Class 16: Exemplars and neighborhoods

To do for next time
- No class Monday (holiday).
- Work on Timugon Murut, due Wednesday, June 2.
- Work on project. Abstracts due Friday, June 4 (draft is OK).

Bybee: Usage-based phonology[1]

Application of usage-based functionalism (may be familiar to you from studies of grammaticization), which attempts to explain aspects of the linguistic system through patterns of use.

1. Importance of frequency in conventionalization/ritualization (Haiman 1994[2])

- Representational strength: frequent items are easier/faster to access (stronger lexical entries).
- Reduction of form: frequent actions become physically reduced.
    - phonological reduction: *going to* → *gonna*
    - Christians: sign of the cross
    - chimpanzees: lying down → leaning back

  (I wonder how this plays out in signed languages)
- Reduction of meaning: through habituation, utterances lose their semantic impact, leading to etymologically redundant constructions.
    - French *ne...pas* (literally "not one step") to mean unemphatic "not"
- Emancipation: actions can become "disassociated from their original motivation and [...] free to take on a communicative function instead" (p. 9).
    - *How are you?* as greeting rather than real question
    - *be going to* as tense auxiliary rather than verb of motion.

2. "Phonetic" changes (those that involve gestural reduction or retiming)

Progress more *quickly* in items with high token frequency.

- Hooper 1976:[3] schwa deletion is more advanced in high-frequency *every, camera, memory, family* than in low-frequency *mammary, artillery, homily*.
- Bybee 2000[4]: {t,d} → Ø / C __ # is more common in high-frequency *went, just, and*.
- Some more examples: San Francisco English vowel shifts (Moonwomon), Dutch vowel reduction (van Bergen), New Mexico Spanish *d* deletion (Bybee), English rhythm rule (Hammond)

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[1] See Bybee, Joan (2001), *Phonology and Language Use*, Cambridge UP, for a recent synthesis.
[2] Haiman, John (1995). Ritualization and the development of language. In *Perspectives on grammaticalization*, ed. W. Pagliuca. Benjamins.
[3] Hooper, Joan Bybee (1976). Word frequency in lexical diffusion and the source of morphophonological change. In *Current progress in historical linguistics*, ed. W. Christie. North Holland.
[4] Bybee, Joan (2000). The phonology of the lexicon: evidence from lexical diffusion. In *Usage-based models of language*, ed. M. Barlow and S. Kemmer. CSLI.

Why: phonetic changes (especially lenition) apply every time you use a word. The lexical entry (the listener's and/or your own) is updated in response. This happens more often in high-frequency words.

This assumes that a lexical entry reflects a range of concrete pronunciations (perhaps a cloud of remembered tokens in a multidimensional perceptual space), rather than a representation stripped of all redundant and varying properties.

Another possible reason: frequent words tend to be used in prosodically unemphasized positions (because old information,[5] or because semantically bleached and thus less likely to carry discourse-important information), and so are even more often subject to lenitory rules.

3. Morphological changes

Progress more *slowly* in items with high token frequency.

- Regularization of English past tenses is more advanced in low-frequency *weep, creep, leap* than in high-frequency *keep, sleep*. (Hooper 1976)

  Google hits, May 25, 2004 (English-only option)

stem	*Kucera-Francis written frequency*	*reg. past*	*hits*	*irreg. past*	*hits*	*reg/total*
weep	14	weeped	7,550	wept	250,000	2.93%
creep	10?[6]	creeped (-out)	1,740	crept (-out)	96,900	1.76%
leap	14	leaped	205,000	leapt	223,000	47.90%
keep	264	keeped	7,030	kept	16,500,000	0.04%
sleep	65	sleeped	2,440	slept	881,000	0.28%

- Phillips (1998, 2001)[7]: stress retraction on nouns (*convíct* (noun or verb) → *cónvict* (noun) / *convíct* (verb)) affects infrequent words first.[8]

  Why: stronger lexical entry makes item resistant to change.

[5] Fowler and Housum (1987) found that subsequent occurrences of a word in a discourse tend to be less emphasized prosodically than the first occurrence. Fowler, Carol and Jonathan Housum (1987). Talkers' signaling of 'new' and 'old' words in speech and listeners' perception and use of the distinction. *Journal of Memory and Language* 26, 489-504.

[6] V and N not separately listed in UWA psychology MRC Psycholinguistic Database (http://www.psy.uwa.edu.au/mrcdatabase/uwa_mrc.htm).

[7] Phillips, Betty (1998). Word frequency and lexical diffusion in English stress shifts. In R. Hogg and L. van Bergen (eds.), *Historical Linguistics 1995, Vol. 2: Germanic linguistics*. Amsterdam: Benjamins.
Phillips, Betty (2001). Lexical diffusion, lexical frequency, and lexical analysis. In J. Bybee and P. Hopper (eds.), Frequency and the Emergence of Linguistic Structure. Amsterdam: Benjamins.

[8] Phillips also found, however, that final stress on verbs ending in *–ate* in British English developed first on frequent words. Phillips suggests that the *–ate* shift is not really a morphological rule in Bybee's sense. Applying the stress shift does not require analyzing the morphological category or morphemic structure of a word; rather, it involves ignoring *–ate*'s status as a suffix, which is more likely if the word is frequent (develops its own, strong lexical entry).

4. What makes phonetic and morphological changes different?

Bybee assumes something like a Pinker-Prince dual-mechanism model:[9] retrieval of a form from the lexicon is in competition with application of a schema (based on similar words) to derive it from a related word. So the lexical entry *wept* competes against application of the *X – Xt* schema to *weep* (yielding variation between *wept* and *weeped*).

With phonetic changes, on the other hand, it's just a question of whether to adjust the articulation in a certain direction or not. There's generally no competing force in the opposite direction (no rule of "schwa insertion/enhancement").

Bybee suggests that while phonetic changes happen through use, and a word's status can change over the course of a lifetime, morphological changes should occur through imperfect learning (affecting low-frequency words the most) during childhood.

A frequency effect on morphological rules could also occur during production: any time the irregular lexical entry fails to be retrieved (will happen most for low-frequency items), a competing schema could determine the pronunciation instead.

Note: Morphological changes are generally not gradient (there's no attested pronunciation that is between *wept* and *weeped*), so the cloud of tokens making up a lexical entry can't get gradually shifted. Rather, there could only be competition between two compact, separate clouds.

5. Lexical neighborhood

A word's lexical neighborhood is the set of words that are similar to it, although they aren't necessarily so similar to each other.

For example, if we set our similarity threshold at one segment change (insertion, deletion, or substitution, counting diphthongs as single segments), which is common is psycholinguistics, then the neighbors of *cat* are *at*, *bat*, *fat*, *hat*, *mat*, *pat*, *rat*, *sat*, *tat*, *vat*, *scat*, *kit*, *cot*, *caught*, *kite*, *coot*, *cut*, *Kate*, *coat*, *Coit*, *cad*, *cadge*, *Cal*, *can*, *cap*, *Cass, cant, cast, cats*.

Neighborliness isn't transitive. Some of *cat*'s neighbors are themselves neighbors (*vat*, *sat*), but others aren't (*scat*, *kite*).

Lexical neighbors are known to be important in processing (lexical access, speech errors—see Rebecca Scarborough's colloquium last week). Bybee and others have also claimed an effect on phonology…

[9] Though different in that it doesn't privilege default schemas over irregular schemas except insofar as they have different frequencies.

6. Frequency and neighborhood gangs

'Gangs' are family-resembling groups of words that behave similarly and can thus influence the behavior of novel words (because of schema formation).

Although members of a gang tend to be densely connected in terms of similarity (each word is a close neighbor of many others), it is often not possible to define necessary or sufficient phonological criteria for gang membership.

A much-studied example is English past tense…

- Gangs with high token/type frequency ratios are less productive (Moder 1992[10])
    - *string-strung* gang, with 199/13, is somewhat productive (e.g., *bring-brung*)
    - *sweep-swept* gang, with 656/14, is not productive

  (I'm not sure if this controlled for within-gang diversity: *string* belongs to a much more phonologically diverse gang than *sweep* does, so that it may support more-general rules.)

- High-token-frequency items don't attract new members (and hence may not really belong to the gang) (Moder 1992)
    - Highly frequent *begin-began* should belong to the *ring-rang* gang, but it hasn't attracted any other *n*-final or 2-syllable members.
    - In experimental tasks, high-frequency irregular primes don't result in as many irregular pasts of nonce words as do medium-frequency irregular primes.

  Why: strong lexical entries are more 'autonomous' and less networked with other items (not completely clear how/why this happens).

- More evidence for independence: very high-frequency verbs in English are the once that end up with suppletive paradigms through dissociation of inflectionally related forms.
    - High-frequency *went* became dissociated from present-tense *wend* and became bleached of meaning from 'go in a turning fashion' to 'go', and replaced the old past tense of *go* (*yede, yode*).

7. Implementation?

All of this sounds attractive, but it cries out for implementation/simulation to see if it can really be made to work.
Hasn't been done yet for analogical change, but Pierrehumbert has implemented phonetic change…

And now let's hear from Lauren about Pierrehumbert.

[10] Moder, Carol Lynn (1992). Productivity and categorization in morphological classes. SUNY Buffalo dissertation.