

Production

- **ANOMIA:** Selective loss in linking meaning to sound in production.



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Comprehension

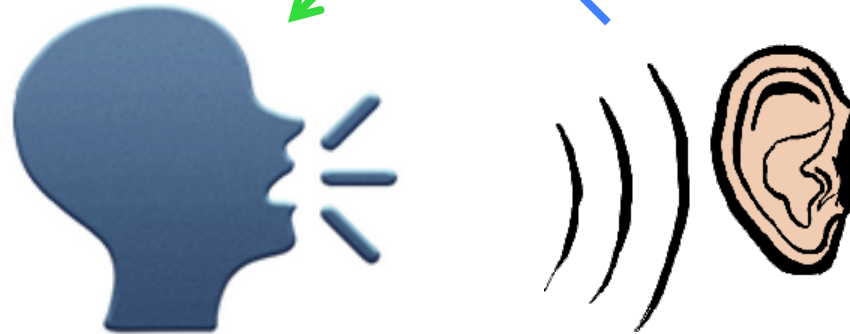
- **TRANSCORTICAL SENSORY APHASIA:** Selective loss in linking sound to meaning in comprehension.

Production

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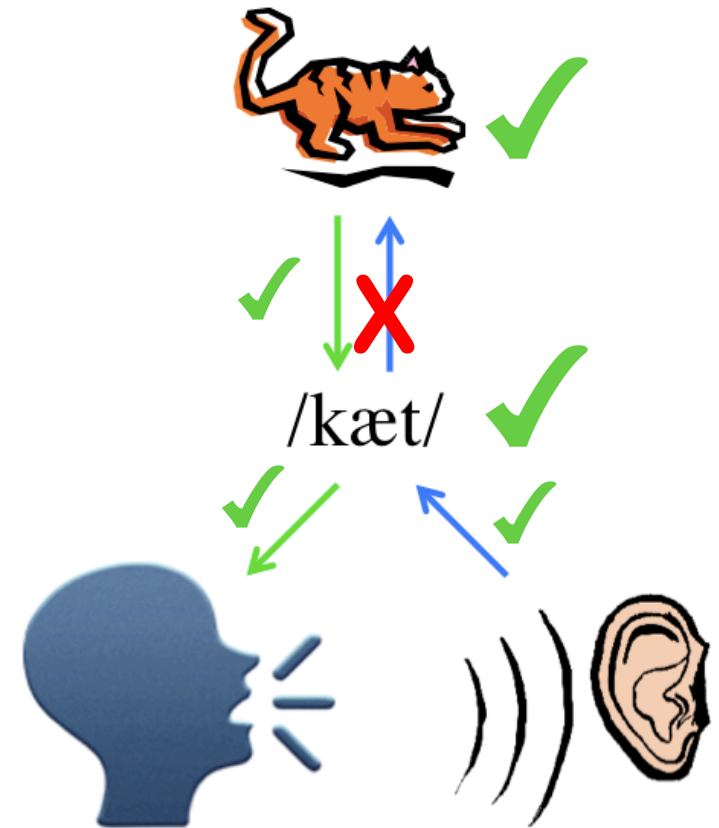


Comprehension

- **TRANSCORTICAL SENSORY APHASIA:** Selective loss in linking sound to meaning in comprehension.

Transcortical sensory aphasia (TSA)

- Auditory comprehension deficit in the absence of phonological or semantic impairment.
- Word repetition is intact.
 - **Requires accessing phonological representations but can be performed without access to semantic representations.**
- Naming is intact.
 - **The route from meaning to sound is intact.**
- The sparing of repetition the main difference to Wernicke's aphasia (where repetition tends to be impaired).
- TSA patients often exhibit "echolalia," repetition of others' words.
- <https://youtu.be/bpeZ4xm62DM>



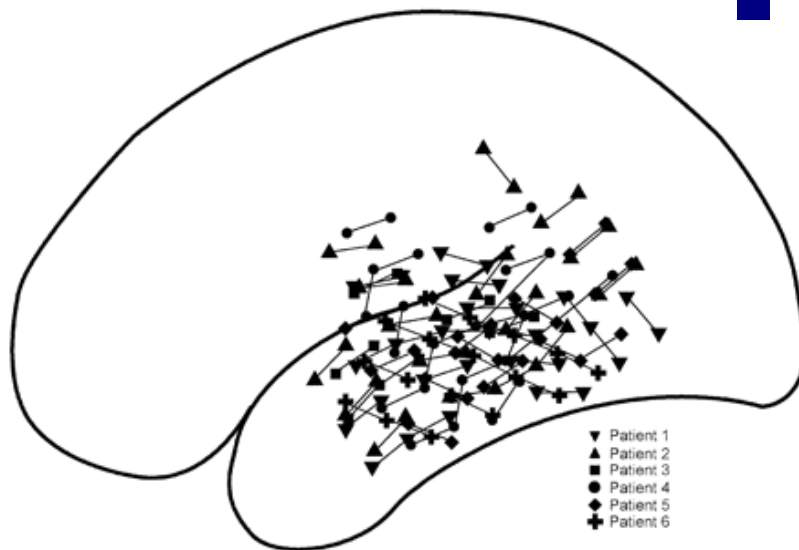
Transcortical sensory aphasia (TSA)

- Rare. Systematic study is hard.
- However, has been successfully studied in pre-surgical patients using electrical interference (or “cortical stimulation”).
- Processing at a cortical site is transiently disrupted with an electric current.
 - **Goal is to understand function at a site that may need to be removed in surgery.**
 - **Presurgical function mapping**
 - **The clinical procedure can also yield valuable data for basic science.**
 - **EEG, MEG, fMRI and PET all yield “correlational” data.**
 - **Electrical interference is the only technique with good spatial accuracy possible with human that yields “causal” data.**

Inducing TSA with electrical interference

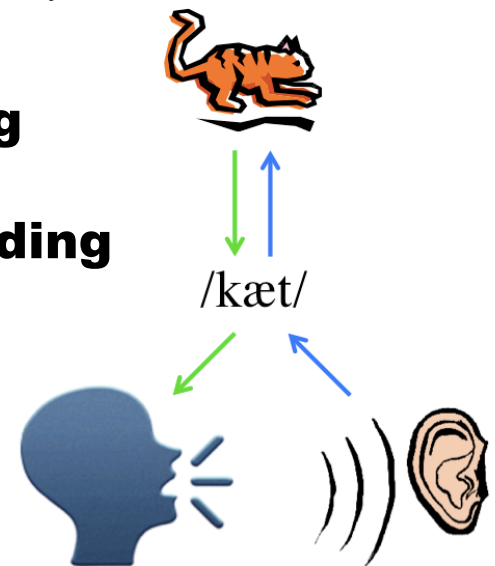
(Boatman et al. 2000, Transcortical sensory aphasia: revisited and revised, *Brain*)

All electrode locations (81 electrode pairs, range: 6-18 pairs per patient)



■ Patients tested on:

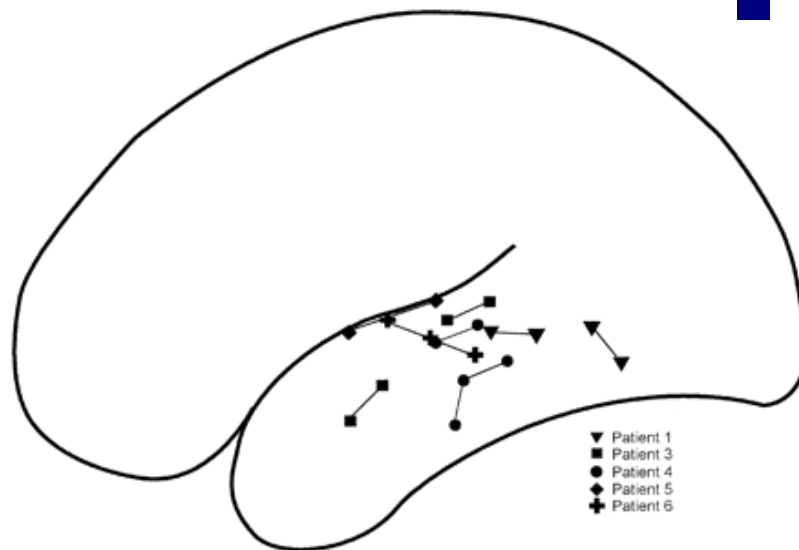
- Repetition**
- Picture naming**
- Word and paragraph reading**
- Spontaneous speech**
- Syllable discrimination**
- Auditory comprehension**
(‘move the green square’)



Inducing TSA with electrical interference

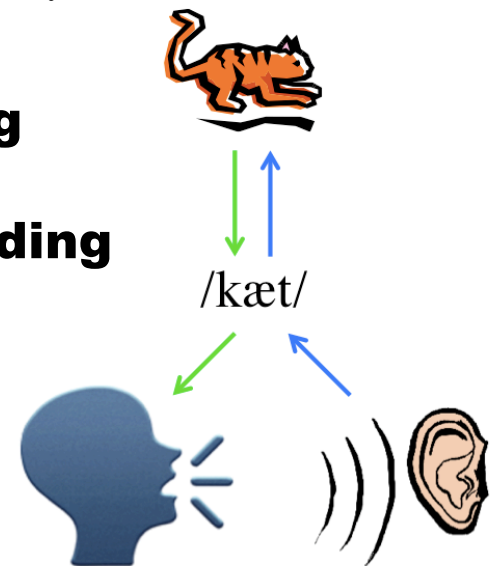
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Location of electrode sites where TSA was induced: All tasks intact except auditory comprehension.

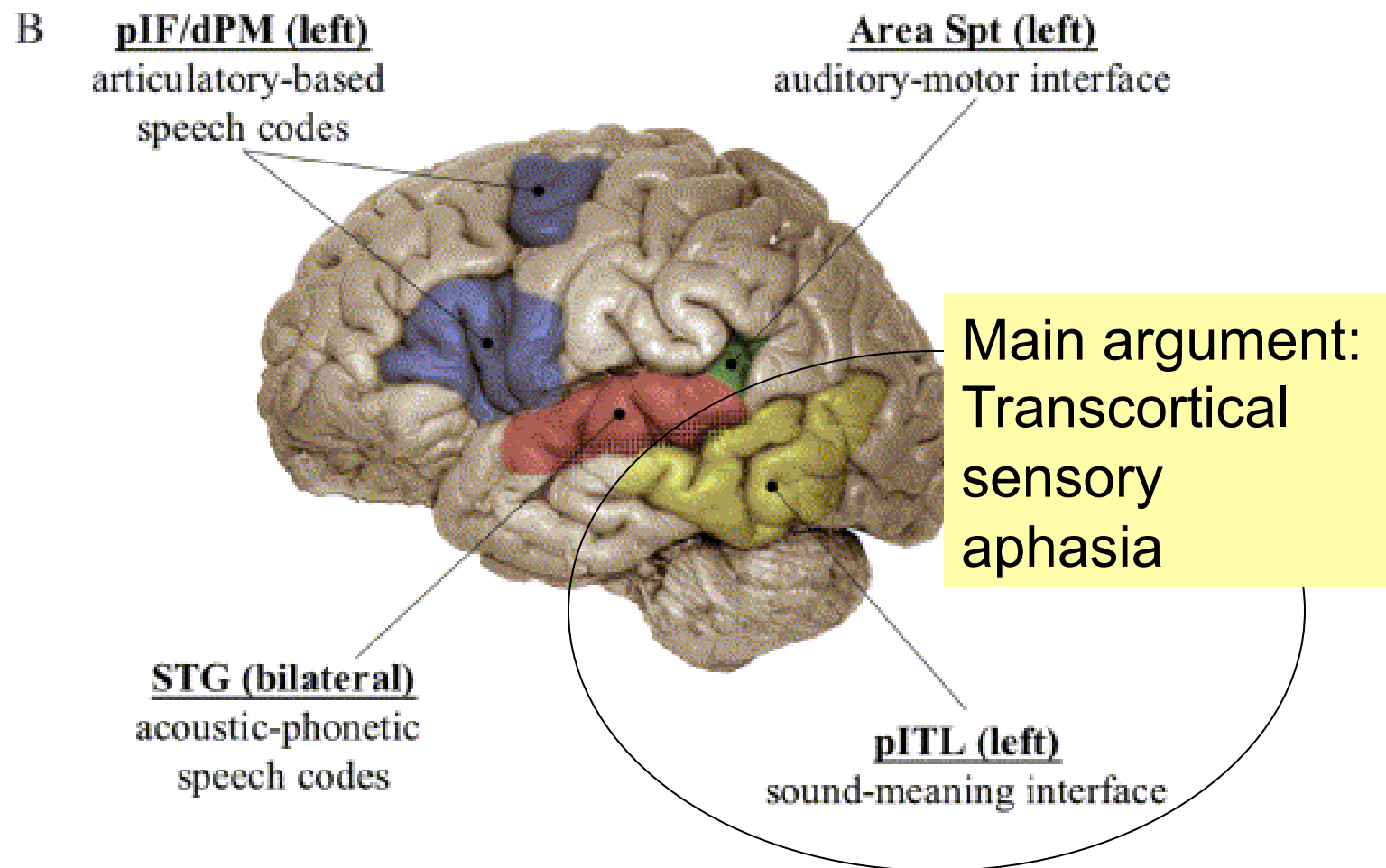


■ Patients tested on:

- ✓ **Repetition**
- ✓ **Picture naming**
- ✓ **Word and paragraph reading**
- ✓ **Spontaneous speech**
- ✓ **Syllable discrimination**
- ✗ **Auditory comprehension**
('move the green square')



Sound-meaning interface in the Hickok & Poeppel model (TiCS, 2004)

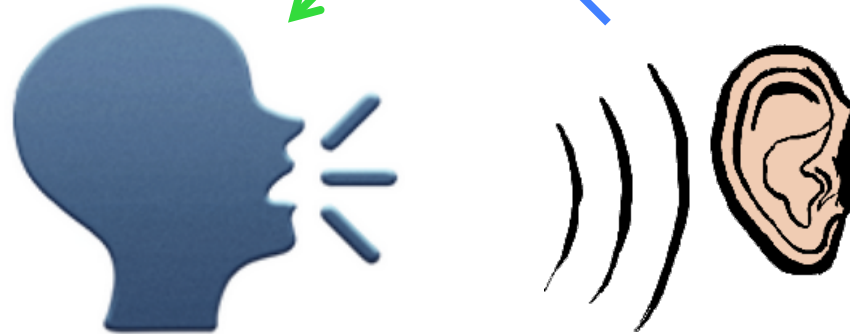


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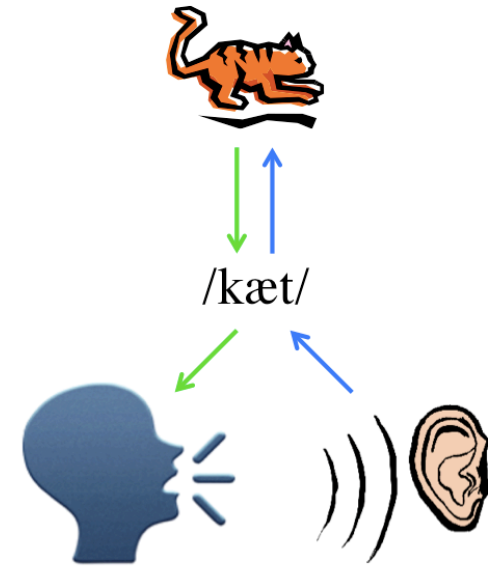
Loss of naming: ANOMIA



<https://youtu.be/w95EF3fW21A>

Loss of naming: ANOMIA

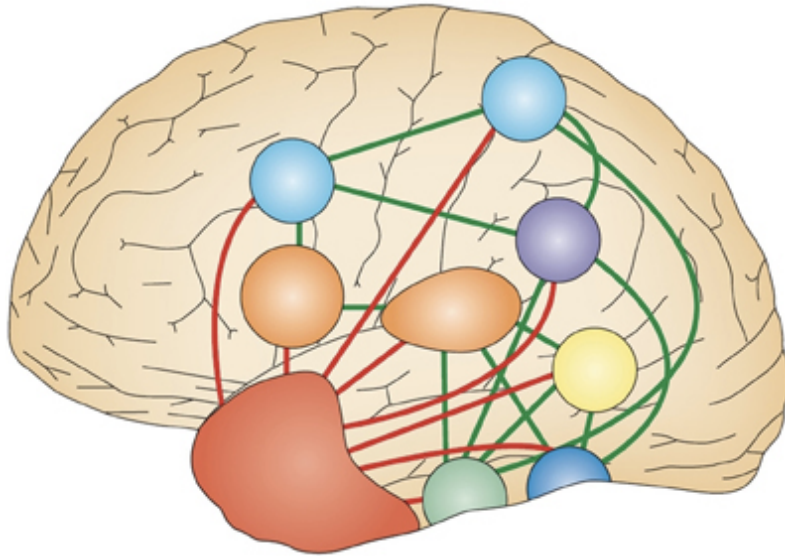
- The impairment is often limited to surprisingly specific semantic domains (e.g., fruits and vegetables, tools...).
- Connection from meaning to sound is impaired for *some* meanings.



- Anomia can arise from many types of left hemisphere damage.
- In general, we have a long-standing tension between **distributed** and **localized function** in the neuroscience of the mental lexicon.

Localized vs. distributed function

- Our brains may have “hubs” that bind distributed feature representations together.



Patterson et al. 2007

- Here, the left anterior temporal lobe (LATL) serves as a “semantic hub,” binding together features from various cortical locations.

- The LATL is rarely damaged in stroke due vascular anatomy.
- But it can atrophy in neurodegenerative disorders (progressive aphasia)
- LATL atrophy commonly causes loss of specificity in one’s semantic knowledge (semantic dementia).

apple → fruit → thing
poodle → dog → thing
sofa → furniture → thing

- Today, neuroimaging research compellingly suggests that both the posterior and anterior temporal lobes are some type of integrative “hubs.”