Cross-cultural neuropsychological assessment: challenges and solutions.

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Declaration: No conflict of interest

Plan for session
- Our background, interest in cross-cultural neuropsychology, and experience.
- Understanding the issues and challenges
- Solutions - practical and ideal world
Our interest in cross-cultural neuropsychology

- Stems primarily from experience in developing/adapting tests for use in countries with relatively few locally developed/normed tests
- Alberto – Argentina
- Jon – Thailand, India, Saudi Arabia.

Understanding the issues and challenges
We now have many neuropsychological tests available

Most have been developed and ‘normed’ in a Western/European context

This is a problem.....

• If you are a neuropsychologist who assesses patients coming from a different linguistic and cultural background to that for which the tests you typically use were designed (or normed).

• It is even more of a problem if you are assessing someone who does not speak the same language as you do.
The problem is recognised in the US...

- AACN ‘Relevance 2050’ initiative
  - “By the year 2050, a full 60% of the American population will be "un-testable" with our current toolkit of largely mono-lingual, mono-cultural neuropsychological assessment strategies. This lack of access to neuropsychological services by non-primarily English speaking, non-European American patients is clearly a social justice issue. But it is more than that. It is a market share issue of staggering proportions. As a profession we will become increasingly irrelevant in the healthcare marketplace if we do not take substantial action now.”
  
  https://theaacn.org/relevance-2050-initiative/#gsc.tab=0

But it is a global issue

- In other countries (e.g. Europe) the same issue arising from globalization/migration is relevant.
- In many countries around the world there are few locally developed/normed tests so tests developed elsewhere in the world are being used.

Why is it a problem? Back to basics: Factors affecting test performance

- When we are conducting a neuropsychological assessment we are addressing questions such as, ‘is there a pathological process such as dementia’, ‘how has a stroke or traumatic brain injury affected this person’s cognitive functioning’.
- So we are trying to identify whether performance is different from what might be normally expected for this person.
- So we have to establish how the person we are assessing is expected to perform if there is no pathology.
- This requires us to understand what factors affect test performance
- Common factors that we know can affect performance on cognitive tests
  - Age, gender, level of education (or quality of education), level of general intellectual function
  - Race, ethnicity, culture...
Culture and cognition

• While basic cognitive processes and characteristics are common to all human beings, these processes and functions can develop in culturally-distinctive ways, and may differ in how they are expressed across cultures (Fernandez & Abe, 2017).
• So, people from different cultural backgrounds may perform in different ways on cognitive tests.
• "Cultural neuroscience is an emerging research discipline that investigates cultural variation in psychological, neural and genomic processes as a means of articulating the bidirectional relationship of these processes and their emergent properties." Chiao et al (2010)

• 'Culture' is not well-defined
• 'The ideas, customs, and social behaviour of a particular people or society'. Oxford Dictionaries
• "A dynamic process involving worldview and ways of living in a physical and social environment shared by groups, which are passed from generation to generation and may be modified by contacts between cultures, in a particular social, historical, and political context" (Whaley and Davis 2007, p. 564).
• Culture often used to mean country, region.
• But this does not identify what characteristic of people is different (that might then explain apparent differences on cognitive test performance)
• Many cultural dimensions have been examined (Assertiveness; Time orientation; Doing vs Being; Loose vs Tight social norms etc.).
• One of the most investigated cultural differences relevant to cognition is the difference between 'East Asians' (Chinese) and 'Westerners' (USA) on the dimension of Individualist vs Collectivist perspectives.

INDIVIDUALIST VS COLLECTIVIST
Culture & perception

Westerners attend more to focal objects, whereas East Asians attend more to contextual information. Differences in judgment and memory may have their origins in differences in what is actually attended as people view a scene.

Chua et al. (2005): Cultural variation in eye movements during scene perception. PNAS

Culture & perception


Challenges to cultural neuroscience

- Limitations of simple binary (East vs West; individualistic vs collectivist) approach to culture.
- Tendency to define culture by country/ethnicity (but cultural traits can be specifically measured).
- Cultural differences in response bias (e.g. use of a Likert scale) creating illusion of other differences.
- Cultural appropriateness of test stimuli (differences in meaning/familiarity of items).
Visual Object and Space Perception Battery

Dutt (2016) Mean Scores on the VOSP subtests for the Indian & UK cohort

Dutt (2016) British norms appropriate for Indians?

Indian cohort fell below the cut-off scores on British norms

Silhouettes 62%
Object Decision 66%
Progressive Silhouettes 42%

British norms may lead to false attribution of perceptual impairment when used for the Indian population
Dutt (2016) Explaining differences?

- Item familiarity? Yes for two items, but differences exist when items excluded.
- Indians have difficulty in analyzing part cues of foreshortened images?

<table>
<thead>
<tr>
<th>Object Decision</th>
<th>Correct Identification %</th>
<th>Most Common Wrongly Identified Object</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorry</td>
<td>30</td>
<td>Identified as “Human Face”</td>
<td>12</td>
</tr>
<tr>
<td>House</td>
<td>33</td>
<td>Identified as “Staircase”</td>
<td>30</td>
</tr>
<tr>
<td>Wheelbarrow</td>
<td>18</td>
<td>Identified as “A” “Headphones” “Tongs”</td>
<td>28</td>
</tr>
</tbody>
</table>

Culture and cognition

- So, there are many factors that may affect performance on cognitive tests.
- If we do not take account of these factors then a person’s performance on a cognitive test may be misinterpreted.
- We are used to thinking of factors such as age, gender, and perhaps education as influences, but in an increasingly globalised world, factors such as race/ethnicity/culture are also important.
- It is important to note that factors such as race/ethnicity may not be the causes of differences in test performance.
- The cause of differences between people from different races/cultures on a cognitive test may be other (often unmeasured) differences between the groups.
Culture and cognition: Manly, 2005

• Discussing the issue of differences in performance of African Americans and Caucasian Americans on cognitive tests.
• Traditional neuropsychological assessment is based on skills that are considered important within White, Western, middle class culture, but which may not be salient or valued within other cultures.
• Cognitive skills and strategies of ethnic minorities are not adequately tapped by standard cognitive tasks—our tests simply do not elicit the full potential of African Americans. Therefore, differences in salience of cognitive skills, exposure to items, and familiarity with certain problem-solving strategies could attenuate performance of African Americans on neuropsychological measures.

Culture and cognition: Manly, 2005

• Even when factors such as level of education are matched between groups, differences in quality of education may exist that explain differences in cognitive test performance.
• In Western countries with a relatively high minimum length of education, number of years of education may mask differences between people that were previously reflected by differences in years of education.
• In low/middle income countries where education is still more limited (or may have been limited for people commonly presenting for assessment e.g. older adults) length of education continues to be a strong predictor of performance.

Culture and cognition

• We need to understand better the factors that explain differences in performance on cognitive tests so that we can be better at detecting the presence of cognitive impairment that is arising from a pathological process rather than arising from a factor that is unrelated to the presence of pathology.
• Other potential differences – acculturation, socioeconomic status, social exposure, “test wisdom”, societal discrimination and lifelong experiences contributing to low group and self-expectations (Norman et al., 2011)
Bias in neuropsychological assessment

- Bias refers to systematic error in the estimation of a value (Reynolds & Suzuki, 2013)
- Bias occurs if score differences on the measure of a particular construct do not correspond to differences in the underlying trait or ability that is intended to be measured (van de Vijver and Tanzer, 2004)
- For example, if I am testing the ability to name objects, if I give a test that contains objects that are common in one country but not common in another country, differences in scores between people from the two different countries will not be because of differences in naming ability but in familiarity with objects. In this situation the test is biased (particularly if we rely on normative data from the country in which the objects are familiar).

Sources of bias

- Fernandez & Abe (2017) draw on van de Vijver and Tanzer’s (2004) taxonomy of potential biases
  - Construct bias
  - Method bias
  - Item bias

Construct bias

- Construct bias occurs when the construct measured is not equivalent across cultural groups.
  - Some cognitive constructs may be universal (e.g., language, memory, attention, speed of processing) but the way they are expressed may differ between cultures
  - Some cognitive constructs (e.g., intelligence) may vary across cultures.
  - So, we should not assume that a test measuring a particular construct in one culture is measuring the same construct in another culture.
  - It is therefore important that if we are taking a test developed in one culture into another that we examine whether there is evidence that the construct is intended to measure is being measured.
Changing language in which test is administered may change the construct being measured

- Particularly relevant for tests assessing aspects of language
  - E.g., testing word repetition where number of syllables is varying
    - ACE III: Caterpillar - Oruga (Spanish version ‘cucaracha’)
  - E.g., testing irregular spellings of words (relevant in English and associated with surface dyslexia, but not relevant in Spanish)
    - ACE III Spanish version includes foreign words that are used within Spanish, but this is very different to assessment of irregular spellings.

ACE III, English version

<table>
<thead>
<tr>
<th>Language</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>sew</td>
<td>sew</td>
</tr>
<tr>
<td>pint</td>
<td>pint</td>
</tr>
<tr>
<td>soot</td>
<td>soot</td>
</tr>
<tr>
<td>dough</td>
<td>dough</td>
</tr>
<tr>
<td>height</td>
<td>height</td>
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</tbody>
</table>

ACE III, Spanish version

<table>
<thead>
<tr>
<th>Language</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hollywood</td>
<td>Hollywood</td>
</tr>
<tr>
<td>Vedette</td>
<td>Vedette</td>
</tr>
<tr>
<td>Blues</td>
<td>Blues</td>
</tr>
<tr>
<td>Tour</td>
<td>Tour</td>
</tr>
<tr>
<td>A capella</td>
<td>A capella</td>
</tr>
</tbody>
</table>

Method bias

- Method bias refers to bias that relates to the methodology of test development/standardisation
  - Sample bias
  - Instrument bias
  - Administration bias
Sample bias

- Sample bias occurs when samples that are being compared (e.g., comparing different cultures on tests) are incomparable on aspects other than the target variable (e.g., cultural background), for instance, differences in educational background, age, or some other factor.
- Bias is also relevant in normative samples
  - Population based normative samples attempt to be representative of the population by including numbers of participants from different ages, gender, education and race based on census data.
  - However, this can mean that if there are real differences between groups these are masked and this is particularly an issue if some groups are a minority within the sample.
  - So a person from a minority group is compared with the whole sample rather than with people from the same race/ethnic/cultural background.
  - Similarly, someone from the majority cultural group is compared with a sample that includes people from a range of other backgrounds.

Instrument bias

- Bias relating to use of the neuropsychological instrument
  - Lack of familiarity with “tests” – relevant in people with no, or limited, formal education who have been exposed to educational assessment.
  - Lack of familiarity with materials used
  - e.g. Could relate to not being familiar with use of a pencil for tasks that require drawing

Administration bias

- Aspects of the process of administration of a test create bias
- Use of language – e.g., failure of testee to understand the demands of the test.
- Stereotype threat effect
  - Effect of testing conditions (e.g., instructions, race of examiner) on neuropsychological performance (Thames et al., 2013)
  - Thames et al. (2013) found that when African American participants were tested under conditions when stereotype threat is activated (participants are told that their cognitive abilities will be tested and their performance compared with their peers) people perform more poorly than when stereotype threat is not activated (e.g., we are experimenting with different types of cognitive measures, so relax and try to do your best).
  - Participants under threat allocate cognitive resources to regulating their emotional state and so less cognitive resource is available for test performance.

Item bias

- Items in a test perform differently in different groups.
- Whilst the overall construct might be measured by the test, the specific items do not perform the same between cultures.
- Particularly relevant to picture naming tests (e.g., Boston Naming Test), but also with verbal items in word lists, story recall etc.

Practical & ideal world solutions

Practical solutions

- See Fujii (2017); Fletcher-Janzen, Strickland, and Reynolds, (2000)
- Prepare – Be aware of cultural differences and provide a culturally sensitive environment; countering stereotype threat
  - E.g. how is patient referred to (formally, informally); explaining the process, taking time to familiarise patient with what will happen.
- Allow extra time for clinical interview, particularly to understand individual’s history (e.g. education, occupation etc.)
- If patient speaks a different language from the examiner, refer, if possible, to another psychologist who speaks the same language as the patient.
- Even if language is not a major obstacle, if the psychologist does not feel they can offer a culturally sensitive environment they are professionally obliged to refer to another psychologist
- If at all possible use of interpreters is to be avoided.
  - But often this cannot be avoided, though changes the nature of the assessment, which may not now be valid.
Compared test performance on WAIS Vocabulary, Similarities, Block Design, Matrix Reasoning when using an interpreter compared to administration by a Spanish speaking psychologist.

Participants were monolingual Spanish speakers.

Performance better on Vocabulary and Similarities when administered with an interpreter compared to when administered by Spanish speaking psychologist.

Raises possibility that interpreters may inadvertently edit responses, leading to higher scores.

British Psychological Society guidance on use of interpreters (See also APA’s Ethical Principles of Psychologists and Code of Conduct 2010)

- The interpreter should translate test instructions and stimuli with guidance from clinician and check the translation for similarity of meaning and cognitive load with the original item.
- Always meet with the interpreter before you meet with the patient.
- Never allow the interpreter to translate written items ‘in the moment’.
- Instruct the interpreter not to give any additional assistance during testing without direct instructions from the clinician.
- Encourage the interpreter to feedback and challenge the clinician if they feel something has been misunderstood by the patient.
- Encourage the interpreter to reflect on their personal knowledge of the cultural background the patient is from and get interpreter to pass on as much information as they can on e.g. education systems in original country.

British Psychological Society guidance on use of interpreters

- Encourage interpreter to inform you if a word or phrase does not translate.
- Encourage interpreter to inform you if they don’t know the translation – it’s ok!
- Encourage interpreter to disclose any issues which may be important. E.g. do they know the patient? Conflicts of interest? Relevant personal difficulties?
- Consider using the interpreter when providing feedback to patients and translating a summary of their test performance for them with guidance and recommendations.
Practical solutions

• Is there really a need for formal psychometric assessment? E.g. do rehabilitation/management strategies depend on outcome of assessment?
• Draw on theoretical knowledge of neuropsychology for qualitative interpretation of performance in real-world situations and on tests.
• Fujii (2017) also provides a helpful discussion of:
  – Strategies for assessing pre-morbid IQ (e.g. occupation, country of origin, education).
  – Test selection (searching for tests that are valid/normed for the person being assessed (e.g. Mayo Older African American Norms), and relatively limited options).
  – Conducting the evaluation (focus on approach to communication, preparation of interpreter).
  – Interpretation and case formulation (key focus on being aware of threats to validity of test scores).

Ideal world solutions

• More culturally diverse profession
• Much better understanding of the factors that affect test performance
• Much larger samples that allow for more sophisticated analysis of factors (sub-group) that affect test performance.
  – Demographics adjusted scoring (e.g. Advanced Clinical Solutions for WAIS/WMS)/Culture-specific norms
  – Regression based norming
• More methodologically sound test adaptation
• New, cross-cultural tests
  – Holy grail?

Culture-specific norms

• When it is clear that there are cultural/ethnic/racial differences on test performance, one option is to provide specific norms or use culture as a factor in regression based norms.
• But, as Thaler, Thames, Cagigas and Norman (2014) note:
  – Separate racial norms may promote individual biases and misinformation as to the reasons for having such norms.
  – Also, racial/ethnic categories are not tied to actual neurological or neurocognitive differences but rather serve as proxy for other variables of interest such as SES, quality and exposure to education in mainstream culture, and level of acculturation.
  – Use of race-specific norms may be inappropriate for young, middle-class, highly educated African American men or women.
• But, in general, if used sensibly, demographically adjusted norms will be more useful than non-adjusted norms (Norman et al., 2011).
Test Adaptation methods

- Simple translation, use original norms
  - Not recommended!
- Simple translation, collect new norms
  - May work if test items are all relevant across cultures
- Adapt the test, examine validity/reliability and collect new norms.
- Develop a culturally relevant test from scratch (i.e. develop test to examine the construct as it applies in your cultural context).
- Develop tests that will work across cultures with minimal adaptation.

WHAT IS A CROSS-CULTURAL NEUROPSYCHOLOGICAL TEST?
It is a test that, from the beginning, is developed in such a way that it can be applied in different cultural settings without major adaptations.

WHAT ARE THE ADVANTAGES OF DEVELOPING CROSS-CULTURAL NEUROPSYCHOLOGICAL TESTS OVER ADAPTING THE CURRENTLY EXISTING ONES?

• Adapting usually involves a costly process: translating, norming, and developing the validity and reliability studies demand significant financial resources.
• Many neuropsychological tests are commercially distributed.
• Copyright issues.
• WISC-III has been adapted to no more than 17 countries.

WHAT ARE THE ADVANTAGES OF DEVELOPING CROSS-CULTURAL NEUROPSYCHOLOGICAL TESTS OVER ADAPTING THE CURRENTLY EXISTING ONES?

• There are around 7,097 languages in the world (Ethnologue, 2016)

WHAT ARE THE ADVANTAGES OF DEVELOPING CROSS-CULTURAL NEUROPSYCHOLOGICAL TESTS OVER ADAPTING THE CURRENTLY EXISTING ONES?

• Commercially distributed tests: pace of publication.
ARE THERE CROSS-CULTURAL NEUROPSYCHOLOGICAL TESTS?

LIST OF CROSS-CULTURAL NEUROPSYCHOLOGICAL TESTS

- Neurobehavioral Core Test Battery (WHO NCTB)
- Cross-cultural Cognitive Examination (CCCE)
- Community Screening Interview for Dementia (CSI 'D')
- Cross-cultural Neuropsychological Test Battery (CCN)
- Cognitive Abilities Screening Instrument (CASI)
- Common Objects Memory Test (COMT)
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)
- Rowland Universal Dementia Assessment (RUDAS)
- Neuropsychological Assessment Scales (SENAS)
- Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS)
- Cross-cultural Dementia Screening (CCDS)

COMMUNITY SCREENING INTERVIEW FOR DEMENTIA (CSI 'D').

- an interview with an informant and the cognitive testing proper.
- The instrument takes approximately 29 minutes to administer (15 minutes for cognitive testing and 15 minutes for informant interview).
- The interview collects information regarding memory and cognition problems, performance of activities of daily living, personality changes and depression.
- The cognitive part includes items on short-term memory, abstract thinking, anoma, praxis, calculation and orientation in place and time.
Language Expression — Naming

We will begin with naming things. I will point to something and I would like for you to tell me the name of the object. For example:

Show your pencil.
6. What is this called?
   0.....Incorrect
   1.....Correct

Point to your watch.
9. What is this?
   0.....Incorrect
   1.....Correct

Pat your chair.
10. What about this...
    0.....Incorrect
    1.....Correct

Point to shoes.
11. And these...
    0.....Incorrect
    1.....Correct

Show your knuckles.
12. What do we call these?
    0.....Incorrect
    1.....Correct

Language Expression — Definition

I will just showing you things and you tell me what we call them. Now I will tell you the name of something and I want you to describe what it is. For example:

15. What is a bridge?
   0.....Incorrect
   1.....Correct

  (Examples of correct answer: something that goes across a river, canyon, etc.; something like the driveway in your mouth; examples of incorrect answers are direct, legitimate)

Language Expression — Repetition

Note to interviewer: Only the presentation is allowed.

19. I would like for you to repeat what I say.
   "no ifs, ands, or buts."
   0.....Incorrect
   1.....Correct

Registration

Now I am going to tell you three words and I would like for you to repeat them after me.

22. Repeat after me these words:

   Cat 0.....Incorrect
   1.....Correct
   House 0.....Incorrect
   1.....Correct
   Fish 0.....Incorrect
   1.....Correct
The CSI-D has been tested with five different cultural groups including African Americans in Indianapolis, USA, Yoruba in Ibadan, Nigeria, Cree Indians in Manitoba, Canada, English speaking Canadians in Winnipeg and Jamaicans of African extraction in Kingston, Jamaica (Hall et al., 2000).

- It showed very good discriminant scores in all five places (above .90 in four of the five places, and .82 in the remaining).

- Frequently used in Nigeria and other African countries (Benin, Central African Republic, Congo, Tanzania) (Guerchet et al. 2014; Howitt et al. 2011)

- There is a good Chinese version (Liu et al. 2005)

- Also used in Latin American countries (Cuba, Dominican Republic, Venezuela, Peru, Mexico, Brazil) and India (Sosa et al. 2009)
CSI-D

• Some limitations:
  • It needs adaptations rather than translations
  • It probably does not differentiate stages of dementia

ROWLAND UNIVERSAL DEMENTIA ASSESSMENT (RUDAS)

• Very brief test that usually takes no more than 10 minutes to administer
• Evaluates six domains: Registration, Visuospatial Orientation, Praxis, Visuoconstructional Drawing, Judgment, Memory Recall and Language.
• Developed as a screening instrument for dementia
• Naqvi et al. (2015) in a meta-analysis, found that RUDAS had a pooled sensitivity of 77.2% and a pooled specificity of 85.9% across multicultural samples.

SIMULTANEOUS DEVELOPMENT METHODOLOGY

HEALTH GROUP
  • number of health disciplines
  • Advised on the validity of culturally and linguistically modified items.

CULTURE GROUP
  • Representatives from 22 cultural and linguistic groups
  • Advised on the cultural and linguistic equivalence of proposed cognitive items and suggested modifications, if necessary
ROWLAND UNIVERSAL DEMENTIA ASSESSMENT (RUDAS)

• Memory
• 1. (Instructions) I want you to imagine that we are going shopping. Here is a list of grocery items. I would like you to remember the following items which we need to get from the shop. When we get to the shop in about 5 mins. time I will ask you what it is that we have to buy. You must remember the list for me.

CROSS-CULTURAL DEMENTIA SCREENING (CCD)
Goudsmit et al., 2017

• approximately) which does not require reading or writing skills
• Developed in Amsterdam
• Three subtests
  • Memory subtest (objects test)
  • Speed and inhibition subtest (Sun–Moon test).
  • Mental speed and divided attention subtest (Dots test)
OBJECTS TEST

Memory test that uses colored pictures of everyday objects, such as household items, tools, food, and clothing. The participant has to recognize 30 target items that are among an increasing number of distractors (92, in total).

Two parts:
- recognition (Part A)
- delayed recognition trial (Part B)

SUN–MOON TEST

- Speed and inhibition subtest
- A series of suns and moons that the participant has to name as fast as possible in his or her mother tongue (Part A).
- In Part B, the participant is asked to say “sun” when a moon is shown and “moon” when a sun is shown (Stroop effect)

DOTS TEST

- Mental speed and divided attention
- Based on the Trail Making Test
- It uses stimuli that resemble domino pieces.

Two parts:
- Part A, dominoes that have one to nine dots have to be connected in the right order as fast as possible by drawing a line in pencil.
- Part B, the participant must connect black and white dominoes to one another, in both an alternating and an ascending order from one to nine, as fast as possible (i.e., 1 white-1 black-2 white-2 black, etc.)
CROSS-CULTURAL DEMENTIA SCREENING (CCD)

• No interpreter is needed: test instructions are given by a computer that contains digitally recorded standard instructions in the language of the patient.
• Available in six languages:
  - Dutch
  - Turkish
  - Moroccan-Arabic
  - Tarifit
  - Sranantongo (languages spoken in Surinam)
  - Sarnami-Hindustani

CROSS-CULTURAL DEMENTIA SCREENING (CCD)

• Good validity properties: discriminates adequately patients with and without dementia
• The idea of little tester-testee interaction is an innovative way to reduce the sources of bias (misinterpretations because of language translations or interpretations)
• Only a few cognitive abilities can be tested with it.
• Stimuli are appropriate for cross-cultural stimulation since they appear to be quite universal.

MULTICULTURAL NEUROPSYCHOLOGICAL SCALE (MNS)

MEMORY
  - Verbal
  - Non-verbal

ATTENTION
  - Visual
  - Auditory

EXECUTIVE FUNCTIONING

LANGUAGE
  - Verbal
  - Non-verbal

CONSTRUCTIONAL PRAXIS

FIVE DOMAINS
MNS FEATURES

- Aimed at adults and elderly
- Subtests adapted to two educational levels (low and high)
- Uses universal stimuli
- Special interest in psychometric properties: scores distribution, validity, inter-rater reliability
- Will use a cut-off score to discriminate between brain dysfunction vs non-brain dysfunction

MNS Memory Subtest - The person subtest

- Now I will show you a picture of a man and I will give you some information about him. I will ask you to try to remember this information (show the selected picture). The name of this person is X (you can use any first and last name). He is 54 years old and is tall. He is married and has four children, three girls and one boy. He works as a soldier and travels everyday by train to his job. He was born on an island and now lives in a white color house by the beach. HE HAS A BLACK DOG. HE LIKES TO PLAY CARDS AND HE DOES NOT LIKE RAIN. HIS FATHER WAS A COOK.

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>CORRECT ANSWER</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How old is he?</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>2. What is his marital status?</td>
<td>Married</td>
<td></td>
</tr>
<tr>
<td>3. How many children does he have?</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4. What is the sex of his children? (How many boys and girls does he have?)</td>
<td>3 girls, 1 boy</td>
<td></td>
</tr>
<tr>
<td>5. What is his height?</td>
<td>Tall</td>
<td></td>
</tr>
<tr>
<td>6. What does he do for a living?</td>
<td>Soldier</td>
<td></td>
</tr>
<tr>
<td>7. How does he travel to his work?</td>
<td>By train</td>
<td></td>
</tr>
<tr>
<td>8. Where was he born?</td>
<td>Island</td>
<td></td>
</tr>
<tr>
<td>9. What color is the house where he lives?</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>10. Where is the house?</td>
<td>By the beach</td>
<td></td>
</tr>
<tr>
<td>11. What animal does he have at home?</td>
<td>A dog</td>
<td></td>
</tr>
<tr>
<td>12. What color is the animal?</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>13. What does he like to play?</td>
<td>Cards</td>
<td></td>
</tr>
<tr>
<td>14. What kind of weather does he not like?</td>
<td>Rain</td>
<td></td>
</tr>
<tr>
<td>15. What did his father do for a living?</td>
<td>Cook</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• In a globalized world there is an urgent need to better understand the factors that influence performance on cognitive tests.
• In many countries neuropsychology is not well established and there is an urgent need for cognitive tests (and skilled practitioners).
• There are some practical steps we can take now to ensure best practice within current limitations (e.g. awareness of the issues; assessment by psychologist from appropriate background where feasible; appropriate use of interpreters; a process approach to formulation; ensure best use test adaptation procedures)
• There are some approaches that could improve practice (a more culturally diverse profession; appropriate use of demographic adjusted/ regression based norms; aiming for freely available culture-free tests).
• These are exciting times for neuropsychology!