

Phonetic reduction

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1. Definition

The following definition is meant to delimit, and state more precisely, our not too sharp concept of 'phonetic reduction'. Phonetic reduction is

articulation energy loss related to the energy maximum of the expression concerned in natural spontaneous speech, apart from volume, intonation, and speed.

Reductions take place according to fixed, traditional rules of the language, but may also be due to individually lowered motor control. Examples of reduction in Modern Unlocalisable Danish and High British are:

Danish: [ˈʁʊðhus ˌb̥l̥æsŋ] → [ˈʁʊðüs ˌb̥l̥æsŋ] → [ˈʁʊðs ˌb̥l̥æsŋ]
Rådhuspladsen 'The City Hall Square'.

High British: [ˌɹɒbɪn ˈhʊd̥] → [ˌɹɒbɪ ˈhʊd̥] → [ˌɹɒmn̩ ˈhʊd̥] *Robin Hood*.

Between upper articulation and the phenomena of glottis amplitude, frequency, and speed there is the essential difference that the former has a natural maximum. *Konge* 'king' is pronounced [ˈɡʰɒŋə] and these sounds cannot be supplied with more upper articulation energy than their well-known positions require. Nor can more energy requiring sounds be added. Whereas loudness, intonation and speed have no clear energy maximum. One may speak as loud and as slowly as one is capable of and with as big intervals as one's mood dictates.

Volume (primarily vocal cord amplitude), of course, serves the same purpose as reduction: comprehensibility respectively energy saving within the limits of comprehensibility. It is correlated (negatively) with reduction: the louder, the less reduction. But only rather weakly so. If you are asked to

speak more clearly by a normal person sitting 1 m away, you do not raise your voice much whereas your reductions decrease drastically.

Intonation. Utterance intonation is even farther away from reduction albeit they are correlated. Only interval size is relevant since bigger intervals require higher, more 'muscle tense' notes. But interval size has another purpose than upper articulation energy in that it does not serve comprehensibility; rather, it signals eagerness, inquisitiveness etc. This is clearly seen from the fact that a maximal interval reduction – as long as some interval remains – in itself does not make speech unintelligible. (It just sounds dull). While a drastic reduction of the individual sounds makes the speech quite blurred.

Speech speed can physically be defined as organ movement speed, but is perceived as the number of actual sounds (or actual syllables) per second. Speed is narrowly correlated with reduction: If you speed up, you are bound to have more reductions, and vice versa. (For instance, the common pronunciation of *hende* (her) [ən] is completely 'unphonetic' at a slow speed).

Speed, however, has a complicated relation to energy. If certain body movements are to be performed, you save nothing by performing them quicker. More speed requires more energy, but the cost, then, is regained with the time saving. When you reduce the upper articulations, your sounds approach the organ position of rest: Vowels are centralised, plosives lose their closure, sounds are devoiced etc. So the organ movements are shortened whereby more sounds are said per second at the same organ speed. This, of course, is no real speed increase. (As certain sounds are omitted, the number of sounds per second actually goes down on this account!).

What people exploit by a high speed is the 'lingering' of the vowels (and the other syllabic sounds and possible long consonants). Syllables are syllables because one of their sounds has a non-minimal duration (is a bit more lingering than the others), most obvious, of course, in the *long* vowels, but it also applies to the short ones. Here length can be 'eaten' in an energy cut. A long vowel like in *Lise* ['li:sə] may easily take 0.25 sec., but at a normal speed less than half of it.

One might consider including speed in the definition of reduction, but it must be admitted that this kind of energy saving (the time during which

energy is spent) is fundamentally different from the articulation savings i.e. reductions of the very routes of the organs.

Comprehensibility. It is tempting to define reduction by comprehensibility, cf. German *Sprich deutlich!* or Danish *Tal tydeligt!* 'Speak clearly!'. The goal of speech (first time round) is comprehensibility. You climb up the comprehensibility ladder to be understood – and downwards to save energy within the limits of comprehensibility. However, comprehensibility – correlating narrowly with reduction – is a *consequence* of reduction, not a *kind* of reduction. You *intend* to talk more comprehensibly *by means of* approaching the articulation energy maximum.

That comprehensibility is not directly built into the concept of reduction, is seen from the fact that comprehensibility *can* go down when articulation energy goes up. If you use very distinct (energetic) pronunciations in normal conversation, your partner may be confused. If, for example, one says ['kʊʂdnə] *rustne* (rusty) instead of the normal ['kʊʂnə], this will confuse the receiver ("Was it *rustende* (rusting)?" – in this word [d] cannot be elided). An American-English super-distinct ['stɛjθən 'æθ] *straighten out* instead of ['stɛjtɪ 'æwɪ] will puzzle him ("...*Turn out?*").

Note that in this section I have pointed to some rather undisputed phonetic phenomena without documentation. My above contribution, however, is a concept analysis and, therefore, not directly subject to empirical evidence.

2. The pedagogical problem

All languages have their rules of reduction – though many of them are shared. They make up a serious pedagogical problem. At school you must of necessity learn the most distinct pronunciation, but, for a long time, you will still not understand foreigners speaking normally together. (Having learnt French for 3 years and achieved a reasonable ability to read and some volubility, I did not in Paris understand *fnet*. I even thought there could not be such a word, the phonotactics were wrong. It had to be repeated to me several times before the window opened: *Oh* [fø'ne:tʁə]./)

The pedagogical solution is not to drop distinctness (you cannot; as soon as you mention a word materially you are sure to get high up in the hierarchy), but to make more of listening to genuine everyday speech.

3. Distinctness level vs reduction level

It is important to distinguish between *distinctness level* and *reduction level*. Each word has a series of reduction levels down to a faint buzz. For example, *sten* 'stone' before a pause:

sten 'stone' ['sd̥eː.^ʔn → 'sd̥eː.^ʔn → 'sd̥eː.^ʔŋ]¹

tiger 'tiger' ['d̥^{sh}iː.jɑ̥ → 'd̥^{sh}iː.ɑ̥ → 'd̥^{sh}iɐ]

The reduction level 0 (maximally distinct) does not simply correspond to the 0-level of another word. You may very well combine *sten*'s no. 0 with *tiger*'s no. 1 in the same bit of a second. – The single utterance parts are normally placed on a certain *general distinctness level* (i.e., can normally only just be understood at a certain distance). As an example, a high distinction level requires the lowest (0th) reduction level of the word *sprække* 'crack', but is easily combined with reduction level no. 1 of *ikke* 'not': ['ɛ̝̊]. The standard-distinct level of a certain word (i.e. neither especially clear nor unclear) will require a certain reduction level apt for this specific word. (See Brink and Lund 1975, § 48).

4. Historical change vs reduction

Reductions must be kept apart from historical changes. The reductions do not offer *new* pronunciations. The reductions existed in older and extinct generations too. When they disturb, it is only because they are carried to excess (e.g., due to sloppiness) so that the receiver does not understand the sender. All normal, sober etc. people can speak clearly. (I cannot prove it, but I have checked it several times). The historical changes, however, show quite new pronunciations. When, for example, all youngsters today say ['f̥ɔ̝ɑ̝.m̥'] (forward) instead of ['f̥ɔ̝ɑ̝.æm̥'], it is not reduction. And it can be said – and is said – just as slowly and loudly as you wish. Whereas a reduction like [mɪŋ 'vɛŋ 'g̊ɔː.] *min ven går* 'my friend goes' cannot be said slowly.

But it is more complicated than that. All sound laws – whether they imply saving articulation energy or not – show vascillation in the beginning, where the new form 'prefers' quick and subconscious passages (Brink

¹ In the phonetic transcriptions the symbol ['ʔ'] represents the Danish *stød*.

and Lund 1975, § 134). For example, before everyone said [g̊k̥ɑːw] *krage* 'crow', this form competed with the old one, [g̊k̥ɑːɥ], which tended to appear in more distinct passages. During the transition period the new form was both a reduction result and a historically new form. (Paradoxically, [w] with its double articulation requires *more* energy than [ɥ]. I have not adjusted my definition of reduction to this very special circumstance).

5. Three Danish reductions

1) All vowels outside maximally distinct speech are centralised, i.e. relaxed and approaching the position of rest of the tongue and lips. The vowels being closest to the centre, viz. [ɐ, ɐ̃], are rather easily reduced all the way to the lax neutral vowel, [ə], provided they are short.: [min 'vən g̊ʰʌm 'əg̊ 'jəm'] *min ven kom ikke hjem* 'my friend did not get home'; in unaccented positions the reduction is even more "willing": [hæn ɑ̃ səð 'f̥k̥ɑ̃æm' d̥ʰə 'd̥ɐ mə mədmɑ̃ 'ki'i] *han har set frem til det med Mette Marie* 'he has been looking forward to the Mette-Marie thing'. Other vowels are less willingly reduced all the way to [ə], the velar vowels almost not at all. So, the starting-point distance to [ə] is decisive, together with the articulation speed which is much higher in unaccented syllables.

It is highly interesting, however, that also the frequency of the word has an effect on its pronunciation: ['b̥h̥ɐ̃ ləg̊s'ɔ̃g̊l̥ ɛðð] *pålægsschokolade* 'chocolate in thin slices' is a normal form that only your receiver's hardness of hearing or a blizzard would force you to make clearer, but the unestablished *vadsækskolonnade* 'colonnade where young people place their duffel bags' will not exhibit corresponding reductions – it would not be understood. Likewise, [d̥ən'] *dén* 'that' is quite common, whereas ['mən'] *mænd* 'men' demands fatigue or depression.

As you see, not only the general distinction level of the *sentences* are adjusted to the situation, but the reduction level of every *word* is adjusted against the hearer's understanding: You choose – depending on distance, shyness, dedication, personal habits etc. a general *distinction level* – characterised by the average sounds per second, correlating well with the time distance between the primary stresses. But within this level, the *reduction level* for each word is very different: high in the unaccented syllables and the most trivial words, low in the more rare ones.

The rarity applies to the sender's belief about the hearer. The head doctor will pronounce the word *pankreas-akylion* with a high reduction level to the nurse, e.g., not to the patient, it is to be hoped. The politicians in the Danish Parliament say ['sɔ̃ɛ: 'sm̥, nisɔ̃Λŋ] *statsministeren* 'the prime minister', we laymen prefer fewer reductions.

2) A seemingly uncomplicated reduction is the law of h-loss after s and in unaccented syllables: *Skovs'oved* (Danish place name), 'Kurt ar 'tabt 'Kurt has lost'. But it is not as simple as that. At the very start of the utterance *h* is not dropped: *Har Kurt tabt?* 'Has Kurt lost?', *Hotellet var godt*, cf. *et godt otel* 'a good hotel'. It might be due to some general decrease in distinctness from the beginning of an utterance (or even a word) to its end.

But even with such detailed rules, something important is missing: *H* may drop, but of course it has not got to. It depends, as we saw, on the situation and the individual. But what is quite independent of the situation and speaker, is the *relative strength* of the reduction:

Some reductions almost always apply, others are weak and rare. Consequently, some reductions can only appear when certain others have taken place. *Dit herbarium* 'your herbarium' sounds maximally distinct like [ɖiɖ hæ̃'ɔ̃ɛ: 'j̥, ɔ̃ m] with older people and like [ɖiɖ hæ̃'ɔ̃ɛ: 'i, ɔ̃ m] with younger people. Everybody can reduce these to:

[ɖiɖ hæ̃'ɔ̃ɛ: 'j̥, ɔ̃ m]

[ɖiɖ hæ̃'ɔ̃ɛ: 'j̥, ɔ̃ m]

[ɖiɖ hæ̃'ɔ̃ɛ: 'j̥, ɔ̃ m]

[ɖiɖ æ̃'ɔ̃ɛ: 'j̥, ɔ̃ m]

[ɖiɖ æ̃'ɔ̃ɛ: 'j̥ m] and younger people further to:

[ɖiɖ æ̃'ɔ̃ɛ: 'j̥ m].

(The variety *herbarie* is ignored). The combination [ɖiɖ æ̃'-] does not exist since ɣ is dropped before h. This phenomenon is called reduction harmony.

3) Let us look at the reduction of the plosives [ɓ, ɠ] between vowels. They are, here, reduced → [ɓ̥, ɠ̥], i.e. they are not being completely closed, so that a minimal noise arises. Since [ɓ, ɠ] are convenience-determined as regards voice (i.e., they have no fixed glottal position but assume ever max-

imally distinctly, the easiest one), they must, here, be reduced to voiced sounds, for example, [$\epsilon:\text{b}\text{p}\text{i}$ $\text{'b}\text{h}\text{a}\text{g}\text{p}$] *aber i pakker* 'monkeys in packs'. The reduction, however, is very weak in accented anlaut: *Få bader, Det går ikke* 'few bathe; it does not go' owing to the fact that all sounds are slightly more energetic and longer in accented anlaut than in other positions. On the other hand, the reduction is a bit stronger if a neighbouring syllable contains a [b , g] too: [$\text{'b}\text{i}\text{b}\text{ə},\text{h}\text{p}\text{l}'\text{ə}$] *bibeholde* 'retain', [di gig $\text{'g}\text{l}\text{e}:\text{ð}$ $\text{'j}\text{e}\text{m}'$] *de gik glade hjem* 'they went home happy'.

This rule is interesting, dissimilatoric as it seems, because a repetition is not especially energy requiring. It might be caused by the well-known fact that repetitions are irritating, so that the motivation for reduction increases.

Finally, I would like to mention that some highly frequent words have their own word-specific reductions. *Sku'*, *ka'*, *ve'*, *ve'*, *te'* instead of *skulle*, *kan*, *vil*, *ved*, *til* 'should, can, will, at, to' are examples (all common, even accented) as well as [$\text{'g}\text{e}\text{m}'\text{m}$] *gennem* 'through' and, with some, [$\text{æ}'\text{m}\text{e}\text{n}'\text{li}$] *almindelig* 'common'. Cf. English *not* → *n't* with stress reduction. These reductions do not follow the general and productive rules, but are independently handed down. (Accordingly, it is impossible to say * $[\text{'g}\text{h}\text{u}]$ *kulde* 'cold (sb.)' or * $[\text{æ}'\text{m}\text{e}\text{g}\text{d}\text{i}]$ *almægtig* 'almighty'.) An amusing example from English is [$\text{'s}\text{i}$ $\text{'r}\text{æ}\text{q}\text{n}$] *Sit down!* with [$\text{d}\text{d} \rightarrow \text{d}\text{d} \rightarrow \text{d} \rightarrow \text{r}$], a reduction succession not found elsewhere (Jones 1966[1909]: 73).

The field of phonetic reduction – or the study of allegro forms – may sound dull. However, the attraction lies not in the fact that sounds reduce and may fuse to a 'phonetic mush' which is hard to distinguish segmentally. Rather, what attracts this author is the huge, strongly automatised rule system controlling it. But also the sender's considerations about his receiver are interesting. They go far beyond linguistics, since judgement of distance, storm, and the receiver's expected perception and horizon is not a matter of language.

6. Sloppiness

The reduction system, of course, has nothing to do with sloppiness. All languages have such a system, its purpose being to save needless articulation energy. Indeed, there is a lot to save – compared to a scenery where we all speak maximally distinctly to each other. You may, for instance, realize

this in an oral, mocking phenomenon. In many languages it is a traditional teasing to speak maximally distinctly where the situation does not require it at all. A kind of read-my-lips speech. For example, a husband under suspicion may say: "'I 'HAVE 'NEVER 'KISSED 'MONICA!!" in such an exaggerated way, including an overspending of articulation energy, that, thereby, he co-signals: "I've told you 7 times. Now you must have grasped it. Don't expect me to discuss it anymore!". If I take it down in accurate phonetic transcription, everyone can see that it is super distinct (pauses and primary stresses), nobody, however, sees that it is *hyper*-distinct. The founding fathers of IPA, as well as the Danish Otto Jespersen, have not given us means to render speech which – in a certain situation – is excessively distinct. For instance, they have not enriched us with signs for speed and loudness.

No pronunciation is sloppy per se. A faint mutter may be addressed to oneself as a reminder of buying cheese, whereas a pronunciation with few reductions may be sloppy because the speaker disregarded a foul radio in the background.

Phonetic sloppiness is: not being *sufficiently* clear (or distinct, or easy to understand) in a particular situation although one could easily have avoided the indistinctness.

Many people today criticize the youth for speaking in a sloppy way. With justice, I *suspect*. For it is my *impression* that young people ask each other to repeat their words more often than we did in 1950–1970. I sense that a certain bravery about speaking quickly has crept in. But it is a phenomenon that calls for systematic research. It would not be too difficult to go through the many recordings of the Danish Radio Company with young people talking freely in the 1960s and compare them with youngsters of today in similar situations (typically informal round table discussions). Suspensions are not enough.

References

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Afterwords

Dansk Rigsmål (Brink and Lund 1975) contains mentioning of reduction in many places, especially in § 48 and § 134. Our material and method is described in § 3. In *Den Store Danske Udtaleordbog* (Brink et al. 1991) each word is shown in a distinct and indistinct version (determined by general or individual rule). Besides, all general reductions known to the authors are listed on pp. 1573–1631. Before the publication of *Dansk Rigsmål* in 1975 there was no serious treatment of Danish reduction. But in recent years the field has received much attention. The following list is almost exhaustive.

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