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ANOTHER LOOK AT FINNISH CONSONANT GRADATION

The process known as Consonant Gradation (henceforth CG), as it appears in Finnish, has received a considerable amount of attention from modern phonologists, the first discussions of the phenomenon dating back to the infancy of generative phonology¹. In the following I shall examine some of the basic assumptions made in these previous studies, and suggest some fundamental revisions in the approach to this topic. Basically the problem concerns the reality of the process in a synchronic grammar of Modern Standard Finnish. That is, what is the form of the native Finn's competence vis-à-vis CG? What is the nature and the scope of the process? Are all the alternations which have been ascribed to CG instances of one and the same process? Under what conditions does CG, whatever its scope, occur?

The first generative treatments of Finnish CG, those by McCawley², and Wiik³, hypothesized that all the alternations in question were, from a synchronic point of view, instances of one and the same process. The process itself was usually referred to as weakening, but it took the form of turning the voiceless obstruent stops /k/, /p/, and /t/ into voiced continuants.⁴ The unity of the process was captured by positing a single Initial Rule, which set the whole gradation process in motion by turning /k/ → /g/, /p/ → /β/, and /t/ → /ð/. Subsequent rules applied to these voiced continuants, assimilating them to preceding homorganic sonorants, turning them into glides, deleting them, etc.

The conditions under which the Initial Rule applied were as follows: The /k/, /p/, or /t/ had to stand at the head of a closed syllable, that is,

¹ A preliminary, "working paper", version of this paper appeared in Contributed Papers 1. Purdue University Department of Audiology and Speech Sciences, June 1972. Royal Skousen has independently arrived at some of the same conclusions as the ones expressed here, especially with regard to the questions of the psychological reality of CG and morphological conditioning. See R. Skousen, *On Capturing Regularities*. — Papers from the Eighth Regional Meeting of the Chicago Linguistic Society, Chicago 1972, pp. 567—577, and R. Skousen, *Evidence in Phonology*, Urbana, Ill. 1972 (Mimeographed).

² J. D. McCawley, *Consonant Mutation in Finnish*. — QPR No. 70, RLET, MIT, Cambridge, Mass. 1963; J. D. McCawley, *Revised Version of Finnish Rules*, Chicago 1966 (Mimeographed); J. D. McCawley, *Further Revisions of Finnish Rules*, Chicago 1967 (Mimeographed).

³ K. Wiik, *Suomen kielen morfofonemiikkaa*, Turku 1967 (Publications of the Phonetics Department of the University of Turku, No. 3).

⁴ Actually, only Wiik's rule turned the stops into continuants. McCawley's rule only voiced the stops, but this created some problems that were avoided in Wiik's solution.

it had to be followed by a vowel which in turn was followed by two consonants or a single consonant followed by a word boundary. As to the preceding environment, in order to be a candidate for gradation, an obstruent stop had to be preceded by either a sonorant or by a non-continuant obstruent of the same point of articulation. The latter condition took care of the geminates.

Among the surface forms of Finnish there were of course instances which did not conform to the stipulations given above. Most of these instances, however, could be brought into conformance by assuming that, at the time when the Initial Rule applied, the crucial syllable had been open or closed, as the case might be. Later rules had then applied to change the syllable structure so that, on the surface, these forms appeared to be counter examples to the postulated rule. There were, however, some genuine exceptions, instances which could not be explained away by means of postulating underlying forms which differed, in the crucial aspect, from their surface manifestation. Most of these were morphologically conditioned exceptions. That is, before certain morphemes CG did not occur, regardless of the syllable structure involved. Morphemes having this effect were, for example, the possessive affixes. But some words were simply unconditionally exceptional, and would therefore have to be marked with an exception feature to the effect that they did not undergo CG, for example *sitten* 'then'.

But apart from these stated exceptions, the Initial Rule was viewed as being unrestricted in scope. One consequence of this assumption was the claim that in all closed syllables (provided of course that they had not been closed by rules applying after the Initial Rule) one could find only the weak grade of obstruent stops. For example, a /t/ in such a closed syllable had to be regarded as derived from an underlying geminate /tt/, otherwise CG would of course have turned this /t/ into its "weak" cognate /d/. By the same argument, all /d/s were derived from underlying single /t/s, by way of an intermediate /ð/.

This derivation of all /d/s from underlying /t/s provided the means for explaining another phenomenon as well, namely the asymmetry of the segment inventory of Finnish. Finnish has (it was claimed), in its surface forms, a normal, full complement of voiceless obstruents — /p/, /t/, /k/, and /s/ — but only one voiced one, /d/. But if all /d/s are derivable from underlying /t/s, then of course this asymmetry is superficial, since at the distinctive level of description there would be only voiceless obstruents. The occurrence of the voiced obstruent /d/ would be contingent, derivable by rule, and hence not distinctive.

Our discussion has up to now concerned CG and related data about Finnish only insofar as they pertain to the "native" portion of the vocabulary. That is to say, recent borrowings into the language do not necessarily conform to the rules given above. Not only do these recent borrowings contain voiced obstruents which would be extremely difficult to derive from underlying voiceless segments, but, as Anderson⁵ was the first to point out, their behavior with regard to CG is only partially in agreement with that of the "native" words. Thus, in the loan words, only the geminates are subject to CG; the singles remain unaffected:

auto : *auton* 'car'

muki : *mukin* 'mug'

but

Amerikka : *Amerikan* 'America'

⁵ S. Anderson, *West Scandinavian Vowel Systems and the Ordering of Phonological Rules*, MIT Doctoral Thesis, Cambridge, Mass. 1969, pp. 103—108.

Instances such as these are usually handled by assigning a feature [—Native] to the recent borrowings, and then stipulating that certain rules do not apply to items marked with this feature. This is the course taken by previous generative studies on Finnish CG.

The use of a feature such as [—Native] makes the claim that the vocabulary of a language may be divided into sets of items which behave differentially with regard to certain processes. Such a situation is of course not at all uncommon: a language may have divisions in its vocabulary according to gender, various declensions, conjugations, etc.⁶ But is this really what we are faced with in the case of Finnish CG? Note, for example, that the differential behavior of gender, declension and conjugation classes is always morphological in nature. For example, the genitive plural morpheme may differ from gender to gender, as in Russian. In the Finnish case, however, we must take into consideration not morphological differences of this kind, but phonological ones, both segmental and morphophonemic.

Consider first the case of the /d/s. If we restrict our attention to the "native" portion of the vocabulary, it is possible to derive all occurrences of /d/ from underlying /t/s, though it might require some imaginative manipulation of baseforms to do so. But as we extend our scope to include the total vocabulary, native and non-native items alike, we find /d/s that cannot be derived from /t/s — and we find /b/s and /g/s and other such un-Finnish segments as well.

Now obviously a speaker's competence involves his total vocabulary and not only parts of it. Consequently, any grammar which aspires to account for the speaker's competence must take the entire vocabulary into account. We cannot rule out the possibility that a language might have vocabulary divisions along phonological, rather than morphological, lines, but even if this were the case, one should be able to require that the claims made about one subpart of the vocabulary should not be incompatible with the claims made about the others.

The vocabulary of a language, and the rules which govern the behavior of this vocabulary are of course acquired by a child as part of his general process of maturation. This must be kept in mind when we debate the existence or nonexistence of grammatical processes. Consider now a child who is learning Finnish as his first language. He will hear words such as *hauta* : *haudan* 'grave' and *auto* : *auton* 'car'. On the basis of this information he might conclude either that some /t/s alternate with /d/s, but others do not, or that in some words one has an alternation, but not in others. That is, he might regard the distinction as being either segmental or morphological in nature. But he will also hear words such as *sydän* : *sydämen* 'heart' and *radio* : *radion* 'radio', where, in the first case we have a /d/ throughout the paradigm, regardless of whether the syllable is open or not, and in the latter case there is a /d/ in a syllable that is constantly open. There is no choice but to posit underlying /d/s in the baseforms of the latter two words. But once we have underlying /d/s in one part of the vocabulary, why should we be forced to regard other /d/s as derived from /t/s — as in *kahdeksan* 'eight' — where there never appears a /t/ anywhere in the paradigm? Clearly, if one is forced to posit underlying /d/s in some cases, there is absolutely no justification for assuming that in other cases the /d/s should be derived from underlying /t/s when no alternation between the /t/ and the /d/ ever occurs in the paradigm in question. A child has no

⁶ Cf. N. Chomsky, M. Halle, *The Sound Pattern of English*, New York 1968, p. 373 ff.

innate knowledge of the history of his language. He has no way of differentiating between words such as *radio*, which a linguist knows to be borrowed, and a word such as *sydän*, which is not. What basis could he possibly have, then, for assigning the /d/ in *sydän* to an underlying /t/, but not the /d/ in *radio*?⁷

Taking into consideration the entire vocabulary of Finnish, rather than what turns out to be an arbitrary subpart of it, we are thus forced to reconsider the status of /d/ in Finnish. /t/s may have /d/s as their weak grade, but all /d/s are not derived from /t/s. Specifically, there is absolutely no justification for regarding non-alternating /d/s as being anything but underlying /d/s. But what shall we now do about the non-alternating /t/s that might be found in closed syllables? According to previous treatments of the subject, these were to be regarded as the weak grade of the geminate, since the gradation rule was unrestricted as to where in the word it applied. But if /d/s in this situation are not the gradation products of /t/s, are the /t/s still the gradation products of /tt/s, the /p/s, of /pp/s, and the /k/s of /kk/s? If so, there would be two major differences between the gradation of single stops and the gradation of geminates: The former would be nonproductive in the sense that it would not be applicable to recent vocabulary items, and furthermore where CG would apply, its applicability would be restricted to certain positions in the word. The gradation of geminates, on the other hand, would not be encumbered by any such restrictions.

Let us examine this possibility. There are no doubts about the difference in productivity between the gradation of singles and the gradation of geminates. Even new words that are not borrowed do not show gradation of single stops, as in neologisms and acronyms such as *valpo* : *valpon* (from *valtion poliisi* 'state police'). As to the positional restrictions, we must first clarify what these are with regard to the single stops. The single stops undergo gradation only in morpheme final syllables, since this is the only position in which we can find alternations, the alternation being due to affixation. Now, given the productivity of the gradation process with regard to the geminates, we should expect to find no (or at least very few) examples of geminates in closed syllables of loan words — they should have been 'weakened' to singles. But we do find such examples, and, what is more significant, we can find words with two sets of geminates, one of which undergoes gradation and the other not:

attentaatti : *attentaatin* = 'assassination attempt'
bakkantti : *bakkantin* = 'bacchante'

Here it is the geminate in the morpheme-final syllable that undergoes gradation, but the other one, the morpheme-internal geminate which stands in a perpetually closed syllable, is not subject to gradation. Obviously, the restrictions on the applicability of CG with regard to position in the word are the same for both singles and geminates.⁸

The next question one must ask is: "What has all this to do with closed syllables?", and the answer in all likelihood is: "Nothing at all!" Given all the primary data, it is extremely difficult to see how a

⁷ Cf. P. Kiparsky, *How Abstract is Phonology?* — Indiana University Linguistics Club, 1968.

⁸ Of course N. Chomsky and M. Halle, *op. cit.*, p. 376, could here invoke the notion of "doubly exceptional", but this notion, besides stretching one's credulity beyond the breaking point, also puts generative phonology totally out of reach of any kind of testability. Cf. R. Botha, *Methodological Aspects of Transformational Generative Phonology*, The Hague 1971, p. 215 ff.

psychologically plausible hypothesis could be constructed on the basis of syllable structure, that is, on the assumption that CG is conditioned by the openness or closedness of syllables. An infinitely more plausible hypothesis would be that CG, synchronically in Standard Finnish, is morphologically conditioned. Certain suffixes are to be regarded as "gradation causing", and the addition of such an affix to a stem would alter the grade of the obstruent stops occurring in stem-final syllables. Thus the possessive affixes and the other affixes which previously were regarded as exceptional will no longer be so regarded. They simply are not "gradation causing". The present passive ending, which in earlier treatments was problematic since it caused CG but was not syllable-closing, is now simply marked as being "gradation causing". And words such as *sitten*, which previously were inexplicably exceptional, are now perfectly regular since they are monomorphemic and contain no suffixes at all — hence no CG!

The issue of the unity of the gradation process still remains to be discussed, and this brings us to the question of the nature of CG. We would like to be able to say that CG proceeds along a phonological parameter such that the relation between the strong and the weak grades is the same regardless of the particular segments involved. The problem then is to determine what parameter we are dealing with, and also to define the number of relevant points on that parameter. This in turn leads us to consider the notion "geminate".

In the binary world of generative phonology all phonological parameters have only two points: a segment is either positively or negatively marked for a given feature — *tertium non datur*. How is one to express, within such a framework, the notion that the relation between a voiceless geminate and a single voiceless stop is the same as between a single voiceless stop and a voiced stop or fricative (eg., *tt : t = t : d*)? That is, how can a binary parameter accommodate what appears to be a ternary phenomenon? The answer must be that either one discards, or at least moderates, the principle of binarity, or that one attempts to reduce the apparent ternary phenomenon to a binary one. The latter course is the one chosen by the previous treatments of Finnish CG.

McCawley, Wiik and Anderson⁹ view the gradation process as applying to single voiceless stops only. A geminate is regarded by them as simply a sequence of two segments which happen to be identical, but which, in principle, do not differ from any other consonant sequence. Thus the stop before the vowel is subject to CG in the form */lintu+n/* as well as in */hattu+n/*. No linguistic significance is thus attributed to the notion "geminate". This makes it easy to posit a single Initial Rule, thereby capturing the notion that all gradation phenomena are instances of a single, unitary process. This Initial Rule applies to single voiceless stops which may be preceded by a homorganic stop (which in practice means an identical stop) in which case it will be deleted (directly in Anderson's solution, indirectly, via voiced intermediate steps in McCawley's and Wiik's), or they may be preceded by sonorants, in which case they will end up as glides, etc.

Another possibility has been proposed by Skousen.¹⁰ He posits two separate rules, one which applies to [+long] stops (i. e., geminates) changing them to [-long], and another, which changes [-long] stops to voiced continuants. The two rules would of course have to be dis-

⁹ Cf. fns 2, 3 and 5.

¹⁰ R. Skousen, *Consonant Gradation in Finnish*. — *Studies in the Linguistic Sciences* 1, Champagne-Urbana, Ill. 1971, pp. 67—91.

junctively ordered with respect to one another. This solution attributes linguistic significance to the notion "geminate" by regarding them as being [+long] segments at some point in the derivation. But now this makes it necessary to involve two parameters in CG, length and voicing/continuance, which would destroy the notion of a unitary process.

A major part of the problem lies in determining the status of the notion "geminate". This is a very complicated problem, since it appears to be the case that "geminate" sometimes function as single entities, at other times, however, they must be regarded as sequences of two segments.¹¹ Obviously some major theoretical innovation will be required to handle split personality phenomena of this kind (diphthongs appear to be of the same ilk), but until that is achieved we shall have to resort to the ad hoc device of regarding geminates as schizophones, which sometimes function as one, sometimes as two phonological entities. In its unitary state of schizophony, the geminate is to be regarded as a [+long] segment. If we assume that CG finds the geminate in this state, then the relation between the strong and the weak grades would be one of quantity (length) with regard to the alternation between geminates and singles. But the relationship that obtains synchronically between the single stops (qua strong) and their weak grades is clearly not one of quantity.

The generally suggested solution to this problem has been to posit a hypothetical parameter of strength, along which different phonological entities would be differently manifested.¹² With regard to obstruent stops, then, geminates would be stronger than singles, which in turn would be stronger than voiced stops or continuants. Though relationships such as the one described are generally assumed to exist, the notion of a parameter of strength has never been formalized. If the assumption of such a parameter can be shown to be valid, then it would of course be possible to posit a single, unitary gradation process for Finnish, and to recognize the linguistic significance of geminates too.

This would still not, of course, prove that contemporary Finnish has a unitary gradation process, since phonological changes subsequent to the historical introduction of CG may have destroyed the unity of the process. And, indeed, this is what seems to have happened. The disparity between the individual manifestations of CG is so great, that it is unlikely that a child learning Finnish would connect them all into one single process. There is unity between the individual cases of CG in the geminates, and thus this process has remained productive. But in the case of the singles, the weak grades have virtually nothing in common with each other, nor are the relationships between the strong and weak grades analogous from case to case. Thus the gradation of singles is dead: when a Finn attempts to accommodate a word such as *auto* to CG, it is put into the geminate gradation series (*autto* : *auton*) rather than subjected to singles gradation (*auto* : *audon*) as one would expect. Evidence of this kind should be sufficient to make highly implausible the hypothesis about a single CG process in Finnish, encompassing both geminates and singles. It appears that there is a limit to the abstractness that can be posited in grammar construction: a child's Acquisition Device is not as smart as a linguist, nor does it have access to the historical information that the generative phonologist almost always makes use of, but always

¹¹ Cf. M. Kenstowicz, On the Notation of Vowel Length in Lithuanian. — Papers in Linguistics 3:1 1970, pp. 73—113; Ch. Pyle, West Greenlandic Eskimo and the Representation of Vowel Length. — Papers in Linguistics 3:1 1970, pp. 115—146.

¹² Cf. N. Chomsky, M. Halle, *op. cit.*, p. 401.

denies having made use of.¹³ The relationships that the Acquisition Device can detect are in all likelihood fairly superficially phonetic in nature.

Although CG in contemporary Finnish cannot be regarded as a unitary process, we must assume that at one time, at its inception, it must have been that. And one need not assume the existence of a hypothetical parameter of strength in order to account for this unity. Rather, it is possible to reconstruct the original CG process as proceeding along a parameter of quantity. As far as CG was concerned, the geminates were single [+long] entities,¹⁴ which were shortened under certain conditions. This same process of shortening can be applied to single stops as well, and the result will be a flap, cf. the shortened alveolar stops found intervocally in American English (as in *letter*). A flap is a reduced stop, just as schwa is a reduced vowel. And, like schwa, the shorter the reduced sound, the more influenced it will be by the neighboring sounds. This would account for the fact that the weak grade of the single stops is always voiced: it is always surrounded by voiced segments.

Historically, then, CG was a shortening process, conditioned, most likely, by accentual shifts, which in turn were conditioned by syllable structure, that is, by whether the syllable was open or closed (cf. the strong and weak syllables of English, and their influence on the stress patterns of that language¹⁵). The shortening of the single stops yielded flaps, but of the three possible flaps — alveolar, labial, and velar — only the alveolar one would have any possibility to survive. And survived it has in certain south-western dialects of Finnish — it is usually referred to as a “one-tap *r*”. In other dialects it has become an /l/ or a fricative /ð/, and in the dialects which formed the basis for Standard Finnish, the flap has again become a stop, but now a voiced one, /d/.¹⁶

¹³ A particularly horrifying example of historicism with regard to CG is illustrated by the treatment given the word *sydän*. This was a problematic word since it contains a non-alternating /d/ though the syllable structure of the word keeps changing throughout the paradigm. Thus the genitive form is *sydämen*, with an open second syllable — nevertheless the /d/ remains unchanged. The obvious solution, one would think, given the framework within which the authors mentioned operated, would have been to regard *sydän* as [—Native], since it obviously behaved the same as the “obviously foreign” word *radio*, and not at all like the regular and [+Native] *ydin* : *ytimen* ‘marrow’. But this possibility was never even considered, since *sydän*, as every linguist knows, is of Common Finnic stock and not a loan. Therefore all previous generative treatments of Finnish CG have postulated an underlying geminate nasal word-finally in *sydän*, viz /sydämm/, a geminate which then had to be reduced to a single, after the application of CG, by a rule that can only be regarded as ad hoc. Perhaps “native” was taken literally, rather than as an abstract marker — one could just as well have used a feature [+Weird].

¹⁴ The geminates would have to be single entities as far as the shortening process itself was concerned, but with regard to the conditioning environment, a geminate functioned as two entities. Thus in the caritive adjectives we may find two sets of geminates, as in /loppu + ttom/ ‘end + less’, where the latter of the two must be regarded as two segments so as to close the syllable in order for CG to apply to the first geminate, which functions as a single entity. The very same CG rule then of course applies again to the latter geminate, which now must be a single entity. In other words, when a geminate is the “patient” of CG it is a single entity, when it is the “agent”, however, i. e. part of the conditioning environment, it is two entities. Such are the vagaries of schizophony.

¹⁵ N. Chomsky, M. Halle, *op. cit.*

¹⁶ This /d/ is taken to be due to Swedish influence by Finnish scholars (Skousen is of the same opinion). It is not at all necessary, however, to credit the Swedes with this. The difference between an alveolar flap and a /d/ is very small — a matter of milliseconds — and it could well be the case that the original flap, the reduced stop, reverted to a non-reduced state, which would be /d/. This seems to have happened in many dialects of American English, where the intervocalic sound in words such as *better* and *butter* is a [d], not a flap.

Very seldom does the phonetic literature make any mention of velar or labial flaps, and indeed, if such flaps developed in a language, their life expectancy should be very short. The reason for this is that flaps, by their very nature, are of very short duration, and the articulators involved in making labials and velars are much less agile than the tip of the tongue which produces alveolars. These circumstances would lead to either a prolonged contact between the active and passive articulators in the case of the velars and labials, in which case we would no longer have a flap, but a full stop, or the result could be no contact at all, or partial contact, in which case we would get a glide or a fricative. And glides and fricatives are what we find whenever deletion or assimilation have not taken place.

РОБЕРТ ХАММАРБЕРГ (Вест Лафайет, Индиана)

НОВЫЙ ВЗГЛЯД НА ЧЕРЕДОВАНИЕ СОГЛАСНЫХ В ФИНСКОМ ЯЗЫКЕ

Все генеративные объяснения финского чередования согласных принимали это явление как синхронно продуктивный процесс, фонологически обусловленный. Более того, большинство трактовок считало этот процесс целостным, т. е. все случаи чередования рассматривались как следствия одного и того же правила. Эти предположения, однако, свели к установлению некоторых исключений, и кроме того, пришлось разделить словарь на исконную и неисконную части, причем чередование рассматривалось как применимое прежде всего для первой и только случайно для последней части.

Это, однако, приведет к совершенно искусственной грамматике. Мы должны рассматривать грамматику как продукт процесса усвоения ребенком языка, а ребенок не имеет способности различения исконных и неисконных слов. Ребенок, следовательно, конструирует свою грамматику на основе всех языковых данных, также должен поступать и языковед.

Учитывая и неисконный словарь, мы получим отличную от прежней картину чередования согласных. Чередование одиночных согласных придется рассматривать как непродуктивный процесс (регулируемый второстепенными правилами), а чередование удвоенных согласных встречается только в позиции на конце морфемы и морфологически обусловлено.

Исторически чередование согласных, несомненно, было целостным и фонологически обусловленным процессом. Этот процесс был видом укорочения, причем удвоенные согласные перешли в одиночные, а одиночные — в хлопки. Этот исторический процесс, однако, нельзя повторять в синхронной грамматике.