination, fitness for duty, etc.).
	• appreciates specific ethical and legal issues that are relevant to neuropsychology practice across settings, including informed consent, third party assessments, use of technicians/psychometrists, third party observers, disclosure of neuropsychological test data, and test security.
Reflective practice/self-assessment/self-care	• engages in reflective self-assessment regarding the dynamic knowledge base and skill sets necessary for practice in clinical neuropsychology across practice settings with the goal of improving skill level over time; understands limits of competence in particular populations or settings and seeks to lessen their impact through continuing education and additional training.
Relational	
Relationships	• maintains effective and productive relationships with patients, families, caregivers, colleagues, team members, and communities across the complex interprofessional settings involved in neuropsychological practice.
	• communicates clearly and effectively, explaining neuropsychological concepts and interpretations in a manner best suited to particular audience (patients, families, and caregivers as well as other professionals).
Science	
Scientific knowledge and methods	• demonstrates advanced knowledge of the clinical and cognitive neurosciences, including neurology, neuroanatomy, neurobiology, brain development, and neurophysiology.
	• maintains currency with key scientific developments in fields related to practice (e.g., genetics, pharmacology, translational science, bioinformatics).
	• demonstrates knowledge of scientific and scholarly developments in clinical neuropsychology.
Research/evaluation	• understands and applies scientific method in generating neuropsychological knowledge and evaluating findings related to neuropsychological techniques, brain–behavior relationships, assessment strategies, and interventions.
	• understands research design and analysis relevant to clinical neuropsychological science and practice.
	• appreciates the wide array of factors that mediate and modulate behavior and their implications for neuropsychological research.
	• selects research topics and performs literature reviews effectively.
	• demonstrates skills in conceptualizing, implementing, and interpreting research design and statistical analysis.
	• performs research activities, monitoring of progress, and evaluation of outcomes accurately and effectively.
	• communicates research findings effectively.
	• applies research methods in evaluating effectiveness of professional activities in clinical neuropsychology.

skills required for specialty practice in clinical neuropsychology. Generic core competencies in the Houston document do not align exactly with professional psychology competencies as described in the Competencies Benchmarks document. Houston Conference guidelines do not clearly distinguish generic clinical skills from those specific to clinical neuropsychology. Furthermore, the descriptions of competencies are often vague, for example, referring to competencies in "administration of tests and measures" and "interpretation and diagnosis" with no elaboration. As such, the level of detail is minimal in comparison to competencies as described in the Competencies Benchmarks document. Our approach in this article incorporates the areas covered in the Houston Conference guidelines and transforms these into contemporary competency constructs. Furthermore, Houston Conference guidelines include only brief statements regarding the contributions that each level of training (predoctoral, internship, residency, continuing education) is expected to make to the development of competencies in the specialty. Although this paper focuses on specific competencies required for the *entry-level* practicing clinical neuropsychologist, more systematic delineation of the development of skills at each level in the sequence of training will be needed.

Foundational Competencies in Clinical Neuropsychology

In what follows, the Revised Competency Benchmarks document was used as a model to describe the general and specialized competencies expected for specialty practice in neuropsychology. Clinical neuropsychology is by nature an integrative, scientifically based discipline, and at some level, it can be challenging to extract and identify discrete competencies within one domain of activity without acknowledging the simultaneous importance of other domains.

Clinical neuropsychologists have foundational and functional skills in professional psychology obtained in professional psychology doctoral programs that, among other roles as scientists and educators, train psychologists as health-service providers. Training is based in the scientist–practitioner tradition, and integration of knowledge and skills across the sequence of training is empha-

sized. Competency requires a foundation in psychological science and practice in professional psychology.

Foundational Competencies in Common With Professional–Scientific Psychology

The generic core knowledge areas and core clinical skills delineated in the Houston Conference policy statement (described above) can be mapped onto the more detailed and elaborated Competency Benchmarks framework. These competencies are expected of all professional psychologists trained to provide health-care services. Foundational competencies include professionalism (integrity, concern for public welfare), reflective practice, scientific knowledge and methods (science of human behavior and research methods), relationship skills, appreciation of and ability to integrate issues of individual and cultural diversity, and knowledge of/adherence to ethical and legal standards. For clinical neuropsychology, a strong foundation in the scientific method, including critical and integrative thinking is fundamental. Clinical neuropsychologists also need to have a strong and enduring commitment to lifelong learning given the rapid development of knowledge in neuroscience, cognitive science, and neuromedicine, the expanding evidence base for practice, and the need to continuously update understanding of issues of cultural and individual diversity in neuropsychology.

Foundational Competencies Unique to Clinical Neuropsychology but Common Across Functional Domains

Foundational competencies expected for specialty practice in clinical neuropsychology have additional unique components. These unique competencies in the clusters of professionalism, relational, and science are described in Table 1. Clinical neuropsychologists function in a range of settings, addressing complex problems with varied characteristics and challenges. Adopting a professional identity as a neuropsychologist entails a set of competencies that are detailed under the area of "professionalism." These professional competencies include attention to professional

Table 2
Evidence-Based Practice

Type	Content
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of: • key signs and symptoms of disease processes relevant to practice and how patient characteristics (e.g., demographic factors, comorbidities) affect their expression. • age-related changes in brain functioning and behavior across the lifespan. • scientific basis for assessment strategy, including test selection, use of appropriate normative standards, psychometric characteristics of selected tests, and test operating characteristics. • decision-making strategies and their applications in differential diagnosis. • scientific basis for diagnostic conclusions and interpretations across a range of neuropsychological disorders.
Applied competencies	The clinical neuropsychologist will be able to: • incorporate and use outcome research in neuropsychology in guiding assessments and formulating interventions, integrating patient and contextual factors. • apply key components of evidence-based practice (i.e., best evidence, clinical expertise, and patient characteristics/values) in selecting appropriate assessment and intervention approaches. • apply information technology (informatics) to assess and evaluate best evidence to guide practice.

Table 3
Assessment

Type	Content
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of: • neuropsychology of behavior, including information processing theories, cognitive/affective neuroscience, social neuroscience, cultural neuroscience, and behavioral neurology. • patterns of behavioral, cognitive, and emotional impairments associated with neurological and related diseases and conditions that affect brain functioning. • neurochemistry, neuropsychopharmacology, neuroendocrinology, and related areas relevant to practice. • neurodiagnostic techniques relevant to practice. • effects on brain functioning and behavior of common medical systemic medical illnesses. • patterns of behavioral, cognitive, and emotional impairments associated with psychiatric disorders. • medications used for common medical diseases and their effects on brain functioning and behavior. • measurement and psychometrics relevant to cognitive abilities, social and emotional functioning, and brain-behavior relationships. • functional implications of neuropsychological conditions, including service needs based on the assessment context and implications related to functional ability level and social/living environment.
Applied competencies	The clinical neuropsychologist will be able to: • employ evidence based assessment techniques. • evaluate assessment questions based on the context, professional roles, and the patient/examinee presentation. • gather information key to addressing the referral question, including interview(s), targeted behavioral observations, and review of records. • select tests, measures, and other information sources appropriately, consistent with best evidence and specific context of assessment, including assessment of effort if relevant. • administer and score tests and measures appropriately. • interpret assessment results, with formation of an integrated conceptualization that draws from all relevant information sources. • provide recommendations for management that are appropriate to the assessment context and consistent with evidence-based practices. • provide feedback, as relevant to the assessment context, to patients, families, or caregivers in a sensitive manner adapting to the needs of the specific audience. • address issues related to specific populations (e.g. cultural or linguistic differences, physical or mental disability, use of interpreters, educational level) appropriately by referring to other providers with specialized competence, obtaining consultation, and describing limitations in assessment interpretation.

roles, understanding of specific cultural and diversity issues relevant to neuropsychology, adherence to standards and appreciation of legal, ethical and policy implications inherent in neuropsychology practice, and commitment to lifelong learning and maintenance of competence. Neuropsychologists are integral members of communities and teams, providing specialty evaluation and treatment often in conjunction with other professionals. Foundational skills in establishing and maintaining successful relationships, not only with patients, families and caregivers, but also with communities and interprofessional teams are key relational skills that

Table 4
Intervention

Type	Content
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of: • evidenced-based intervention practices to address cognitive and behavioral problems present in different clinical populations. • theoretical and procedural bases of intervention methods appropriate to address disorders of attention, learning and memory, executive skills, problem solving, perceptual processing, sensorimotor functioning, and psychological/emotional adjustment. • how complex neurobehavioral disorders (e.g., aphasia, anosognosia, neuropsychiatric illness) and sociocultural factors can affect the applicability of interventions. • empirically supported interventions provided by psychologists and other health professionals.
Applied competencies	The clinical neuropsychologist will be able to: • identify targets of interventions and specify intervention needs. • employ assessment and provision of feedback for therapeutic benefit. • develop and implement treatment plans that address neuropsychological deficits while accounting for patient preferences, individual differences, and social cultural context. • implement evidence-based interventions in neuropsychological disorders. • evaluate the effectiveness of interventions employing appropriate assessment and outcome measurement strategies. • demonstrate an awareness of ethical and legal ramifications of neuropsychological intervention strategies.

Table 5
Consultation

Type	Content
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of: • professional roles and expectations of a consulting clinical neuropsychologist specific to each setting. • relevant literatures on the roles of neuropsychologists in consultation settings. • appropriate and contextually sensitive methods of consultation.
Applied competencies	The clinical neuropsychologist will be able to: • determine and clarify referral issues. • educate referral sources regarding the utility and relevance of neuropsychological services. • communicate findings from consultation activities effectively in clinical, forensic, rehabilitation, policy and community settings. • provide effective assessment feedback and articulate appropriate recommendations in language appropriate for the audience. • provide effective consultation services within common settings and contexts in clinical neuropsychology practice. • communicate scientific findings within clinical neuropsychology in a manner that is relevant to the consultation setting and understandable to the recipient. • provide consultation in clinical research regarding brain behavior relationships and appropriate neurobehavioral assessment strategies and tools.

require sensitivity, empathy, and ability to appreciate other perspectives. Neuropsychological interpretations and concepts can be complex and detailed and need to be formulated and communicated in a manner that addresses the needs of the specific audience addressed. Core foundational skills in science and research methods prepare the neuropsychologist to practice effectively in a specialty whose knowledge base is rapidly expanding.

Functional Competencies in Clinical Neuropsychology

Functional competencies in clinical neuropsychology include effectiveness in comprehensive history taking; identification of key neurobehavioral problems/issues to be addressed; appropriate selection and application of a wide range of neuropsychological assessment procedures to diverse populations; application of knowledge of psychometric theory (test construction, reliability/validity, diagnostic accuracy); integrative interpretive strategies for differential diagnosis; design and implementation of rehabilitation and supportive interventions; and individual and systems consultation, while applying the current knowledge base in clinical neurosciences. Clinical neuropsychologists integrate psychological findings from records, histories, interviews, behavioral observations, and examination results with an understanding of brain–behavior relationships as well as social/cultural contexts.

Following the model provided by France et al. (2008), we have divided functional competencies into knowledge-based and applied competencies, recognizing that competencies are typically demonstrated in an integrated manner and involve a set of essential

Table 6
Teaching/Supervision

Type	Content
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of: • varying levels of acquisition of clinical neuropsychology knowledge and skills found in trainees at different levels and in different professions. • appropriate teaching and training experiences to employ with trainees of varying disciplines. • awareness of supervision methods and practices in professional psychology and clinical neuropsychology.
Applied competencies	The clinical neuropsychologist will be able to: • manage effectively in a supervisory context issues and problems that are commonly encountered in clinical neuropsychology professional activities (e.g., needs of cognitively impaired individuals, role clarification). • provide effective training to psychology trainees in the administration and scoring procedures for a wide range of tests and measures employed in clinical neuropsychology practice. • provide effective training to psychology trainees in psychometric theory and foundations of assessment relevant to the wide range of tests and measures employed in clinical neuropsychology practice. • provide training in developing and asserting professional identity and role as a clinical neuropsychologist. • demonstrate sensitivity to individual and cultural differences in supervisory contexts. • provide effective supervision to psychology trainees and trainees in other disciplines. • educate others in professional and community settings about neuropsychology, neuropsychological disorders, and neurobehavioral functioning relevant to particular contexts. • evaluate the effectiveness of supervisory techniques by engaging in ongoing assessment of competency development in trainees.

attitudes and values as well. The four competency domains under "application" (evidence-based practice, assessment, intervention and consultation) are described in Tables 2, 3, 4, and 5. It is understood that the knowledge-based competencies listed under assessment are also relevant in the other application domains. Education and training competencies (teaching, supervision) are described in Table 6 and systems competencies (interdisciplinary systems, management/administration and advocacy) are outlined in Table 7.

Concluding Comments

This article offers an initial application of a contemporary professional psychology competency model to the specialty of clinical neuropsychology. The described competencies were based on the Houston Conference policy statement, which remains the most widely used set of education and training guidelines in neuropsychology today, and serves as a resource for the accreditation of neuropsychology postdoctoral residencies by the APA Commission on Accreditation. Although clinical neuropsychology as a specialty was in the forefront in establishing specialty education and training guidelines, the neuropsychology community has additional work to do in updating existing guidelines and implementing a well-articulated competency approach. We hope that the competencies defined and discussed above will serve as a helpful contribution for broader consideration within the specialty.

Of note, this paper does not address stages of professional development, which represents one of the three dimensions of the competency cube model. As mentioned above, the Houston Conference policy statement paints in broad strokes regarding the competencies specified, and a similarly broad treatment is given to the description of stages of professional development. Training in

Table 7
Systems

Type	Content
Interdisciplinary Systems	
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of:
	• roles, responsibilities, skills and values/attitudes of different disciplines in a range of settings (e.g. health care, education, forensic, policy, community).
	• different systems relevant to neuropsychological practice and strategies to negotiate these systems effectively.
	• interprofessional collaboration and its role in contributing to optimal care.
	• general and setting-specific contributions and limitations of neuropsychological expertise.
	• functional impact of neuropsychological disorders on patient abilities to negotiate systems (e.g. healthcare, employment, education) and relevant management strategies.
Applied competencies	The clinical neuropsychologist will be able to:
	• collaborate effectively with individuals and systems across disciplines, adapt communications to context appropriately, address questions about neurobehavioral functioning, and contribute to integrated understanding.
	• work cooperatively across systems, validating shared values and demonstrating mutual respect.
	• work collaboratively, providing neuropsychological expertise in clinical and research teams.
Management/Administration	
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of:
	• administrative structures of practice settings relevant to neuropsychology (independent practice, academic health centers, group practice, forensic, military, education, research, etc.).
	• specific administrative and business strategies needed to address prevalent assessment and consultation issues in neuropsychology practice (e.g., referral patterns, coding, billing, documentation).
	• methods and procedures for outcome assessment, program evaluation, and research in neuropsychology.
Applied competencies	The clinical neuropsychologist will be able to:
	• function effectively within administrative systems, educating others about role of neuropsychology and supporting structures with the goal of improving access to needed services.
	• implement administrative structures to address needs in neuropsychology practice settings (e.g., quality improvement, access to care, funding).
	• train and supervise technicians/psychometrists and monitor their skills following regulatory, ethical and legal standards.
Advocacy	
Knowledge-based competencies	The clinical neuropsychologist will have knowledge of:
	• the evidence base of neuropsychological services and their role in clinically necessary and cost-effective healthcare.
	• psychology and neuropsychology membership organizations and their role/activities.
	• regulatory and policy initiatives that can affect provision of neuropsychology services and access to care.
	• the increasingly important role that board certification plays in protection of the public and insuring continued access to neuropsychological services in a changing healthcare environment.
Applied competencies	The clinical neuropsychologist will be able to:
	• apply scientific knowledge and skills in neuropsychology to advocate for needs of individuals/groups across systems.
	• collaborate with psychologists and other professionals to advocate for the profession and the specialty of neuropsychology.
	• educate public policy makers regarding the importance and impact of neuropsychological science and practice.

the specialty is expected to occur within the doctoral program, internship, and postdoctoral residency, with internship training as the capstone of the "general practice of professional psychology" and postdoctoral residency as the capstone of "independent practice in the specialty" (Hannay et al., 1998). Furthermore, the guidelines include a graphical example of how the relative proportions of training in specialty knowledge and skill may vary across doctoral, internship, and postdoctoral training levels. This allows for flexibility in training experiences across individuals in their paths toward independent practice, but the policy statement does not clearly specify the degree of flexibility that is permissible. Clearly, a tension exists between defining stages of professional development on the one hand and allowance for flexibility of training on the other. Future directions might include work to better define stages of professional development from a competency standpoint, relevant to entry into practicum, internship, and postdoctoral training experiences. In addition, we would recommend that the specialty as a whole adopt a specialty-competencies approach to defining entry-level practice that leads to board certification. As progress is made in describing stages of professional development, the specialty will need to develop and validate tools for the assessment of these competencies at each level of the training sequence.

With respect to updating existing guidelines, a workgroup comprised of representatives of neuropsychology organizations, the Interorganizational Summit on Education and Training (ISET), developed a survey whose primary focus was to determine how the Houston Conference training guidelines have influenced the development of the specialty and the education and training of new neuropsychological specialists. The 2010 Survey on the Influence of the Houston Conference Training Guidelines indicated that the Houston Conference guidelines have been very influential and have had a positive impact on the specialty (Sweet, Perry, Ruff, Shear, & Guidotti Breting, 2012). Neuropsychology organizations are in the process of reviewing the survey results and proposing methods for insuring that training guidelines keep pace with scientific and professional developments in the field. An ongoing examination of recommendations for the scientific preparation of neuropsychologists will need to occur given the need to incorporate burgeoning knowledge bases in the neurosciences (including developmental, affective, social, and cultural), cognitive science, genomics, neuroimaging, and molecular biology into expected competencies. To support true evidence-based practice that adapts to the rapid development of new scientific knowledge, neuropsychology will also need to address and develop resources in information science (Bilder, 2011). One key issue will be the extent to which such new developments will require formal updates to existing curricula at the various levels of training.

In the emerging health-care climate, interprofessional competencies (Holtman, Frost, Hammer, McGuinn, & Nunez, 2011; Interprofessional Education Collaborative Expert Panel, 2011), as well as integrated patient-centered care with a focus on neuropsychology will need to be incorporated into essential competencies. These initiatives will require continued attention and interorganizational support in the specialty. The current article can serve to promote discussions and development of new initiatives in delineating specialty competencies for clinical neuropsychology that are consistent across education/training, credentialing, and practice

contexts and that are able to address the contemporary landscape of practice.

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