APHASIA

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APHASIA

Aphasia is an *acquired* language disorder causing deficits of production and comprehension of verbal messages in individuals with a *normal language acquisition history*.

Aphasia can involve *the entire linguistic system*, but can also impair *single components or modalities*:

- phonology, lexicon, morpho-syntax or semantics
- input or output, oral or written language
• **Aphasia usually follows left hemisphere damage:**
  1\textsuperscript{st} report of the asymmetry of human brain functions (Broca, 1865)

• Language is organized around the **left Sylvian fissure**:
  - **Broca’s area**: left premotor cortex (BA 44)
  - **Wernicke’s area**: left superior temporal cortex (BA 22)
MAIN TYPES OF APHASIA
following WERNICKE (1874) & LICHTHEIM (1885)

A
- center of auditory representations of words (BA 22)
  - a. auditory analysis
  - b. articulatory programming

B
- center of motor representation of words (BA 44)
  - a. pure verbal deafness
  - b. pure anarthria

AB
- arcuate fasciculus (exter.caps.)
  - A. sensory aphasia (Wernicke’s)
  - B. motor aphasia (Broca’s)
  - AB. conduction aphasia
A  centre of auditory representation of words (22)

B  centre of motor representation of words (44)

C  conceptual knowledge

a  auditory analysis

b  articulatory programming

AB  arcuate fasciculus (exter. caps.)

AC  transcortical sensory a.

- comprehension
+ repetition

CB  transcortical motor a.

+ comprehension
+ repetition
+ ideational-verbal inertia

AB  conduction aphasia

- comprehension
- repetition
LIMITS OF WERNICKE-LICHTHEIM’s MODEL

• The *sensory* (auditory) / *motor* dichotomy is not sufficient to account for the fact that the majority of the patients may have a damage that affects both *input* and *output* modalities, oral and written language.

• The model cannot explain how non-lexical strings (non-words) are processed.

• Nor can it explain the existence of category-specific impairments (nouns vs verbs) and part of speech effects.
Neurolinguistics

• Investigating aphasic deficits is very useful because language is a function that is specific of the human behaviour and brain.

• In addition to the clinical classification of aphasias, we should also use one based on linguistic components: phonology, lexicon, semantics and syntax, each of which can result selectively damaged.

• In this way we can both:
  • provide a clinical diagnosis and evaluate the effect of the rehab treatment
  • test cognitive models of linguistic functions
PRINCIPLES FOR ASSESSING APHASIC DEFICITS

• Anamnesis

• Spontaneous Speech

• Modality- specific Tasks
ANAMNESIS

General Anamnesis
• handedness
• past and recent clinical history

Anamnesis about pre-morbid language use
• Did the P use to talk a lot or not?
• Did the P speak other languages or dialects and when?
• How frequently did the P read (rarely, frequently, only for work)?
• How frequently did the P write (rarely, frequently, only for work)?
• Did the P use to watch TV (which programs) or to go the cinema or to the theatre?

• Anamnesis of the linguistic deficits (P & relatives)
• Evolution of the deficit since the illness onset
• What does the P say when s/he communicates with the relatives?
• Ask for previous linguistic assessment and rehab when available
SPONTANEOUS SPEECH

• Qualitative phenomena
  • content
  • pragmatics
  • comprehension
  • articulatory difficulties
  • phonological deficits
  • lexical (and/or lexical-semantic) deficits
  • morpho-syntactic deficits
  • automatic elements

• Conversation or description of a complex drawing
Qualitative phenomena 1

• **Content**
  - Amount of information that is communicated

• **Pragmatics**
  - alternating roles
  - anaphora (pronouns, temporal adverbs etc)
  - irony
  - indirect communicative acts

• **Comprehension**
  - questions posed by the interlocutor (who, where, when)
  - lexical-semantic decoding
  - syntactic analysis (passive, relative sentences etc)
Articulatory difficulties

A patient affected by brain damaged can show articulatory deficits which can be:

- *paretic* in nature → *dysarthria*

- due to a disorder of *programming the movements* necessary for producing linguistic sounds → *speech apraxia* or *anarthria*
Qualitative phenomena of articulatory deficits

**disartria**
- reduced intelligibility
- slurred speech
- dysphonia
- nasality
- rhythm anomalies
- volume anomalies

**speech apraxia**
- staccato speech
- dysprosody

(or anarthria)

[deficit
of the articulatory
motor
programming]

**phonetic disintegration syndrome:**
- voiced sounds $\rightarrow$ voiceless
- fricative sounds $\rightarrow$ occlusive

(/f/ $\rightarrow$ /p/)

Spontaneous Speech
Qualitative phenomena 3

Phonological deficits

phonemic paraphasias
omissions
additions
transpositions
duplications
conduites d'approche
phonemic neologisms
neologistic jargon

Spontaneous Speech
Qualitative phenomena 4

**Lexical-semantic deficits**

- anomias
- anomic latencies
- circumlocutions
- semantic paraphasias
- passe-partout forms
- semantic jargon

Spontaneous Speech
Morpho-syntactic deficits

agraffmatism
simplified sentence structure
telegraphic speech (omissions of function words, verbs in infinitive form)

paragrammatism
agreement errors (gender, number)
substitutions of grammatical function words
Qualitative phenomena 6

**Automatic elements**

Recurring utterances (recurrent syllabic fragments: TAN)

Automatisms

Perseverations

Echolalia

**Automatic-voluntary facilitation**

Patients, who are not able to retrieve a lexical element when asked to do it or when they would like to do it (*voluntary condition*), can sometimes manage to retrieve it if it is facilitated by the context (*automatic condition*)

Spontaneous Speech
MODALITY-SPECIFIC TASKS

- Repetition
- Naming
- Lexical decision
- Comprehension
- Written language
• **Repetition**
  - sounds and syllables
  - words
  - non-words
  - sentences

• **Naming**
  - confrontation (line drawings, photographs)
    - objects and actions (*nouns and verbs*)
    - oral and written
  - to definition
  - fluency
    - category
    - Initial letter

**Lexical effects:** Word Frequency, Age of Acquisition
• **Lexical Decision**
  – presented orally and written

• **Comprehension**
  – words and sentences
  – presented orally and written

• **Written language**
  – reading aloud
    – words, non-words, sentences
  – dictation: writing and oral spelling
    – words, non-words, sentences
## MAIN APHASIA BATTERIES

<table>
<thead>
<tr>
<th>Test</th>
<th>Authors</th>
<th>Theoretical frame</th>
<th>Language</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aachener Aphasie Test (AAT)</td>
<td>Huber, Poeck, Weniger e Willmes, 1983</td>
<td>Neuro-linguistics</td>
<td>G, D, I</td>
<td>3 h</td>
</tr>
<tr>
<td>Boston Diagnostic Language Examination (BDAE)</td>
<td>Goodglass e Kaplan, 1983</td>
<td>Neuro-linguistics</td>
<td>E, F, I, S, P</td>
<td>2 h</td>
</tr>
<tr>
<td>Esame del Linguaggio (2 ed)</td>
<td>Ciurli, Marangolo e Basso, 1996</td>
<td>Neuro-linguistics</td>
<td>I</td>
<td>2-3 h</td>
</tr>
<tr>
<td>Western Aphasie Battery (WAB)</td>
<td>Kertesz, 1979; 1982</td>
<td>Neuro-linguistics</td>
<td>E, P</td>
<td>1-2 h</td>
</tr>
<tr>
<td>Batteria per l'analisi dei deficit afasici (BADA)</td>
<td>Miceli, Laudanna, Burani e Capasso, 1996</td>
<td>Psycholinguistics</td>
<td>I</td>
<td>8 h</td>
</tr>
<tr>
<td>Psycholinguistic Assessment of Language Processing in Aphasia (PALPA)</td>
<td>Kay, Lesser e Coltheart, 1992</td>
<td>Neuro-linguistics</td>
<td>E</td>
<td>1-6 h</td>
</tr>
<tr>
<td>Communication Abilities in Daily Living (CADL)</td>
<td>Holland, 1980</td>
<td>Pragmatics</td>
<td>E, I</td>
<td>1 h</td>
</tr>
</tbody>
</table>
VERBAL FLUENCY
(Novelli et al. 1986)

• This test is used to scan the mental lexicon

  \textit{Initial letter}

  • produce words that begin with a letter S, L, P (1 min)
    (except for proper nouns and derivatives e.g. scarpa→
    scarpetta)

  \textit{Semantic category}

  • produce all … you know (1 min) (animals, fruits
    vegetables etc)

• This test is sensitive also to frontal deficits and to
dementia
TOKEN TEST
TOKEN TEST
(De Renzi et al., 1962, 1978, 1980)

**Aims**
- test comprehension of speech
- test severity of aphasia

**Advantages**
- good discrimination *aphasia/non aphasia* (cut off=29)
- sensitive to *mild deficits*
- it can be used with patients with *low-level education*
- it is sensitive to *syntactic comprehension deficit*
- it is sensitive to phonological STM deficits
SPONTANEOUS SPEECH

Cookie theft

(BDAE, Kaplan e Goodglass, 1983)
## FLUENT & NON-FLUENT DEFICITS

<table>
<thead>
<tr>
<th>Deficit</th>
<th>fluent aphasias</th>
<th>non-fluent aphasias</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>speech characteristics:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of speech</td>
<td>abundant long</td>
<td>reduced short</td>
</tr>
<tr>
<td>length of sentences</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>qualitative phenomena:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>speech apraxia</td>
<td>--</td>
<td>+/-</td>
</tr>
<tr>
<td>agrammatism</td>
<td>--</td>
<td>+/-</td>
</tr>
<tr>
<td>paragrammatism</td>
<td>+/-</td>
<td>--</td>
</tr>
<tr>
<td>jargon</td>
<td>+/-</td>
<td>--</td>
</tr>
</tbody>
</table>

- absence / + presence
## FLUENT APHASIAS

<table>
<thead>
<tr>
<th>Deficit</th>
<th>Wernicke’s conduction aphasia</th>
<th>transcortical aphasia</th>
<th>transcortical sensory aphasia (a.nom.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral expression:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech apraxia</td>
<td>--</td>
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<td>agrammatism</td>
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<td>--</td>
<td>--</td>
</tr>
<tr>
<td>paragrammatism</td>
<td>+/-</td>
<td>-/+</td>
<td>+/-</td>
</tr>
<tr>
<td>jargon</td>
<td>+/-</td>
<td>--</td>
<td>+/-</td>
</tr>
<tr>
<td>Other verbal tasks:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>comprehension deficit</td>
<td>±/+++</td>
<td>-/±</td>
<td>+++</td>
</tr>
<tr>
<td>repetition deficit</td>
<td>+/+++</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>naming deficit</td>
<td>+/+++</td>
<td>-/+</td>
<td>++(+), (±)</td>
</tr>
</tbody>
</table>

- absence / + presence


## NON FLUENT APHASIAS

<table>
<thead>
<tr>
<th>Deficit</th>
<th>Broca’s aphasia</th>
<th>global aphasia</th>
<th>transcortical motor aphasia</th>
<th>double transcortical a.</th>
</tr>
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<tr>
<td><strong>Oral expression:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>speech apraxia</td>
<td>+/-</td>
<td>+/-</td>
<td>--</td>
<td>+/-</td>
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<td>agrammatism</td>
<td>+/-</td>
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<td>+++</td>
<td>--</td>
<td>±</td>
</tr>
<tr>
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<td>++/+±</td>
<td>++/</td>
<td>--</td>
<td>+++</td>
</tr>
</tbody>
</table>

- absence / + presence
FLUENT VS NON-FLUENT APHASIA

• **Fluent** aphasia is usually caused by left *temporal* damage

• **Non-fluent** aphasia by left *premotor* damage, or – much more frequently – by lesions **ALSO** involving the left *premotor area*

![Diagram](image)