Research Statement

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A pervasive question within not only linguistics, but psychology in general, is the nature of the mental structures that are formed during learning, used to categorize and label objects in the real world, and that act as the symbols manipulated by mental processes. In phonology this question reaches all the way through speech recognition, the selection of articulatory targets during speech production, the way languages differ in carving up the acoustic space into contrastive sounds, and how those divisions can change over time: categories merging, splitting, or shifting. My research focuses on the interface between phonetics and phonology, and the means by which phonetic representations become phonological representations. This statement presupposes the fact that a distinction can be made between phonetics and phonology, and that linguistic phenomena can be sorted into one domain or the other with some degree of confidence. Because neither of these things is necessarily true the pursuit of the question of representational change must begin with several prior questions, such as: how phonetic and phonological representations differ, if they do, and how to distribute the explanatory burden of grammars between representations, and operations on those representations. The result is a research program that is necessarily heterogeneous over methodology, phenomena of study, and sub-discipline, in order to be globally coherent and cumulative.

Typology

Claims about representational structure are inextricably linked to the rest of the theoretical commitments one adopts. In linguistics, more so than many other fields, the evidence used to test a given theory is itself a product of that theory. The basic units of linguistics are underlying forms, while the basic units of linguistic data are surface forms. In generative phonology, a non-formal analysis must be done prior to treatment by the formal theory, and this analysis is often massively indeterminate. The immediate practical consequence of this situation is that `empirical facts' cannot be taken at face value. One branch of my research program thus focuses on re-analysis of the original source data used to motivate certain typological claims. In Morley (2015a) I examined the effect of the analytic ambiguity involved in deciding whether a given alternation pattern should be analyzed as epenthesis (in inter-vocalic context), or deletion (in pre-consonantal context). Different criteria alter – sometimes drastically – what we take to be the typology of consonant epenthesis, and can falsify claims about universal markedness hierarchies for epenthetic segments. I conclude from this work that intervocalic epenthesis of any consonantal segment may be much rarer than previously thought.

Axiomatics

The ambiguity problem on the theory side manifests in a number of different ways; intuitively plausible claims that are not formalized; covert assumptions that are not explicitly stated. Then there is the lack of specification that often arises from theories that deal with single linguistic modules in isolation: synchrony divorced from diachrony, diachrony divorced from acquisition, etc. It has been claimed that synchronic phonological grammars are more regular than would be expected under natural circumstances of change and evolution. However,

Morley (2015b) explicitly demonstrated that the assumptions underlying this claim could not be made consistent with minimally plausible models of learning, lexical inventories, phonetics, and sound change itself. This line of research was also pursued in Morley (2014), this time with computer simulations of evolving phoneme categories comprised of phonetic tokens. In this work I showed that not only was it unlikely for the model learner to generate unnatural (or anti-natural) phonotactic associations, it was also unlikely for it to generate purely contrastive patterns. The outcome of the mostly local, phonetically natural sound changes was typically a pattern that was mostly allophonic, and marginally contrastive. Since the degree of a contrastive relationship is not typically reported in the description of a language's inventory, this prediction may actually be on the right track. The alternative is that an additional mechanism is needed in the model – and as part of the theory – in order to accurately capture the distribution of fully contrastive systems.

I have also applied the axiomatic approach to the question of how the typology of epenthesis described in Morley(2015a) could have emerged through a sequence of sound changes beginning with consonant deletion – the diachronic counterpart of the synchronic ambiguity between deletion and epenthesis (Morley 2012). The result is that a number of quite specific historic conditions are necessary to arrive at a synchronic epenthesis pattern, for example, that consonant deletion must apply to only a subset of the consonants, both pre-consonantally and word-finally. As with the other two projects, the particular characteristics of the lexicon and the learner are key players in this analysis, and strongly affect the predicted outcomes.

Learning Representational Structure

My experimental work provides more direct tests of representational structure in the minds of speaker/hearers. Most of this work involves teaching participants made-up language patterns containing covert phonological and phonetic structures. For example, I have shown that adult listeners can encode novel phonetic cues (degree of vowel nasalization) which are differentiable only by quite small acoustic differences, even when those differences are not used contrastively either in their native language or the artificial language of the experiment (Morley 2013). Furthermore, participants are able to consistently associate those cues with more abstract linguistic structure, namely, the presence or absence of a morphological juncture.

Other experiments using the same morphological learning paradigm contrast environments in which consonant epenthesis does and does not occur. Here I show that 'phonetically natural' tokens – vowels separated by homorganic glides – are overwhelmingly treated by listeners as the outcome of phonetically predictable coarticulation over vowel-vowel sequences. This bias can be completely reversed, however, by including an unambiguously phonemic glide in training, but only if the phonemic analysis allows the learner to assume a single allomorph. Phonological learning on the other hand is much more idiosyncratic, if it can be said to occur at all. There is no evidence that learners in any of the conditions acquire a rule of epenthesis, suggesting, at least, that re-analysis, or `rule inversion', requires a number of incremental changes in the distributions of allomorphic variants. However, participants generally show a bias to generalize, if not uniformity in how they do it (Morley 2011, Morley in prep.)

Current & Future Work

My current work leads me in the direction of analyzing and quantifying phonetic variation. If such variation is ubiquitous, as well as forming the substrate from which phonological patterns emerge, then it should be possible i) to observe the effect of different phonological systems (i.e. different languages) on the same phonetic phenomenon, and ii) to differentiate between expected (i.e. observed) variation, and anomalous, or exaggerated variation. According to a fairly sizeable literature vowels are phonetically longer before voiced obstruents than before voiceless, but the degree to which vowels are `lengthened' varies considerably across different languages. This phenomenon provides an ideal scenario for the type of study just described, and the wider availability of spoken language corpora make it possible to compare natural phonetic variation across languages that vary in relevant ways.

The first stage of this project using the Buckeye Corpus of American speech has produced some surprising results. There is little to no observable vowel lengthening effect for CVC words ending in phonologically voiced stops, and numerically, vowels actually shorten before fricatives. Nor does controlling for factors like word frequency, vowel quality, coda consonant place of articulation, and speaking rate significantly affect the result. Instead, the data support the interpretation that the duration cue is inherent to the obstruents themselves (voiced obstruents shorter; voiceless obstruents longer), and whatever variation is seen in the vowel duration is epiphenomenal of a partial temporal compensation, occurring only at the longest absolute vowel durations in the corpus (around 200 ms). This interpretation also appears to be consistent with the perception and production literature using laboratory speech in which vowel duration can be several times longer than what is found in the corpus. This re-interpretation of the phenomenon of 'vowel lengthening' has led me in the direction of investigating the role of speaking rate in phonological representations.

This work has also led to a collaboration on the dynamics of phonetic and phonological vowel length with Björn Köhnlein (Linguistics, Ohio State), also involving current and past OSU students, and funded by an internal department grant. The project involves the collection and comparison of spoken data from different dialects and perception and production experiments eliciting several different speaking rates. The ultimate goal is the development of a diachronic model of the interaction of coda obstruent voicing on compensatory lengthening phenomena cross-linguistically.