Consonant Synchronicity in Polish and English

Phonotactics is the study of how the sounds of language combine to form larger units such as syllables or words. The Polish language is well-known for its phonotactics, due to the elaborate collection of consonant "clusters" that are found in the language. It is not difficult to find Polish words beginning with three or more consonants (*krtań, pstrąg, źdźbło* 'larynx', 'trout', 'blade of grass'), which are not combinable in most other languages. Polish has therefore attracted the attention of numerous scholars.

Most research on phonotactics seeks to measure the "markedness" of a given cluster. In other words, scholars have tried to answer the question "which consonant clusters are preferred in languages?" by examining areas such as L1 acquisition, speaker intuitions, frequency data, and processing performance in psycholinguistic experiments. While researchers have developed and employed increasingly advanced methods for studying "markedness", it is often taken for granted that the concept has any theoretical justification (see Haspelmath 2006 for a critique). Indeed, markedness tells us nothing about how the unusual consonant sequences in Polish originated, or how they have managed to survive linguistic evolution.

To gain a deeper understanding of these issues, it is necessary to obtain comprehensive data on how consonant sequences are actually pronounced, their acoustic features, and how these acoustic properties are processed by listeners. This will allow us to better characterize the place of consonant sequences in linguistic structure. At the same time, current theories of phonology are somewhat ill-equipped for formulating research hypotheses about the pronunciation of clusters. According to alphabetic transcription, which is the foundation for most phonological frameworks, clusters in two different languages are the "same" when they are transcribed with the same symbols. If we accept this premise, it is difficult to see why such clusters should be subject to phonetic study. To proceed further, we need a new theory of phonotactics, one that makes concrete predictions for phonetic research.

This project will conduct a set of empirical tests of a theoretical proposal outlined in a relatively new theory of phonological structure, the Onset Prominence framework (OP; Schwartz 2016). For OP, cluster "synchronicity" is not a question of the symbols used to transcribe the consonant sequence, but rather it refers to the degree of simultaneity with which the consonants are pronounced. In the OP system, there are three possible structural organizations for consonant sequences, with different predictions for the relative phonetic synchronicity of the cluster. Consonants in a cluster may (1) be *absorbed* into a single structural constituent at the same representational level, resulting in a high degree of synchronicity, (2) span two separate constituents *adjoined* at a higher level of structure, or (3) be 'submerged' into a single constituent that spans two levels (intermediate synchronicity). Polish clusters are nearly always adjoined (Schwartz 2016: 59), yielding a lesser degree of phonetic cohesion than we find in English, which allows both absorbed and submerged consonant sequences. For languages like Polish with elaborate phonotactic patterns, asynchronous articulation may be expected to have perceptual motivation, rendering individual consonants in a cluster audible to the listener.

This project will document the phonetic realization of consonant clusters in Polish, using English as a reference point, and Polish learners of English as an important source of experimental data. In English, there is solid evidence for a significant degree of phonetic synchronicity in the production of consonant clusters, so the L2 acquisition process for Polish learners is hypothesized to be one in which greater L2 proficiency goes hand in hand with increasing cluster synchronicity. Our research will include both production and perception of consonant sequences. Production will be examined by means of acoustic analysis, as well as experiments into articulatory timing using Electro-Magnetic Articulography (EMA). Perception will be investigated using the E-Prime software, which records data such as discrimination and identification accuracy, as well as response time.