

Translation of the National Institutes of Health Stroke Scale (NIHSS) List of Words: Methodology and Challenges

Stefania Vasarri¹, Catherine Acquadro², Caroline Anfray², Marie-Pierre Emery²; ¹Mapi Language Services, Lyon, France; ²Mapi Research Trust, Lyon, France

Methodological Question Being Addressed

- This poster intends to address the methodological question of translating the list of words of the National Institutes of Health Stroke Scale (NIHSS). The main difficulty was in developing the best methodology to create translations using satisfactory phonological equivalents and testing the same difficulties in articulation as the original US terms.

Introduction (Aims)

- The National Institute of Health Stroke Scale (NIHSS) [1] was developed in the US to assess stroke severity across 11 categories.

- Level of Consciousness (LOC):** tests stimulation.
- Best Gaze:** tests horizontal eye movements.
- Visual:** tests visual fields.
- Facial Palsy:** tests the patient's ability to move facial muscles.
- Motor Arm:** tests motor abilities of the arms.
- Motor Leg:** tests motor abilities of the legs.
- Limb Ataxia:** tests coordination of muscle movements.
- Sensory:** tests sensation of the face, arms, and legs.
- Best Language:** tests the patient's comprehension and communication.
- Dysarthria:** tests the patient's speech.
- Extinction and Inattention:** tests patient's recognition of self.

- Dysarthria is evaluated with a list of six terms, each one exploring different movements of the lips and the tongue: MAMA, TIP-TOP, FIFTY-FIFTY, THANKS, HUCKLEBERRY, BASEBALL PLAYER. See Table 1.

Table 1. NIHSS List of Words and corresponding movements tested

Words	Movements tested
MAMA	This word tests the lips (M).
TIP - TOP	This word tests the lips (P) and the tongue (T). Two strong /T/ should be used in the language versions.
FIFTY - FIFTY	This word tests the lips (F) and the tongue (T). Here a fricative should be used.
THANKS	In this word, the weakness of the tongue is measured: the tongue should come from the front to the back of the mouth.
HUCKLE-BERRY	Lips (B and L) and tongue (K) are tested.
BASEBALL PLAYER	Lips (B and P) and tongue (Y) are tested.

- The clarity of articulation or spontaneous speech is rated as follows:
 - 0 = Normal – no difficulties with speaking or forming the words
 - 1 = Mild to moderate dysarthria – patient slurs at least some words and, at worst, can be understood with some difficulty.
 - 2 = Severe Dysarthria – patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric.
 - UN – Intubated or other physical barrier that prevents a proper evaluation.

- The objective of our study was to present the methodology used to translate the NIHSS list of words into Bulgarian, Canadian French, Korean and US Spanish, and the resulting outcomes.

Reference

1. Brott, T., H.P. Adams Jr., C.P. Olinger, J.R. Marler, W.G. Barsan, J. Biller, J. Spilker, R. Holleran, R. Eberle, V. Hertzberg, M. Rorick, C.J. Moomaw, and M. Walker (1989) Measurements of acute cerebral infarction: a clinical examination scale. Stroke, 20, 964-970.

Conclusion

- It was necessary to adapt the classical linguistic validation process to translate the NIHSS list of words.
- Finding phonological equivalents to terms used to assess dysarthria was not an easy task and needed the collaboration of specialists and the developer in each target language.
- In comparison to the Indo-European languages of the study, Korean was the most challenging in determining words requiring the same movements due mainly to the absence of equivalent sounds.

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Methods

- The traditional translation process had to be adapted. In each country, instead of a classical linguistic validation, a thorough forward translation was performed with a neurologist and a speech therapist, both native speakers of the target languages. The aim of the translation was not to find conceptual equivalents but words testing the same difficulties in articulation and using similar phonological characteristics as the original terms. Then, the suggested words were validated by an expert panel and, if needed, alternate words were requested. Backtranslation into English of the solution was always provided for the record.

Results

- MAMA was translated literally in all languages, the pronunciation being similar. The important feature was the repetition of the /m/ sound. See Table 2.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian	None	MAMA (mom)	[mama]
Canadian French	None	MAMAN (mom)	[mamɑ̃]
Korean	2 consecutive /m/	엄마 (mom)	[ɐm ma]
US Spanish	None	MAMÁ (mom)	[ma 'ma]

Table 2. Translations of MAMA

- The translation of TIP-TOP used satisfactory phonological equivalents in all languages. The important feature was the repetition of /t/ combined with /p/ - see Table 3.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian	None	ТИП-ТОП (tip top)	[tipɔp]
Canadian French	Absence of /p/ sound	TAM-TAM (tom tom)	[tamtam]
Korean	Absence of /p/ sound	똑딱 똑딱 (tick tack)	[t'ok. t'ak. t'ok. t'ak]
US Spanish	None	TIPITAPA (name of a city in Nicaragua)	[tipi 'ta pa]

Table 3. Translations of TIP TOP

- THANKS was difficult to translate because the sound [θ] did not exist in the target languages. The important feature was a sound involving tongue movement from back to front. In the end, equivalent words allowing measuring the weakness of the tongue were used: "tennis" in Bulgarian and Korean, "taxes" in Canadian French and "dando" in US Spanish. See Table 4.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian		ТЕНИС (tennis)	[tenis]
Canadian French	The English sound made by the English /th/ [θ] doesn't exist in Bulgarian, French, Korean and Spanish	TAXES (taxes)	[taks]
Korean		테니스 (tennis)	[tenis]
US Spanish		DANDO (giving)	[ˈdaŋ do]

Table 4. Translations of THANKS

- FIFTY-FIFTY was rendered completely differently in Korean, since the fricative sound [f] does not exist in this language. The important feature here was the repetition of the /f/ sound. See Table 5.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian	None	ФАНФАП (trumpet)	[fanfar]
Canadian French	None	FLAFLA (something insignificant)	[flafla]
Korean	No equivalent Korean sound to /f/ in English	너 잡고 나 잡고 (I hold you and you hold me)	[nɐ jab go na jab go]
US Spanish	None	FINAL FELIZ (happy ending)	[fi 'nal.fe 'lis]

Table 5. Translations of FIFTY FIFTY

- The important feature in HUCKLEBERRY was the juxtaposition of different sounds (/k/, /l/ and /b/). The Korean translation could not contain all the original sounds. See Table 6.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian	None	ХЪКЪЛБЕРИ (huckleberry)	[h'kɫberi]
Canadian French	None	ONCLE BORIS (uncle Boris)	[ɔ̃kl.boris]
Korean	No juxtaposition of /k/, /l/ and /b/	허수아비 (scarecrow)	[hɐ su a bi]
US Spanish	None	CASCABEL (bell)	[kas ka 'βel]

Table 6. Translations of HUCKLEBERRY

- As for BASEBALL PLAYER, Bulgarian and French Canadian referred to the loanword "baseball." The important feature here was the presence of /b/, /p/ and /y/ sounds. See Table 7.

Language	Issue	Translation (backtranslation)	Phonetic transcription
Bulgarian	None	БЕЙЗБОЛНО ПОЛЕ (baseball playground)	[beizbo:lnɔe.pole]
Canadian French	None	PLACE AU BASEBALL (make way for baseball)	[plas o beis.bo:l]
Korean	None	비빔밥과 고추장 (bibimbop and chili paste)	[bi bim bop gwa go chu jang]
US Spanish	No /p/ sound	BARBILLA (chin)	[bar βi ʎa]

Table 7. Translations of BASEBALL PLAYER

For more information, please contact:
Catherine Acquadro, cacquadro@mapi-group.com,
www.mapi-group.com



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