Overview

1) Course Business
   a) Readings
   b) Your Paper

2) Previous Classes
   a) Evidence for "the syllable" as a phonological constituent (linguistic & meta-linguistic arguments).
   b) Some psycholinguistic evidence for the syllable in the online processing of French by French speakers

3) Today
   a) Cutler (1997) (from last time)
   b) Not just a linguist’s dream 2: syllable manipulation tasks (new)
      i) Treiman papers
      ii) Zamuner & Ohala paper

CUTLER ET AL 1997 – Syllable processing in various languages

4) French
   a) Robust fragment detection effects with French speakers
      i) ...even when materials come from other languages!
      ii) English, Japanese

5) English
   a) No effect in English
      i) Monitoring for ba-bal in balance-balcony shows nothing! (Bradley et al, 1993)

6) German and Dutch
   a) Other stress languages like German and Dutch also don’t show an effect: why?

7) Ambisyllabic in English á la Kahn 1976
   a) Kahn claims that medial pre-stressless consonants are ambisyllabic (in two syllables at the same time)

   b) Aspiration
      i) Aspiration word-initially: toe, tip, ten, etc.
      ii) No aspiration after [s]: stow, sting, sty, etc.
      iii) No aspiration word-finally: oat, lit, cat, etc.
      iv) Aspiration medial pre-stress: attack, atone, antenna, etc.

   c) Flapping
      i) Flapping medial pre-stressless: pity, vanity, catamaran, etc.
8) Relevance
   a) English syllable boundaries are "murky"

   b) Cutler's surmise: perhaps speech segmentation in English is stress-based not syllable-stressed

   c) Some evidence for (8b)
      i) Kiparsky (1979): aspiration is foot-based
         (1) Aspirate foot-initially
         (2) [toe], [stow], [oat], a[ttack], [pity], [catama[r]an]
         (3) Problematic per Hammond 1982

SEGUE

9) Three things to keep in mind:
   a) What does a linguist’s vs. a psychologist’s syllable look like?

   b) What does an adult’s vs. a child’s syllable look like?

   c) Are any of these similar to one another?

TREIMAN & DANIS (1988) - Syllabification of VCV sequences by adults

10) Some relevant variables first
    a) English stress (a subset of possibilities)
       i) SW: apple, candy, orange, motto
       ii) WS: about, compel, defer

    b) Sonority
       i) Liquids, nasals, obstruents

    c) Vowel quality
       i) Tense/long: lean, lane, loon, loan, lawn
       ii) Diphthongs: line, town, loin
       iii) Lax/short: tin, ten, tan, good, ton

11) Linguistic & Psychological Treatments of the syllable (circa 1980s)
    a) Linguistic = consideration of phonological factors (Hoard 1971, Kahn 1976, Selkirk 1982, Pulgram 1970, etc.)

    b) Psychological = consideration of orthographic and other print factors (Hansen & Rodgers 1968, Taft 1979, Adams 1981, etc.)
12) Some predicted syllabifications, or: How do you take your tea - with lem.on, le.mon, or le.m.on?
   a) le.m.on/de.m.on (Hoard, Kahn-slow speech, Selkirk-deep level, H&R-1st VCG parse)
   b) lem.m.on/de.m.on (Kahn-fast speech; proposes ambisyllabicity)
   c) le.m.on/de.m.on (Selkirk-surface level, H&R-2nd parse for lemon)
   d) le.m.on/dem.on (Taft 1979; no role for stress or vowel quality)

13) Tasks-General Description:
   a) Oral syllable reversal task (grandfather = father grand); break after the first syllable (titude at for attitude, *tude atti)
   b) Written forced-choice task (le/m.on or lem/on), "choose the better syllabification"
      i) Preceded by speaker's pronunciation of word; followed by subject's own explanation of why they did what they did
      ii) Note there is no option for ambisyllabicity

**T&D-STUDY 1**

14) Stimuli:
   a) 84 words in stress-pairs (WS, SW) with similar spelling for the medial C
      i) E.g, propel/proper, command/comma).
   b) Other controlled factors were frequency, number of letters in word, number of syllables, vowel quality, preceding and following letters, and bigram frequencies.

15) Analysis
   a) Responses coded as 1 (medial C in 1st syllable), 2 (medial C in 2nd syllable), or 1-2 (medial C in both syllables) and adjusted for subject's own spelling.
   b) Analyses conducted by subjects and by items.

16) Results-ORAL TASK
   a) Stress Effect:
      i) In WS sequences: V.CV > VC.V (prop.el > prop.el)
      ii) In SW sequences: VC.V = V.CV, (prop.er = pro.per)
   b) But when the C in only one syllable (i.e. when ambisyllabic responses removed), SW preference emerges: 'VC.V (prop.er)
   c) Spelling
      i) Ambisyllabic responses more common in SW words: prop.per > prop.pel
      ii) And words with double-letter spelling: com.ma > ev.vil
17) Results - WRITTEN TASK
   a) Same as oral but stress effect is greater in words with single vs. double-letter spellings:
      i) In WS sequences: V.CV > VC.V (pro/pel > prop/el)
      ii) In SW sequences: VC.V = V.CV, (prop/er = pro/per)

   b) VC/V more common in double-letter spellings (comm/a, comm/and)

18) Some Interim Questions:
   a) Why control for all that stuff? Why analyze by-items and by-subjects?
   b) What to make of the differences between written and oral tasks? Is one better than the other? Do we see evidence for the syllable? If so, what does it look like?

T&D-STUDY 2

19) New Stuff:
   a) Adds consonant quality (liquid, nasal, obstruent) as an additional factor

20) Results:
   a) Replicates stress/spelling findings of Study 1, finds consonant quality effect:
      i) In the oral task, VL.LV and VN.NV > VO.OV: mel.lon, lem.mon > sev.ven
      ii) In the written task, VL/V and VN/V > VO/V: mel/on, lem/on > sev/en

T&D-STUDY 3

21) New Stuff:
   a) Adds vowel quality (tense vs. lax), which limits stimuli to SW sequences only

   b) Restricts stimuli to single-letter spellings to see if 1-2 response-rates go down

22) Results - ORAL TASK:
   a) V.CV when 1st vowel tense and C is obstruent: o.ver

   b) VC.CV when first vowel lax and C is liquid or nasal: bal.ance, cam.mel

   c) VL.V and VN.V > VO.V when ambisyllabic responses removed: bal.ance, cam.el > ov.er

23) Results - WRITTEN TASK:
   a) Same effects of vowel and consonant quality except:
      i) when 1st vowel tense, VC.V more common if C was L vs. N or O: mol/ar
      ii) when 1st vowel lax, VC.V more common if 1st vowel N vs. L or O: cam/el
T&D-Summary

24) Stress matters, spelling matters, vowel and consonant quality matter, bigram frequency does not

25) Who’s right? Linguists or Psychologists?
   a) Kahn and Selkirk (in the authors’ opinions) with a proviso about sonority/consonant quality

26) Questions:
   a) Where does that leave us? What does it mean if people’s intuitions do not match with the psychologists expect to find? (Note that the latter theories were based on reading)
   b) How do these meta-linguistic tasks inform the results of Mehler et al and the subsequent work by Cutler and others?
   c) How do people’s intuitions about syllable boundaries prove, disprove, or remain agnostic about the syllable as a phonological constituent?

TREIMAN & ZUKOWSKI (1990) - Syllabification of VCCV sequences in adults

27) Similar premise as earlier paper: "If the syllable is a real linguistic unit, how are its boundaries determined?"

28) New Stuff:
   a) Morphological effects (lifted vs. Lipton)
   b) Maximal Onset Principle (MOP)
   c) Sonority contours (SC)
   d) Legality

29) Sometimes impossible to satisfy all the "rules" of syllabification:
   a) By MOP, estate = e.state, but by SC: es.tate
   b) By MOP, quarter = quar.ter, but by stress: quart.er
   c) So what do people do?
      i) “Favor” one solution over the other?
      ii) Opt for amabisyllabicitY?
**T&Z-STUDY 1**

30) Looked at legality in SW and WS VCCV sequences

31) Task & Procedure:
   a) Same written forced-choice task as in T&D
   b) Each word presented in 3 ways (e.g., atl/ases, at/lases, a/tlases)

32) Results:
   a) Consistent with legality VC.CV response predominated, regardless of stress, e.g.:
      i) SW: at/lases > atl/ases, a/tlases
      ii) WS: con/fetti > conf/etti, co/nfetti

**T&Z-STUDY 2**

33) New Stuff:
   a) Same factors but looked at cases where the medial CC is legally ambiguous:
      i) WS like pontoon, theories agree: pon.toon
      ii) SW like pontiff, theories differ as outlined in T&D (e.g., pont.iff, pon.tiff, and pon.tiff all possible - although Kahn claims pon.ntiff but quart.ter)

34) Procedure:
   a) Same as STUDY 1, but only 2 options (e.g., pont/iff, pon/tiff); illegal options not included

35) Results:
   a) VC.CV responses predominated (same as STUDY 1)
      i) but proportion significantly higher in WS than SW words (pon/toon > pon/tiff)
   b) Also, VCC.V more common in SW words (pont/iff > pont/oon)

**T&Z-STUDY 3**

36) New Stuff:
   a) Addresses the "forced-choice" issue (i.e., no ambisyllabicity allowed) by using Fallows' (1981) oral syllable-doubling task (e.g., ponpontiff or pontifftiff)

37) Procedure:
   a) Subjects asked to repeat "part" of a word that an experimenter presented in isolation and then in a sentence
   b) Subjects asked to spell all words at end of experiment (wanted to include only single C-spelled words to control for effects of ambisyllabicity)
c) Subject completed two blocks in which they either doubled the first part of the word and then the second part in a second block or vice versa.

38) Results:
   a) Generally the same as STUDY 1 and 2: VC1.C2V
   b) For C1 responses:
      i) C1 always in 1st syllable regardless of stress: pontiff, pontoon
      ii) C1 never ambisyllabic: *pon.ntiff, *pon ntoon
   c) For C2 responses:
      i) C2 in 1st syllable for only a small proportion of words (regardless of stress): pontiff, pontoon very rarely occurred
      ii) C2 was ambisyllabic significantly more often in SW than in WS words: pont.tiff > pont.toon

39) Results are ambiguous between MOP and SC

T&Z-STUDY 4

40) New Stuff:
   a) Distinguishes sonority-rise from sonority-fall CC clusters (e.g., nt vs. st)
   b) Keeps stress and adds vowel quality per T&D

41) Procedure & Stimuli: went back to forced-choice written task: e.g.,
   a) non-s clusters: Mad/rid, Ma/drid
   b) s-clusters: Eas/ter, East/er, Ea/ster

\begin{tabular}{l}
\hline
Type  \\
VCCV' st (e.g., estate)  \\
V'CCV st (e.g., master)  \\
V'CCV st (e.g., cloister)  \\
VCCV' non-s (e.g., Madrid)  \\
V'CCV non-s (e.g., metric)  \\
V'CCV non-s (e.g., apron)  \\
\hline
\end{tabular}

42) Results-First syllable responses to C1:
   a) Effect of vowel quality and stress: VC.CV more common in SW with first vowel lax than SW when first vowel tense or WS
   b) Effect of cluster type: C1 in first syllable more likely in s-clusters than non-s
c) Interaction between stress and cluster-type: In WS, C1 in first syllable more likely for s-clusters than for non (es.tate vs. ma.drid)

43) Results - First syllable responses to C2:
   a) Interaction between stress and cluster-type:
      i) When 1st V short: VCC.V more common for s-clusters in SW words than in WS words
   b) Otherwise C2 first-syllable responses were rare overall

T&Z-STUDY 5

44) New Stuff:
   a) Used an oral task (to allow for ambisyllabicity), adjusting for subject's own spellings as before (i.e. only items where subjects spelled the medial C with a single letter were analyzed).

45) Results - First syllable response to C1:
   a) Effects of stress and vowel quality: C1 in first syllable more common when 1st vowel stressed and short

   b) Effect of cluster-type: C1 in s-clusters more likely to be placed in 1st syllable than C1 of non-s clusters

   c) When C1 placed in only one syllable:
      i) in non-s clusters C1 in 2nd syllable more likely in WS and SW with initial tense vowel; no preference in SW with initial lax vowel
      ii) in s-clusters, C1 in 2nd syllable more likely in SW with initial tense vowel; no preference in other two patterns

46) Results - First syllable response to C2:
   a) C2 hardly ever placed in 1st syllable alone, so only ambisyllabic responses were considered
   b) When C2 placed in both syllables, more likely to be an s-cluster than non (where in the latter case it would be illegal, e.g. madr.id)

Gist-STUDY 5

47) Cluster-type matters:
   a) Non-s clusters syllabified as V.CCV in WS words almost 80% of the time (as per the MOP)

   b) In s-clusters the MOP was sometimes violated, e.g., VS.CV, but less so in this experiment because ambisyllabicity was allowed, VS.SCV
c) Cluster-type effects supported by English stress facts:
   i) Can't skip over a heavy penult to stress an antepenult: ag'enda, *agenda
   ii) Obstruent+liquid behave like onsets: 'algebra
   iii) Many cases of s+C seem to behave differently: c'anister, but can'asta
   iv) The number of cases like canasta suggest that s+C is different from Obs+Liq

48)SC matters:
   a) People syllabify so that each (stressed?) syllable has an ideal sonority contour: es.tate but ma.drid

   b) Vowel type effects support those found in T&D

49)Spelling errors:
   a) Except in Study 5, C1 more likely to erroneously double than C2 (garlic > garlic)
      i) Supports idea that final consonants more likely to double than initial

   b) Study 5 showed different stress effects for non-s clusters vs. s-clusters
      i) For non-s clusters, C1 significantly more likely to erroneously double after lax stressed vowel (gobblet for goblet)
      ii) For s-clusters, C1:
          (1) More likely to erroneously double in WS (essteem for esteem) and after a lax stressed vowel (clustered for clustered).
          (2) Never after a long stressed vowel.

T&Z-GENERAL DISCUSSION

50) Legality, sonority contour, and stress all appear to be principles that people follow when syllabifying English words.

51) Sonority:
   a) As earlier, SC dictates es.tate but ma.drid,
      i) Even though syllable-final /s/ is not to be preferred, /t/ makes a better onset for the second syllable than /st/.
      ii) /dr/ makes the perfect rise, and d.r would be bad re sonority in a number of ways

   b) Not clear how to explain es.state - unless MOP does play a role

52)Stress:
   a) Stressed syllables tend to attract consonants although more so if 1st vowel is lax;

   b) Perhaps stress effect is the weakest or it is all carried by the vowel.
53) Legality:
   a) Part of legality may include that syllable-final vowels must be tense or else lax and closed (just as for ends of words)
   b) Although this was generally true of the data it was not always true

54) Final thoughts on T&Z
   a) Some may argue that these results don't argue for the syllable at all; rather they reflect performance factors and should not be considered in theories of linguistic competence
   i) Authors suggest that although the path between linguistic representations and theories of performance is not necessarily direct (e.g., is there really a level of representation in which the C is in both syllables?) it is still informative

   b) There is no “level of the syllable”, rather syllables are an epiphenomenon resulting from the interaction of other factors (stress, legality, sonority – although not bigrams)

   c) The generality of these results to other domains could be questioned. These are off-line tasks involving conscious decisions. To what degree do such responses reflect unconscious knowledge? Can we find similar effects in online tasks?

SEDUE

55) So far
   a) Syllabification in literate, adult speakers

   b) Derwing, Derwing & Nearey (not assigned readings) also looked at syllabification but with illiterate adults in a variety of languages to probe effects of orthography and morphology on syllabification

56) Next
   a) Syllabification in preliterate children
   i) Looking at children's responses will not only allow for a further probe of "learning to read" influences but also allow us to question WHERE these principles come from? Are they learned? If so, when? Are the automatic? And, in either case, what does this mean for our notion of the syllable?

ZAMUNER & OHALA (1999) - Syllabification of VCV sequences in preliterate children

57) Background
   a) Syllabification of medial C is affected by a variety of factors that can interact. E.g. raven: (nb. this differs from what is in the paper, unfortunate typo):
   i) Stress principle: rav.en
   ii) Vowel and consonant quality: ra.ven
Fallows (1981) looked at syllabification in children, aged 9-10 and pre-readers, aged 4-5 and found similar effects as T&D and T&Z, BUT

a) Spelling was not controlled.

b) Consonant quality was not controlled across vowel quality.

c) Not all children performed the same task. Some did syllable repetition and some did an oral pause-task like Derwing's pause-break.

d) Literacy of 'pre-readers' not well defined.

**Z&O Study**

59) Subjects: younger children than Fallows (1981), mean age 34 months; all children unable to read per parent report.

60) Hypotheses

a) Children's responses unaffected by spelling because children are not literate

b) Children's responses affected by spelling due to underlying phonetic differences between words spelled with double vs. single letters.

61) Stimuli

a) 24 bisyllabic English nouns controlled for vowel quality, consonant quality, and spelling.

b) Only one stress pattern, SW, due to the difficulty of finding WS words in English that contain double-letter spellings.

c) For the same reason, spelling was only a factor in words with an initial lax vowel.
Task & Procedure:

a) Children were taught a pause task similar to Fallows’ task for the younger children and an oral version of that used by Derwing for illiterate adults.

b) Experimenter and child each had a puppet.
   i) For training items, the experimenter would show the child a picture and say, for example, “This is a picture of a dump truck, and when the puppet says dump truck, he jumps up and down and says the word”.
   ii) The experimenter would then model this for the child, making the puppet jump in time to each syllable of the word with a pause in between.
   iii) After modeling, the experimenter would then ask “Can you make you bear say dumptruck like the puppet?”

c) Training items continued until the child could play the game correctly.

d) Test items were then given but without modeling. The experimenter simply said: “This is a picture of X. How would your bear say X playing the game?”

e) If the child had trouble responding, the experimenter returned to the training items to re-model the game for the child.

Results:

a) As in Treiman, data coded as 1, 2, or 1-2 depending on whether the medial C was placed in the first, second, or both syllables.

b) Analyses focused on whether the first syllable was open or closed, so 1 and 1-2 responses collapsed.
c) Interaction of VQ and CQ due to behavior of liquids in the different vowel conditions:
   i) If the initial vowel was tense and the C was a liquid, V.CV (as in pi.lot, tu.lip but. tun.a, bac.on; somewhat like adults in T&D written task)
   ii) If the initial vowel was lax and the C was a liquid or nasal, VC.V (e.g., sal.ad, cam.el but ca.bin; same as adults)

d) Effect of spelling (!)
   i) Ambisyllabic responses more common when medial C spelled with double letter (cab.bage vs. cab.in, bal.lot vs. sal.ad), suggesting an underlying phonetic difference