

Challenges on adapting and developing normative scores of Neuropsychological Tests: Case studies of Indonesian Boston Naming Test for Java and Non-Java Population

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Abstract

Introduction. Boston Naming Test (BNT) was one among the most frequent assessment measures for neuropsychology. The current article describes the adaptation and validation study of the Indonesian-Boston Naming Test (I-BNT). Initial normative data on the I-BNT has been published (Sulastrri et al., 2019), representing participants living in one city in Central Java (N=200). Recently, we have extended data collection in Java Island (Jakarta, Semarang, and Surabaya), and outside Java Island (Denpasar, Samarinda, and Makassar) from 2018-2019. In this article I will also further discuss some interesting findings with regard to the development of normative scores using data represented Java and Non-Java population (N=800).

Literature review. BNT is firstly developed by Goodglass, Kaplan, and Weintraub (1983). Since then it is widely used by psychologists and neuropsychologists to assess complaints pertaining language ability. BNT can be used either as assessment to evaluate aphasia disorder or to evaluate improvement of a therapy on language disorder.

Results and Conclusions. Based on our data there are some unique responses that are presumably highly correlated with the first and second language frequently spoken by the respondents. Therefore, it is imperative to collaborate with linguists and local psychologists to determine the correct responses that represent the local cognitive properties. It is because naming ability is heavily influenced by cultural and linguistic factors. It is also suggested that a researcher should provide alternative target words as correct responses to avoid mis-diagnose of aphasia disorder. In Indonesia context, adaption and validation studies should also collaborate with local people to determine which responses considered as correct as they are part of local knowledge (communal cognitive properties).

Keywords: Indonesian Boston Naming Test, adaptation, validation, aphasia, normative scores.

Indonesian – Boston Naming Test (I-BNT): Challenges on Adapting and Developing the Test and Normative Scores For Java and Non-Java Population

Dr. Augustina Sulastri

International Symposium on Research Collaborations

3rd September 2020

A shared-dream: “The Indonesian Neuropsychological Test Battery for Adults”.



MANUAL TES NEUROPSIKOLOGI



- Tes Memori
- Tes Bahasa
- Tes Atensi
- Tes Fungsi Eksekutif

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Universitas Katolik Atma Jaya Jakarta
2017



EDISI REVISI

Manual Tes Neuropsikologi

Tes Memori | Tes Bahasa | Tes Atensi | Tes Fungsi Eksekutif

Hibah Penelitian Kerjasama Luar Negeri



KERJASAMA

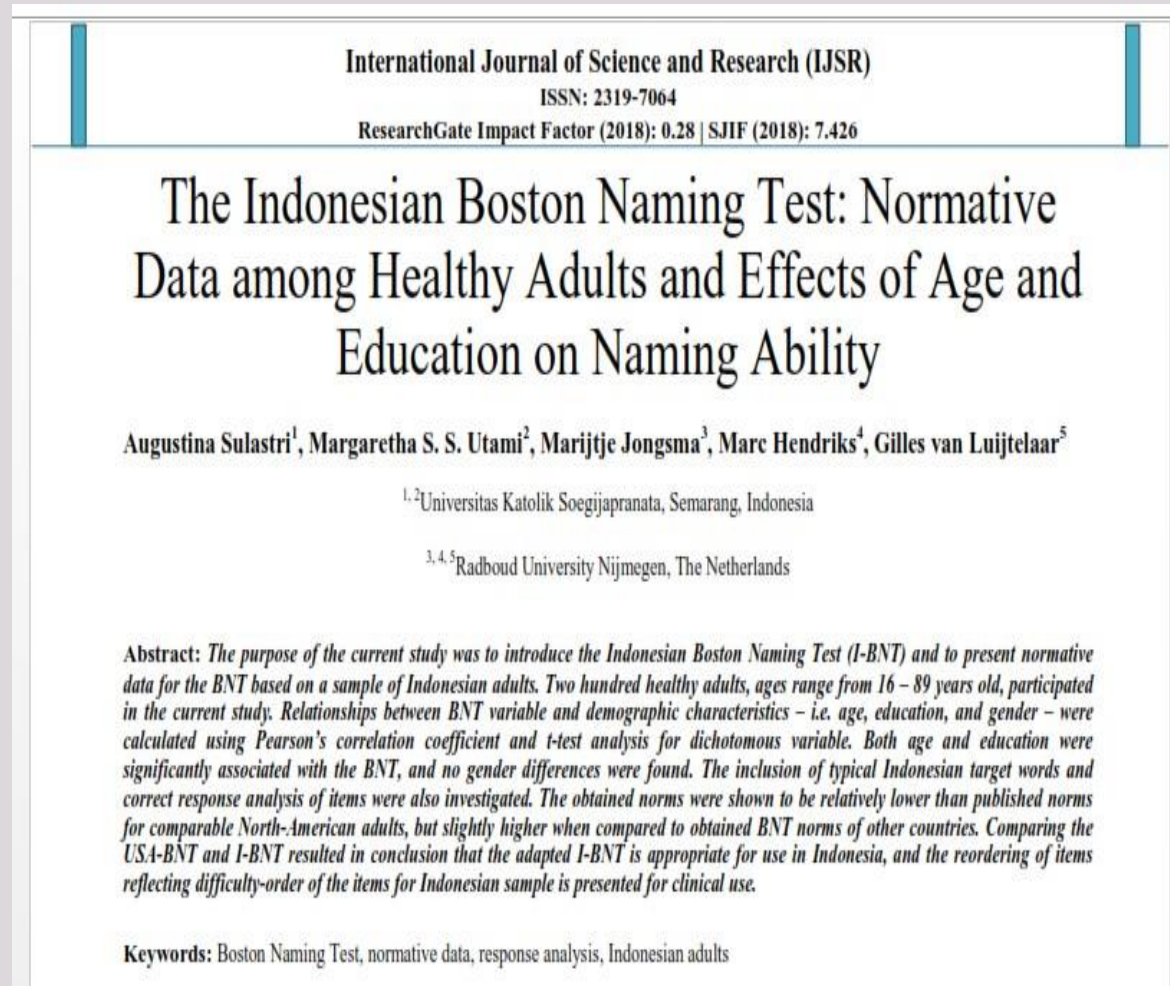
UNIVERSITAS KATOLIK SOEGIJAPRANATA SEMARANG,
RADBOD UNIVERSITY NIJMEGEN BELANDA
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2018

1st milestone on adapting and developing NPT and normative scores of paper and pencil test and computerized I-BNT (2016-2018):



- Reporting initial project on the adaption process of the 60-item Indonesian BNT
- Reporting validation and development of the initial normative data of I-BNT
- Dataset: N=200 (involving normal participants, living in Semarang)

2nd milestone on adapting and developing NPT and normative scores of paper and pencil test and computerized I-BNT (2016-2018):

Information System Databases for Neuropsychology Tests: Case Study In Boston Naming Test

Information System Databases for Neuropsychology Tests: Case Study in Boston Naming Test

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Abstract— In the field of psychology, determining the psychological condition of a person's can be done using various types of tests. Neuropsychology test is a battery test that means every person should be taken 11 test in a moment. Each test has a different objective, as an example, The Boston Naming test is used to measure a person's ability in the language domain. The data stored for each data in the Boston Naming Test (BNT) is around 130 fields. Each test has different specific data. This makes the data grow rapidly and requires a database design that can accommodate this need.

There are many approaches can be done to store the database such a relational database and NoSQL database. When the data are stored using relational methods and amount of data are large, there can be a lack of time in both processing and tracking. This article proposes a system to store the result of the neuropsychological test using the NoSQL database approach

database that should be used is NoSQL. Applications like e-commerce, CMS and business applications are more optimal when developed with database schemes using NoSQL [1][3]. Other examples of applications using complex and a lot of data are student academic application and library application. It is complex because besides being used to store data, student and libraries applications are also accessed by many users. However, using NoSQL the database response time on a web application only takes less than one minute [2]. In Addition, NoSQL database also supports large-scale statistical analysis. In addition, NoSQL is used in EI (Em-bedded Intelligent) to process data generated from sensor readings [5].

Neuropsychology is a field of psychology that focuses on neuro-human problems. For Neuropsychological it is used name to determined the brain disorder. There are tree domain like language, attention, executive function, and memory. Each domain consists of one or more test, like a Boston Naming

- Initial report on the attempt to develop the Indonesian Advanced Neuropsychological Diagnostics Infrastructure (I-ANDI) – see further: Natalie de Vent et al. (UvA).
- A case study on the dataset of I-BNT normative data



3rd Milestones on adapting and developing NPT and normative scores of paper and pencil test and computerized I-BNT (2016-2018):

REPUBLIK INDONESIA
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA

**SURAT PENCATATAN
CIPTAAN**

Dalam rangka perlindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan : EC00201981201, 12 November 2019

Pencipta

Nama : Shinta Estri Wahyuningrum, Augustina Sulastri, , dkk

Alamat : Sendang Elo No.73 RT.08 RW.02 Banyumanik , Semarang, Jawa Tengah, 50264

Kewarganegaraan : Indonesia

Pemegang Hak Cipta

Nama : LPPM Universitas Katolik Soegijapranata

Alamat : Jl. Pawiyatan Luhur IV/1, Bendan Dhuwur, Semarang, Jawa Tengah, 50234

Kewarganegaraan : Indonesia

Jenis Ciptaan : Program Komputer

Judul Ciptaan : Computerized Indonesia Boston Naming Test

Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia : 4 November 2019, di Semarang

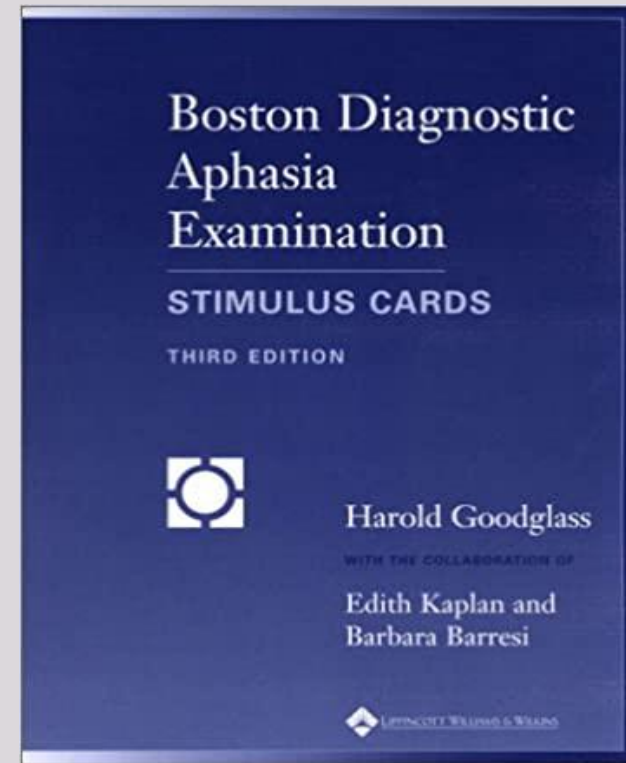
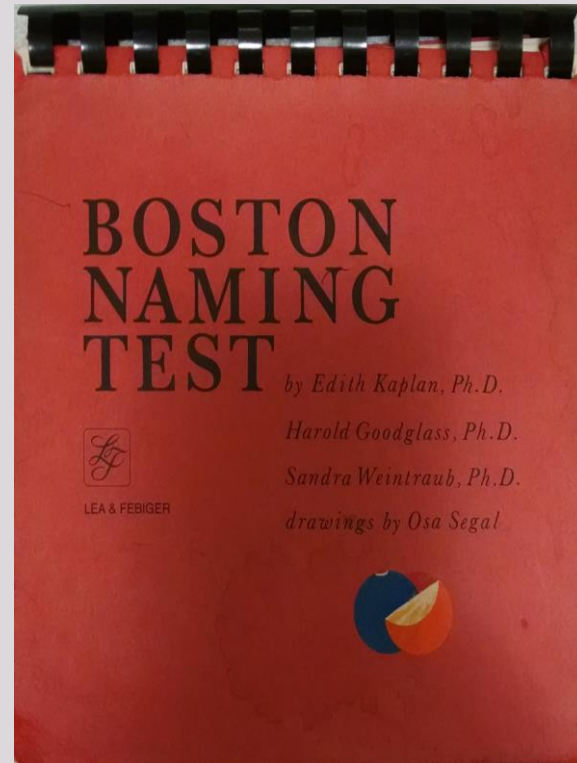
- Registered copyrights of the initial online platform of Indonesian ANDI
- Initial project: developing platform of I-BNT

The challenges on adapting and validating NPT for Indonesia: Case study of I-BNT

- (1) Boston Naming Test and its use.
- (2) Adaptation and validation studies of BNT among non-English speaking countries.
- (3) Challenges in Indonesia context.

(1) Boston Naming Test and its use

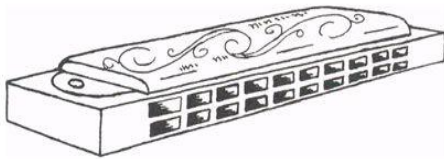
- Created by Goodglass, Kaplan & Weintraub (1983).
- Consists of 60-black and white line drawings (can also be shorter: 30-drawings), & arranged by difficulty order.



The use of BNT in clinical setting:

- Naming

- Ability to name objects, or line drawings is impaired in most aphasic patients to some degree



30. harmonica.....
(musical instrument)

Copied from Boston Naming Test for educational purposes

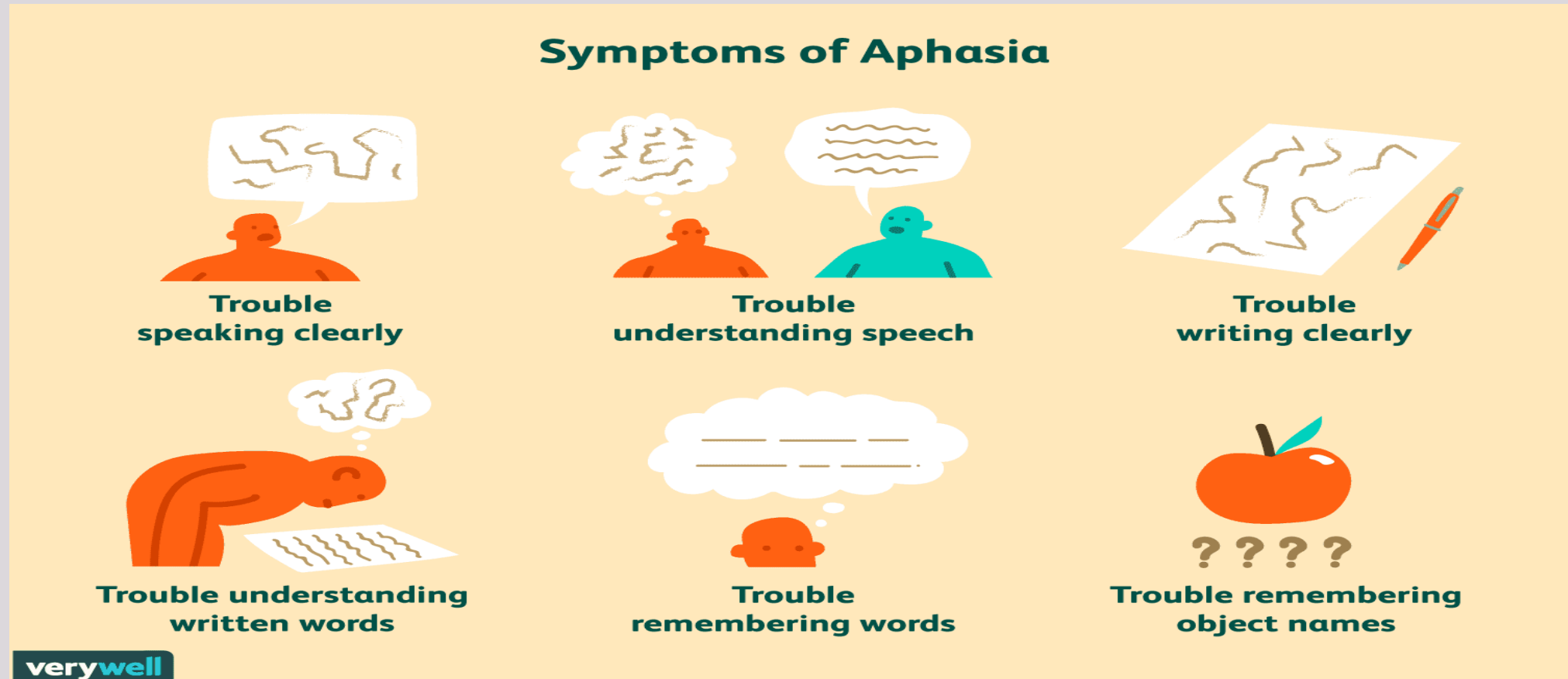
(1) Assessment purpose: on naming ability

→ evaluates for **APHASIA DISORDER.**

(2) Therapeutic purposes
(see Vroege et al., 2017)

What is aphasia?

Language disability caused by brain injury: Traumatic Brain Injury (TBI) or Acquired Brain Injury (ABI).

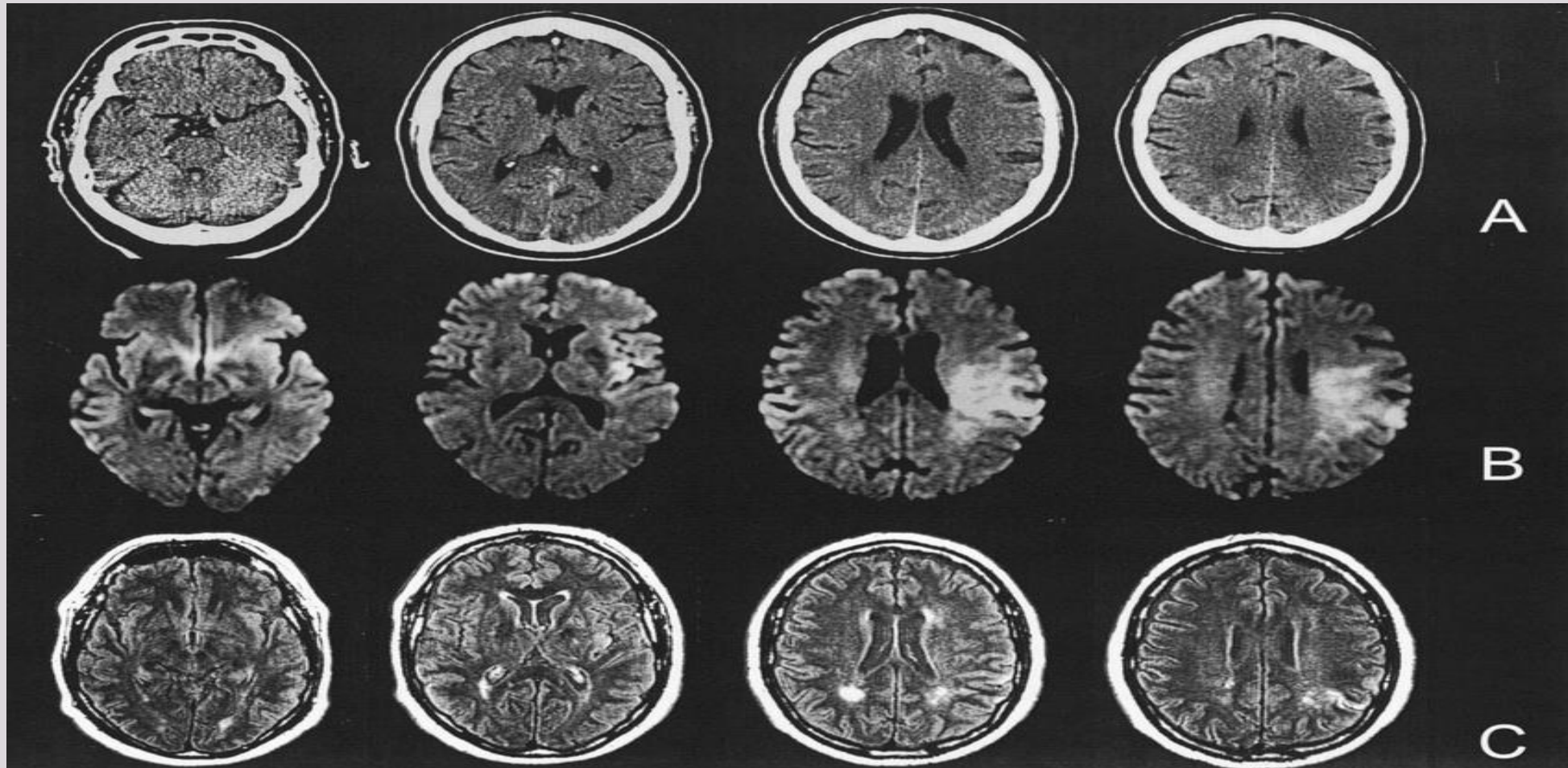


How to diagnose aphasia disorder?

A doctor will review the symptoms and undergo some tests:

1. Neurological examination
2. Blood tests
3. Brain scans

A case of 62-years old patient with aphasia and right hemiparesis
(see Saur et al., 2003).



Neuropsychological Assessment (NP-A)

“Refers to the **measurement of cognitive functions and processes** with the aim to *establish whether cognitive dysfunction or cognitive impairment is present* in individuals, typically in patients with (suspected) brain disease, psychiatric disorder or information processing complaints” (Kessel & Hendriks, 2016).

NP-A for assessing “cognitive deficits”

We may apply NP-A for two reasons:

- (1) **Diagnostic aim:** to investigate whether an individual has cognitive impairments compared with reference group.
- (2) **Descriptive aim:** to interpret the pattern of impairment that is whether selective deficits of one or more cognitive processes – or domains – exist.

Neuropsychology

“the application of **assessment** and intervention principles based on the scientific study of human behavior across lifespan **as it relates to the normal and abnormal functioning of the central nervous system**” (Crowe, 2010, p. 5).

(2) Boston Naming Test: Adaptation and Validation Studies of BNT among Non English-speaking countries.

- **ASIA: Korea** (Kim & Na, 1999), **Malay-BNT** (Van Dort et al., 2007), **Object & Action Naming Battery/OANB for Saudi Arabic** (Alyahya & Druks, 2000, 2015).
- **Other countries: Brazil** (Mansur et al., 2006; Miotto,, et al., 2010; Leite et al., 2017), **Belgium – Dutch-speaking Belgian** (Marien et al., 1998), **Spain** (Allegri et al., 1997; Pena-Casanova et al., 2009), **Sweden** (Tallberg, 2005), **Maltese** (Gimma & Franklin, 2016), **Greece** (Patricacou et al., 2007), **Dominica** (Silvestre et al., 2018); **New Zealand: Maori people** (Barker-Collo, 2001).

Considerations when adapting and validating Boston Naming Test for non-English speaking countries.

1. BNT is arranged by difficulty order, from high frequency/high degree of familiarity (i.e. bed, tree, pencil, etc.), to lower frequency/significantly harder (i.e. yoke, palette, abacus) → the order is very unique from one to another (country-specific and ethnicity-specific), i.e. abacus (sempoa) is not reported as the most difficult object (Korea, Spain, and also Indonesia).
2. It highly relates with educational and cultural background. Lower education perform poorer than higher education. Hence, cognitive properties of population being studied have to be considered, i.e. Leite et al., (2017) replaced 20 target words as they did not represent common knowledge among Spanish people (i.e. pretzel, beaver, pelican, pyramid, acorn, etc.)





Indonesian-BNT (2016's version)

- | | |
|------------------------------------|--|
| (1) octopus by squid; | (10) pelican by pigeon; |
| (2) pretzel by bread; | (11) unicorn by <i>wayang</i> ; |
| (3) beaver by rat; | (12) accordion by <i>gendang</i> ; |
| (4) harmonica by <i>seruling</i> ; | (13) asparagus by carrot; |
| (5) acorn by nut; | (14) tripod by telescope; |
| (6) igloo by <i>Rumah Gadang</i> ; | (15) tongs by hoe; |
| (7) harp by guitar; | (16) sphynx by <i>Monumen Nasional</i> ; |
| (8) hammock by tent; | (17) yoke by saddle. |
| (9) knocker by doorbell; | |

I-BNT in comparison with other studies.

Comparison of the obtained Mean and Standard Deviation of BNT across countries

Table 6 shows that the obtained norms of Indonesian BNT (I-BNT) is relatively lower than the USA-BNT, but in average were higher than that of other studies.

Table 6.

Comparisons of BNT studies across countries

	<i>M (SD)</i>	<i>(SD)</i>	Sample size	Cronbach Alpha
Tombaugh & Hubley (USA)	54.3	(3.7)	219	.78
Marien et al. (Belgium)	51.9	(5.5)	200	-
Tallberg (Sweden)	47.58	(4.5)	111	.76
Mansur et al. (Brazil)	41.6	(9.5)	133	-
Patricacou (Greece)	42.9	(9.8)	100	-
Sulastri et al. (Java - Indonesia)	51.9	(5.9)	200	.86

Initial normative scores of I-BNT (Sulastri et al., 2019)

Table 2.
Results of the Boston Naming Test stratified by Age

	<i>M (SD)</i>	Range	Median value	Cut-off scores
16 – 25 <u>y.o.</u>	52.3 (4.7)	35 – 60	53	42.9
26 – 35 <u>y.o.</u>	54.8 (3.6)	49 – 60	55.5	47.6
36 – 45 <u>y.o.</u>	53.8 (4.3)	40 – 60	54.5	45.2
45 – 55 <u>y.o.</u>	48.4 (7.1)	33 – 59	49	34.2
>56 <u>y.o.</u>	49.3 (8.7)	25 – 60	51	31.9

**N* = 200

Table 3.
Results of the Boston Naming Test stratified by Education

	<i>M (SD)</i>	Range	Median value	Cut-off scores
High School	50.9 (5.8)	26 – 60	52	39.3
College (Diploma)	51.1 (5.9)	38 – 59	53	39.3
University (Undergraduate)	53.9 (5.9)	25 – 60	55	42.1
University (Graduate)	56.2 (3.2)	50 – 60	58	49.8

**N* = 200

(3) Challenges in Indonesia context: Java and Non-Java population.

1. We have collected data from 3 big cities in Java: Jakarta, Semarang, Surabaya (N= 500), and other three cities outside Java: Denpasar, Samarinda, and Makassar (N=300).
2. Challenges in Indonesia context lies on determining the correct target words when using Indonesian Boston Naming Test

Samples of responses – Samarinda cases (N=100)

60.	Moncong (Bagia wajah dari hewan)	Hidung (47), Mulut (33), Mata (10), Lidah (2), Bangkang (1), Cungur (1), Kecambah (1), Sapi (13), Kaca (1), Bunga (1), Lampu Mobil (1), Muka (12), Bibit (1), Gigi (1), Sungut (1), Batang Hidung (1), Mancung (2), Ilat (1), Cingur (2), Congor (3), Kerbau (2), Wajah (3), Kepala (2), Corong (1), Monyong (1), Muntung (1), Kumis (1), Lubang Hidung (1), Kambing (1)
53.	Rumah Padang/Rumah Padang/Rumah Minang (Rumah Adat)	Rumah Panggung (2), Rumah Toraja (6), Rumah Balai (1), Rumah Gembong (1), Rumah Adat (18), Rumah Lamin (4), Rumah (6), Rumah Makan Padang (1), Rumah Dayak (1), Kenda (1), Rumah Banjar (1), Rumah Batak (1), Rumah Makasar (1), Rumah Palangkaraya (1), Rumah Adat Jawa (1), Minangkabau (1), Rumah Suku Minang (1), Rumah Adat Pariaman (1), Rumah Aceh (1)

Samarinda (item response samples: 30-31-32)

30.	Perahu (Transportasi air)	Kapal (9), Sampan (4), Kano (2), Kelinting (2), Kubang (1), Jukung (1)
31.	Suling (Alat musik tiup)	Seruling (20), Recorder (2), Peluit (4), Seluling (1), Pianika (3), Terompet (3), Seruni (1), Seling (1), Alat periksa panas (1), Saxophone (1), Alat Musik (2), Bersiul (1), Termometer (1), Flute (1), Jaros (1), Serulik (1)
32.	Burung Dara/Burung Merpati (Seekor hewan)	Burung Camar (1), Manuk (1), Burung Gagak (1), Burung Kakaktua (3), Burung Beo (2), Burung Serindit (1), Ayam (7), Burung (31), Bebek (1), Entok (1), Burung Perkutut (1), Burung Teukur (3), Burung Nuru (3), Unggas (2), Hewan (1), Burung Tiung (1)

Conclusions and future directions

1. It is critical to use **a local knowledge** because naming ability is heavily influenced by cultural and linguistic factors.
2. It is suggested that researchers also provide **alternative target words as correct responses** to avoid mis-diagnose of aphasia disorder.
3. In Indonesia context, adaption and validation studies should collaborate with **local people to determine which responses are correct as they are** part of local knowledge (communal cognitive properties) and, therefore, cannot indicate disturbances on naming ability of any clients.