The representation of exceptions

(1) What kinds of data should a theory of exceptions explain?

Some possibilities: (not all of these may be important)

- The existence of exceptions
  - How do some words manage to avoid the regular processes of the language?
- Limits on possible exceptions
  - Turkish has a few words like [etyd] that do not undergo final devoicing, but there are no words with "anti-devoicing" (hypothetical [kod] ∼ [kotɯ])
  - Should we also rule out other irregular changes (hypothetic [kot] ∼ [kopɯ])?
- Distributional facts about exceptions
  - Minority status: most Turkish words do devoice (just a handful like [etyd])
  - Frequency: exceptional words often tend to have high token frequency
    - Things are different in cases of learned exceptions, or fancy loanwords
- Productivity
  - Is the regular pattern also the default for novel items?
  - Are speakers willing to extend exceptional patterns, given the right circumstances? (e.g., a strong subregularity)
- Direction of historical change
  - Exceptions introduced by incomplete sound change
  - Exceptions introduced by loanwords
  - Exceptions introduced as a phonological process breaks down
  - Exceptions eliminated by regularization over time
- Direction of errors (child & adult)

(2) A classic example from English: exceptions to trisyllabic shortening

- Trisyllabic shortening:

div[aɪ]ne	div[ɪ]nity
sal[aɪ]ne	sal[ɪ]nity
obsc[iː]ne	obsc[ɛ]nity
ser[iː]ne	ser[ɛ]nity
extr[iː]me	extr[ɛ]mity
ins[eɪ]ne	ins[æ]nity
prof[aʊ]nd	prof[ʌ]ndity
verb[oʊ]se	verb[a]sity

- Exceptions to trisyllabic shortening:

ob[iː]se	ob[iː]sity (*ob[ɛ]sity)
—	pr[oʊ]bity

(3) A traditional approach to exceptions: diacritics

- Lexical diacritic prevents application of rule, even though structural description is met
- *Obesity*: negative input exception (*-ity* ordinarily provides context for TSS, but this root is immune)

  OBESE: /əbiːs/$_{[-\text{Trisyllabic Shortening}]}$

(4) Predictions of this theory:

- Suffixation of *-ity* should either cause TSS or not (two possible patterns)
- Morphemic consistency: roots like *obese* should never undergo TSS (even if they happen to occur with other suffixes that cause TSS, like *-acy*)
- New/unknown words: no intrinsic prediction
  - Obvious extension: default/redundancy rule marking all words as [+TSS] unless they are specifically known to be exceptions
  - In principle, either value could be default; in this case, most *-ity* words do trigger TSS, so exceptions are the minority pattern
- Historical change and frequency
  - If a word is too infrequent, learners may never encounter the *-ity* form that would reveal a morpheme's [−TSS] status
  - So, if we assume [+TSS] is the default, then predict regularization to [+TSS] (if learners fail to learn that a particular root is [−TSS])
  - This would affect primarily low frequency words; only exceptions that remain over time are high frequency words
- Child errors: more complex prediction
  - Interaction of two factors: what the learner knows about individual morphemes, and what the learner knows about TSS in general
  - Errors could come about from incorrect formulation of TSS, or incorrect assignment of [±TSS] diacritics
  - Need a better theory of how TSS is learned before we can make precise predictions

(5) How do these predictions stack up empirically?

- Just two patterns (TSS or not): not quite true
  - Insufficient lowering: *ant*[iː]*que* ∼ *ant*[ɪ]*quity* (**ant*[ɛ]*quity*)
  - Too much lowering: *cl*[iː]*r* ∼ *cl*[æ]*rity* (**cl*[ɛ]*rity*)
  - Vowel deletion: *en*[ə]*my* ∼ *en*∅*mity* **en*[ɛ]*mity*
  - Other oddities: *p*[oʊ]*pe*, *p*[eɪ]*pacy* (synchronically unjustified)

  Wang and Derwing (1994): under certain conditions, speakers even volunteer "reverse TSS" (Trisyllabic Lengthening?) on wug words
- Morphemic consistency: seems to be false
  - Another suffix that can cause TSS: *-((a)c)y*

bur[oʊ]crat	bur[a]cracy
t[aɪ]rant	t[ɪ]ranny
supr[iː]me	supr[ɛ]macy
consp[aɪ]re	consp[ɪ]racy

    Many exceptions (see SPE, p. 181); e.g. *p*[aɪ]*racy*, *pr*[aɪ]*macy*, *dipl*[oʊ]*macy*, *r*[iː]*gency*; in fact, there are rather few [+TSS] words in *-y* (words like *bureaucracy* and *tyranny* in the minority)
  - Standard American pronunciation:

pr[aɪ]vate	pr[aɪ]vacy	pr[ɪ]vity
	[−TSS]?	[+TSS]?

    A couple other potential cases (rare but occurring forms; these are just my own intuitions about how they would be pronounced)
    - 1660 R. SHERINGHAM *King's Suprem. Asserted* viii. (1682) 70:
      "He grants him a **primity** of share in the supreme power."
    - http://www.jurispundit.com/2005/01/tom-friedman-and-john-locke.html
      "Locke saw that the **extremacy** of religious sects was not attributable to piety, but rather to the lust for power."

My intuitions:

extr[iː]me	**extr[iː]macy**??	extr[ɛ]mity
pr[aɪ]me	pr[aɪ]macy	**pr[ɪ]mity/pr[aɪ]mity**??

➢ Likelihood of TSS depends on both affix and stem, but neither can be marked [±TSS]
  ◦ Similar to Spanish diphthongization case discussed previously; each suffix has its own likelihood to cause the alternation
  ◦ Difficult to test in this case; few roots appear with more than one TSS-inducing suffix

- New/unknown words: a surprising effect
  - Novel formations are generally [−TSS], even for *-ity* (where most existing words are [+TSS])
    ◦ *Comedity*: web comic http://www.comedity.com
      "Com·e·dit·y: n. (kŏmˈē-dĭtˈē)"
    ◦ *Profoundity*: http://www.writing.com/main/handler/item_id/893037

3/3/05 2:35pm	"Ooo, kudos for the profoundity of that statement. (made up a new word!)"
3/3/05 10:55pm	"'Wait...now that I think about it, I think 'profoundity' is actually a word . . . hahah, silly ol' me . . . But if it's not, go me!"

      (Lexicalized *profundity* uncertain/unknown to this particular speaker)
  - "Wug tests": native speakers tend not to apply TSS (Jaeger 1983, Wang & Derwing 1983)

➢ Most existing Level 1 formations that could undergo TSS in fact do (especially with *-ity*); why would [−TSS] be the default for new words?

(Caveat: *-ity* is, in general, not productive;[1] whatever process leads to the creation of novel *-ity* forms goes beyond normal, unconscious application of the rules of English. We should have a better theory of the creative/humorous use of unproductive processes before making too strong a claim based on novel uses of unproductive affixes.

- Errors:
  - NPR radio show "Brain Brew", April 17, 2004
    "The FCC has cracked down on obsc[iː]nity. . . [pause]. . . obsc[ɛ]nity, even. . . "
- Historical change:
  - *ob*[iː]*sity* was (apparently) formerly *ob*[ɛ]*sity*; *pr*[aɪ]*vacy* was *pr*[ɪ]*vacy* (and still is, in UK)
  - Change from [+TSS] to [−TSS] mirrors productivity of [−TSS]
- Lexical frequency: untested
  - Too few relevant *-ity* and *-acy* forms to make meaningful comparison

(6) What do we learn from all this?

- More patterns of exceptions than can be expressed by [±RULE]
  - Speakers can memorize lots of exceptional stuff; not clear that there's a principled division between [iː]∼[ɛ] (*serenity*) and [iː]∼[ɪ] (*antiquity*), beyond the fact that one occurs in multiple words, and the other is more or less idiosyncratic
  - We probably do not need to require that the theory place formal limits on possible exceptions
    ◦ Limits could come from learnability (idiosyncratic alternations make it harder to discover that two forms are actually related to one another
    ◦ Isolated patterns of exceptions are thus in severe danger of not being learned
  - We do need a formal way for listed forms and regular processes to interact in the grammar
- We need a theory of how learners decide whether a pattern is productive or not

(7) Issues to be dealt with in the remainder of this discussion:

- How are exceptions listed?
- How do we know which words must be listed as exceptions?

[1] Except in a few very specific morphological environments, such as after *-ic* and *-al*.

Exceptionality via graded faithfulness

(8) Starting at the beginning

- We need a mechanism for listing exceptional forms, and having those forms surface untouched (in the relevant respects) by the regular grammar

Why this is not trivial: (stated now in OT terms)

- Alternation A∼B is active in the language: *A $\gg \mathcal{F}$(A)
- Retaining lexically specified A: $\mathcal{F}$(A) $\gg$ *A

(9) An example

- Final devoicing: CodaCondition $\gg$ Ident[voi]

/rad/	CodaCond	Ident[voi]
a. rad	*!	
☞ b. rat		*

- Exception: voicing remains (Ident[voi] $\gg$ CodaCondition)

/pad/	Ident[voi]	CodaCond
☞ a. pad		*
b. pat	*!	

How can both types of words co-exist?

(10) Possibility 1 (to be rejected): devoicing is now exceptional

- Existence of words that don't devoice shows that devoicing is no longer active in the language
- To allow non-devoicing words to surface, we need $\mathcal{F} \gg \mathcal{M}$
- Voicing is now contrastive, so final devoicing must be a listed property
  - Voicing remains (Ident[voi] $\gg$ CodaCondition)

/pad/	Ident[voi]	CodaCond
☞ a. pad		*
b. pat	*!	

  - Final devoicing: extra listed allomorph satisfies both conditions simultaneously

/rad/, /rat/	Ident[voi]	CodaCond
a. rad		*!
☞ b. rat		

Why this won't work:

- If final devoicing is the default, then morphemes must, by default, be provided with devoiced allomorphs, even though they have never been heard
- But what blocks /pad/ from being given also a /pat/ allomorph? No amount of hearing [pad] can prevent it
- Conclusion: the fact that /pad/ does not devoice must be stored more directly (e.g., listed surface form [pad], to block regular *[pat])

(11) Possibility 2 (problematic): different grammars for devoicing and non-devoicing words

- Use the scheme in (9); words are simply annotated for which grammar they are sent through
  ➢ Lexical strata/co-phonologies
- Final devoicing grammar designated as default
  - Words/morphemes marked for "faithful" grammar if the devoicing grammar fails to derive them correctly
  - I.e., when hearing exceptional [pad], learner determines that default grammar would derive *[pat], so marks for faithful grammar

- Prediction: multiple exceptionality
  - Alternate grammar may differ from regular grammar in more than one respect; exceptional words may have a variety of exceptional properties
  - Conversely, we *don't* expect exceptional properties to be orthogonal/fully crossed (4 grammars needed for 2 properties)
- A major issue with this approach: allowing alternate high-faith grammar can block learning
  - Initial state (assuming $\mathcal{M} \gg \mathcal{F}$: learner expects a language with no voiced obstruents in codas, but doesn't know how they will be fixed (i.e., which $\mathcal{F}$ constraint is violated to satisfy CODACOND)
  - This grammar does not yet produce final devoicing correctly
  - All words are therefore exceptions, and must be sent to the "high-faith" grammar; an easy out that lets the learner "explain" the data without ever actually learning the pattern
- Conclusion: we do need to incorporate high faith somehow to allow lexicalized exceptions to surface, but it should be used only after $\mathcal{M}$ constraints have had a chance to try to explain the data

(12) Possibility 3 (promising): all forms handled by a single grammar, but faithfulness is weak and hard to invoke (Zuraw 2000; adapted somewhat to try to make applicable to present example)

- Intuition: you want to be really sure before you invoke a faithfulness explanation
- Language-wide: initial state of $\mathcal{M} \gg \mathcal{F}$ ensures that $\mathcal{M}$ is given "first dibs"
  - Lack of final voiced obstruents is attributed to CODACOND, and not an accident of the lexicon
- Individual words: even if you know that final voiced stops are, in principle, possible, you should be really sure that the word in question has one before uttering one
  - ➢ Crucially, this is certainty not just that the morpheme has a voiced stop, but that the uninflected form keeps that voiced stop word-finally
  - That is, knowledge that zero-affixed /pad+∅/ yields surface [pad] (even if grammar would otherwise prefer [pat])

Implementation: listed output forms + graded faithfulness constraints

Listed: /pad/ (=PAD root), [pad] (=PAD-nom.sg., listed inflected form), etc.

$\mathcal{F}$(extremely well known word) $\gg$ $\mathcal{F}$(well known word) $\gg \ldots \gg$ $\mathcal{F}$(barely known word)

(13) Example: well-known exception [pad]

[pad] =/pad+∅/, well known	$\mathcal{F}$(high)	CODACOND	$\mathcal{F}$(low)
☞ a. pad		*	
b. pat	*!		*

vs. not so well-known exception [sad]

[sad] =/sad+∅/, not well known	$\mathcal{F}$(high)	CODACOND	$\mathcal{F}$(low)
a. sad		*!	
☞ b. sat			*

- Predicts regularization of low-frequency (insufficiently known) exceptions
- Needs a blocking principle to make sure we use listed form [pad] = /pad+∅/, to enforce faithfulness.
  - Zuraw (2000) enforces this with a USELISTED constraint

(14) The representation of non-exceptions: two possibilities

- Regular derived forms could be harmlessly listed in surface form: [rat] = /rad+∅/

[rat] =/rad+∅/, well known	$\mathcal{F}$(high)	CODACOND	$\mathcal{F}$(low)
☞ a. rat			
b. rad	*!	*	*

- Or, could be derived productively using grammar, as usual (derivation done on-line, so form acts as unknown; gets lowest level of faithfulness)

/rad+∅/	$\mathcal{F}$(high)	CODACOND	$\mathcal{F}$(low)
☞ a. rat			*
b. rad		*!	

- Upshot: no need to make specific claims about listing of regular words (could be listed or not); the only specific requirement is that irregular words be listed, and frequent enough to enforce faithfulness to them
- (A possible issue: in Turkish, the exceptions, like *etude*, are probably not all that common; getting them to surface would require us to say that in principle, Turkish allows final voiced obstruents on any word down to at least the frequency of *etude*. This misses the intuition that *etude* survives intact because speakers know that it is French—captured neatly in the cophonologies approach)

(15) How learning would work in this system

Assume: general process of final devoicing, one very high frequency exception

- Initial state: $\mathcal{M} \gg \mathcal{F}_{highest} \gg \mathcal{F}_{high} \gg \ldots \gg \mathcal{F}_{avg} \gg \ldots \gg \mathcal{F}_{low} \gg \mathcal{F}_{lowest}$
- Scaling: $\mathcal{F}_{avg}$ means "faithfully pronounce any word that is at least as familiar as the mean familiarity of words in the lexicon"
- When learner starts learning, not many words are known; hearing a final voiced obstruent causes $\mathcal{F}_{highest} \gg \mathcal{M}$
- As the vocabulary grows, no more final voiced obstruents are heard; final grammar allows voiced obstruents only in highest freq words

More generally:

- If there are more words with final voiced obstruents, $\mathcal{M}$ will continue to move down
- Truly contrastive final voicing emerges only when learner has heard many words—enough to be sure that final voiced obstruents occur even in the rarest words known
- Meanwhile, in the course of the learning process, learner has learned relative ranking of $\mathcal{M}$ constraints to try to capture pattern using markedness alone (covert generalizations)

(16) Predictions of this theory:

- Morphemic consistency: not necessarily
  - Any surface form could, in principle, be listed. (Will only be realized faithfully if it's frequent enough, however)
- New/unknown words:
  - $\mathcal{F}$ does not apply; default pattern is applied using the ranking of $\mathcal{M}$ constraints (TETU effect, of sorts)
- Frequency:
  - Straightforwardly predicts that higher frequency/more familiar words should retain their properties, while low frequency words are open to regularization
- Historical change:
  - Relative ranking of $\mathcal{M}$ constraints can produce regularization when $\mathcal{F}$ does not hold, but no way to overapply irregular pattern
  - In this case, no way to create final voiced obstruents (only eliminate them)

(17) Application to Yiddish voicing assimilation

- Recall basic pattern: regresssive voicing assimilation among obstruents, but only *devoicing* (/DT/ → /TT/), not *voicing* (/TD/ $\not\to$ */DD/)
- Analysis suggested from discussion of Comparative Markedness:
  - $_N$*D ≫ AGREE(voi) ≫ IDENT(voi) ≫ $_O$*D

/abta/	$_N$*D	AGREE(voi)	IDENT(voi)	$_O$*D
a. abta		*!		*
☞ b. apta			*	

/apda/	$_N$*D	AGREE(voi)	IDENT(voi)	$_O$*D
☞ a. apda		*		*
b. abda	*!		*	*

- Allowing exceptions with graded $\mathcal{F}$:

/abta/ (well-known)	$\mathcal{F}_{high}$	$_N$*D	AGREE(voi)	$_O$*D	$\mathcal{F}_{low}$
☞ a. abta			*	*	
b. apta	*!				*

/abta/ (unfamiliar)	$\mathcal{F}_{high}$	$_N$*D	AGREE(voi)	$_O$*D	$\mathcal{F}_{low}$
a. abta			*!	*	
☞ b. apta					*

  - Although non-agreeing words are permitted for (sufficiently) known words, the basic $_N$*D ≫ AGREE(voi) ≫ $_O$*D ranking is in place, covertly waiting to kick in
  - A type of TETU effect (process applies when faithfulness is too weak to prevent it)

(18) Summary:

- Gradient listedness/faithfulness solves many of the paradoxes concerning the interaction of markedness and faithfulness in exceptions vs. regular forms.
- Allows learner to discover & encode ranking for general pattern, even in the face of exceptions
- Captures difference between behavior on novel/unknown words & behavior on existing words
- Thus, provides a promising mechanism for handling listed exceptions in the grammar

Next time: why do learners sometimes seem to fail to grasp the basic pattern?

➢ How do we encode the fact that TSS applies at different rates before different affixes, and for different input vowels?

➢ Why does TSS generally act like an exceptional pattern, even though there is quite a bit of evidence for it, and it has rather few exceptions (at least in some contexts)?