Neuropsychological Assessment with Asian American Clients

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A comprehensive neuropsychological evaluation can differentiate neurodevelopmental disorders and identify cognitive impairment due to a direct cerebral insult or progressive disease. It also allows for the development of treatment recommendations and prognoses. While the specific cultural considerations for variability within specific neurocognitive domains and behavioral sequelae are discussed herein, there is an established homogeny of known neurological organizational similarities (e.g., the function of the cerebellum in motor functioning; the role of the frontal lobes in executive functioning and decision making: Siedlecki et al., 2010). Despite this homogeny, between ethnic neurological differences do exist. For example, differences in processing semantic versus functional relationships have been observed between East Asians and American participants (Gutchess, Hedden, Ketay, Aron, & Gabrieli, 2010; Gutchess, Welsh, Boduroĝlu, & Park, 2006) suggesting specific cultural underpinnings for neurological functioning. There is also an emerging cultural neuroscience literature that has identified interactions between culture and underpinning neurobiological processes which influence the brain and behavior in meaningful ways (Chiao, 2009).

In the following sections, an overview of assessment for various neuropsychological domains is reviewed, and available research specific to Asian Americans is presented. Although not abundant in the extant literature, research that discusses the appropriateness and utility of linguistic or cultural adaptations for existing standardized tests is also discussed. This is largely due to researchers (e.g., Chan, Shum, & Cheung, 2003) who indigenously developed tests (e.g., a test designed from the ground up in the country of origin rather than an adaptation of a Western derived measure) that they demonstrated were better than adaptations of existing measures. These same researchers further noted that functional performance (in particular a hypothetical, functional shopping task), which is not uncommon to comprehensive neuropsychological assessment, demonstrated differences in performance that appeared

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to be greatly influenced by social norms, suggesting that because a shopping task that is a common occurrence in Western cultures is not a valid functional measure and translates poorly to Eastern cultures (Chan et al., 2003).

It is important to note that all clinicians will inevitably be challenged with referrals for individuals who are not well represented (if represented at all) in the normative data of traditional standardized assessments. This scenario creates a circumstance where the clinician must weigh the desire to provide beneficial services to the client against the ethical standards for assessment, which are not typically at odds (Ethical Standards for the Appropriate use of Assessments; Standard 9 and Principal A; for the most current information related to ethics, including 2010 language changes please see www.apa.org/ethics/code/index.aspx). This challenge is exacerbated in rural settings where available providers are sparse. A consistent finding across measures is the influence of acculturation and (with some exceptions that are specifically identified in this chapter) education, with higher acculturation and more years of education resulting in performance that better approximates the normative sample (Blair & Qian, 1998). As long as the clinician adheres to best practices and professional guidelines, a quality neuropsychological assessment can be provided.

General Considerations for the Neuropsychological Assessment of the Asian American Client

A benefit of the comprehensive neuropsychological assessment is the inherent inclusion of a multidomain assessment that includes not only verbal tasks, but also nonverbal and motor coordination tasks that would appear at face value to be culturally neutral. Purportedly this should allow the neuropsychologist to make a global as well as comparative appraisal across domains. Although these motor and nonverbal tasks do not contain the cultural bias of language and Western U.S. factual knowledge, researchers identified some culture-specific differences for nonverbal tasks (Boone, Victor, Wen, Razani, & Pontón, 2007; Flaherty & Connolly, 1996; Flanagan, Ortiz, & Alfonso, 2013; Salkind et al., 1978; Wong et al., 2000). Therefore our first general consideration is that the clinician must not assume that nonverbal and motor coordination tasks are culturally neutral.

Additional considerations for cross-cultural assessment are efficiency (cost) and availability (that could come from the client, managed care, or the professional) that do not always allow for a comprehensive neuropsychological test battery such as the Halstead–Reitan. Thus, this chapter includes discussions of fixed batteries of assessment as well as flexible options and common, domain-specific measures that can be used independently and within an as needed paradigm allowed by the flexible battery approach.

Finally, when a clinician encounters an individual who is not appropriately represented by traditional standardization samples there is increased risk in obtaining inaccurate data. While culturally salient measures for Asian Americans are not as prolific as the development of assessments and normative data for Hispanic clients (for a review of psychological assessment of Hispanics please see Benuto, 2013), there are some current efforts to create new measures and adapt existing measures (through linguistic adaptation and/or collecting new normative data) for this population (e.g., The Korean version of the CVLT, the Keio Version of the WCST and data collected on individual tests for the Consortium to Establish a Registry for Alzheimer's Dementia). However, such efforts remain limited and the literature on their psychometric properties and clinical use are sparse. When neither a specific measure nor appropriate normative data are available, recommendations are provided that can aid the clinician in making an informed and ethical decision related to the evaluation and interpretation of the test scores.

Executive Functioning

Executive functioning tasks are designed to test an individual's ability to interpret, coordinate, and integrate brain processes (Lezak, 2004). This composite includes several higher-order func-

tions that are to be mediated primarily by the prefrontal cortex. Such functions are behaviorally assessed by assessments that require patients to plan ahead, inhibit inappropriate responses, solve complex problems, demonstrate abstract reasoning, shift behavior when required, and use working memory (Lezak, 2004). While there is research specific to Asian Americans available, it is limited, and sometimes atypical, as compared to patterns of performance differences we have seen between Asian Americans and the existing normative data thus far.

For example, a test like the Wisconsin Card Sorting Task (WCST, Grant & Berg, 1948; Heaton, Chelune, Talley, Kay, & Curtiss, 2003) is designed to assesses functioning by creating a high cognitive demand on the participant to respond to the presentation of novel stimuli as well as an ambiguous rule-set, with nothing more than a correct or incorrect acknowledgment to their immediate choice. This test is sensitive to impairment of functioning within the prefrontal cortex (Sullivan et al., 1993). We identified a single study for a modified version of the WCST (Keio Version, Abe et al., 2004), but this study is likely of little value for the majority of clinicians, because it was specific to Japanese older adults in Japan, and presented research findings available only in Japanese (Abe et al., 2004).

Another example of an executive functioning test, the traditional Trail Making Test (TMT), is a two-part task (Trails A and Trails B) that assesses timed attention, mental flexibility sequencing, and nonverbal processing speed (Corrigan & Hinkeldey, 1987; Gaudino, Geisler, & Squires, 1995; Lezak, 2004; Reitan & Wolfson, 1958). In a more thorough exploration of the association between neuropsychological scores and ethnicity, language, and acculturation variables, Boone and colleagues (2007) included Trails A as part of a larger neuropsychological assessment battery. Differences between ethnic groups were identified between Caucasians and African Americans but no such differences were identified between Asians and Caucasians, African Americans, or Hispanics. The same was true for English-speaking participants vs. English-as-a-second-language participants. Conversely Spreen and Strauss (1998) found that Asian individuals took longer to complete Part A of the Trail Making Test than their Caucasian peers even when educational differences were accounted for. With regard to Trails B, Lu and Bigler (2000) demonstrated that Chinese English-as-a-second-language participants performed markedly worse on Trails B. This is of particular interest because, while this sample was small, the participants were younger in age and highly educated (described as graduate or postgraduate students). Thus even when participants are highly educated and are younger in age, impaired performance does not suggest neurological impairment and should be considered as a comprehensive assessment of the domain. Based on these findings, we recommend that normative data should *not* be the primary method of reference in identifying neurocognitive compromise in Asian nationals, particularly when they are not fluent in English. Practitioners may elect to use the Chinese version of the TMT when appropriate. Lu and Bigler also recommended that the Chinese version may be appropriate for other Asian nationals familiar with Chinese characters. However, in situations in which the clinician is unfamiliar with the task, the TMT should be interpreted with caution and corroborating evidence from other measures should be weighed into interpreting low standardized scores.

There is also evidence of differential performance for the Stroop color word interference task (Golden, 1978) with researchers suggesting a simplistic adaptation of this test is not sufficient. For example, Korean individuals have greater difficulty discriminating green and blue (Fisher, Freed, & Corkin, 1990; Golden & Freshwater, 2002). Moreover, Doan and Swerdlow (1999) found that Vietnamese individuals demonstrated a positive correlation between age and performance for a Vietnamese Language Stroop task when compared to the English Language Stroop task. While the degraded performance corresponding with increasing age on the English version was reportedly expected, the improved performance with increasing age for the Vietnamese version suggests that the measures are not truly equivalent and that there are possibly other cultural factors at play. There are

linguistic adaptations for the color word Stroop task (e.g., the Korean Color Word Stroop Task; K-CWST) and the CERAD contains protocols for neuropsychological assessment that includes various translations of the Color Word Stroop Task. Therefore linguistically adapted measures of this test should be used when practical.

When assessing more complex tasks of visuospatial memory and learning. The tower of London (TOLDX; Culbertson & Zillmer, 1998; a modified task of the original Tower of London developed by Shallice, 1982) is designed to assess more complex tasks of visuospatial memory and learning. Specifically, it is designed to assess areas of executive control related to planning that also correlates well with tasks of continuous performance. Research for Asian Americans on this task appears to be limited to those studies that include Asian Americans in the research sample (e.g., Riccio, Wolfe, Romine, Davis, & Sullivan, 2004), without specific discussion of relevant cultural or ethnic differences. Thus, culturally specific normative data is absent.

Digit Span is a common measure of working memory that is incorporated into a number of cognitive assessments (e.g., MMSE, WAIS, WMS, and the RBANS). Language is an important consideration when adapting traditional tests like the Digit Span because of the varying linguistic differences for numbers among different languages. When assessing Asian Americans, there is a great deal of variability in the complexity (e.g., the word length) with languages that use short numeric representations performing better than those that use longer numeric representations (Chan & Elliot, 2011). Put simply, differential linguistic performance has been demonstrated for tasks that involve recall where number of syllables varies across languages. Vietnamese- and Chinese-speaking individuals score higher on digit span than English and Spanish speakers (Dick, Teng, Kempler, Davis, & Taussig, 2002). Of note, Mandarin Chinese speakers perform significantly better than English speakers. This is believed to be due to the linguistic brevity of digits in Mandarin. Most notable was that the forward span performance for the worst performing participants was better than the average performance of the English-speaking participants (Chen, Cowell, Varley, & Wang, 2009). When administered, English language proficiency should be considered and if the test is administered in the person's native language the results of the test should be interpreted in light of performance on other neurocognitive tasks. For example, if the patient's performance on backwards digit span is incongruent with performance on nonverbal tasks of executive functioning (e.g., WCST) the results may be attributable to sociocultural factors such as language.

Delis–Kaplan executive function system. The Delis–Kaplan executive function system (D-KEFS; Delis, Kaplan, & Kramer, 2001) is a battery of assessments designed to examine various aspects of higher-order executive functioning. This assessment system is valuable in that it corresponds with the most recent version of the California Verbal Learning Test (CVLT-II, a verbal learning and memory task discussed in more detail below) and assesses a broad range of neuropsychological abilities that are thought to be mediated by executive processes including inhibition, cognitive flexibility, verbal fluency, and sorting. The D-KEFS was also conceived as a process-oriented test in which behavioral observations factor in as much as quantifiable test data in interpreting results. The test authors endeavored to produce process scores that allow such behavioral observations that might influence test performance to be standardized and compared with normative samples. However, this measure does not contain normative data for educational attainment. There is limited research for Asian Americans, but what research exists is of great importance. Researchers have identified differential cognitive impairment between pediatric and adult cases of Moyamoya Disease. Weinberg and colleagues (2011) described this neurological disease as one that is disproportionately found in Asian individuals, and has a profound impact on the brain, but one that is readily treatable through surgery. These researchers identified that while children demonstrate FSIQ in the mildly retarded range (FSIQ < 70), adults tend to demonstrate less impairment in IQ and greater impairment in

executive functioning. Where assessment of IQ fails to identify a serious, but treatable neurological disorder, the DKEFS succeeds by identifying marked deficits in specific areas of executive functioning (as identified by Design Fluency Test, the Letter and Category Fluency Tests, and the Trail-Making Test Part B of the DKEFS). Thus, while not a specific appraisal of the performance of the DKEFS in Asian Americans per se or an identification of the specific sensitivity of the Trail-Making subtest, this study demonstrates the clinical utility of this assessment system for Asian Americans.

Recommendations for executive functioning. There is a great deal of data demonstrating variability in performance (often in unexpected ways) on tasks of executive functioning for Asian American ethnic and cultural groups. This variability is of primary importance for this domain and the unexpected nature of it (i.e., positive correlation for education and performance on some tasks, but an inverse relationship on others) suggests that there are either some sociocultural factors or perhaps a genetic factor (such as a seeming lack of color saliency between the colors Blue and Green for Koreans on the Stroop Task) beyond age and education that may result in differential performance for executive functions. Thus, for executive functioning tasks specifically, one needs to be aware of the aforementioned extant literature and attempt to collect additional collateral information from its subcomponents before making interpretations of sparing or impairment. For example, although there may be deficits suggested by poor performance on a color word Stroop task, non-impaired performance on a trails task would suggest that the Stroop impairment potentially may be a cultural rather than a cognitive deficit. Thus an assessment of executive functioning should include the use of:

- Appropriately normed and translated versions of the Stroop (e.g., the Korean CWST).
- DKEFS tasks (Design Fluency, Letter and Category Fluency, and Trail-Making Part B).
- Trail-Making Tests can be used, but one should use caution, especially given that even highly educated and young individuals have demonstrated impaired performance on this task, without true cognitive impairment.
- Digit Span Tests can be used, but the clinician should be aware that Asian Americans may demonstrate better performance when compared to their English speaking and Western counterparts.
- Translated versions of the WCST exist (e.g., the Keio Version), but even translated measures should be interpreted with caution, as the sample is limited to a specific subset of participants (older Japanese).

Visuospatial Processing

Visuospatial processing tasks have long been identified as a behavioral indicator of neurocognitive problems. In fact Benton, Sivian, Hamsher, Varney, and Spreen (1994, p. 53) reported documented observations for this relationship dating back to the latter half of the nineteenth century, and further provided a compendium of historical, empirical data for the identification of the lateralized nature of visuospatial abilities (primarily occurring in the right hemisphere). Thus, these tasks not only provide us with a measure of a specific neurocognitive ability, but allow us to develop well-supported hypotheses about the possible nature of the injury (e.g., location and extent of the insult). There are a great number of visuospatial tasks that are found both in measures of intellectual assessment and in neuropsychological batteries. Some of these common measures are discussed below.

The Rey–Osterrieth test (ROCFT; for a complete description of the test and scoring see Duley et al., 1993) is a classic neuropsychological assessment of visuospatial processing. With regard to Asian Americans, Boone and Colleagues (2007) demonstrated that there is discrepancy in performance among racial and ethnic groups for the copy condition, with ESL individuals performing better on ROCFT copy condition (when compared to native English speakers) than on verbal tasks; a post hoc analysis of these differences revealed that Asian Americans performed better than African Americans. Thus, the authors suggest that ROCFT

copy performance may overestimate cognitive abilities, and extrapolating from this comment, one could infer that there is a potential of failing to identify impaired performance in Asian Americans. When using this test with Asian populations the clinician should be aware of the increased possibility of a false negative.

A visuospatial processing test that is relatively well researched for Asian individuals is Clock Drawing. There are several versions of clock drawing tests (CDT), with the general idea being that time is a construct so universal, and omnipresent, that an individual should be able to create a novel drawing of a clock, with a specified time. While researchers (Royall, Cordes, & Polk, 1998) have criticized the lack of uniformity for objective evaluation of clock drawing, a CDT is part of the CERAD protocol (described in more detail below), and includes relevant cut scores. Of importance for Asian Americans, researchers (Borson & Brush, 1999) assessed a range of multiethnic, foreign born, elders ($n=295$) with just under half reporting speaking a language other than English (Spanish or some form of Chinese, Korean, or Filipino dialects). Unique to this study was the overrepresentation of Asian American-Pacific Islanders ($n=139$). While not as specific as other screens for dementia, the authors found the CDT to have greater sensitivity than the Mini-Mental Status Exam (MMSE) or the CASI (Cognitive Abilities Screening Instrument), and also reported that the CDT was less likely to be discontinued or unscorable than the aforementioned screens. In an effort to standardize the scoring and evaluative process, Royall and colleagues (1998) created the CLOX task. The drawing tests included in the CLOX are multiple administration (CLOX1 and CLOX2) clock drawing tasks that assess executive functioning by having the individual draw a nondescript (beyond the time; CLOX1) clock and then a condition where the individual is asked to copy the administrators' clock drawing (CLOX2). Research with Chinese Singaporeans suggests that the CLOX has good sensitivity and specificity (above 75 % for all conditions of disease and drawing task) and for differentiating Alzheimer's Dementia from Vascular Dementia (84 % and 85 % respectively). The researchers adjusted for age, education, stage of dementia, and MMSE scores, and identified significantly ($p=0.0002$) different mean scores for CLOX1 (8.1 as compared to 5.5). Thus the CLOX task is a good measure for identifying cognitive impairment for Asian Americans and for differentiating the type of dementia (e.g., differentiating Alzheimer's dementia from a vascular dementia).

Visuospatial tasks can also assess judgment and comparison of visual stimuli. The Benton judgment of line orientation test (BJLOT; Benton, Varney, & Hamsher, 1978; Benton et al., 1983, 1994) presents an individual with two stimuli lines of varying or equal lengths, and asks them to identify the lines based on a response set, which consists of an arch of equidistant parallel lines of equal length, numbered 1–11. Benton and colleagues (1994) described the development of this test as a tool to identify and localize brain injury or disease in the right hemisphere of the brain. A benefit of this test is its compact size (approximately that of a small notepad) and the brief time needed for administration. This test has been used to accurately localize the insult to the right hemisphere with the majority of the cases involving a vascular problem or cancer. Thus this is an untimed and language independent task, which is used to identify very region-specific impairments. It is unfortunate that ethnic and culture-specific normative data are not available, but given its limited language requirements this test could be used to collect collateral information for making intra-individual decisions about visuospatial impairment.

A general concern when assessing cognitive functioning, in particular with those with language impairment, is the potential impact of impaired language abilities on nonverbal problem-solving tasks. When directly studying the impact of language on nonverbal problem-solving abilities, Baldo et al. (2005) found no impact in patients with aphasia, suggesting the spared ability of visuospatial problem solving. However, it should be noted that there was no description of race or ethnicity for these participants, and the performance could be an overestimate for individuals with impaired lan-

guage. This is particularly true when you consider findings that show little reliance on language by Asian Americans for problem-solving tasks.

Summary and recommendations for visual processing tasks. The available research relevant to Asian Americans for this domain suggests that visual processing tasks can overestimate general cognitive abilities in Asian Americans (e.g., the ROCFT). Further research is needed with Asian Americans on tests designed to specifically assess cognitive impairment even in the presence of aphasic disorders (such as the BJLOT). Of note, block design, a task found on many IQ measures, and designed to assess constructional praxis, lacked any extant data relevant to Asian Americans. Thus for the domain of Visuospatial Processing, only the CDT have empirical data available for Asian American ethnic and cultural groups. However, data for the other assessment measures can be used to provide a broader base of information for intra-individual comparisons to determine sparing and impairment. Thus recommendations include the following:

- Use of a CDT.
- Use of the ROCFT with the knowledge that this test has overestimated abilities in Asian Americans.
- Use of tests that are traditionally used even with aphasic patients (e.g., the BJLOT) does not have extant data for Asian Americans.

Learning and Memory

Learning and memory as a domain assesses the acquisition and retention of information. It is a process that requires the coordination of multiple domains (including attention, concentration, and executive functioning tasks) and is often assessed in terms of verbal and nonverbal tasks. Common memory batteries used to assess memory function are the Wechsler Memory Scales (WMS-IV; Wechsler, 2008), the WRAML (-2; Sheslow & Adams, 2003), and the TOMAL-2 (Reynolds & Voress, 2007). These batteries all yield scales for discrete domains of memory performance.

The authors for each of the above batteries utilized complex sampling strategies in an effort to include representative samples of the population as a whole for their normative sample, which includes a small, but statistically representative group identified as Asian American. However, specific research relevant to Asian Americans for these tests is lacking. Of note, research into the impact of age and education (for the overall standardization sample) suggests that for the WMS-IV, there continues to be a correlation among these variables (Brooks, Holdnack, & Iverson, 2011). Thus one could theorize that the frequently observed impact of these variables for previously discussed measures of neurocognitive performance (including the WMS-III) is likely to be similar for the newer WMS-IV, with age and education predicting better performance even when considering culture-specific factors. Boone and colleagues (2007) examined memory performance using verbal and nonverbal tasks of the WMS-R and WMS-III. Of note, when comparing performance across ethnic groups of varying linguistic abilities (including a broad sample of English-as-a-second-language participants with a subset of Asian ethnic groups), they found no differences among ethnic group or linguistic ability in performance. Similarly, Walker and colleagues (2010) also found few differences in performance, when comparing groups of varying linguistic and educational background (native or foreign born parent(s) and English or non-English education) for a brain injured group of Australians. This study found only significant differences on the first logical memory task of the WMS, but equivocal performance on the second, for nonnative, non-English educated, individuals. The authors posited that this difference suggested the possibility of culturally salient differences for the first logical memory task, but also provided a caveat that the sample size for the nonnative, non-English educated group was small. Researchers (Hoelzle, Nelson, & Smith, 2011) have identified that the WMS-IV is a better measure of the discrete domains of auditory attention and memory as well as visual attention and memory. A principle components analysis revealed that these factors are much cleaner and more dis-

tinct than the previous unitary dimension measured by the WMS-III. Further these investigators suggest that the visual memory component is free from the verbal overlap found in the WMS-III tasks (e.g., memory for faces) and thus is a purer measure of nonverbal attention and memory. Specific recommendations are provided below.

Verbal learning and memory. We previously discussed systems of assessment that provide general measures of learning and memory such as the WMS, WRAML, and TOMAL that provide both a global measure and discreet domain scores. In addition to these systems we have domain-specific measures designed explicitly to assess learning and memory of verbal information specifically. The majority of these tasks are based on list-learning paradigms that include some measure of learning over multiple trials, interference, delayed recall, and recognition. Examples of these tasks include the California Verbal Learning Test (CVLT; Delis, Kramer, Kaplan, & Ober, 1987), the Hopkins Verbal Learning Test (HVLT-R; Brandt & Benedict, 2001), and the Rey Auditory Learning Test (Rey AVLT; Schmidt, 1996).

These tests all follow a similar pattern of administration that consists of presenting word lists over multiple trials, with immediate and delayed recall tasks as well as free and cued recall trials. There are various Verbal Learning and Memory tests designed to assess these same processes that exist in both English and the various languages of the Asian Panethnic group, e.g., the Hong Kong List-Learning Test (HKLLT; Chan & Kwok, 1999) and the Korean-CVLT (K-CVLT; Kim & Kang, 1999). The Korean-CVLT is a culturally relevant equivalent to the CVLT and Kim and Kang conducted a factor analysis of their measure. They identified six factors for their measure (identified as general verbal learning, response discrimination, retroactive interference, proactive interference, serial position effect, and learning rate), which suggest that the K-CVLT is a good measure of verbal learning and memory. Additionally, the authors suggested that when compared to K-CVLT performance, the standard deviations for the CVLT were inflated (suggested as a result of a CVLT standardization sample that includes individuals with a mean education attainment higher than would be expected in the population). Although the authors had a robust sample (357 psychiatrically healthy individuals) of participants based on census data, the sample and census data were indigenous to Korea, thus limiting the utility of this assessment for Korean populations.

Of these measures only the HVLT (Vanderploeg et al., 2000) found no relationship among age, education, and performance, suggesting that it is one of the few measures that is not influenced by these demographic variables. However, because the sample included few (0.05) Asian Americans, we cannot rule out the influence of these variables on scores for Asian American individuals particularly given data from other domains of assessment that shows an influence of age and education (e.g., Boone et al., 2007).

Similar to the aforementioned tasks, the Rey AVLT includes repeated presentation of a list as well as an interfering list, but also includes process scores that look at inhibition, subject organization, retention, and encoding compared to retrieval. Of note the author reports normative information for demographic variables including cultural and ethnic norms (Rey, 1964; Schmidt, 1996). A nice feature of the Rey AVLT is its ability to detect feigned impairment, with demonstrated sensitivity and specificity in research that included a heterogeneous mix of patients, patients with suspect performance, and unimpaired, student controls (Boone, Lu, & Wen, 2005). There exists an adaptation within the Rey–Kim memory test that includes a Korean version of the Rey AVLT, often found in literature as the KAVLT, with country-specific normative data. It also appears that there is an attempt underway to directly translate the test into Japanese (Cromer, Krishna, Nguyen, Acquadro, & Fuller, 2013), but this research is in the very early stage with little reported beyond a conclusion that the direct translation "preserved the intent and integrity" of the existing measure. Thus, when available list-learning measures should be utilized, and when this is not possible, an assessment measure such

as the HVLT that has demonstrated a lack of influence based on age and educational factors should be utilized.

Summary and recommendations for assessing verbal learning and memory. Verbal tasks are, on face value, going to be influenced by factors such as proficiency, acculturation, and years of education. Many assessment batteries (e.g., the WRAML and the TOMAL) included Asian Americans in their normative sample, but do not directly assess culture or ethnic variables. Further, there is little information specific to tests of verbal learning and memory that allows us to identify specific recommendations for these tasks. The little information we have for the K-CVLT suggests that there may be some overestimation of abilities for Korean populations, which highlights that even when performance is identified as adequate, considerations for intra-individual differences and premorbid functioning must be made in making a final determination about levels or patterns of performance. When possible, the evaluator should present a list-learning test that is in the individual's native or preferred language such as the KVLT. However, when this is not possible, the clinician may wish to use a measure that is reportedly not influenced by demographic factors of age and education (e.g., the HVLT), with the caveat that the normative sample of Asian Americans was relatively small. Thus one can use (respective of the client):

- The Korean CVLT
- The Korean translation of the RAVLT (K-AVLT)
- Hong Kong List-Learning Test (HKLLT)
- Hopkins Verbal Learning Test (HVLT; when unable to utilize a translated version)

Discussion of Batteries and Systems of Assessment

Neuropsychological assessment can be conducted using a fixed battery such as the Halstead–Reitan as well as a flexible administration, either through a formal system of assessment that is designed to be administered in a flexible fashion or through the selection of subtests of other assessment systems (such as tests from the Halstead–Reitan) or stand-alone measures (such as the complex figure task, although many of these stand-alone measures and even subtests have been incorporated into flexible battery systems, for example trail making tasks). Flexible administrations may be preceded by a screen or a clinical interview as well as the collection of collateral information. However, the screening approach is more likely to occur in rural settings or impoverished communities where neuropsychologists and/or funds are limited. An overview of tasks common to both fixed and flexible batteries as well as a discussion on the full batteries themselves follows below.

Halstead–Reitan Neuropsychological Battery (HRNB; Reitan & Wolfson, 1985)

The HRNB remains a standard fixed battery designed to assess cognitive impairment stemming from possible organic sources. Originally developed to assist in pinpointing specific lesions, its original purpose has been supplanted by modern neuroimaging techniques. Despite this, the HRNB still allows clinicians to ascertain the degree to which an organic insult impacts cognition and behavior, and assesses several broad domains that overlap with those discussed above, including motor functions and cognitive flexibility, as well as basic tactile and auditory sensory functions. While there are extended norms available for African Americans, no such normative data exists for Asian Americans. However, some of the subtests of this battery have been tested independently with Asian Americans.

The Seoul Neuropsychological Screening Battery (SNSB; Kang & Na, 2003)

There are neuropsychological test batteries available for specific ethnic and cultural groups of Asian Americans (in this case Korean populations).

The SNSB is one such example, and is described by its authors as assessing the traditional domains of language, visuospatial abilities, as well as attention, memory, and executive functioning that are common in most neuropsychological evaluations. The battery has been adapted to include a dementia-specific screen (SNSB-D; Ahn et al., 2010) that has good overall convergent validity with the MMSE ($r=0.876$), as well as moderate to good convergent validity for the General Cognitive Functioning score and the subdomains of the SNSB-D (attention $r=0.629$, language and related function $r=0.848$, visuospatial function $r=0.779$, memory $r=0.945$, frontal/executive function $r=0.919$). Further, the SNSB-D was able to differentiate among a sample of Korean patients with Mild Cognitive Impairment, Koreans with Alzheimer's Dementia, and Normal Controls, with a high degree of test-retest reliability (0.960 for Normal Controls, 0.999 for Mild Cognitive Impairment, and 0.918 for Alzheimer's Dementia). With the exception of a subtest used to measure frontal lobe/executive functioning ($p<0.072$), the discriminant validity of this measure is good (being able to discriminate normal controls from cognitively impaired individuals). Specifically, the remaining subtests were able to differentiate between those participants with MCI vs. AD vs. normal controls ($p<0.001$). Despite the apparent strong psychometric properties of this measure, it was developed and designed for use in Korea. Thus, it presents several challenges for the clinician who is not fluent in Korean and who practices in the United States. It was introduced here mainly to support the initial assertion that there are universal constructs across cultures as evidenced by the inclusion of the aforementioned domains of neuropsychological functioning.

Consortium to Establish a Registry for Alzheimer's Dementia (CERAD; http://cerad.mc.duke.edu/)

While the CERAD is not a neuropsychological battery per se or even an assessment instrument, it serves as a repository and center for research and information for assessment practices (e.g., behavioral assessments, neuropathological assessment, family history), including the provision of a standard neuropsychological assessment protocol to assess common neurocognitive domains. Their stated impetus for this project was a National Institute on Aging (NIA) funded project to standardize assessment for Alzheimer's disease. The result has been the identification of standardized, psychometrically sound, assessment instruments to serve this goal. As a result of the consortium, this project has spawned subsequent follow-up research of these instruments among a broad range of cultures. Additionally, many of these individual measures have been translated into multiple languages and assessed for the relevant samples (for information related to the CERAD please see http://cerad.mc.duke.edu/).

The CERAD protocol for neuropsychological assessment of Alzheimer's disease is not a newly designed assessment battery or measure, but rather includes a number of measures found in traditional neuropsychological assessment designed to assess neurocognitive domains, and includes the following measures: Verbal Fluency, Boston Naming Test, Mini-mental State Exam, Word List Memory, Constructional Praxis, Word List Recall, Word List Recognition, and Recall of Constructional Praxis. Because many of these tests are part of larger existing batteries or independent tests themselves, they will be discussed within their relative context, and research specific to the CERAD will be referenced within those sections.

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS: Randolph, Tierney, Mohr, & Chase, 1998)

The RBANS, while technically a screening instrument, is a brief battery delineated into traditional domains of cognitive functioning (e.g., verbal abilities, visuospatial abilities, attention and concentration, memory). The RBANS was initially designed as an assessment of dementia and is a relatively brief (typically 30 minutes or less) appraisal of neuropsychological impairment.

Additionally, while not a true comprehensive neuropsychological test battery, the author (Randolph, Tierney, Mohr, & Chase, 1998) suggested that it is a good screening tool for non-neuropsychologists who suspect neurocognitive impairment. The publishers indicate that the measure has been translated into over 30 languages, including Korean and Japanese. An additional benefit of this screening instrument is that it was designed with the intent of multiple administrations (utilizing parallel forms), which can be beneficial when measuring decline or assessing for the benefits of rehabilitative therapy. Unfortunately, there is limited data specific to Asian Americans for the RBANS, and within what little research exists, many studies are conducted outside of the United States. Additionally, while the RBANS includes traditional indices of neurocognitive domains, researchers (Schmitt et al., 2010) conducting a factor analysis for the RBANS and a subsequent validation of these factors suggest that the RBANS measures primarily two factors: one consisting of memory and the second factor of visuospatial/construction. Cheng and colleagues (2001) found that a Chinese version of the RBANS, administered in Shanghai, had factors similar to the original RBANS. One caveat for the RBANS should be made specific to inpatient psychiatric patients. King and colleagues (2010) found that only the total score was relevant for this population, and thus differentiating verbal and nonverbal performance in an inpatient psychiatric population might not be possible with this test.

Neuropsychological Assessment Battery (NAB; White & Stern, 2003)

The NAB contains a screening component that allows the battery to be administered as a fixed or a flexible battery, and like the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, Tierney, Mohr, & Chase, 1998) has alternative forms available. In addition to the screening module, it contains individual modules to assess verbal performance, nonverbal performance, attention, executive functioning, and memory. The author utilized a standardization sample of 1,400 participants. While the measure does not report specific data for Asian Americans, the authors included census-matched norms for a group of 950 participants with matching based on age, education, and ethnicity. The NAB screening module has good psychometric properties and demonstrates convergent validity with the Modified Mini-Mental Status Exam ($r=0.46$) and the RBANS ($r=0.65$) which holds true even for the assessments of the full battery relative to existing measures for various neurological insults (e.g., dementia, HIV, ADHD; White & Stern, 2003). Given that the normative sample was matched to the census use of the NAB with the Asian American client who is proficient in English should be appropriate.

Research has confirmed that the RBANS is heavily influenced by SES factors, with those of older age and less educational attainment performing the poorest (Duff et al., 2003; Green et al., 2008; Sahadevan, Tan, Tan, & Tan, 1997). These findings have been replicated outside of the United States with Chinese elders in Singapore (Lee, Collinson, Feng, & Ng, 2012; May-Li, Collinson, Lei, & Tze-Pin, 2010), and while both groups of researchers found a great deal more heterogeneity for individuals with less than 6 years of education, May-Li and colleagues reported that semantic fluency and picture naming remained uninfluenced by these variables. Additionally, these authors administered the battery across multiple languages and with the exception of English-speaking participants found no effect for language on performance. Perhaps specific to the sample studied, Lee and colleagues (2012) identified atypical findings, and suggested that educational attainment was found to be of greater importance at a younger age, with poorer performance for older adults having greater educational attainment when they were compared to their peer with less education (Lee et al., 2012).

Recommendations for Systems of Assessment

The use of a particular style or approach to assessment is a matter of professional experience

and theoretical orientation as well as answering the referral question. Thus, the recommendations here suggest that the clinician not alter their approach to assessment based solely on the fact that they are assessing a member of a minority cultural group, but rather consider the empirical information presented throughout this chapter in structuring their assessment and making conclusions as well as recommendations. Some of the batteries identified above include Asian Americans in the normative sample or have research for their individual subtests that are specific to Asian Americans (e.g., Digit Span, Trails, Complex Figure Drawing). Other tests have actual translations specific to Asian languages (e.g., Chinese, Korean). Further, the clinicians should continue to review for themselves extant literature related to the selection of these measures, in particular when utilizing measures where results are mixed or atypical.

Summary and Recommendations

The challenge of assessment of Asian American clients is multifaceted. Beyond the limited number of individuals in the U.S. population, there is a diversity of language that creates an additional challenge that is not present for some other minority groups (e.g., Hispanics). Thus while several psychological assessment measures have been created and adapted in Spanish, the same is not true for Hindi, Hmong, Japanese, Korean, Mandarin, etc. Further, the availability of clinicians, in particular neuropsychologists fluent in these languages, is even less likely, and presents a challenge even when translated measures are available. On a positive note, several of the systems of assessment discussed in the latter section of this chapter engaged in purposeful efforts to include a representative normative sample, to include Asian Americans, and available literature for neuropsychological assessments created indigenously (e.g., the SNSB) demonstrate the generalization of neurocognitive domains across cultural and ethnic groups. Thus, those individuals that are more acculturated to U.S. culture, with more years of U.S. education as well as English language abilities, are more likely to demonstrate performance that can be evaluated based on those measures' existing normative data. Conversely, those with less language fluency and education as well as those with a lesser degree of acculturation must rely on a strategy that evaluates intra-individual differences (such as changes in occupational and functional performance) including domain discrepant performance that considers multiple informant sources (e.g., a single impaired result for executive functioning is not sufficient or necessarily indicative of impairment for the domain).

For discreet domains there are specific differences that suggest sociocultural influences such as language, visuospatial abilities, and functional exposure (e.g., shopping tasks) exist that may impact performance. Examples of this can be seen in the differential performance (purportedly due to an insensitivity in some color differentiation, even within the larger panethnic category of Asian Americans) on the color word Stroop task and the overestimation of abilities that can occur with the ROCFT as well as digit span tasks. Nonverbal memory tasks, such as those found on the WMS, have previously shown fewer differences (Boone and colleagues) and the WMS-IV has been identified as a test with more discrete constructs (Hoelzle et al., 2011), and thus while research is not currently available specific to Asian Americans, will hopefully yield an even better measure of nonverbal memory performance. We suggest that the WMS-III nonverbal memory tests be utilized for Asian Americans, and recommend that the clinician continue to monitor for emerging research related to the WMS-IV. Further, specific tasks such as the clock drawing tasks have good normative data and application for Asian American clients, independent of acculturation, language, and education.

Language is a very salient factor in the assessment of the Asian American client. As previously discussed, those with increased fluency and years of English language use (as well as

more years of Western education) should perform more approximate to the normative sample, in particular those that included Asian Americans (such as the WRAML and the TOMAL). There are learning and memory tasks specific to Asian American ethnic and cultural groups (e.g., the KVLT) as well as translated neuropsychological screening batteries (e.g., the Chinese version of the RBANS), and when possible, those tests should be utilized. However, when not practical or possible, the clinician may have to rely on an interpreter and utilize intra-individual data to make determinations of sparing and/or impairment. Further, when English is not the primary or even secondary language, consideration for the use of an interpreter may be warranted. Judd and colleagues (2009) make recommendations that suggest that the use of an appropriately trained interpreter will provide a better assessment, but one should avoid using family members and utilize interpreters that are trained at least at a medical level, and when testing is involved, a conversation between the interpreter and the clinician should happen in advance of test administration.

In sum, the existing batteries, in particular those with normative data that includes Asian Americans (such as the WMS-III and WMS-IV, as well as the RBANS and NABS), should provide adequate information for interpretation when English language fluency, acculturation, and education are high. Challenges increase as these factors decrease, and specific considerations for each domain have been described above. For those less acculturated, less English proficient (or even ESL), and lesser educated, a greater emphasis should be placed on collecting collateral data and utilizing intra-individual comparisons for diagnostic decisions and subsequent prognosis as well as treatment recommendations. However, the constructs that neuropsychologists rely on (e.g., memory, verbal and nonverbal abilities, executive functioning) appear stable across cultures and can be applied in making the aforementioned decisions and recommendations. It is hoped that future research and test development continue to yield data specific to ethnic and cultural considerations for Asian Americans, and clinicians should be diligent in seeking out this research as it becomes available.

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