Chapter 9

Summary, conclusions, remaining issues

“It is most troublesome to collect any reliable data with regard to assimilation under the compounding and derivation of words. As soon as one requests someone to say a word or sentence after all, he will strain to pronounce it as good as he can, and the result will be artificial. . . . Material to base rules on can therefore be collected only in a haphazard fashion and will necessarily be very incomplete and very divergent for different observers.” (Zwaardemaker & Eijkman 1928: 223-224)

One of the principal aims of this chapter was to develop a functionalist perspective on the phonetics and phonology of fortis-lenis systems, i.e., obstruent systems that use voicing as a cue to a two-term lexical contrast. This enterprise was organised into three broad parts, comprising chapters 1 to 3, chapters 5 through to 7, and chapter 8 respectively. The first of these was concerned with the theoretical underpinnings of a functionalist model of (laryngeal) phonology and phonetics, its basic architecture and predictions, as well as with a survey of the relevant phonetic and phonological data in the literature. The second part described three experiments designed to test the predictions of the model
Chapter 1 described the analytical framework for this study, which was inspired by Ohala's (1981, 1993) theory of language change and more recent work on what I have referred to as diachronic or evolutionary functionalism (de Boer 1999, 2001; Blevins to appear). This brand of functionalism is distinct from the synchronic functionalism of Boersma (1998), Kirchner (1998), Flemming (2001) and others in its hypothesis that speakers' grammars have no direct access to functional or ‘ecological’ principles such as articulatory effort minimisation or perceptual optimisation. It is distinct from formalist frameworks in its assumption that all phonological and phonetic constraints are ultimately derived from such principles. An additional difference with formalist models and some (early) models of the phonetics-phonology interface associated with work on laboratory phonology is that all constraints are stated in terms of continuously-valued auditory and articulatory features.

Chapter 2 motivated the terms fortis/tense and lenis/lax as convenient descriptive labels for the phonetic categories found in obstruent inventories bifurcated by a two-term contrast that is phonetically supported in terms of voicing distinctions, and attempted a review of the vast literature on the phonetics of such systems.

Chapter 3 provided the phonological counterpart to the phonetic investigations of chapter 2. It attempted to identify a number of generalisations about laryngeal neutralisation in fortis-lenis systems including the type of dynamic word-final neutralisation that can be found in Dutch and German. Its theoretical point of departure was the work of Steriade (1997) which tries to derive generalisations about the effects of flanking contexts on laryngeal neutralisation from the effects of those contexts on the perceptibility of distinctions between fortis
and lenis obstruents (and thus on the likelihood of such obstruents to be subject to copying errors in acquisition).

As it stands, Steriade’s theory deals only with the effects of flanking contexts and not with neutralisation asymmetries between fricatives and plosives or the asymmetry between word-initial and word-final environments. Following suggestions by Balise & Diehl (1994) and the work of J. Beckman (1996, 1997) I argued that a perceptibility-driven account of laryngeal neutralisation can at least in principle be extended to incorporate positional and manner-based asymmetries. First, the well-documented phenomena of articulatory weakening and strengthening are likely to have an asymmetric effect on the perceptibility of word-initial and word-final contrasts which is consistent across flanking contexts. Second there is evidence that voicing distinctions inhibit the expression of place cues in fricative systems, which biases any functionalist model towards fricative inventories composed of only voiceless fricatives.

Chapter 3 is in many ways the most speculative of this study because several of its assumptions about perceptibility remain to be confirmed. However, I think it is important to emphasise yet again that perceptibility hierarchies represent propositions about the relative salience of specific phonetic features to speakers with specific native languages at particular times in history that can be tested in perception experiments. Thus a perceptibility-driven account of laryngeal neutralisation is empirically accountable.

Chapter 4 developed a preliminary typology of voicing assimilation phenomena, showing that there are important differences between assimilation in restricted morphological contexts and regressive assimilation across word boundaries. Whereas the former occurs regardless of the voicing categories employed by a language to cue the distinction between tense and lax obstruents, the latter is clearly dependent on the active (de)voicing of trigger obstruents. In addition, experimental studies indicate that regressive assimilation at word boundaries tends to be phonetically gradient whereas morphologically restricted assimilation (at least) seems to operate in a neutralising fashion.

These observations suggest that voicing assimilation occurs in two forms: as a phonological rule that operates on the feature [tense] or its formal equivalent(s), and as a purely articulation-based process driven by the mechanisms underlying the production of voicing contrast. I hypothesised that the former type of process is the one typically found in morphological paradigms and that the latter is responsible for regressive assimilation across word boundaries. Coarticulation-based approaches to voicing assimilation rules have been proposed before, e.g., by Slis (1985) and Ernestus (2000), but such proposals rarely spell out the phonetic typology of articulation-driven assimilation rules. Three principal features of this typology are (1) that only actively (de)voiced obstruents are able to trigger coarticulatory voicing assimilation; (2) that the only correlates
of [tense] affected by assimilation obstruent voicing and phonetic features me-
chanically dependent on voicing; (3) that assimilation is always gradient.

The experiments reported in chapters 5 and 6 were designed to test whether
regressive assimilation at word boundaries is always of the coarticulation-driven
type, as suggested by chapter 4. Experiment 1 investigated patterns of assim-
ilation in British English obstruent clusters whilst experiment 2 was an attempt
to apply the same design to regressive voicing assimilation in Hungarian. In
many respects the results of these experiments are in accordance with the pre-
dictions of the phonetic theory, and in some respects surprisingly so in the light
of descriptions in the literature. The hypothesis that receives almost completely
unequivocal support from these experiments as well as from experiment 3 is
the one that states that only actively (de)voiced obstruents can trigger regressive
voicing assimilation.

However, whereas the results of experiment 1 match the predictions of
the phonetic theory more generally, the behaviour of vowel duration before Hungar-
ian velar stop + obstruent sequences represents the most notable problem since
it cannot be attributed to the coarticulation of voicing targets. In 6.4 I suggested
that this might be interpreted as evidence for the idea that Hungarian RVA is a
part-phonologised process, and a process that was perhaps sparked by the effects
of phonetic RVA on the perceptibility of [±tense] in word-final plosives.

It is perhaps important to emphasise that whilst the data reported in chapter
6 contradict a purely phonetic analysis of Hungarian RVA, it does not vindicate
recent generative analyses of the phenomenon. Such analyses describe Hungarian
RVA as categorical, non-manner specific, and imply that the length of vowels
preceding obstruent clusters should cue the laryngeal specification of the final
obstruent in such clusters. All these claims are contradicted by the results of
experiment 2.

Chapter 7 investigated regressive assimilation of voicing in Dutch three-term
clusters with a medial fricative. Part of the descriptive literature has it that assi-
milation does not apply in such clusters. Given that Dutch devoices word
initial lenis fricatives that are preceded by an obstruents it is difficult to see this
description as completely unconnected to phonological analysis. It is an inaccu-
rate description in any case, because regressive assimilation clearly does apply
in three-term clusters with a medial fricative, exactly as predicted by the pho-
netic theory. However, there is some evidence that the effect of assimilation is
weaker in the clusters investigated in chapter 7 than in the corresponding single-
ton obstruents examined by Slis (1986), and this may well have given rise to the
perception that assimilation does not apply at all.

The observation that Dutch RVA is [tense]-symmetric is probably the more
exciting conclusion of the work reported in chapter 7: the observation that /ps/
clusters have less voicing before a fortis plosive than before a sonorant /m/ un-
dermines one of the most pervasive and unquestioned assumptions about RVA in Dutch. It is entirely consistent with the phonetic theory of RVA (because Dutch fortis obstruents are arguably actively devoiced) and with Ernestus’ (2000) hypothesis that Dutch word-final neutralisation leads to the phonetic underspecification of [tense].

Chapter 8 finally, tried to dispel the notion that formalist phonological theory has a role to play as a source of metaconstraints on functionalist analyses or at least as a source of complimentary constraints that cannot be derived otherwise. This chapter went into considerable detail in fleshing out the predictions of current generative models of laryngeal phonology. I believe this detail was essential for pinning down the predictions of the models in question and exposing the inconsistencies introduced by patches designed to make these predictions to fit the data. The final section of this chapter brought the overall argument of this study full circle by showing how autosegmental models that improve on lexical feature analyses by incorporating phonetic detail need to be constrained by external principles and thus dissolve into the type of framework set out in chapter 1.