1. Introduction

- Since SPE, exceptions have been dealt with in two ways in generative phonology:

(1)  
  a. **Diacritic approaches**: Exceptional lexical items are marked as subject to a rule or constraint that does not apply to regular items (or vice versa)
  
  b. **Structural approaches**: Exceptional lexical items are specified with phonological structure that is not present on regular items

- Within Optimality Theory, diacritic and structural approaches have continued to be taken:

(2)  
  a. Diacritic approaches:
    
    i. **Lexically specific ranking** - lexical items are specified for the ranking of two or more constraints:
    
    A. Lexical items are specified for a ranking of constraints that differs from the ‘core’ ranking of the language (McCarthy and Prince 1993, Nouveau 1994; Pater 1994; Itô and Mester 1995a,b; Inkelas, Orgun and Zoll 1997; cf. Paradis and Lebel 1994)
    
    B. Lexical items are specified to choose a particular ranking of unranked constraints (Antilla 2002)
    
    ii. **Lexically specific constraints** - a lexically specific version of a constraint, ranked differently from the general one:
    
    A. Only faithfulness constraints (Fukuzawa 1997; Kraska-Szelenk 1997, 1999; Itô and Mester 1999)
    
    B. Markedness and faithfulness constraints (Pater 2000)
    
    C. Only markedness constraints (?)
    
  b. Structural approaches:
    
    i. **Prespecification**: Specified structure that is protected by a faithfulness constraint (many; see esp. Inkelas, Orgun and Zoll 1997)
    
    ii. **Allomorphy**: Similar to prespecification, except that entire morpheme alternants are stored (Kager 1999)

- To save time, I will discuss only (2aii) and (2bi), though see the Appendix on (2ai)

*Acknowledgements: Thanks to Iwona Kraska-Szelenk and Wim Zonneveld for sending me copies of their work on exceptionality. Thanks also to UMass and Rutgers phonologists for useful discussion, as well as Arto Anttila and Cheryl Zoll.

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• I will argue that only an approach with lexically specific faithfulness and markedness constraints can deal with the cross-linguistic typology of exceptions, under the following standard assumptions about what an adequate theory of exceptions should do:

(3) a. It should be able to express the distinction between regular and exceptional forms  
    b. It should be able to express the distinction between exceptional and ungrammatical forms

• For example, in English (Hayes 1982; cf. Pater 1994):

(4) a. If the penultimate syllable is light, the antepenult is usually stressed (e.g. Cánada), but in exceptional words, the penult receives stress (e.g. banána)  
   b. If the penultimate syllable is heavy, antepenultimate stress is impossible (*‘póedektal’)

• To facilitate the comparison of the different models, I will use a small set of constraints to construct hypothetical instances of lexical exceptionality.

(5) NOCODA Syllables end in vowels (*C\_o)  
MINWD Words are minimally bimoraic (CVCV or CVC)  
*COMPLEX No consonant clusters  
MAX Input segments have output correspondents (‘No deletion’)  
DEP Output segments have input correspondents (‘No epenthesis’)

• I will relate each of these cases to general predicted types of exceptionality, and discuss how the typology is instantiated cross-linguistically  
• I will be mostly discussing cases of alternation, to set aside at least some concerns about productivity and learnability (see Rice 1997, Itô, Mester and Padgett 1999)

2. Exceptional Blocking by Faithfulness

• This is the most commonly discussed type of exception: an alternation is blocked in exceptional items  
• Illustration: a language in which underlying codas are generally eliminated through deletion, and in which exceptional items retain their final consonants

(6) /pak/ → [pa] /pidot/ → [pido]  
/lot/ → [lo] /talak/ → [tala]  
/tak/ → [tak] /likot/ → [likot]

• Analysis of coda deletion:

(7) NOCODA >> MAX

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>NOCODA</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td>* !</td>
<td></td>
</tr>
<tr>
<td>*&lt;sup&gt;→&lt;/sup&gt;pa</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
Under a lexically specific constraint analysis, the exceptional items are targeted by a ‘cloned’ MAX constraint, MAX-L, that ranks above NoCODA.

(8) Grammar: MAX-L >> NoCODA >> MAX
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

Illustrative tableaux:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>MAX-L</th>
<th>NoCODA</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td>* !</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pa</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>tak</td>
<td>* tak</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>ta</td>
<td></td>
<td>* !</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

To further illustrate this approach, let us assume that the language also bans consonant clusters, but unlike the restriction against codas, this one is absolute.

This is accounted for by *COMPLEX >> MAX-L; if under Richness of the Base an underlying form with a cluster is given a lexical diacritic, the cluster is reduced:

(9) Input | Output | *COMPLEX | MAX-L | NoCODA | MAX |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CCV</td>
<td>CCV</td>
<td>* !</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>CCV_L</td>
<td>CCV</td>
<td>* !</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Our desiderata for a theory of exceptions are fulfilled as follows:

(10) a. Exceptional forms, but not regular forms, are marked in the lexicon as subject to a lexically specific constraint
b. Exceptional forms are distinguished from ungrammatical forms by the ranking of the lexically specific constraint

A structural approach would posit an underlying distinction between deleting and non-deleting codas - let us say in terms of whether they bear a syllabic timing slot (x):

(11) Grammar: *COMPLEX >> MAX-X >> NoCODA >> MAX
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

The tableaux for the previous analysis would be adapted by replacing the diacritic ‘L’ with the structure ‘X’, and our desiderata would be met in this minimally different fashion:

(12) a. Exceptional forms, but not regular forms, are marked in the lexicon with extra structure
b. Exceptional forms are distinguished from ungrammatical forms by the ranking of the constraint referring to that structure
Note that the success of this structural analysis depends on constraint ranking: why should lexically specified structure override one constraint or rule, but not another? (Pater 2000)

Examples of exceptional blocking by faithfulness:

(14) a. Turkish words regularly undergo coda devoicing, but it is blocked in some loanwords (Inkelas et al. 1997)

b. In Japanese, voiced geminates are regularly devoiced, but unassimilated foreign words retain their voicing (Itô and Mester 1999)

c. English sonorant-final medial syllables are regularly destressed (e.g. *information), but sometimes retain the stress from their base (e.g. *exhortation) (Pater 2000)

d. In French word-final nasals are usually deleted, except in a small set of exceptional words (e.g. abdomen, spécimen) (Schane 1970)

3. Exceptional triggering

In this type of exceptionality, exceptional items undergo an alternation that does not apply to regular items; this is traditionally referred to as a minor rule

Illustration - codas are generally tolerated, except in exceptional forms, in which they delete:

(15) /pak/ → [pak] /pidot/ → [pidot]
/lot/ → [lot] /talak/ → [talak]
/tak/ → [ta] /likot/ → [liko]

Here the exceptional items are indexed to a markedness constraint - in this case NoCODA:

(16) Grammar: No-CODA-L >> MAX >> NoCODA
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

Illustrative tableaux:

(17) | Input | Output | NoCODA-L | MAX | NoCODA |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>pa</td>
<td></td>
<td></td>
<td>* !</td>
<td></td>
</tr>
<tr>
<td>tak</td>
<td>tak</td>
<td>* !</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>ta</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

If lexical indexation is limited to faithfulness constraints, then one must analyze the regular forms as being lexically marked, and the exceptional pattern as regular:
(18) Grammar: MAX-L >> NoCODA >> MAX
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

A structural analysis faces a similar difficulty, since the non-alternating consonant must be lexically marked:

(19) Grammar: MAX-X >> NoCODA >> MAX

\[
\begin{array}{cccc}
\times & \times & \times & \\
\end{array}
\]
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

Since these approaches to exceptionality are forced to analyze exceptional blocking and triggering identically, one cannot account for the following in terms of the grammar:

(20) a. Native speaker’s awareness of regulars vs. exceptions
b. Regularization of exceptional forms

On the difficulty that regularization can pose for a structural account, see Albright (2002)

In contrast, with lexically specific markedness and faithfulness constraints (or rule diacritics), one can maintain the standard view that regularization is loss of lexical marking

Examples of exceptional triggering:

(21) a. In French, word-final velars are not normally deleted after oral vowels (e.g. bac,avec, roc, mec); however, there is a small group of words in which they are (estomac, croc, escroc; cf. estomaquer, croquer, escroquer); similarly for [l] (calcul vs. cul) (Schane 1970)

b. In Palauan, stressless high front vowels are not normally deleted, but they are in a small set of words (Flora, 1974 cited in Zonneveld 1978)

c. In Somali, codas are usually tolerated, but the autobenefactive suffix /-ad/ loses its consonant in final position (Saaed 1985, cited in Kraska-Szlenk 1999)

4. Exceptional blocking by markedness

An alternation is sometimes blocked only when another markedness constraint is at stake

For example, coda deletion is exceptionally blocked, but only in monosyllabic words, due to word minimality:

(22) /pak/ \rightarrow [pa] /pidot/ \rightarrow [pido]
/lot/ \rightarrow [lo] /talak/ \rightarrow [tala]
/tak/ \rightarrow [tak] /likot/ \rightarrow [liko]

(23) Grammar: MINWD-L >> NoCODA >> MINWD, MAX
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/
(24) | Input | Output | MINWD-L | NOCODA | MAX | MINWD |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td>* !</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pa</td>
<td>* !</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tak</td>
<td>* !</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ta</td>
<td>* !</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pidot</td>
<td>* !</td>
<td>*</td>
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<td></td>
</tr>
<tr>
<td>pido</td>
<td>* !</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The following “Richness of the Base” tableau shows that if a CVCVC form is supplied with a lexical diacritic, it still undergoes deletion, since word minimality is satisfied:

(25) | Input | Output | MINWD-L | NOCODA | MAX | MINWD |
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCVC_L</td>
<td>CVCVC</td>
<td>* !</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVCV</td>
<td></td>
<td>*</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- With only lexically specific faithfulness constraints, MAX must be indexed:

(26) Grammar: MAX-L >> NOCODA >> MINWD, MAX
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

- This grammar fails the Richness of the Base test, showing it is insufficiently restrictive:

(27) | Input | Output | MAX-L | NOCODA | MAX | MINWD |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCVC_L</td>
<td>CVCVC</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVCV</td>
<td></td>
<td>* !</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

- The structural analysis is similar, since it must use a faithfulness constraint to preserve the lexical material:

(28) Grammar: MAX-X >> NOCODA >> MAX, MINWD
\[\hat{X}\]
Lexicon: /pak/ /lot/ /tak/ /pidot/ /talak/ /likot/

- This pattern of exceptionality is problematic for a purely rule-based theory in the same way as regular blocking, and also may pose additional formal difficulties: the exception feature must be in some way limited to CVC words

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2 John McCarthy (p.c.) points out that an analysis is possible with conjoined constraints (Smolensky 1995): MINWD&Max-x. It counts an argument in favor of lexically specific constraints that they do not require the additional device of local conjunction to restrict the phonological distribution of exceptional structures.
Examples of exceptional blocking by markedness:

(29) a. In Russian, deletion of [i] from the suffix /-isk/ is sometimes blocked, but only when the preceding stem ends with a velar or palatal consonant (Chomsky and Halle 1968: 379)

b. In Finnish, stem-final /a/ usually rounds to [o] before suffixal [-i], however, when the preceding vowel is round, deletion usually occurs instead (Anttila 2002)\(^3\)

c. In English, initial consonant-final pretonic syllables are usually stressed (e.g. *bàndána*), however in an exceptional group of words, mostly formed with Latinate prefixes (*admíre*), these syllables surface as stressless

5. Exceptional Repair

- A lexically driven conspiracy: exceptions use a different repair than regular words to satisfy the same constraint
- For example, codas generally delete, but epenthesis applies in exceptional cases:

(30) /pak/ → [pa] /pidot/ → [pido]
   /lot/ → [lo] /talak/ → [tala]
   /tak/ → [takɔ] /likot/ → [likotɔ]

- Analysis:

(31) Grammar: MAX-L, NoCODA >> DEP >> MAX
      Lexicon: /pak/ /lot/ /takɔ/ /pidot/ /talak/ /likotɔ/

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>MAX-L</th>
<th>NoCODA</th>
<th>DEP</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✶ pa</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✶ pakɔ</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>takɔ</td>
<td>tak</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ta</td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>✶ takɔ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

- This pattern shows that lexically specific faithfulness is required as well as markedness, for reasons beyond distinguishing exceptional blocking from triggering (i.e. §2 vs. §3),

\(^3\) This is only part of the story. As Anttila shows in detail, the choice between deletion and mutation is subject to a number of conditioning factors, both phonological and morphological. He also points out that lexically specific faithfulness constraints fail to capture these generalizations.
• Examples of exceptional repair:

(33) a. In OshiKwanyama, nasal-voiceless obstruent clusters undergo nasal substitution with native stems (e.g. oN+pote → omote ‘good-for-nothing’). With non-native stems, post-nasal voicing occurs instead (e.g. oN+papila → ompapila ‘paper’) (Steinbergs 1985)

b. In Swahili loanwords, epenthesis applies to break up clusters and avoid codas (e.g. [gilasi] ‘glass’, [sampuli] ‘sample’). A set of suffixes, however, lose their initial consonants after consonant-final stems (e.g. the applicative /-li/ /pik+li+a/ → [pikia] ‘cook (APPL.)’) (Kraska-Szlenk 1999)

6. Conclusions

• A theory with lexically specific markedness and faithfulness constraints is more powerful than either a theory with no lexically specific constraints (i.e. a purely structural approach), or one with only lexically specific faithfulness constraints
• However, it seems that this extra power is warranted, since the full set of predicted constraint interactions are attested:

(34) i. Exceptional blocking by faithfulness: FAITH-LEX >> MARK >> FAITH
ii. Exceptional triggering: MARK-LEX >> FAITH >> MARK
iii. Exceptional blocking by markedness: MARK-B-LEX >> MARK-A >> FAITH, MARK-B
iv. Exceptional repair: FAITH-B-LEX, MARK >> FAITH-A >> FAITH-B

• Further research:

(35) i. Testing of native speaker awareness of the distinctions
   Do people recognize that a class of exceptions is phonologically delimited (e.g. that only monosyllables are exceptions to coda deletion)?

ii. An explicit learning algorithm for the creation of lexically specific constraints
   Building on work the work on inconsistency detection by Tesar (2000) and Prince (2002), Winslow (2003) and Pater (2003) suggest that constraints are cloned to resolve inconsistency

iii. The scope of indexed constraints
   Can all constraints be indexed?
   Is the indexation of a root inherited in derived words? (cf. Mascaró 2003)
   Is the indexation of an affix be inherited by the entire word? (cf. Coats 1970, Kisseberth 1970)
   Can segments be indexed? (cf. Chomsky and Halle 1968, Inkelas et al. 1997)
References

Appendix: Lexically Specific Rankings

- An alternative diacritic approach is to specify rankings in the lexicon
- This approach can generate the same set of patterns as lexically specific constraints, but it has some disadvantages

- The following is an analysis of the exceptional blocking by faithfulness pattern: exceptional lexical items are specified for MAX >> NOCoda, which reverses their ranking in the tableau:

(A1) Grammar: *COMPLEX, NOCoda >> MAX
Lexicon: /pak/ /lot/ /takMax>>NoCoda/ /pidot/ /talak/ /likotMax>>NoCoda/

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>*COMPLEX</th>
<th>NOCODA</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>pak</td>
<td>pak</td>
<td>* !</td>
<td></td>
<td></td>
</tr>
<tr>
<td>πττ ρa</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pakο</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>*COMPLEX</th>
<th>MAX</th>
<th>NOCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>takMax&gt;&gt;NoCoda</td>
<td>tak</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>τa</td>
<td></td>
<td>* !</td>
<td></td>
<td></td>
</tr>
<tr>
<td>τakο</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- The problem with this approach is that given Richness of the Base, nothing rules out lexically specifying any other ranking
- For example, if our language has an absolute restriction against clusters, this cannot be expressed, since lexical items can be specified for MAX >> *COMPLEX

(A2) Grammar: *COMPLEX >> NOCoda, MAX
Lexicon: /pak _NoCoda>>Max/ /lot _NoCoda>>Max/ /takMax>>NoCoda/ /pidot _NoCoda>>Max/ /talak _NoCoda>>Max/ /likotMax>>NoCoda/

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>*COMPLEX</th>
<th>NOCODA</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCV</td>
<td>CCV</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ππ ρCV</td>
<td></td>
<td>* !</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>MAX</th>
<th>NOCODA</th>
<th>*COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCVMax&gt;&gt;*Complex</td>
<td>CCV</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td>* !</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- One way of restricting lexical rankings is to stipulate that only constraints that are unranked in the grammar can have lexically specified rankings (Anttila 2002):

(A3) Grammar: *COMPLEX >> NOCoda, MAX
Lexicon: /pak _NoCoda>>Max/ /lot _NoCoda>>Max/ /takMax>>NoCoda/ /pidot _NoCoda>>Max/ /talak _NoCoda>>Max/ /likotMax>>NoCoda/

- Under this account, we lose the distinction between regulars and exceptions, since both of their rankings must be lexically specified, so as to block variation
Another approach is to allow words to choose between a specified set of rankings, or co-grammars; exceptions are subject to a special grammar, here marked the L-Grammar:

(A4) Grammar: *COMPLEX-ONSET >> NOCODA >> MAX
     L-Grammar: *COMPLEX-ONSET >> MAX >> NOCODA
     Lexicon: /pak/ /lot/ /tak₁/ /pidot/ /talak/ /likot₁/

This seems empirically indistinguishable from having lexically specific constraints, and has the notational disadvantage of replicating the entire hierarchy for each exceptional ranking.