1 Sommersteinian Analysis of Italian

Let us first introduce the following "markedness conditions" as phonotactic constraints holding, with some generality, over Italian.

1. If a syllable is stressed, then it is heavy. ("Weight-to-Stress Principle")
2. No final vowel is long.
3. Long C occurs only in the context V_V or V_[+son, +cont].

Now, we may use these constraints to "motivate", both positively and negatively, some simple transformational operations mapping Italian underlying forms (h.f. "UF") to surface forms (h.f. "SF"). These rules are given the following definitions and ordering.

1. **Length:** [+syllabic] → [+long]
   Positively Motivated by Constraint (1); **Negatively Motivated** by Constraint (2)[1]
2. **Gemination:** $C_i \rightarrow C_iC_i$
   Positively Motivated by Constraint (1); **Negatively Motivated** by Constraint (3)
3. **Resyllabification:** V.C → VC.
   Positively Motivated by Constraint (1)

We will see that the system of rules and constraints above correctly predicts the relevant generalizations stated in Section (2) of the handout explaining the assignment. First, however, we must account for a conspicuous oversight of this system.

The rule system given above would not predict the phenomenon of "vowel truncation" mentioned in subsection (c) of Section (2) of the handout. However, we argue that there is good reason for not positing this phenomenon as due to a phonological rule.

First, this process of "vowel truncation" occurs in a *very* limited set of Italian words. It is only the masculine forms of the determiners "un," "nessun" and "bel" [2] which undergo this process. Suspiciously, the feminine form "una" does not automatically become "un" before any word following in its phrase, as the (putative) masculine form "uno" does. Furthermore, in contrast to "bello," such phonologically similar forms as "giallo" do not undergo the truncation process. Italian allows such sequences as "giallo cinema." Finally, this "truncation process" appears to be part of a more general system of morphological alternation. For example, the adjective "bello" also has forms "bei" and "begli",

[1] Recall that this means that the rule applies if and only if (i) the resulting form is improved with respect to Constraint (1) and (ii) *not worsened* with respect to Constraint (2).

[2] One may further doubt whether it's correct to label "bel" a determiner. Italian allows such sequences as "un bel libro".

which are conditioned by the plurality and gender of the modified noun. The phonologically similar adjective "giallo" shows no such alternations. Since we may be reluctant to capture the alternation [bello] ∼ [bei] ∼ [begli] with a purely phonological rule, we may similarly be reluctant to represent the [bello] ∼ [bel] alternation as just phonological. Instead, we might do better to assume that this alternation is morphological.

Secondly, the putative vowel truncation operation is highly unnatural as a phonological process. It creates environments in which two stressed syllables are contiguous (e.g., [nessún gátto]). Usually, this sort of environment is actively avoided by a language's phonology, but we are asked to suppose that the phonology of Italian purposefully creates such "clashing" situations. Moreover, this proposed operation would act *against* the observed phonotactics of Italian, creating words ending in consonants as opposed to vowels.

For these reasons, we will henceforth assume that the [bel] ∼ [bello] and [nessun] ∼ [nessuno] alternations are the result of a *morphological* process. The underlying forms of "bel gatto" and "nessun ragazzo" are therefore taken as [bel gatto] and [nessun ragazzo]. Now, one might object that this upsets our predictions regarding the location of stress in the form "nessun". We could previously account for its location by supposing that the truncation rule applies after stress assignment. On the other hand, we see from such forms as [cittá] that there are words in Italian with idiosyncratic final stress. Thus, the ability to predict the location of stress in [nessun] seems quite a small victory in comparison to the naturalness of the phonological system which results from dropping the truncation rule.

Having established that the "truncation process" is a red-herring, let us see how the rule system above captures the real phonological generalizations in Section (2) of the handout.

1.1 Length and Stress

The system predicts that vowels in non-final stressed open syllables surface as long. We suppose, of course, that Rules 1 - 3 apply after the UF's have been syllabified and assigned stress. When such forms are passed to Rule 1, the structural change will apply to any stressed vowel in an open syllable, as long as that vowel isn't word final. Since we assume that vowels are all underlyingly short, the application of Rule 1 to the vowel of a stressed open syllable changes that syllable from a light one to a heavy one. Thus, the form is improved with respect to Constraint 1. However, Rule 1 will only apply if the resulting form isn't also *worse* with respect to Constraint 2. Therefore, Rule 1 will fail to apply when the stressed, open syllable is word-final. Thus, we predict that vowels in non-final stressed open syllables are all long, while those in final stressed open syllables emerge as short.

1.2 The Limits of Length

The system predicts that long vowels occur nowhere but in stressed open syllables. First, if a syllable is not stressed, then the increase in its vowel's length would do nothing to improve the form with respect to Constraint 1. Since Rule 1 is positively motivated by only that constraint, no length change takes place in such vowels. Similarly, if V is the nucleus of a closed syllable, then changing its length does nothing to improve the form with respect to Constraint 1; since the syllable is closed, it already counts as "heavy". Thus, Rule 1 does not apply and the V surfaces as short.

1.3 No Final Vowel is Long

The system correctly predicts that final vowels are all short. Since all vowels are underlyingly short, the only way in which a vowel may surface as long is if Rule 1 applies to it. However, we've already seen that Rule 1 will not apply to a vowel if it is word-final, since that rule is negatively motivated by Constraint 2.

1.4 Gemination

Our system predicts that a final, stressed V will cause a following C to lengthen, unless that C is the initial /s/ of an s-stop cluster. For example, when the form /cit.tá pu.lí.ta/ is passed through the system, we've already seen that the application of Rule 1 is blocked by that rule's negative motivation with respect to Constraint 2. Since Rule 1 cannot apply to lengthen the final vowel of /cit.tá/, the UF is still in violation of Constraint 1 when it's passed along to Rule 2. Now, however, an application of Rule 2 to the initial consonant of the word following /cit.tá/ will improve the form with respect to that constraint. However, it might also worsen the form with respect to Constraint 3, if that consonant happens to be initial /s/ of an s-stop cluster. Therefore, given Rule 2's positive motivation by Constraint 1, and its negative motivation by Constraint 3, we predict gemination in the consonants following a stressed, final vowel *as long as* such gemination would not violate Constraint 3.

1.5 Resyllabification

We have already seen that the rule system predicts word-initial s-stop clusters not to geminate. Thus, UF's such as /cit.tá spór.ka/ are not in any way altered by the time they reach Rule 3. Since the final syllable of "citta" is still light, this form continues to violate Constraint 1. Now, however, an application of Rule 3 will fix this mess. If Rule 3 resyllabifies the form to /cit.tás pór.ka/, the result will be better with respect to Constraint 1, since all stressed syllables are now heavy. Since Rule 3 is negatively motivated by no constraint, we correctly predict that stressed, final vowels induce resyllabification of contiguous s-stop clusters.

Now that we see how the analysis using phonotactically motivated constraints would proceed, let us compare such an analysis to the purely rule-driven one given in section 4 of the handout.

The most obvious disparity between the two systems is in the quantity of ink used in their statement. The rules employed in the constraint-driven system are simpler and much more general than those in the rule-driven one. Since the constraint-driven system employs the notions of "negative and positive motivation" to control the environments in which the structural changes take place, the transformational operations of our constraint-driven system, unlike those of the rule-driven system, needn't mention explicitly the specific environments in which they apply. They may be given a maximally simple and general formulation, the constraints acting to limit the range of such changes. For example, the rule for Gemination given on the handout is the following:

$$\mathrm{V}]\,'\sigma]_{\mathrm{word\ word}}[\sigma[\mathrm{C}_i \quad \Rightarrow \quad \mathrm{VC}_i]\ '\sigma]_{\mathrm{word\ word}}[\sigma\ [\mathrm{C}_i$$

The statement of this rule includes the stipulation that it applies only to C's which follow stressed, open, word-final vowels. Our Rule 2, by comparison, is far more elegant.

The increased elegance of the constraint-driven system has more than aesthetic interest: the learning task for the child is thereby simplified as well. Rather than having to induce a set of complex rules, the child need only learn the surface phonotactics of his language, and then induce a maximally simple set of repair strategies, mapping them to particular "kinds" of phonotactic violation. That children do seem to learn the phonotactics of their language at a very young age, prior even to their leaning the language's phonological alternations, lends support to this view. The task of learning a set of simple, general repair strategies, and pairing those strategies with particular "defects" is arguably an easier one than that of learning a rich set of more complicated rules.

Furthermore, besides the improvements in aesthetics and learnability, the sound-pattern of Italian simply "makes more sense" when described by our constraint-driven system. The rule-driven system describes the phonological processes of Italian as the result of a set of unrelated formal transformations. Why some rules appear rather than others, why some rules are ordered before others, are not questions which the analysis directly addresses. Our system, however, captures the compelling intuition that many processes in Italian are fulfilling a similar "purpose." We know from looking at the language that stressed syllables "like" to be heavy. For whatever reason, final vowels cannot be long. Nevertheless, stressed, open, final syllables still "want" to be heavy. We therefore see the operations of gemination and resyllabification as fulfilling the "desire" for stressed syllables to carry increased weight. This intuition forces itself on the analyst as soon as he confronts these data, and they form an integral part of his "common-sense" understanding of the phenomena. However, the insight that processes within a language have a common *raison d'etre* is not only entirely missed by our rule-driven system, but it in principle could not be stated within such a theory.

Finally, our constraint-driven system admits the cognitive reality of phonotactic principles, as well as their active role in phonological systems. By finding a place for phonotactics within phonology, we can begin to grasp why certain forms never appear within the language. For example, the absence of long final vowels is neither predicted nor addressed by our rule-driven system. Our constraint-driven system, however recognizes this as an important fact about Italian, one which has an active role within the sound system of the language.