Cultural Diversity in Neuropsychological Assessment
Developing Understanding through Global Case Studies
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Cultural Considerations in Neuropsychological Assessment of Arab Populations

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Context for the Arab World

Terminology and Perspective

In this chapter, we refer to people of the Arab world. Due to the fact that this term is highly simplified, lacking a true reflection of the vast diversity encompassed by Arab countries, we will attempt to illuminate the richness and heterogeneity of its people and cultures through brief descriptions of socio-economic discrepancies, language/dialects, culture, and geography. These descriptions are not meant to be exhaustive. Instead, they serve as an abbreviated introduction to the many cultures that make up this region to help practitioners and researchers identify specific cultural considerations when working with this population in the context of neuropsychological evaluation and care.

As such, we will focus on the clinical implications of cultural variables on neuropsychological assessment. From a clinical perspective, we will speak to certain differences between sub-cultural groups in the Arab world and how they should be considered in neuropsychological procedures.

Geography

The Arab world is made up of 22 countries, and of these, 12 are in Asia (Saudi Arabia, Bahrain, United Arab Emirates, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Syria, Yemen), and 10 of which are found in Africa (Algeria, Comoros, Egypt, Djibouti, Libya, Mauritania, Morocco, Sudan, Somalia, and Tunisia). The Arab world is divided into four main geopolitical areas: the Fertile Crescent (Iraq, Jordan, Lebanon, Syria, and Palestine), the Nile Valley (Egypt and Sudan), the Gulf states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates), and the Maghreb (Algeria, Libya, Morocco, Mauritania, and Tunisia). There are four additional countries in the Arab world that have not been included in these four geopolitical areas. These countries geographically pertain to the Gulf of Aden (Djibouti, Somalia, and Yemen) and the Indian Ocean (Comoros Islands). Despite the geographical proximity between these countries in each geographical region, customs and traditions may differ from one country to another.

People

The term Arab is related to a specific region of the world. Most people in the region extending from the coast of Northern Africa to the Arabian Gulf refer to themselves as Arabs. The Arab population is made up of over 400 million people, representing around 5% of the global population. While Arab populations in the modern world are, generally speaking, considered to share
similar linguistic, historical, cultural background and genetic roots. Arab ethnic identity is considered one of the most difficult to define. There are a variety of minority groups that have different ethnicities (such as the Kurds in Iraq or the Berbers in Morocco), and there may be social and familial mixing with other groups. With regard to other population demographics, there are many discrepancies in terms of population density and age stratification. For example, in Egypt there are more than 100 million inhabitants, while in Qatar there are less than a million. In terms of age characteristics, the majority of the population are either young adults or children.

**Immigration and Relocation**

Over the history of the Arab world, there have been numerous emigration and relocation patterns marked by strife over land and resources. In more recent years, most of these relocations involved Syrians and Palestinians who fled their countries in search of refuge. In fact, there are over two million people living in refugee camps in Palestine, over 700,000 Syrians and two million Palestinian refugees living in Jordan (nearly 40% of the total population), and one million Syrians and 470,000 Palestinian refugees living in Lebanon (close to 25% of the total population). Of special relevance to those of us who work in neuropsychological outreach, these paramount shifts have placed many people at a greater risk of suffering mental health problems, including neuropsychological difficulties.

There have also been other important international immigration patterns, such as the migration of Arabs to North America. In the United States, it is estimated that there are around 3.7 million Arab Americans. Despite the significance of this growth, many practitioners face difficulties in understanding how the culture of this population may influence health-related behaviors and consequently affect treatment. In fact, some suggest that there is a prevailing idea that Arab patients should assimilate and adjust to the Western perspective of health care and disease, which may exacerbate the disconnect between patients and practitioners. In this respect, more research and cross-culturally sensitive tools may help to ease this important gap.

**Language and Communication**

Throughout the 22 countries making up the Arab world, people typically read and write in Classic Arabic and its colloquial form, Modern Standard Arabic (MSA). Due to the fact that these forms of Arabic are often used for Arabic books, newspapers and major television shows, they are considered to be more neutral and are less geographically specific. Nonetheless, each country has its own dialect(s), which in large part can be considered an informal variation of the classical Arabic language. These dialects, while stemming from the same root, are so diverse that they may even be incomprehensible for people speaking different dialects. In fact, the vernacular of each country, or even of each region within countries, differs so greatly from Classical Arabic that learning one could resemble learning a new language. For example, the historical influence of different empires and civilizations has made an everlasting impression on the different variations of Arabic, as is the case in the Egyptian dialect, which has been influenced by the Coptic.

Multilingualism is an additional factor that is also fundamental to language and communication in the Arab world. As a historical consequence of Western colonization and occupation (e.g., Morocco, Algeria), there is a high percentage of bilingual or multilingual individuals. Many patois have adapted to these external influences, such as the French influence in Levant spoken in Lebanon and Morocco. Further, many schools and universities instruct in multiple languages, including English and French.
**Socio-Economic Status, Education, and Literacy**

Beyond linguistic differences, there are also many discrepancies between nations and regions in economic status as well as educational systems. These factors are all inextricably connected, as those who complete their high school degree tend to have more advanced Arabic comprehension and speaking skills than those with fewer years of education or less formal training.\(^{17,18}\) Due to the fact that each educational system varies greatly by country in terms of quality, content, and teaching strategies, when conducting neuropsychological assessment it is essential to consider more than just the number of years studied when assessing level of education.\(^{19}\) For example, in some countries it is not obligatory to attend preschool, and as such many children do not begin schooling until age 6. There may also be differences across countries and regions in terms of literacy rates. According to the World Bank,\(^{20,21}\) 85% of men and 80% of women between 15 and 24 years of age are literate in the Arab world. Quality of education may largely be influenced by the socio-economic status (SES) of the region, as this can determine the caliber of training for professors, the infrastructure of school facilities, and the number of students per classroom. SES varies greatly from country to country, ranging from areas of high income due to natural resources (Gulf States) to more impoverished areas such as Sudan. Due to these differences, some have recommended factoring in both the quality of education as well as the level\(^{22,23}\) and SES factors.

**Religion**

In the Arab world, a variety of religions are practiced. Islam, however, is the most practiced religion in the Arab world and the second most practiced religion in the world.\(^{24}\) Followers of Islam, known as Muslims, believe that there is only one God and that Muhammad is the messenger of God’s word, as is taught through the Quran. Often times the terms *Muslim world* and *Arabic world* are used interchangeably. It is important to make a distinction, however, as there are Muslim nations that do not pertain to the Arab world, such as Turkey, Afghanistan, and Pakistan.

**Mental Health Views**

The field of mental health in the Arab world faces significant barriers due to the stigma surrounding mental health disorders.\(^{25}\) In our experience, people tend to seek services in severe cases and prefer receiving medicine over psychotherapy. Further, people living in the Arab world are more likely to report psychosomatic symptoms, such as headaches and stomach ailments.\(^{26}\) The conversation surrounding the topic of mental health is also taboo and sensitive. Anecdotally, we once had the family of a patient ask that we not reveal our professional background to the patient so as not to alarm him.

**Current State of Neuropsychology in the Arab World**

**Neuropsychology as a Science and Discipline in the Arab World**

There is a clear bias in the amount of globally representative psychological research,\(^{27,28}\) with the vast majority of research representing only 5% of the world population.\(^{29}\) One way to avoid this bias and to improve our knowledge about the impact of cultural variables on neuropsychological performance is to study new cultures. Although clinical neuropsychology is not well developed in the Arab world, the number of neuropsychological studies has recently been increasing.

A systematic review conducted by Fasfous and colleagues\(^{30}\) about the status of Neuropsychology in the Arab world revealed three major challenges: the scarcity of neuropsychological studies in
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the Arab world, the limited number of neuropsychological tests available for Arab populations, and the misuse of neuropsychological tests in research and practices. More recently, in a review of methodological practices for psychological testing in the Arab world, authors highlight that the majority (89%) of available tests have been translated or adapted from English using methods that are incompatible with the latest guidelines and standards.31

Neuropsychological Test Development and Validation in the Arab World

Despite the fact that the number of Arabic people in the world is far greater than the number of inhabitants in the United States, the majority of neuropsychological research and tests have been developed and validated in the United States. Further, many of those that have been normed and produced within the Arab world have not followed standard procedures for test translation and adaptation, making the true number of available tests much smaller.30,31 In fact, of the 117 neuropsychological measures identified in the Arab world, only 57 provided normative scores. Of these 57 tests, 53 followed at least 3 of the principal criteria for test adaptation and validation, constituting only 55% of published neuropsychological measures.30 It appears as though certain regions are following standard protocol for test adaptation more than others, as cognitive tests used in Jordanian publications represented 63% of those identified, followed by Lebanon (53%) and Libya (50%).

The amount of research in the Arab world has followed a similar pattern.30 During the past years, there has been only an approximate rate of 7.7 publications per year of studies using cognitive measures with Arabic speakers, many of which were conducted in Egypt and nearly half a century ago. Fortunately, it seems that the number of publications is on the rise, beginning with 22 publications between 1961 and 1989 and later 204 from 2011 to 2015. Nonetheless, these studies are not all representative of the Arab context. The majority of these studies have been and continue to be conducted in Egypt, which took the lead with 45% of the studies included in the systematic review. Following Egypt, other countries such as Saudi Arabia and Tunisia have contributed a significant proportion as well (8.9% and 7.8%, respectively). Cross-country differences found in publication rates and test adaptation protocol may be related to the number of universities and the level of medical training offered at these institutions. These findings reflect the great need for the adaptation and validation of tests for new cultures32,33 and a need for transparency regarding which tests are available for clinicians and researchers working with Arab individuals.

As previously detailed, there are a plethora of cultural biases on these tests that may impede an accurate diagnosis when used with the Arab population. The lack of tests not only hinders the development of Neuropsychology as a scientific discipline but also has a detrimental impact on patients with brain damage, both those living in their country of origin as well as those who have emigrated from the Arab world. In a review of the literature on available cognitive tests for Arab individuals, we found that there was a large variation in the quality of test adaptation. On the one hand, the adaptation of the MMSE in Tunisia34 and Lebanon35,36 met many of the criteria outlined by van de Vijver and Hambleton37 as well as the standards for test development and adaptation.38,39 These authors included back translations and piloting and even assessed the cultural adaption of both verbal and non-verbal measures.

On the contrary, other authors conducted a direct translation of some measures, which resulted in meaningless sentences in Arabic and a loss of construct validity. There is a general consensus that direct translations are not sufficient for the adaptation of psychological and neuropsychological tests which have been developed in and for another cultural context.23,32 As such, the linguistic and cultural adaptations are fundamental to verifying the validity and reliability of the new version.32 Many of the tests (e.g., Cambridge Cognitive Examination (CAMCOG), German Test
Battery of Attentional Performance for Children (KITAP), Arabic version of the Stroop Test, Motor-Free Visual Perception Test-Revised (MVPT-R) have undergone a simple translation to Arabic without adapting the measures and validating the test for the Arabic population. Only seven of the identified 19 Arabic tests have been adequately adapted, including psychometric properties of validity, reliability and normative scores. For additional information about psychometric properties, cultural adaptation, and adequately adapted neuropsychological tests that could be properly used with Arabs, readers can refer to supplementary material published in Fasfous et al.30 and Zeinoun et al.31

With these examples in mind, we believe that test validity and reliability are not sufficient, and tests must be carefully adapted for cultural differences in addition to following specific protocol for test translation. Critically, we have found that people of different cultures use different cognitive abilities to carry out the same task,40 suggesting that there may be underlying cultural differences in the way we process information. With this in mind, we cannot assume that a test designed for a specific cognitive task is measuring the same skill-set in another population, even if the outcome in performance is similar. Construct validity may be useful when comparing the relevance of a task to measuring specific abilities.

**Culturally Sensitive Training for Professionals in Neuropsychology**

In addition to developing and validating culturally informed instruments for cognitive evaluation, it is imperative to bolster specialized training in the field of cross-cultural neuropsychology. This work is necessary both for professionals living in the Arab world, as well as neuropsychologists outside of the Arab world who may test patients of Arab origin. For the latter, it would be helpful for practicing professionals to have easy access to cultural information relevant to neuropsychological performance in Arabic individuals.

Most graduate programs in the Arab world do not include a specialization in neuropsychology, and those who wish to gain specific training must study outside the Arab world. As a consequence, the evaluation of neuropsychological impairment caused by brain injury or dementia is principally managed by neurologists and psychiatrists. Nonetheless, as time has gone on, there has been a significant growth in post-graduate psychologists who are specialized in evaluations. As a result, there has been an appropriate shift in who administers cognitive tests, and trained psychologists have begun to acquire more and more responsibility in this sector.

As new programs in graduate-level psychology continue to emerge in the Arab world, efforts should be made to emphasize the importance of valid cognitive testing in their training. These programs may consider developing a board of accreditation, similar to that of the American Board of Professional Psychology/American Board of Clinical Neuropsychology, to ensure a minimum standardization in the level of training for professionals. This would ideally be organized in unison with all Arab countries, so that each region would be able to contribute to determining standard protocol for teaching, practicing, and adhering to standard international guidelines for neuropsychological assessments, such as those by the American Educational Research Association38,41 and the International Test Commission.32 Establishing a board may also give way to organizing seminars and conferences in Arab countries so that professionals and academics may exchange information and further promote a cross-culturally sensitive protocol. Promoting international exchange could also potentially lead to the creation of professional groups for neuropsychological testing, leading to improved cross-cultural test adaptation, development and validation. Through these collaborations, Arabic speaking neuropsychologists may also be able to connect with linguists to create Arabic word-databases in order to develop language-based cognitive measures, such as vocabulary or wordlist memory tasks. Offering a platform to Arabic...
speaking neuropsychologists would allow professionals to share their experience about everyday practice and the different strategies they use for local populations. This could potentially lead to an open-access depository of translated tests and localized normative scores.

While development of accreditation boards and exchanges requires much coordination and time, there have been some notable efforts in this direction. One such example is the “Neurodevelopmental Care for Refugees (NeuCare)” which was launched in 2020 in order to design and implement a higher diploma program about neurodevelopment focused on refugee children for professionals involved in their care. The course, which is currently being developed at universities in Palestine (Bethlehem University and Hebron University) and Jordan (the University of Petra and Al-Yarmouk University) includes modules about brain and neuropsychological development, detection of neuropsychological problems, and cross-culturally sensitive instruments for detection. Further, it includes a teaching module to guarantee the sustainability of the project by means of qualifying students as trainers for new course editions. Due to a dearth of professionals trained in psychology, students will also be recruited from the departments of Social Work and Education to be trained in the latest advances on neurodevelopment applied to refugee children. In order to avoid competence conflicts with national professional regulations, qualifications based on competences will be adopted and modules will have different profiles for psychologists, social workers and teachers. The NeuCare project is thus a pioneering push in the way of universalizing a cross-culturally sensitive and standardized protocol of neuropsychological care in the public sphere of the Arab world.

Considerations for Neuropsychological Assessment in Arab Populations

While research dedicated to the specific cultural biases of neuropsychological tests for Arabic individuals is still nascent, findings in the existing literature may help to guide researchers and practitioners in detecting some of the central concerns. Below we will highlight some of the cultural unqiuities found in cognitive test performance with Arabic individuals pulling from both empirical and anecdotal evidence.

Construct Relevance

After a plethora of studies demonstrating differences in neuropsychological testing between individuals of diverse cultures, the question arises as to whether we are measuring what we are claiming to measure. In other words, does the executive functioning task that was created in North America also measure executive functioning in Jordanians, even after it has been translated to Arabic? In one of our studies, we found that a Spanish and a Moroccan sample used different neuropsychological processes to achieve the same task on a test for non-verbal intelligence. If we apply these results to the field of Cross-Cultural Neuropsychology, perhaps we should begin with determining the concept of cognitive functions (for example, What is intelligence according to the members of this culture?), and only after should we develop the tools necessary to measure these constructs.

These questions resurface some of the oldest and central dilemmas of neuropsychological testing, which is critical to ensuring “fairness,” as termed by the Standards for Educational and Psychological Tests. In the absence of a sufficient number of cognitive tests that can ensure construct relevance to the Arab world, it is essential that researchers and practitioners inform themselves about these specific differences so that they may take extra precautions during testing. In practice, whenever possible, practitioners should select and use tests that have adequate construct validity to avoid this problem (for more information about available tests with adequate construct
validity for Arab populations, see Zeinoun et al. Further, neuropsychologists should follow APA recommendations when providing psychological services for individuals from different cultural backgrounds. Along these lines, there are different alternatives for standardized neuropsychological testing which could offer a more holistic view on cognitive performance in Arab populations. For example, Naturalistic testing (i.e., assessing behavior in a natural setting) could serve as an alternative method of measuring psychological variables. Multiple and collateral interviews (such as parents, friends, teachers) may also offer pertinent qualitative information to understand the patient’s status in their historical context. Ideally, the practitioner will be able to apply a mixed-methods approach, in which both qualitative and quantitative variables are interpreted. Mixed-method strategies may help clarify the construct being assessed and offer salient information relative to the patient’s behavior and performance in his/her cultural context. Moreover, applying and comparing more than one neuropsychological test to measure the same function could help practitioners in validating their results.

**Test Familiarity**

As is widely noted in the literature, test comfort and familiarity are important predictors of neuropsychological performance. Familiarity with standardized testing is especially relevant in the Arab world, considering the general population is not as accustomed to taking timed and standardized tests as compared to people in other countries, such as the United States. We will highlight some of the main concerns of test familiarity and why they are relevant to testing with Arab individuals.

In one of our studies, 80% of the Moroccan and 20% of the Spanish participants reported having never taken a psychological test. In this same study, we found differences between the two groups on cognitive measures, and we hypothesized that the difference in familiarity may have impacted in the group performance. One possible explanation is that Moroccans relied more on complex executive functioning skills as compared to Spaniards when performing a non-verbal intelligence task due to the fact that they are not familiar with this type of test. This coincides with previous studies, which have demonstrated that processing novel stimuli is related to increased cognitive control and activation of the prefrontal cortex. In other words, the Moroccan sample may have coped with the unfamiliar task by recruiting complex neuropsychological processes. This example highlights the impact of test familiarity on test performance.

Considering these findings, it may be useful for practitioners to ensure that patients clearly understand the test instructions and spend ample time in the sample trials prior to beginning the evaluation. Practitioners could also inquire about the patient’s subjective experience with standardized timed testing to gauge how this may influence their performance.

**Patient History**

Since the number and quality of neuropsychological tests available for Arab populations are limited, all evaluations should include an extensive qualitative analysis about the individual’s history and background. Considering the strong social ties between friends and family in the Arab world, it may be helpful to gather information from those who are involved in the patient’s day to day care. On the other hand, it is important to note that many children in the Arab world have been exposed to distinct environmental insults that can affect their neurodevelopment. Among these factors is the exposure to war violence (e.g., Palestine and Iraq) or poverty and malnutrition, (e.g., Mauritania and Somalia). These factors have been related to neurodevelopmental problems. This may develop during childhood and adolescence and later have influence throughout life,
including impact on academic performance, professional status and mental health during adulthood. As such, inquiring about these relevant details may be important when determining the possible causal mechanisms for alterations among patients.

Language Considerations

There are various factors to examine when considering the potential effect of language on cognitive performance in Arabic individuals. Beyond the aforementioned characteristics involving multilingualism and “code-switching,” the Arabic script poses important differences from English and many Western languages in which most cognitive tests have been originally developed. One of these variables is the direction of the script, as Arabic is written and read from right to left. Some studies have shown that the direction of attentional biases can develop differently depending on these two ways of writing. Further, another study has shown that the perception of time, including in which direction the past and the future move, is related to the direction in which one writes. This reveals another subtle yet potentially decisive factor in neuropsychological performance of Arabic individuals, as multiple cognitive domains may be influenced by this directionality. As such, it is important for practitioners to consider the direction of the stimulus being presented when assessing Arab populations. For example, in tests measuring attention (such as the “cancelation task”), speed of processing, and reaction time, stimuli are often presented from left to right. Wherever possible, it is preferable for practitioners to apply tests that have adapted the direction to read from right to left, or to present stimuli on the right side, in an effort to reduce directional biases.

In addition to direction, the length of the words may also influence scores. Arabic dialects are often shorter than the Classic form of Arabic, and it is possible that individuals are able to name fewer words if they must do so in Classic Arabic because it takes them longer to pronounce all of them. Along these lines, other research comparing children from Lebanon and Holland found that differences in a digit task disappeared when controlling for the pronunciation speed. In light of these differences, practitioners should give precedence to assessing the patient in his or her native dialect when applying verbal tests such as verbal memory and fluency.

In addition, careful consideration must be taken with how neuropsychological tests are translated. As previously mentioned, there are many different dialects in the Arab world, some of which are incomprehensible to others. Further, some individuals may speak an Arabic dialect, but may not fully understand the formal Classic Arabic. As such, we recommend that when validating or adapting a new test, researchers and practitioners strictly follow the International Test Commission guidelines for test translation and adaptation. When carrying out these procedures, we also advise including an expert panel of individuals from different countries who are also experienced in psychological testing. A diverse representation of experts in cognitive assessment will help ensure that construct validity is being maintained and that the translated version is as culturally sensitive as possible. An example of an adequate adaptation and translation is the English verbal fluency test, FAS. Instead of using the same three letters to assess verbal fluency as are used in the English version (FAS), the Arabic version has included three letters (WRG) for which there is a comparable level of frequency in the verbal and written Arabic language. It may be helpful for practitioners to pay special attention to how adaptations were made before applying them to ensure they have followed a similar protocol.

Bilingualism

There is extensive evidence that bilingualism can affect neuropsychological functioning and performance. Due to a long history of colonization and Western occupation in the Arab world, there
is a high percentage of bilingual or multilingual individuals (e.g., Morocco, Tunisia, Lebanon). As a consequence, individuals living in largely multilingual areas often resort to ‘code-switching’ (i.e., alternating between different languages within the same phrase or conversation). These authentic modes of communication surface the novel need for multilingual assessments, especially considering the scientific evidence that bilingualism is relevant to test and norm selection. 55,56 As anecdotal evidence of this phenomenon, we are facing particular difficulty in adapting certain neuropsychological measures for the Moroccan population. In addition to differences in preferred language by region, within regions individuals often mix multiple languages into their speech and have even integrated numbers into their script to accommodate vowel sounds that are not easily pronounced or reflected in the traditional Arabic language.

As we mentioned before, another important factor is the Arabic dialect, which in many cases could be considered as a second language. Instructions, performance, and norms could vary between classic Arabic and dialect. In fact, we have found in our clinical experience that children and adults perform better on fluency tests when using the dialect language. The literature has also reflected performance differences rooted in language. In a cross-cultural study conducted by Shebani et al. 57 to compare memory performance between Dutch and Arab children from Libya, they found that Dutch children outscored Arab children. However, when word length and pronunciation speed were controlled, the difference disappeared.

Considering the implications that bilingual- or multilingualism can have on neuropsychological performance, there are several approaches practitioners may take in order to reduce linguistic biases based. First, it is preferable for multilingual neuropsychologists to assess multilingual clients, as they are better equipped to resolve doubts about testing protocol and material. Further, it may be helpful for practitioners to assess language proficiency or to ask the participant in which language he or she feels most comfortable. This information can inform test selection, where practitioners may give precedence to tests available in the preferred language. On the other hand, practitioners may also consider applying multiple tests in different languages to evaluate the same function, especially when they face challenges in finding tests that are adequately validated and culturally adapted.

**Timed Tests**

In line with the importance of test familiarity, there are also cultural differences in terms of having to complete a certain task within a given amount of time. In some Arabic cultures, such as in Morocco, teachers often organize the school day according to how well children have grasped the subject and will not move on to the next topic until it has been fully comprehended by all. Further, students are usually given as much time as they need to complete exams. As such, when presented with timed testing demands, these individuals may not feel the same urgency, may experience more pressure or stress, or may not be able to organize their time in a fashion that would allow them to complete the task successfully. In line with these, we have found cultural differences between Moroccans and other cultural groups on timed tests that were once deemed to be “culture-free.” In the case of the CCTT, Moroccan children took significantly longer than average North American children to complete the tasks. 58 The difference was so great that if we were to apply the North American normative scores to our sample, they would have appeared to be in the clinically impaired range (even after controlling for age, education level, and gender). Cross-cultural differences in timed testing have also been found in other cultures that do not share the same perception of time. 59 Due to these apparent discrepancies on the basis of time constraints, we urge-practitioners to keep this in mind when interpreting the results of neuropsychological testing. It may not be that the patient-is not able to correctly complete the task, but rather his/her past experience has taught her to complete it differently (i.e., giving precedence to variables other than speed).
Considering the cultural differences in time perception, practitioners may consider selecting both timed and non-timed tests to evaluate the same domains. Further, they may even measure the patient’s subjective experience of time in order to understand how it may influence their test performance. To the best of our knowledge, there is only one measure (COTI-33) to assess this variable. While this measure is currently not available in Arabic, it is currently being translated and cross-cultural adapted for Arabic populations. Finally, as previously mentioned, it is important for practitioners to ensure that patients comprehend test instructions. Spending extra time on sample trials may aid practitioners in this effort.

Acculturation

Acculturation is a complex process in which psychological and cultural adaptations must be made to better assimilate into the new environment. Through the acculturation and assimilation process, individuals must learn to cope with the stressors of a new and unknown environment, and in the case of refugees and asylum seekers, learn how to cope with past traumas in an entirely new context. Acculturation plays a fundamental role in the neuropsychological performances of ethnic minorities and/or immigrants who live outside of their country of origin.

As the percentage of Arab-speaking individuals living outside of the Arab world continues to grow, there is an increasing need to develop neuropsychological tests that are sensitive to one’s native culture but that also take into account the new cultural influences of living in a novel place. When looking at the literature related to neuropsychological performance of healthy Arab adults living outside their country, it would be safe to assume that tests that have not yet been culturally adapted could potentially erroneously diagnose Arab individuals as having neuropsychological sequelae consistent with brain damage. For this reason, it is important to administrate validated and adapted tests in the assessment process. Even if the practitioner discerns that the patient has a good level of the language spoken in the host country, he/she cannot assume that the help of a translator will solve this problem. Language is not the sole measure for level of acculturation, and the practitioner must be aware of a variety of cultural biases that could influence one’s performance. In a meta-analysis regarding acculturation and its impact on cognitive testing, a series of acculturation factors are highlighted as relevant to neuropsychological testing. Acculturation can be seen as a multidimensional process that occurs in different “domains” and can vary depending on one’s life situation and developmental stage. Typically, these “domains” include variables such as language proficiency, ethnic identity, media preferences, and eating habits. Beyond these variables, others highlight proxies of acculturation (e.g., years of residency), which oftentimes branches into other sociocultural constructs (such as SES). Practitioners may include an analysis of these domains in the clinical interview and through questionnaires to consider their level of acculturation and how it could influence performance when interpreting test results.

Ideally, practitioners would also be able to use validated tests and norms for the individual’s dominant culture. Yet despite growing efforts, there remains an urgent need to create construct-relevant neuropsychological tests as well as appropriate norms for each cultural group. In the absence of these tools, practitioners and researchers alike should consider the level of acculturation through qualitative interviews and how that may influence their performance on traditional cognitive testing.

Educational Level and Quality of Education

Educational level is traditionally one of the central variables to control in neuropsychology and cultural neuropsychology. However, educational levels (as counted by years of education) could be
affected by the differences in educational systems around the world. For example, in some countries, preschool education is obligatory and in others it is not.

The central clinical implications of not attending preschool are two-fold: (1) accuracy in measuring abnormalities in learning abilities and (2) difficulties in comparing performance with normative scores. If children do not receive preschool training, they may not develop the skills needed to perform well on neuropsychological tests commonly used to assess for learning disabilities and writing skills. Thus, poor scores may be interpreted as delays or abnormalities, when in reality they simply may not have received specific training. With regard to the latter, it may be difficult to compare their results to normative scores, which are typically based on educational level. Without a proper comparison group, practitioners may face important barriers when making a clinical interpretation of their performance.

In addition, the quality of education plays an important role in neuropsychological functioning and performance. Reading ability is widely used to evaluate quality of education among English speakers. However, calculation skills could be an alternative approach to evaluate the quality of education among Arab individuals. It has been suggested to use non-verbal tests to assess cognitive performance in culturally diverse individuals due to the supposition that they depend less on language capacity. In a previous study, we found that even after controlling for the traditional confounding variables of acculturation, occupational social class, and IQ, non-verbal abilities (such as calculation skills) remained a significant predictor of neuropsychological performance between different cultural groups however, these differences disappeared after controlling for calculation skills. Therefore, we think that calculation as measured by an adequately adapted calculation test skills could be used to evaluate the quality of education among non-English speakers as they may differ depending on the educational system of each country.

In our cross-cultural research on verbal memory, we found differences in performance between Spanish-speaking children from Ecuador and Moroccan children. When conducting a deeper analysis of these differences, we came across important unities in the educational system and teaching methodology that may have influenced the discrepancies we found. In Morocco, children are taught to repeat aloud everything they have learned in class, which may in turn contribute to strengthening their verbal memory capacity. It is possible that this teaching method, which emphasizes the communication of memorized material, strengthens verbal memory capacities over other cognitive abilities (such as reasoning and planning) that may be fomented more by other didactic methodologies that focus on critical analysis and synthesis of information.

**Socio-Economic Status**

As we have alluded to before, SES is an important variable to be considered in neuropsychological test performance. Considering the vast differences found in SES between the 22 countries making up the Arab world, it is especially relevant for practitioners evaluating Arab populations to use normative scores that are representative of their historical context. In a recent study conducted by Lozano et al., researchers found differences in non-verbal IQ tests between normative scores of children from different Arabic-speaking countries (Morocco and Oman). Critically, about 8% of the healthy Morrocan sample of children were misclassified as intellectually impaired when applying the Omani norms of the Raven Test. These findings highlight not only the urgent need to develop culturally sensitive normative scores but also the need for practitioners to apply scores that best reflect their patient’s background.

In light of a trend toward a more globalized world and growth in Arab immigration, clinicians will have to take on more patients from different cultures, likely outnumbering the amount of culturally representative tests and normative scores. While these demographic fluctuations can be expected
to happen at a much quicker pace than appropriate test development, practitioners can take into account the variables highlighted throughout this chapter (bilingualism, acculturation, quality and level of education, SES) in order to make cultural adaptations to testing protocol and interpretation.

Conclusion

In Arabic countries, few neuropsychological studies have been conducted, and the number of available neuropsychological tests that are culturally adequate is small. To further compound this issue, cultural differences in neuropsychological test performance exist (both in adults and in children) within Arabic countries as well as between individuals from different Arab countries.

In this chapter, we have highlighted some of the important cultural differences that may influence test performance, such as teaching methodologies and the perception of time. Teaching methodologies have been found to impact the types of cognitive domains that are reinforced, while time perception has been associated with performance on timed neuropsychological tests. Further, research has shown that Arabic individuals may use different cognitive abilities to complete the same task on a neuropsychological test. As such, construct relevance must be considered by all practitioners and researchers working with Arabic individuals. In addition to selecting validated and adapted neuropsychological tests during the assessment, it may be helpful to employ subtests for IQ that have demonstrated adequate construct validity. For example, the Stanford Binet and WAIS have been validated in different Arab countries such as Egypt, Jordan, and Saudi Arabia, and the subtests of these instruments could be used in neuropsychological testing for Arab individuals (see Refs. 30, 31 for more detail on available validated tests).

An additional central finding is that verbal tests and non-verbal tests are not “culture-free,” and using these types of tests can lead to diagnostic errors in Arab children and adults. Therefore, tests must undergo an extensive and detailed adaptation before they can be used properly. Due to these cultural biases, practitioners may consider employing a few different strategies. On the one hand, practitioners may use various tests to evaluate the same function and analyze results both qualitatively and quantitatively. Ideally, practitioners will be able to use a mixed-method approach in which he or she combines both objective quantitative data from standardized neuropsychological tests (in the best case, adapted, and validated with representative normative scores) with qualitative information on the patient’s history. Qualitative analysis can be done by pulling from external resources, such as by collecting information from the family or school teachers. Finally, we consider it important for practitioners to mention the challenges and limitations of testing in the neuropsychological report so that interpretations are made with precaution.

Despite the challenges mentioned in this chapter for Arab neuropsychologists working in the Arab world as well other Arab neuropsychologists working with Arab patients around the world, the field of neuropsychology in the Arab world has been emerging. In the last 20 years, a number of neuropsychological studies and initiatives, projects, and programs have been implemented with the objective of improving the field of neuropsychology in the Arab world. Notably, among these initiatives is the NeuCare project, which is an international collaborative effort centered on the development of a graduate program about neurodevelopment. This project will help qualify Arabic-speaking clinical neuropsychologists as well as formalize a standardized training for professionals in the Arab world.

Many of these challenges can be addressed by the need for an international Arabic board that can establish standardized cross-cultural training for neuropsychologists in the Arab world as well as develop testing protocols and guidelines for the Arabic population. The APA guidelines for working with people of different cultures may serve as a reference point in this initiative. The creation of such a body may also be useful in connecting professionals across the Arab world to
discuss central issues in evaluation and treatment and to develop new neuropsychological programs for researchers and practitioners. The aforementioned national and international efforts are leading the field of neuropsychology in this direction toward a more culturally representative and conscientious science and practice.

References

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