1. **Influential Levelt & colleagues model**

- Top references
  - Levelt 1993: book-length presentation
  - Levelt, Roelofs & Meyer 1999: updated presentation, plus computational implementation, *weaver++* (figures below from here)

1.1 **Lexical representations**

- Are complex, exist at many levels

> no phonology here!

> still no phonology!

> these entries actually contain phonological info (which prosody, and segments to access)

> notice that prosodic shape is separate from segmental content. Which segments belong to which syllable is not stored, but computed online.
1.2 Producing a word

- Also requires many stages (arrows mine)
2. Classic findings about these stages

2.1 Speech errors that swap words can be longer-distance than speech errors that swap sounds

- *The test will be about discussing the class vs. thollow hud* (Dell & O’Seaghdha 1992)
  - interpretation: lemma for *class* is ready well in advance
  - and gets put into the wrong slot
  - word-form entry, or at least segmental content, for <thud> is available only a little bit in advance
  - and likewise, part of it gets put into the wrong slot

2.2 Importance of clause boundaries (overview from Dell & O’Seaghdha 1992)

- Word-swap errors are usually in the same clause (Garrett 1975)
- Hesitations tend to be at clause boundaries (Holmes 1988)

2.3 Smith & Wheeldon 2004: semantically related nouns can interfere at longer distances than phonologically related nouns

- Method
  - See picture and word, with motion: \[\text{AXE}\]
  - Say *The saw and the axe move down. The saw moves towards the cat, etc.*
  - Dependent variables: how long to start talking, error rate

- Result
  - If picture and word are semantically related (saw/axe), takes longer to start talking
    - true in both structures: *[the saw and the axe] move down* or *[the saw] moves towards [the axe]*
    - but weaker effect if not in same phrase
    - interpretation: both words’ lemmas can be accessed before speech starts, especially if they’re in the same noun phrase
  - If picture and word are phonologically related and in same noun phrase (*the flag and the bag*), faster and fewer errors
    - but only if same at end (*flag/bag*), not beginning (*cat/cap*)—they’re not sure why
  - No effect if phonologically related and far apart (*the cat moves above the cap*)
    - interpretation: before the utterance starts, phonological information from both nouns in the subject NP can be available, but not from a noun later in the sentence

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1 Thanks, thenounproject.com
2.4 Dell & O’Searghda 1992: “lemmas are buffered […] before they are phonologically specified”

- Method
  - See vaguely logic-looking formula: REMOVE(BOXER, COAT) or REMOVE(BY BOXER, COAT)
  - Prepare utterance: The boxer removed the coat or The coat was removed by the boxer
  - Filler trials: see *, say utterance
  - Critical trials: see target word (COAT or COAL or SHIRT) and read it aloud
  - Dependent variable: response time in saying target word

- Result
  - *The coat was removed by the boxer* slows down response to COAL
    - interpretation: coat is already phonologically accessed, enough to compete with planning coal
  - *The boxer removed the coat* actually speeds up response to COAL!
    - interpretation: maybe just the /k/ or so has been accessed, and/or the prosodic shape, which are helpful for coal
  - Effect of semantically related prime, SHIRT, is more complicated (there’s another experiment)
    - but basically, it doesn’t much depend on whether coat was early or late in the prepared sentence

- Interpretation: again, something like lemma access happens earlier than full phonological access

3. Size of the planning unit: looking up lemma or so

3.1 (“phrasal-level”) prosodic word (Wheeldon & Lahiri 1997; Wheeldon & Lahiri 2002)

Dutch

- 1997: Syntactic words vs. prosodic words vs. syllables
  - p-words or lexical words matter, not syntactic words or syllables

<table>
<thead>
<tr>
<th></th>
<th>(ik zoek het) (water)</th>
<th>(ik zoek) (water)</th>
<th>(ik zoek) (vers) (water)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘I seek the water’</td>
<td>‘I seek water’</td>
<td>‘I seek fresh water’</td>
<td></td>
</tr>
<tr>
<td>2 p-words</td>
<td>2 p-words</td>
<td>3 p-words</td>
<td></td>
</tr>
<tr>
<td>2 lexical words</td>
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<td>3 lexical words</td>
<td></td>
</tr>
<tr>
<td>4 syntactic words</td>
<td>3 syntactic words</td>
<td>4 syntactic words</td>
<td></td>
</tr>
<tr>
<td>5 syllables</td>
<td>4 syllables</td>
<td>5 syllables</td>
<td></td>
</tr>
</tbody>
</table>

“naming latency”: how fast it takes the participant to start talking

<table>
<thead>
<tr>
<th></th>
<th>faster (just about identical)</th>
<th>slower</th>
</tr>
</thead>
<tbody>
<tr>
<td>although <em>ik zoek water</em> has shorter duration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- follow-up experiment: no, it’s p-words that matter, not lexical words

<table>
<thead>
<tr>
<th></th>
<th>(ik zoek)</th>
<th>(ik zoek het)</th>
<th>(ik zoek) (het)</th>
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<tr>
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<td>‘I seek fresh water’</td>
<td></td>
</tr>
<tr>
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<td>2 p-words</td>
<td>2 p-words</td>
<td>3 p-words</td>
<td></td>
</tr>
<tr>
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<td>2 lexical words</td>
<td>1 lexical word</td>
<td>3 lexical words</td>
<td></td>
</tr>
<tr>
<td>2 syntactic words</td>
<td>4 syntactic words</td>
<td>3 syntactic words</td>
<td>4 syntactic words</td>
<td></td>
</tr>
<tr>
<td>2 syllables</td>
<td>5 syllables</td>
<td>4 syllables</td>
<td>5 syllables</td>
<td></td>
</tr>
</tbody>
</table>

naming latency: fastest | medium (just about identical) | slowest

- 2002: Oh no, here it looks like syntactic word matters!

<table>
<thead>
<tr>
<th>óoglīd</th>
<th>órgel</th>
<th>orkāan</th>
<th>óud líd</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘eyelid’</td>
<td>‘organ’</td>
<td>‘hurricane’</td>
<td>‘old member’</td>
</tr>
<tr>
<td>2 p-words</td>
<td>1 p-word</td>
<td>1 p-word</td>
<td>2 p-words</td>
</tr>
</tbody>
</table>

naming latency: faster (all about the same) | slower

their interpretation: actually, it’s the “phonological word at the phrasal level”, some kind of “superword”
- I buy this:
  - by some diagnostics, Dutch compounds are 2 p-words (syllabification)
  - but still they have a single primary word stress, unlike a phrase, which has two word stresses

3.2 Maybe it’s flexible (Wagner, Jescheniak & Schriefers 2010—different Wagner!)
- Note: this is about access, not encoding (we’ll return to this point and all the terminological confusion next time)

- Different experimental setup, different results
  - simple sentence: two nouns
    - *the frog is next to the mug*
  - more-complex sentence: mostly just the first noun
    - *the blue frog is next to the blue mug*
  - interference from additional task, or utterance variety: first noun only
    - participant has to switch between simple and complex format, depending on whether the objects they see depicted are (in nature) small or big
    - *the (blue) frog is next to the (blue) mug*
  - interference from working-memory task: back to both nouns
    - before each trial, participants given 5 digits or 5 adjectives to memorize
    - *the frog is next to the mug*
  - Their speculation: this task is “not directly related to utterance production” (p. 435)
• Experimental setup
  ▪ Subject sees side-by-side drawings\(^2\) 🐸 🍪
  ▪ Has to describe them, in format \textit{the \_ is next to the \_}
  ▪ Headphones play a distractor word
    ▪ if \textit{toad}, should interfere with first word
    ▪ if \textit{cup}, should interfere with second word
  ▪ Dependent variables
    ▪ how long it takes to start talking (compared to semantically unrelated distractor word)
    ▪ error rate
    ▪ If only \textit{toad} harms performance, only first word was accessed before participant started talking
    ▪ If both \textit{toad} and \textit{cup} harm performance, both words were already accessed

• Also, differences between fast responders and slow responders
  ▪ Slow responders plan more before starting to talk (in simple task)

\textit{I think that’s enough of this for one day—let’s move on to…}

4. Comments on how the two handbook articles relate to previous articles
   (Goldrick 2014; Buchwald 2014)

4.1 Wagner 2012 (English –\textit{ing/-in’}, research program; Kie)

• In Wagner’s –\textit{ing/-in’} experiment, the following word could be \textit{the} (starts with coronal: encourages –\textit{in’}) or \textit{a} (doesn’t start with coronal)
  ▪ But there’s a coarser difference too
    ▪ \textit{the} = CV (could start with coronal)
    ▪ \textit{a} = V (can’t possibly be coronal)
  ▪ Goldrick reviews evidence that a word’s CV structure is retrieved separately from its segmental structure.
    ▪ plausibly, CV structure is retrieved earlier than segmental
    ▪ fact that \textit{a} = V (and therefore doesn’t start with a coronal) could be available earlier than the fact that \textit{the} starts with a coronal
  ▪ This predicts a bigger effect for \textit{the} vs. \textit{a} than for \textit{the} vs. \textit{my}, especially in the no-clause-boundary condition
    ▪ Would be interesting to replicate experiment with third condition (\textit{my})
    ▪ across clause boundary, we might expect difference between \textit{the} and \textit{my} to become especially small (I will draw hypothetical plot on board)

\(^2\) Thanks, emojidex
• **Buchwald** emphasizes the difference between phonological encoding, which outputs something like /kæt/, and the phonetic processing, which fills in things like aspiration (i.e., postlexical)
  ▪ This makes me wonder about the processes Wagner discusses, which all cross phoneme boundaries
  ▪ –*ing/-in’*, tone sandhis, French liaison
  ▪ Maybe the phonetic processor is able to do these things
  ▪ but especially in the case of –*ing/in’*, which requires selecting between allomorphs,
    maybe phonological encoding needs to already do the work
  ▪ This might mean that these types of morphology/phonology might pattern differently w.r.t.
    planning than truly postlexical stuff like English tapping

4.2  **Kilbourn-Ceron, Wagner & Clayards 2016** (English tapping; Meng)
4.3 Kilbourn-Ceron & Sonderegger 2018 (Japanese high V devoicing; Canaan)

4.4 Kilbourn-Ceron 2017b (French liaison; Jesse if he wants to)
4.5 Tanner, Sonderegger & Wagner 2017 (English t/d deletion; Isabelle)

4.6 Tamminga 2015 (English t/d deletion; Brice)
4.7  Gahl & Garnsey 2004 (English t/d deletion; Allie)

4.8  MacKenzie 2012, ch. 5 (English is/’s, has/’s, will/’ll; Beth if she wants to)
4.9 MacKenzie 2016 (English is/’s; Jacob)

4.10 Lamontagne & Torreira 2017 (Spanish V hiatus; Kie)

- Goldrick’s opening figure shows a word’s syntactic properties being accessed early
  - That should include gender
  - In a Spanish phrase like buena estrella ‘good star, lucky star’…
    - gender of estrella must be known before final vowel of buena can be planned
  - Whereas in suer a ejemplar ‘exemplary mother-in-law’…
    - nothing syntactic about ejemplar needs to be known before final V of suer a can be planned
  - In fluent productions of buena estrella, estrella’s syntactic planning needs to be done in good time, so maybe its phonological planning is also a little more advanced?
  - Probably not big enough to see an effect
    - but I guess there’s a hypothesis to be tested about pairs where Word1 agrees with Word2 (and Word2 is the head, driving the agreement) vs. other bigrams
  - By the way, Lamontagne, in other slides, does find that feminine suffix –a (herman-a ‘sister’) is deleted more than other final –a (ahora ‘now’)
    - but doesn’t distinguish whether the –a is in the head, is before the head it’s agreeing with, or is after the head it’s agreeing with
• Buchwald discusses “the role of the syllable in phonetic processing”
  ▪ Relevant to the Spanish case, because vowel deletion changes the syllabification
    ▪ [es.te.a.mor] vs. [es.ta.mor]
    ▪ [nues.tras.kue.la] vs. [nues.tras.kuela]
  ▪ Buchwald reviews evidence that high-frequency syllables have processing advantages
  ▪ but says it’s unclear whether these advantages happen during phonological encoding
    or phonetic processing (or even later)
  ▪ If the frequency of syllables like [ta] and [tras] matters in predicting Spanish deletion…
    ▪ then I think that tells us that this really is the syllabification, and we’re not just
      looking at some kind of very late blending/competition of the two vowel gestures

5. Up next:
• I’ll present some more of these highlights from the general speech-planning literature

• Keating & Shattuck-Hufnagel 2002
• Wheeldon, Meyer & Smith 2006 plus Wheeldon 2013
  ▪ Here’s a suggestion for a different task for these two: let’s each bring one highlight to share
    about the paper:
    ▪ something you didn’t know before reading it
    ▪ what stood out to you the most
    ▪ your biggest question about the paper
    ▪ …?

• Kie: present highlights from speech error literature (as relevant to OCP!)
  ▪ I think all this will take through the end of next week—we can divide up the next set of
    readings of Tuesday

• On the horizon: I have a group writing exercise in mind (maybe 1 hour, maybe 2)

References
Buchwald, Adam. 2014. Phonetic processing. In Matthew Goldrick, Victor Ferreira & Michele Miozzo
Goldrick, Matthew. 2014. Phonological processing: The retrieval and encoding of word form information
  in speech production. In Matthew Goldrick, Victor Ferreira & Michele Miozzo (eds.), The Oxford


Tamminga, Meredith. 2015. Modulation of the following segment effect on coronal stop deletion [slides]. NWAV 44. Toronto.


