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] ~ [kotui])
  - Should we also rule out other irregular changes (hypothetical [kot] ~ [kopui])?
- 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[a]ne  div[i]nity
  sal[a]ne  sal[i]nity
  obsc[i]ne  obs[c]nity
  ser[i]ne  ser[r]nity
  extr[i]me  extr[e]mity
  ins[e]ne  ins[a]nity
  prof[a]nd  prof[A]ndity
  verb[oo]se  verb[a]sity

- Exceptions to trisyllabic shortening:

  ob[i]se  ob[i]sity (*ob[r]sity)
  pr[oə]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: /əbɪs/ [-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[i]uity (*ant[v]uity)
  - Vowel deletion: en[a]my ~ en[ə]mity *en[v]mity
  - Other oddities: p[ou]pe, p[ei]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
    bur[ou]crat bur[a]cracy
t[ai]rant t[i]ranny
supr[iː]me supr[v]macy
consp[ai]re conspi[racy]

Many exceptions (see SPE, p. 181); e.g. p[ai]racy, pr[ai]macy, dipl[ou]macy, r[i]ency; in fact, there are rather few [+TSS] words in -y (words like bureaucracy and tyranny in the minority)

- Standard American pronunciation:
  pr[ai]vate pr[ai]vacy pr[i]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.”
  “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[e]mity
  - pr[a]me pr[a]macy pr[a]mity/pr[a]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](http://www.comedity.com)
      “Com-e-dit-ye: n. (kóm-e-dit-ë)”
      3/3/05 2:35pm “Ooo, kudos for the profundity of that statement. (made up a new word!)”
      3/3/05 10:55pm “‘Wait...now that I think about it, I think ‘profundity’ is actually a word...hahah, silly of me...But if it’s not, go me!”

  - “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[e]nity, even...”

- Historical change:
  - ob[iː]sity was (apparently) formerly ob[e]sity; pr[a]vacy was pr[e]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]∼[e] (serenity) and [iː]∼[ə] (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?

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1Except 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 ≫ \mathcal{F}(A)
- Retaining lexically specified A: \mathcal{F}(A) ≫ *A

(9) An example

- Final devoicing: CODACONDITION \gg IDENT[voi]

<table>
<thead>
<tr>
<th></th>
<th>CODACond</th>
<th>IDENT[voi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>/rad/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. rad</td>
<td>*!</td>
<td></td>
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<tr>
<td>b. rat</td>
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</tbody>
</table>

- Exception: voicing remains (IDENT[voi] \gg CODACONDITION)

<table>
<thead>
<tr>
<th></th>
<th>IDENT[voi]</th>
<th>CODACond</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pad/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. pad</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. pat</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

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} ≫ \mathcal{M}
- Voicing is now contrastive, so final devoicing must be a listed property
  - Voicing remains (IDENT[voi] \gg CODACONDITION)

<table>
<thead>
<tr>
<th></th>
<th>IDENT[voi]</th>
<th>CODACond</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pad/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. pad</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. pat</td>
<td>*!</td>
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</tbody>
</table>

- Final devoicing: extra listed allomorph satisfies both conditions simultaneously

<table>
<thead>
<tr>
<th></th>
<th>IDENT[voi]</th>
<th>CODACond</th>
</tr>
</thead>
<tbody>
<tr>
<td>/rad/, /rat/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. rad</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. rat</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

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 $M \gg F$: learner expects a language with no voiced obstruents in codas, but doesn’t know how they will be fixed (i.e., which $F$ 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 $M$ 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 $M \gg F$ ensures that $M$ 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.
$F$(extremely well known word) $\gg F$(well known word) $\gg \ldots \gg F$(barely known word)

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

<table>
<thead>
<tr>
<th></th>
<th>/pad+∅/, well known</th>
<th>$F$(high)</th>
<th>CODACOND</th>
<th>$F$(low)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. pad</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. pat</td>
<td>*†</td>
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</tr>
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</table>

vs. not so well-known exception [sad]

<table>
<thead>
<tr>
<th></th>
<th>/sad+∅/, not well known</th>
<th>$F$(high)</th>
<th>CODACOND</th>
<th>$F$(low)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>a. sad</td>
<td></td>
<td>*†</td>
<td></td>
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<tr>
<td></td>
<td>b. sat</td>
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</table>

• 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: \( [\text{rat}] = /\text{rad}+\emptyset/ \)

<table>
<thead>
<tr>
<th>( [\text{rat}] = /\text{rad}+\emptyset/ ), well known</th>
<th>( \mathcal{F}(\text{high}) )</th>
<th>CODACond</th>
<th>( \mathcal{F}(\text{low}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. rat</td>
<td>*!</td>
<td>*</td>
<td>*</td>
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<tr>
<td>b. rad</td>
<td>*!</td>
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</table>

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

<table>
<thead>
<tr>
<th>( /\text{rad}+\emptyset/ )</th>
<th>( \mathcal{F}(\text{high}) )</th>
<th>CODACond</th>
<th>( \mathcal{F}(\text{low}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. rat</td>
<td>*!</td>
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<td>b. rad</td>
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</table>

- 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: \( \mathcal{M} \gg \mathcal{F}_{\text{highest}} \gg \mathcal{F}_{\text{high}} \gg \cdots \gg \mathcal{F}_{\text{avg}} \gg \cdots \gg \mathcal{F}_{\text{low}} \gg \mathcal{F}_{\text{lowest}} \)

- Scaling: \( \mathcal{F}_{\text{avg}} \) 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 \( \mathcal{F}_{\text{highest}} \gg \mathcal{M} \)

- 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)
Application to Yiddish voicing assimilation

- Recall basic pattern: regressive voicing assimilation among obstruents, but only *devoicing* (/DT/ → /TT/), not *voicing* (/TD/ → */DD/)

- Analysis suggested from discussion of Comparative Markedness:
  - \( N^+D \gg \text{AGREE(voi)} \gg \text{IDENT(voi)} \gg O^+D \)

<table>
<thead>
<tr>
<th>/abta/</th>
<th>( N^+D )</th>
<th>( \text{AGREE(voi)} )</th>
<th>( \text{IDENT(voi)} )</th>
<th>( O^+D )</th>
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<tbody>
<tr>
<td>a. abta</td>
<td>*!</td>
<td>*</td>
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<td>b. apta</td>
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<table>
<thead>
<tr>
<th>/apda/</th>
<th>( N^+D )</th>
<th>( \text{AGREE(voi)} )</th>
<th>( \text{IDENT(voi)} )</th>
<th>( O^+D )</th>
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<tr>
<td>a. apda</td>
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<td>b. abda</td>
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- Allowing exceptions with graded \( F \):

<table>
<thead>
<tr>
<th>/abta/ (well-known)</th>
<th>( F_{\text{high}} )</th>
<th>( N^+D )</th>
<th>( \text{AGREE(voi)} )</th>
<th>( O^+D )</th>
<th>( F_{\text{low}} )</th>
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<td>a. abta</td>
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<td>b. apta</td>
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<table>
<thead>
<tr>
<th>/abta/ (unfamiliar)</th>
<th>( F_{\text{high}} )</th>
<th>( N^+D )</th>
<th>( \text{AGREE(voi)} )</th>
<th>( O^+D )</th>
<th>( F_{\text{low}} )</th>
</tr>
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<tbody>
<tr>
<td>a. abta</td>
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<td>*!</td>
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<td>*</td>
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<tr>
<td>b. apta</td>
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- Although non-agreeing words are permitted for (sufficiently) known words, the basic \( N^+D \gg \text{AGREE(voi)} \gg O^+D \) ranking is in place, covertly waiting to kick in
- A type of TETU effect (process applies when faithfulness is too weak to prevent it)

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)?