05 - Morphological representation and processing

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05 - Morphological representation and processing

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1 Non-word roots

(2) The role of frequency

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minute exercise

Look at these examples. What does the suffix 'mouth' mean? How do you pronounce it in each word?

- 1. Portsmouth
- 2. Plymouth
- 3. Tynemouth
- 4. Grangemouth
- 5. Cockermouth

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Dual systems models of morphology

Dual sys. model

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Dual sys. model

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1. A **computational** system

Words are generated by taking a root and adding a stem (combinatoric symbolic rule)

e.g. meaning of *laughed* is LAUGH + PAST TENSE

2. A **lexical** system

Morphologically complex words are stored / processed as wholes in the lexicon

1. Productive usage

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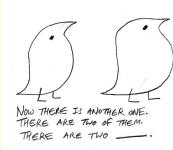
- 1. He merengu**ed** his way onto the dance floor
- 2. She was so angry that she crutched her boyfriend
- 3. There are two wugs
- 4. Look! The dog is meeking
- 5. The dog was **un**meek**able**

1. Productive usage

Berko-Gleason's 'Wug test'



THIS IS



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1. Productive usage

- 1 Non-word roots

- (1) Pseudo-regularity

5-minute exercise

Morphological movement, stranding and substitution errors

3. We have a lot of church-es in our minister

1. She wash upp-ed the dishes. 2. I'd forgot about-en that

4. She always pack-s a keep

5. He gave me some good **de**-vice

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2 Morph errors

1 Non-word roots

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Туре	Example	RT
Real infl.	Fill ed -fill	
Pseudo infl.	Mil d -mile	
Novel infl.	Nill ed -nill	
No infl.	Bel t -bell	

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Туре	Example	RT
Real infl. Pseudo infl. Novel infl.	Fill ed -fill Mil d -mile Nill ed -nill Bel t -bell	949

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Туре	Example	RT
Real infl.	Fill ed -fill	949
Pseudo infl.	Mil d -mile	932
Novel infl.	Nill ed -nill	
No infl.	$Belt ext{-bell}$	

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Туре	Example	RT
Real infl. Pseudo infl. Novel infl. No infl.	Fill ed -fill Mil d -mile Nill ed -nill Bel t -bell	949 932 908
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Pseudo infl.	Mil d -mile	932
Novel infl.	Nill ed -nill	908
No infl.	Bel t -bell	806

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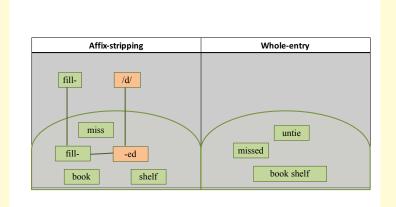
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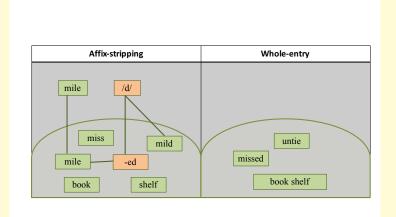
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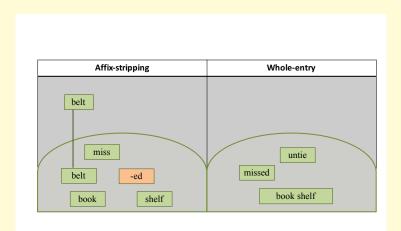
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4. Phonotactic evidence

lost \rightarrow frost, accost, riposte

turned \rightarrow spurned, learned, earned

swam \rightarrow dam, tram, ham

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Whole-wd. storage

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(2) The role of frequency

Evidence of the whole-word storage of morphologically-complex words

1. Non-word roots

1. Un-**remitt**-ing-ly It's in-evit-able.

3. The food supplies were de-**plet**-ed

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1. Non-word roots

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2. Multiple meanings

Agent / instrument ambiguity

Stripp**er** Garden**er**

Cooker

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2. Multiple meanings

(2) The role of frequency

5-minute exercise

3. Psycholinguistic evidence

Loscewicz (1995)

 $laps \longrightarrow lapse \rightarrow$

 $hovered \longrightarrow covered \rightarrow$

 $nee ded \longrightarrow knea ded \rightarrow$

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1 Non-word roots

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A hybrid view

A hybrid view

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Novel inflected forms, e.g. meeked

Non-word roots, e.g. *un-remitt-ing-ly*

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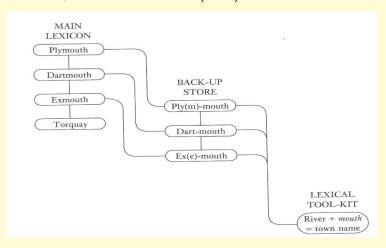
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processing $\Leftarrow \Rightarrow$ expressivity

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Aitchison, 'Words in the Mind' (2002)



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*Chicken***less** *nuggets* ⇒ A careless person \Rightarrow A gormless/ruthless person



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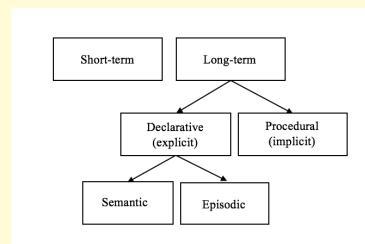
Morphology in language impairments - Ullman and Pinker's Dual Route model

5-minute exercise

Bibliography

Procedural versus Declarative memory

Tulving's Memory model



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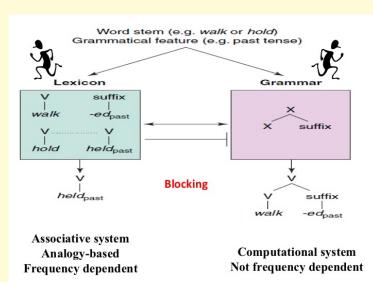
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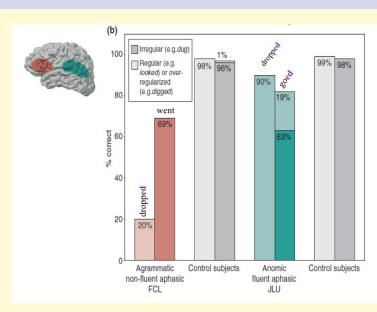
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Evidence

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in the irregular system

1. Children's overregularisation errors, e.g. she swammed are determined by the density of the irregular neighbourhood

Pinker & Ullman (2002) - Frequency effects are only found

```
e.g. [ swim \rightarrow swam, sing \rightarrow sang ] versus
[bring \rightarrow brought, buy \rightarrow bought, seek \rightarrow sought,
teach \rightarrow taught, fight \rightarrow fought
```

2. Adult generation of inflected form is affected by input frequency only in the irregular system.

Evidence

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Evidence

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Procedural memory affected IRREG > better than > REG Dev. Lang. Disorder **Parkinsons** Broca's type aphasia

Declarative memory affected

RFG > hetter than > IRRFG

Alzheimmers

Wernicke's type aphasia

Criticism of the dual route model

Joanisse & Seidenberg, 1999.

Irregular system shows characteristics of regular system $meet \rightarrow met, \ let \rightarrow let, \ put \rightarrow put, \ shut \rightarrow shut$

 $goose
ightarrow geese, \ mouse
ightarrow mice, \ moose
ightarrow moose.$

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Criticism of the dual route model

Frequency **does** play a role in regular morphology.

e.g. Losiewicz and Alegre & Gordon studies cited above

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5-minute exercise

Which one of these sentences did Yoda say in the Star Wars trilogy? Can you explain the reasons behind your choice?

- 1. Have become powerful you. You the dark side I sense in.
- 2. Powerful you have become. The dark side I sense in you.
- Become powerful you have. The dark I sense in you side.

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1 Non-word roots

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Aitchison, J. (2002). Words in the Mind: An Introduction to the Mental Lexicon (3rd Edition). Wiley-Blackwell.

Alegre, M., & Gordon, P. (1999). Frequency effects and the representational status of regular inflections. Journal of Memory and Language, 40, 41–61.

Joanisse, M. F., & Seidenberg, M. S. (1999). Impairments in verb morphology after brain injury: A connectionist model. Proceedings of the National Academy of Sciences of the United States of America, 96(13), 7592.

Losiewicz, B. L. (1992). The effect of frequency on linguistic morphology. University of Texas at Austin.

Pinker, S., & Ullman, M. T. (2002). The past and future of the past tense debate. $\underline{\text{Trends in Cognitive}}$ Sciences, 6(11), 456–463.

Post, B., Marslen-Wilson, W. D., Randall, B., & Tyler, L. K. (2008). The processing of English regular inflections: Phonological cues to morphological structure. <u>Cognition</u>, 109(1), 1–17. https://doi.org/10.1016/j.cognition.2008.06.011

Ullman, M. T., & Pierpont, E. I. (2005). Specific language impairment is not specific to language: the procedural deficit hypothesis. Cortex, 41(3), 399–433.

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