Problem Set 2 – due class 2 of week # 4: Italian length

Given: Three Phonotactic Constraints in Italian, which I have labeled (I)-(III)

    (I)   **If a syllable is stressed then it is heavy.**
    (II)   **No final long V**
    (III)   **Long C occurs only in the context V_V or V_[+son, +cont]**

I will give an analysis roughly following Sommerstein's system, where rules can be motivated by phonotactic constraints. I will make one key departure from Sommerstein's program, which is that I will not assume that all phonotactic constraints must be surface-true, or unviolable. (The possibility of adapting Sommerstein's proposal this way has been discussed in class.) In particular, I will allow rules to be positively motivated by Phonotactic Constraint (I) even though there do exist surface forms that violate (I), notably the citation forms of *cittá*, *caffé*, and *parló*, where the final, stressed vowel is short. I think this move is justified because even though (I) is not surface-true in all cases, there seem to be a number of otherwise separate processes (vowel lengthening, gemination, and resyllabification) that "conspire" to make it surface-true in most cases. If we were to follow Sommerstein and not allow (I) to be a real phonotactic constraint, then we would have no account for the connection between these processes.

      The Analysis: I will posit five rules, some of which will be positively and/or negatively motivated by phonotactic constraints. Four of the rules are based on those given in the handout; the fifth is a rule of de-gemination which accounts for the fact that when a determiner[1] ending in C:V (e.g., *bello*) is truncated (in this case, to *bel*) before a consonant-initial noun, the long consonant is also shortened. The rules are formulated below, with crucial ordering restrictions noted. If a rule is designated "positively motivated by Phonotactic Constraint X," this means that it only applies if the input violates X (and if the rule will make it satisfy X). If a rule is designated "Blocked by Phonotactic Constraint Y," this means that it will NOT apply if the output will violate Y (even if the input violates a constraint that positively motivates the rule). In other words, in a sense I am taking the "negative motivation" conditions to be implicitly ordered

before the "positive motivation" condition, even though I haven't written that way. (I could have designated such an ordering for each rule, but I never found it necessary to order a blocking condition after a positive condition.)

> **Rule 1: Vowel Lengthening**
>   - Positively motivated by Phonotactic Constraint (I)
>   (ordered before Rules 2-3)
>   - EXCEPT: Blocked by Phonotactic Constraint (II)
> **(1)**   V $\rightarrow$ V:

Note that designating Rule (1) as being positively motivated by Constraint (I) allows the rule to be formulated more simply than rule (c) on the handout. Specifically, we no longer need a context term (saying that the rule only applies in a stressed syllable) because this comes from the phonotactic constraint. Also, since we can designate this rule as being blocked by Constraint (II), we don't need to posit any additional "fix-it" rules to change a final long vowel back to a short vowel, which we might otherwise need to do. (Alternatively, we could have added more to the context term so that the rule wouldn't apply in a final syllable, but this also would have made the rule more complex.)

> **Rule 2: Gemination**
>   - Positively motivated by Phonotactic Constraint (I)
>   (ordered after Rule 1 and before Rule 3)
>   - EXCEPT: Blocked by Phonotactic Constraint (III)
> **(2)**   V$]_\sigma$ $_\sigma[C_i$ $\rightarrow$ $VC_i]_\sigma$ $_\sigma[C_i$

Again, this rule is somewhat simpler than its counterpart (g) from the handout. In this case, we don't have to specify that the rule only applies at a word boundary, because in all other cases Rule (1) would have applied first, so that the form would already satisfy Constraint (I), in which case Rule (2) would no longer apply. We also don't need to specify that it only applies to a stressed syllable, since that's the only context where Constraint (I) could potentially be violated.

> **Rule 3: Resyllabification**
>   - Positively motivated by Phonotactic Constraint (I)
>   (ordered after Rules 1-2)
> **(3)**   V$]_\sigma$ $_\sigma[C_i \dots$ $\rightarrow$ $VC_i]_\sigma$ $_\sigma[\dots$

This rule can be written in much more general terms than could rule (f) on the handout (i.e., "$C_i\dots$" rather than "s stop"), since this rule will only apply if Rules 1 and 2 have not

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[1] I would expect *bello* to be classified as a modifier, not a determiner, unless there are some important

done so. More importantly, by invoking a phonotactic constraint, we can capture the fact that Rules (1)-(3) are all working towards making stressed syllables heavy, although they do this in different ways. Then by ordering the rules we can capture the fact that making a vowel long is the preferred way to effect this heaviness, while re-syllabification is a last resort. The three rules together guarantee that a stressed syllable will be made heavy one way or another unless it is open and not only word-final but utterance-final, which is the correct result.[2] It is particularly important to notice here that if we followed Sommerstein strictly and did not consider (I) a real phonotactic constraint since it isn't surface-true, we would lose much of the simplicity of Rules (1)-(3) and would not be able to account for their "conspiratorial" nature.

Rule 4: Vowel Truncation (in determiners)
      (Not phonotactically motivated)
      - Ordered before Rules 1-3
(4) $V \rightarrow \varnothing$ / $\_]_{determiner}$ $X]_{phrase}$, **where $X \neq \varnothing$**

This rule is written the same way as in rule (d) on the handout, since it cannot be simplified by invoking any of the phonotactic constraints (I)-(III). I think it makes sense in this case not to try to invoke (or invent) a relevant phonotactic constraint, since the phenomenon of vowel truncation only applies to a limited class of lexical items and constructions. In particular, I believe that this only occurs with masculine nouns/determiners, so that we get *bel giardino* but *bella bambina* (a well-attested phrase from movies). It would have to be a mighty specific phonotactic constraint that would cause a final "o" to be truncated from the masculine form but not a final "a" from the feminine. Of course, we might want to account for the *bel~bello* alternation outside of the phonology per se, perhaps in the syntax or even the lexicon (depending on one's conceptions of these), but for the purposes of this problem this issue does not matter provided that vowel truncation occurs before all the other phonological rules here.

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syntactic facts which I'm not aware of; but I'll call it a determiner for the purposes of this problem.
[2] It's not clear in the data if gemination and resyllabification can only occur within syntactic phrases or if they can occur anywhere in a single utterance; however, the way the rules were formulated on the handout would predict that these processes can occur over phrase boundaries, so I will assume that that is correct.

Rule 5: De-gemination[3]
- Positively motivated by Phonotactic Constraint (III)
(ordered after Rule 4)

(5)   C: → C

If the rule for vowel-truncation above is formulated correctly, then when *bello*, for example, is truncated, it is predicted that the underlying form is /bell/ rather than /bel/. Since the surface form contains a short /l/ (at least before a consonant-initial noun – see note 3), we need a rule like (5) to shorten the consonant. We can do this by invoking Phonotactic Constraint (III), which allows us to formulate the rule very simply without a context term. In a purely rule-based system, we would have to specify that Rule (5) only applies if a long consonant is followed by a [-son] segment. This would actually be a fairly simple rule to write, but it would fail to capture the connection between the process of gemination given in rule (2) and this process of de-gemination. One of these rules is blocked by a phonotactic constraint and the other is positively motivated by the same constraint, meaning that the two processes do the opposite thing but have the common goal of satisfying a general constraint on legal gemination.

In the table below, it is shown how this analysis accounts for the key data given in part (2) of the handout. The surface form is in bold type.

UR	Rule (4) (4)»(1), (5)	Rule (1) (1)»(2)»(3)	Rule (2) (1)»(2)»(3)	Rule (3) (1)»(2)»(3)	Rule (5) (4)»(5)
/a.'mi.co/ /re.'ga.lo/	n/a	**a.'mi:.co re.'ga:.lo**	n/a	n/a	n/a
/fra.'tel.lo/ **/'for.no/**	n/a	n/a	n/a	n/a	n/a
/ɛ.#.'bel.lo/	n/a	n/a	n/a	n/a	n/a
/'bel.lo.# ._ar.'di.no/	'bel.l# _ar.'di.no	'bel.l# _ar.'di:.no	n/a	n/a	**'bel.# _ar.'di:.no**
/nes.'su.no.# .gat.to/	**nes.'sun.# .gat.to**	n/a	n/a	n/a	n/a
/_**it.'ta**/ /**par.'lo**/	n/a	<u>Blocked</u>	n/a (since no C following)	n/a (since no C following)	n/a

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[3] The way this rule is formulated predicts that when *bel* comes before a vowel-initial noun, the "l" will be long (the second half of the geminate forming the onset to the next syllable). The other option would have been to somehow build the shortening of the consonant into the truncation rule. This would predict that when *bel* came before a vowel-initial word, the *l* would be short. (If there is a process that allows a final consonant from one word to become the onset of the next, and if the rest of my analysis is right, then this would also predict that the /ɛ/ in *bel* would be lengthened.) Although I don't know the relevant facts about Italian, I suspect that the first prediction may be correct. As Sonny Webb pointed out to me, there is some evidence for this from the orthography in forms such as *bell'anno*.

UR	Rule (4) (4)»(1), (5)	Rule (1) (1)»(2)»(3)	Rule (2) (1)»(2)»(3)	Rule (3) (1)»(2)»(3)	Rule (5) (4)»(5)
/_it.'ta.# .pu.'li.ta/	n/a	[blocked on 'ta] ['li → 'li:] _it.'ta.# .pu.'li:.ta	**_it.'tap.# .pu.'li:.ta**	n/a	n/a
/_it.'ta.# .'spor.ka/	n/a	<u>Blocked</u>	<u>Blocked</u>	**_it.'tas.# .'por.ka**	n/a

Discussion: I have already noted how each rule is affected specifically by invoking phonotactic constraints. In general, this allowed the rules to be written much more simply, often without a context term since the relevant constraint completely determined the context for rule application. In the case of rules (1)-(3), for example, this arguably simplifies the overall grammar since a single phonotactic constraint takes the place of three different context terms in three separate rules. Moreover, invoking constraints allowed us to naturally capture the "conspiracies" apparent in the Italian alternations, e.g., the different strategies for making a stressed syllable heavy that show up in rules (1)-(3). This feature of an analysis involving constraints was also particularly striking in rules (2) and (5), which actually do more or less the opposite thing from each other (one creates a geminate and the other gets rid of it), but seem to both be conditioned by the same phonotactic constraint. Allowing a constraint to either positively or negatively motivate a rule gives us a natural way to express the relationship between such "opposite" rules as (2) and (5). In some cases, such as Rule (1), allowing a constraint to block a rule let us avoid putting in extra "fix-up" rules or complicated context terms.

The moral of the story, then, as I see it, is that we can "buy" ourselves a lot by invoking phonotactic constraints. I have done this conservatively, without claiming that these constraints must be universal or getting rid of rules altogether, which seemed to work well for this problem. I haven't worked out a solution in OT, so it remains to be seen whether a more radical departure from a rule-based system would do any better. I actually suspect that OT wouldn't do any better than a Sommerstein-type account for this particular problem, since my solution got so much out of these particular constraints without claiming universality or having to introduce a whole new class of carefully-ranked faithfulness constraints. But there are, of course, many other considerations which could potentially point to a completely constraint-based analysis.