Investigating lexical retrieval in aging by means of a tip-of-the-tongue (TOT) study [Juncos-Rabadan et al., 2010]

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The "tip of the tongue" phenomenon
*Journal of Verbal Learning and Verbal Behaviour* 5, 325 – 337.

On the tip of the tongue: What causes word finding failures in young and older adults?
*Journal of Memory and Language* 30, 542 – 579.

Lexical knowledge and lexical retrieval in ageing: Insights from a tip-of-the-tongue (TOT) study
*Language and Cognitive Processes* 25(10), 1301 – 1334.
Q: What are TOTs and how can they be explained mentally?
Introduction

Definition of TOT [Brown & McNeill, 1966]

Failure to recall a word of which one has knowledge when one wishes to accompanied by the sensation that recall is imminent

- ”Do you know this famous poet, author, and philosopher of early German Romanticism?”
- ”I know who you mean, the one who used a pseudonym, right?”
- ”He starts with /n/”
- ”/na:/, /no:/, …”
- ”/no’va:lis/!”
Cognitive Model for Common Nouns [Burke et al., 1991]
### Definitions

<table>
<thead>
<tr>
<th></th>
<th>semantic access</th>
<th>phonological access</th>
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<tbody>
<tr>
<td>pTOT</td>
<td>+</td>
<td>-</td>
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<tr>
<td>negTOT</td>
<td>-</td>
<td>-</td>
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<tr>
<td>GOT</td>
<td>+</td>
<td>+</td>
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<tr>
<td>notGOT</td>
<td>-</td>
<td>+</td>
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</tbody>
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**Table:** TOT definitions [Juncos-Rabadan et al., 2010]

- **DK (“don’t know”):** word that is not known
- **N:** total amount of words that were asked
Definitions

Theorem (Success in semantic access)

\[
\frac{(\text{GOTs} + p\text{TOTs} + \text{negTOTs})}{N}
\]

Theorem (Proportion of TOTs in successful semantic retrieval / failures in phonological access)

\[
p\text{TOTs}/(p\text{TOTs} + \text{GOTs})
\]
Transmission Deficit Hypothesis (TDH) [Burke et al., 1991]

- Three layers of nodes: *semantics* $\rightarrow$ *phonology* $\rightarrow$ *phonetics*
- Activation of nodes by priming through connected nodes
- TOT as a result of faulty priming transmission from semantic to phonological node (competitors?)
- Transmission lines degrade with age; degradation prevented by frequent and recent use
- Proper nouns more vulnerable to transmission deficits than common nouns (additional connections)
Cognitive Model for Proper Nouns [Burke et al., 1991]

The diagram illustrates a semantic system with nodes representing various concepts. The system includes nodes for visual concept system, semantic system, propositional nodes, lexical nodes, and phonological system. This model demonstrates how cognitive processes are involved in retrieving proper nouns.
The study

**Q:** Does ageing really have a negative influence on lexical retrieval?
Subjects and Materials

Participants

- 140 in 4 age groups (19-26; 50-59; 60-69; 70-82)
- vocabulary: significantly lower for the youngest group (Spanish WAIS: $F(3, 136) = 2.94, p < .05$; Peabody: $F(3, 136) = 4.89, p < .001$)

Materials

- 100 low-freq words (Pre-test: 150; exclusion of total GOTs and DKs)
- Definitions taken from the Diccionario de la lengua Espanola (1991)
Results - Total stimuli

- youngest group (compared to oldest)
  - more DKs ($F(3, 136) = 23.56, p < .001$)
  - fewer GOTs ($F(3, 136) = 18.56, p < .001$)
  - less success in semantic access ($F(3, 136) = 24.57, p < .001$)

**Interpretation**

- larger vocabulary and stronger semantic connections with higher age
- relationship between vocabulary and the strength of semantic connections?
  - → multiple regression with both variables
- *why is there no significant difference in pTOTs?* (TDH)
  - → separate analysis of common and proper nouns
Results - Common and Proper Nouns

![Graphs showing the comparison between proper and common nouns across different age groups. The graphs illustrate the rate of pTOTs and pTOTs/(pTOTs+GOTs) failures in phonological access.](image-url)
Results - Common and Proper Nouns

common nouns

- no significant difference among age groups for pTOTs
  - failures in phonological access \((pTOTs/(pTOTs + GOTs))\)

**Interpretation**: if transmission deficits exist (TDH): compensation by increased amount of semantic connections (larger vocabulary?) enabling alternative routes
proper nouns

- significant difference among age groups for
  - pTOTs ($p < .001$)
  - failures in phonological access ($p < .05$)

**Interpretation:**

1. phonological access to proper nouns decreases with age
2. proper nouns are more vulnerable to transmission deficits which cannot be compensated (as seen for common nouns)
Multiple regression analysis on all stimuli with age and vocabulary as predictors

- success in semantic access best predicted by increasing age and Peabody scores
  - common nouns: \( R^2 = .37, F(1, 138) = 41.32, p < .001 \)
  - proper nouns: \( R^2 = .17, F(1, 138) = 13.77, p < .001 \)

- Interpretation: There is a relationship between vocabulary size and the strength of semantic connections
1 - Vocabulary
Increasing vocabulary with age strengthens semantic connections

2 - TDH
Deficits are compensated
- common noun retrieval profits
- proper noun retrieval still limited due to complexity
A first comprehension question: Do competitor activations of TOT phenomenons favor serial or cascaded lexical retrieval?
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Why do older people actually have a worse performance in picture naming if they can compensate their deficits?
Discussion

- A first comprehension question: Do competitor activations of TOT phenomenons favor serial or cascaded lexical retrieval?
- Why do older people actually have a worse performance in picture naming if they can compensate their deficits?
- Can we even compare the experiments in the TOT study to picture naming?