Nick Riches

# Introduction

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

# Dual systems models of morphology

These propose two systems involved in morphological storage / processing:

1. A computational system

* Words are generated by taking a root and adding an affix (combinatoric symbolic rule)

1. A lexical system

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

## Evidence for a computational system

1. We can use morphemes *productively*
   1. He merengu**ed** his way onto the dance floor
   2. She was so angry that she crutch**ed** her boyfriend
   3. There are two wug**s**
   4. Look! The dog is meek**ing**
   5. The dog was **un**meek**able**
2. *Morphological movement, stranding and substitution errors* indicate separate storage of inflectional / derivational morphemes
   1. She wash upp**ed** the dishes.
   2. I’d forgot about**en** that
   3. We have a lot of church**es** in our minister
   4. She always pack**s** a keep
   5. He gave me some good **de**vice
3. Evidence that we process sounds which are potentially morphemes as morphemes (*morpho-phonological parsing* - Post et al. 2008). For example reaction times indicate that we parse pseudo-inflections, e.g. *mil****d*** (potentially past tense of the verb *to mile*) as actual inflections.
4. Words with regular inflectional affixes tend to be phonotactically irregular (e.g. irregular *lost* rhymes with *frost*, but regular *turned* does not rhyme with any other monomorphemic word). This suggests they are not stored.

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

1. Some complex forms contain *non-word roots*, indicating that they haven’t been built up compositionally, e.g.
   1. Unremittingly
   2. It’s inevitable
   3. The food supplies were depleted
2. Some morphemes have multiple meanings, e.g. *-er* = AGENT, e.g. *gardener*, or INSTRUMENT, e.g. paint *stripper*. If words are built up compositionally, how do we know which meaning of *-er* to select?
3. Psycholinguistic evidence indicates that some morphologically-complex forms are stored as wholes, e.g. Loscewicz (1995) found that inflections in high-frequency inflected forms were significantly shorter than in low-frequency inflected forms -> high-frequency forms were stored as a whole. Alegre and Gordon (1999) found a relationship between whole-word frequency and performance on a nonword discrimination task when whole-word frequency exceeded 1 per 7 million.

## A hybrid view

There is strong evidence for both computational and whole word accounts. Novel inflected forms, e.g. *meek****ed***, must be generated by adding the morpheme. Words with non-word roots, e.g. *unremittingly* clearly cannot be generated compositionally. So we have **two possible** routes to creating morphologically-complex words.

1. High frequency morphologically complex forms are stored in the lexicon
2. Lower frequency forms are generated by computational processes

This reflects a trade-off between speed of processing, and expressivity. Whole-word storage of morphologically complex forms -> rapid processing. Separate storage of morphemes allows coining of novel morphologically complex forms, e.g. *meek****ed***.

Pronunciation of *mouth* in *Plymouth* versus *Cockermouth* may reflect two systems (high frequency form, stored as a whole, involves *schwa* sounds (neutral vowel)

The binary view may be too simple. Aitchison (2002) suggests a variety of different levels of storage. For example, the semantic **transparency** of morphemes (how interpretable they are) exhibits gradient properties.

*Fogglemouth* = This is an imaginary town lying at the mouth of the river ‘Foggle’. Suffix *-mouth* is fully transparent. It is applied using a productive rule > *Grangemouth* = A real town, but for those outside the Cumbria, this is likely to be a low-frequency word. It may be stored as a whole. Suffix *-mouth* is less transparent than the *-mouth* in *Fogglemouth* > *Plymouth* = High frquency word stored as unanalysed whole. Suffix *mouth* is less transparent than in *Grangemouth*.

*chickenless* (FULLY PRODUCTIVE / TRANSPARENT) > *careless* (PARTIALLY PRODUCTIVE / TRANSPARENT) > *gormless, ruthless* (NOT PRODUCTIVE / TRANSPARENT)

For *chickenless*, both morphemes are semantically transparen. The word looks derived. For *careless*, the morphemes are transparent, but we are likely to store and process the word as a whole. Finally, in *gormless* and *ruthless* the roots are not semantically transparent.

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

Ullman and Pinker explain language difficulties in terms of the computational and lexical systems, and also give it a neuropsychological grounding. The computational system is governed by **procedural memory** (involved in the acquisition of unconscious, implicit routines), while the lexical system resides in **declarative memory**. In particular, they focus on verbs

1. Irregular forms are stored as wholes in the lexicon
2. Regular forms are generated via the computational system

(NB Pinker and Ullman accept that high-frequency inflected forms *may* be stored in the lexicon)

The two systems **compete** with each other under time pressure. If an irregular form is found, the computational process is blocked. If the irregular form is not found, the computational process takes over.

Evidence:

1. Frequency effects are only found in the irregular system only
   1. Children’s overregularisation errors, e.g. *she swammed* are determined by the density of the irregular neighbourhood which the irregular root belongs to.
   2. Adult generation of inflected form is affected by input frequency only in the irregular system.
2. Difficulties with regular forms are linked to impaired procedural memory
   1. Children with Developmental Language Disorder
   2. Adults with Parkinsons
   3. Adults with Broca’s-type aphasia
3. Difficulties with irregular forms are linked to impaired declarative memory
   1. Adults with Anomia
   2. Adults with Wernicke’s type aphasia

## Criticism of the dual route model

### (1) Pseudo-regularity (irregular forms exhibit characteristics of regular forms)

Irregulars exhibit characteristics of the regular system, e.g. verbs already ending in an alveolar plosive are more likely to be irregular, e.g. *meet -> met, let -> let, put -> put, shut -> meet -> met*, and nouns already ending in -s are more likely to take irregular plurals, e.g. *goose -> geese, mouse -> mice, moose -> moose*. This has led some researchers to argue that there are not two completely separate systems for regular and irregular forms, e.g. Joanisse and Seidenberg (1999)

### (2) The role of frequency

The Dual Route model argues that frequency effects are characteristic of the lexical/declarative system, but not the computational system. Nonetheless, frequency effects also characterise the regular system (e.g. Losiewicz and Alegre & Gordon studies cited above)

# 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.
3. Become powerful you have. The dark I sense in you side.

# Bibliography

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. *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. *Cognition*, *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.