Culturally Relevant Visual Acuity Charts For Aboriginal Canadians

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Disclosure

Graham Strong has a financial interest in Sight Enhancement Technologies Inc. (Waterloo, Canada), Sight Enhancement Systems Inc. (Waterloo, Canada), and eSight Corp. (Ottawa, Canada)

Cultural Differences in Health Care

- Communication and language
- Sense of Self and Space
- Values & Norms
- Time Orientation/Time Consciousness
- Family Values & Relationships - decision making
- Gender Roles, Role of Elderly
- Diet- food & nutrition
- Concept of Health - health seeking behaviour
- Folk Medicine
- Religious Beliefs
- Health Care System in “Home” Country

What is cultural relevance?

- Cultural Relevance is a term used to describe how well a given idea, or the presentation of such an idea, speaks to a given group of people.
- An idea or a presentation that is culturally relevant will be better received and understood than one that is not.

https://honors.rit.edu/amitraywiki/index.php/Cultural_Relevance
Cultural Competence

“...the integration and transformation of knowledge about individuals and groups of people into specific standards, policies, practices, and attitudes used in appropriate cultural settings to increase the quality of health care; thereby producing better health outcomes” (Davis, 1997, as cited in Cross, Bazron, Dennis, & Isaacs, 1989).

Culturally Competent Health Care

- “an approach to health care that offers all participants equal access and opportunity to receive quality care and medical purchasing efficiency through elimination of structural barriers and respect for the cultural context of each individual. Cultural context refers to race, language, age, gender, lifestyle, ethnicity, faith, location, and/or socioeconomic status, which influence individual decisions about health and medical care.”
- “A health care disparity is substandard access, treatment, or outcomes based on racial, ethnic, or socioeconomic factors.”

Clinical experience with geographically isolated native populations suggests that conventional letter visual acuity charts are culturally irrelevant for some Aboriginal Canadians.

http://internationalweek2010.files.wordpress.com/2010/03/dsc00773.jpg

Six Stages in the Cross* Model of Cultural Competence

1. Cultural Destructiveness
   Attitudes, policies and practices within the organization are destructive to cultures and individual members of those cultures.

2. Cultural Incapacity
   The organization does not intentionally seek to be destructive but rather lacks the capacity to help minority clients or communities.

3. Cultural Blindness
   The organization functions with the belief that color or culture makes no difference and that all people are the same.

4. Cultural Pre-Competence
   The organization recognizes its weaknesses and attempts to improve some aspects of its services to a specific population.

5. Cultural Competence
   The organization seeks to develop a base of knowledge of culturally competent services by conducting research, developing new therapeutic approaches based on culture, publishing and dissemination information on cultural competence and hiring specialists in culturally competent practices.

6. Cultural Proficiency
   The organization is characterized by acceptance and respect for differences, continuing self assessment regarding culture, careful attention to the dynamics of differences, continuous expansion of cultural knowledge, and a variety of service models to meet the needs of minority clients.

http://internationalweek2010.files.wordpress.com/2010/03/dsc00773.jpg
Importance of Visual Acuity Determination

“Visual acuity testing with optotype charts and projection systems is the most widely used test of visual function. It is used nearly universally in ophthalmology and optometry for screening, refraction, and monitoring of disease progression; in licensing for vision-intensive tasks such as driving and flying; and in occupational testing.”


Test Fairness and Bias

- Any test is unfair if it demonstrates bias, such that the examinees of one group are less likely to respond correctly than examinees of another group simply because some characteristics of the test components or the testing situation that are irrelevant to the test purpose.
- The components are said to exhibit “differential item functioning (DIF)” when examinees from different groups consistently show differing probabilities of success on the item in spite of matching the underlying ability that the item is intended to measure.


Boston Naming Test

- This is a picture-naming vocabulary test that is used in the examination of children with learning disabilities and the evaluation of brain-injured adults.
- Naming difficulty (anomia) is common in neurological conditions such as Alzheimer’s disease (AD) or damage affecting the language and communications parts of the brain.


Boston Naming Test (BNT)

- Different norms and modifications of the BNT test items are necessary different ethnicities (Barker-Collo, 2001; Kim & Na, 1999; Tsang & Lee, 2003) due to the vocabulary demands (Calero et al., 2002) or interference from bilingual capabilities (Roberts et al., 2002).
- In these cases, poor BNT scores may not be due to anomia but to lexical ignorance of the name of the item presented (Calero et al.) or to responses that are culturally or regionally appropriate but are not “correct” for BNT responses (Azrin et al., 1996; Cruice et al., 2000).

How appropriate are these charts for assessment of native Canadians who are unfamiliar with standard test optotypes?

Research Objective

...to research and develop a valid and reliable visual acuity test chart for Aboriginal Canadians using traditional, culturally relevant symbols.
The complexity of the challenge
(Source: 2001 Census; 2006 Census, Statistics Canada)

Total population of Canada: 31,414,000
Total people of aboriginal origin: 1,319,890 (~ 4%)

Origin
North American Indian: 957,650* (~53% registered and 11% non-status)
Métis: 266,020* (~30%)
Inuit: 51,390* (~4%)
More than one aboriginal origin: 44,835

Reserves
People of aboriginal origin living on reserve: 285,625
People of aboriginal origin living off reserve: 1,034,260

*Includes people of a single aboriginal origin and those of a mix of one aboriginal origin with non-aboriginal origins

Methodology

- 743 key informants were contacted via email from native communities and agencies across Canada to solicit suggestions and comments concerning graphic symbols that were deemed to be culturally relevant for aboriginal Canadians.
- Additional feedback was solicited concerning how these symbols could be rendered in a style that would be suitable for visual acuity testing.
- This information was used to guide a series of preliminary optotypes for potential inclusion in an aboriginal acuity chart.

Norris, MJ. The Diversity And State Of Aboriginal Languages In Canada Conference Proceedings Canadian and French Perspectives on Diversity Gatineau, Quebec October 16, 2005.
K is for Kolus

Symbol suggestions and proposed graphic renderings were highly variable depending on affiliation of informants.

• One consistent feature in the feedback received was the commonly perceived relevance of animals and other living creatures within the living environment of native Canadians.

• Over forty prospect symbols were identified and graphically rendered for recognition, relevance and legibility testing.

Aboriginal peoples

• The Canadian Constitution (Section 35, “The Constitution Act, 1982”) recognizes three distinct groups of Aboriginal people with unique heritages, languages, cultural practices and spiritual beliefs.
  – Indians - commonly referred to as First Nations;
  – Métis - People of mixed First Nation and European ancestry with a unique culture that draws on their diverse ancestral origins, such as Scottish, French, Ojibway and Cree; and
  – Inuit - Aboriginal people in Northern Canada, who live in Nunavut, Northwest Territories, Northern Quebec and Northern Labrador. The singular of Inuit is Inuk.


• It was clear than a single symbol set (10 optotypes) would not be suitable for the diverse aboriginal Canadian population.
• Symbols of high relevance to some groups were virtually unrecognizable to others.

Inuit living environment and surrounding fauna are significantly different from those of Métis and First Nations peoples.

A myriad of cultural pitfalls can render scientific inquiry invalid for Native populations: these include lack of trust, cultural misunderstandings, ignorance toward a population’s methods of communication, learning and knowing and disrespect (even unwitting) resulting from lack of knowledge regarding traditions, ceremonies and symbolism. (Macedo et al, 2004)

Group research activities, such as focus groups, are very structured in mainstream societies, particularly with regard to number of participants allowed.

Aboriginal communities often see group activities (even research) as combinations of social gathering and decision making arenas.

Researchers must learn the correct methods of communication used by the population rather than expect the population to learn your methods.


• All prospect figures were evaluated for recognizability, relevance and relative legibility (to Standard Landolt C).

• Additional feedback was solicited regarding the graphic renderings themselves and how they could be improved.

What is this symbol? How recognizable is it? How might it be improved?

1 (Unrecognizable) 2 3 4 5 (Easily identified)

How might it be misidentified or confused with other symbols? How relevant is this symbol for aboriginal people? How might it be improved?

1 (Irrelevant) 2 3 4 5 (Highly relevant)
Legibility Testing

- It is important for all of the characters to be similarly legible, so that size becomes the sole variable being tested.
- The relative legibility of each component character is verified experimentally by determining the critical distance at which the characters are identified with high accuracy.
- The reference legibility distance at which a similarly sized Landolt C is correctly identified with high accuracy.

METIS/FIRST NATIONS

INUIT SYMBOLS

<table>
<thead>
<tr>
<th>Character</th>
<th>Original</th>
<th>Proposed Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deer</td>
<td>![Original Deer]</td>
<td>![Proposed Deer]</td>
</tr>
<tr>
<td>Wolf</td>
<td>![Original Wolf]</td>
<td>![Proposed Wolf]</td>
</tr>
<tr>
<td>Polar Bear</td>
<td>![Original Polar Bear]</td>
<td>![Proposed Polar Bear]</td>
</tr>
<tr>
<td>Heart</td>
<td>![Original Heart]</td>
<td>![Proposed Heart]</td>
</tr>
<tr>
<td>Love</td>
<td>![Original Love]</td>
<td>![Proposed Love]</td>
</tr>
<tr>
<td>Tent</td>
<td>![Original Tent]</td>
<td>![Proposed Tent]</td>
</tr>
<tr>
<td>Canoe</td>
<td>![Original Canoe]</td>
<td>![Proposed Canoe]</td>
</tr>
</tbody>
</table>

Deer’s body seems a little heavy; Deer needs to be more slender. 

Wolf has too few legs; Wolf needs additional legs.

Polar Bear silhouette is not properly formed; The sides need to be more rounded.

Heart needs to be more symmetrical; Heart needs to be more symmetrical.

Tent needs to be more symmetrical; Tent needs to be more symmetrical.

Canoe needs to be more slender; Canoe needs to be more slender.
INUIT SYMBOLS (New Symbols to be created)

- Caribou
- Muskox
- Walrus

Consider killer whale as substitute for fish

Problems with symbol scaling

- A significant issue was how to “size” optotypes that were deemed to be highly relevant and recognizable for potential inclusion in chart.
- What vertical symbol dimension should be used to describe acuity demand?
- Modest size adjustments were calculated to harmonize the relative legibility of the symbols used in each acuity row.

Final symbol selections were determined using analyses of focus group feedback (cultural relevance and symbol recognition) and legibility test data (relative legibility).

- Symbols were discarded if they were deemed to have low relevance or recognizability by the target populations.
- The ideal selection will consist of a series of ten symbols having the same average legibility and standard deviation values as those of the ten Sloan optotypes.
- Legibility analyses were complicated by the fact that many of the symbols defied conventional sizing using a fixed aspect ratio.

And the winners are....

INUIT CHART

- Insukchuk
- Fish
- Moose
- Seal
- Skidoo
- Caribou
- Bear
- Igloo
- Orca
- Muskox

METIS/FIRST NATIONS CHART

- Fish
- Buffalo
- Moose
- Bear
- Deer
- Turtle
- Heart
- Wolf
- Beaver
- Campfire
Two prototype 6-metre visual acuity charts were created in accordance with established logMAR principles (five symbols per acuity row, 0.1 logMAR acuity increments, and consistent inter-symbol/inter-row spacing).

Comparison VA Testing

- Preliminary validation testing was conducted using naïve non-Aboriginal subjects who were recruited from the general University population.
- Sample “training” cards were created with all letter and symbol optotypes printed on them.
- Participants were allowed sufficient time to familiarize themselves with all of the symbol and letters component of the charts under test.
- Three acuity charts (standard ETDRS – Inuit Prototype – First Nations/Metis Prototype) were positioned side-by-side at a 4-metre test distance under standard clinical test conditions (chart luminance = 140 cd/m²).
• Unaided and aided binocular acuities were measured using a letter by letter scoring method for each chart being viewed in random order.

• Visual acuity scores derived from both prototype charts were well correlated with those obtained using a standard ETDRS acuity chart (r
  First Nations/Metis = 0.875, p<0.01 ; r Inuit = 0.875 p<0.01).

Conclusions

• Two new visual acuity charts have been designed for the assessment of Aboriginal Canadians (including First Nations, Metis, and Inuit populations).

• They consist of culturally relevant and recognizable symbols that are organized in accordance with contemporary design principles.

• These acuity charts provide valid and reliable visual acuity information when used under standard test conditions.

Case Studies

• Non-urban Aboriginal Canadians sometimes present with unusual seeing problems related to their customary seeing activities and somewhat unique seeing environments.

• I present two tele-rehabilitation cases where visual acuity results were used to deduce unusual but successful low vision intervention strategies.

Driving is rarely a problem (VA is mostly a non-issue)
Glare is a common problem.

Case Study – ARB
(age 37 yrs - Tataskweyak Cree Nation)

• One year ago experienced sudden central vision loss which was attributed by his physician to either ethyl alcohol poisoning or solvent abuse.

• Some modest recovery, but this was followed by gradual loss of vision which eventually stabilized at the current level (with some peripheral field constriction).

Habitual visual acuity (no Rx required)
– Right Eye 20/120
– Left eye 20/100
• No improvement with pinhole

“When fishing with live bait I don’t see well enough to bait my hook properly.”

“I keep killing my minnows, which is bad for my fishing”
How to hook live minnows

• The best method for float-and-sinker fishing is to hook the minnow through the back, but avoid the spine so as to not paralyze the baitfish.
• This allows more natural baitfish movement.

and [http://g-images.amazon.com/images/G/01/askville/2344106_2375387_mywrite/minnow.jpg](http://g-images.amazon.com/images/G/01/askville/2344106_2375387_mywrite/minnow.jpg)

• It is estimated that +5D to +8D is required to provide approximately 20/40 acuity equivalent at near (Wolffsohn, 2004)
• Acuities suggest binocular capability (which would help with near depth perception)
• Must have hands free and preferable to be selectively accessible (he’s not baiting hooks all the time he’s fishing)
• Around the neck (sewing magnifier ) may be an option but may be awkward when not being used...


• Eschenbach labo-clip magnifier (+7.75 D) could be clipped to his current spectacle frames or sunglasses when worn
• Comes with spare lens (clips in)
• Too expensive (well over $100)

Eschenbach labo-clip magnifier (+7.75 D) could be clipped to his current spectacle frames or sunglasses when worn

• VisorMag™ is a set of clip-on, flip-up magnifying glasses that attach to the brim of most caps and hats.
• Magnification: 1.75x / +3.00 diopters; 2x / +4.00 diopters; 2.25x / +5.00 diopters
• Weight: 1 oz.
• Cost: $8.95.

VisorMag™ is a set of clip-on, flip-up magnifying glasses that attach to the brim of most caps and hats.

Case Study – KP

KP is a 32 year old Iglulik Inuit hunter from the hamlet of Pond Inlet (population 1,315 on the northern tip of Baffin Island).

The hamlet of Pond Inlet (Mittimatalik in Inuktitut) is located approximately 2,500 km north of Montreal at the Northern tip of Baffin Island.

Case Study – KP

- Hunting vision problem
- “Light off snow bothers me and I can’t see when driving my skidoo…”
- “My vision changes during the day because of my diabetes (doctor says it is out of control)”
- “I have always been the best hunter in my family, but I am not doing so well.”
- “I can find game with my tracking and binoculars…but I have trouble shooting like I used to.”

Stalking a seal at midnight

- The sun rises and sets daily only in the spring and the fall.
- There is no day here in winter and no night in summer.
Contrast sensitivity deficits pose significant problems. 

- Uses open iron rifle sight (optics fog up with affordable telescopic sights).
- Local health worker confirms acuity can fluctuate from 20/30 to 20/100.
- Asked to confirm whether variability occurs when using a pinhole.
- Low contrast (10%) chart created and emailed for local printing at the government office.
- Found to be relatively stable at 20/30 to 20/40.

Prototype Low Contrast (10%) Inuit Visual Acuity Chart

Low contrast acuity dropped to 20/100, a four line reduction compared with a normal 2.5 line reduction report by Brown, 1989.


Light and Glare Management

(CPF 527 in men’s Hideout Frame with side shields)
Conversion to small aperture (Williams) peep sight was recommended to provide enhanced sighting acuity in spite of variable refraction.

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Thank you!

MERCI (French)
Wli Wni (Abenaki)
Meegwetch (Algonquin)
Mikwetc (Atikamekw)
Meegwetch (Cree)
Tshinashkumitin (Innu)
Qujannamiik (Inuit)
Nakurmiik / Ai (Inuit)
Welalig (Micmac)
Niá : wen (Mohawk)
Chiniskomiitin (Naskapi)
Jawenh (Wendat)