THEORETICAL BACKGROUND

The present chapter discusses the principal tenets of the linguistic frameworks that prevailed in the 19th and 20th centuries, starting with Kruszewski's theory of alternations (the Kazan School) and concluding with Optimality Theory. I focus on selected examples that constitute typical theoretical problems in each of the frameworks, the analyses being either cited from the original source or conducted by me. The main aim of this introductory chapter is to provide an overview of the basic mechanisms of selected frameworks, while further features and principles are elaborated on in the succeeding chapters, in which I account for selected problematic issues from the perspective of each framework. For example, the notions of resyllabification (Selkirk 1982, Borowsky 1986) and amibisyllabicity (Anderson and Jones 1974, Kahn 1976, Rubach 1996) are introduced in Chapter 2, Derivational Optimality Theory (Rubach 1997) is introduced in Chapter 2 and further discussed in Chapter 3, while more intricate problems of the phonology--morphology interface are investigated in Chapter 4.

1.1. The Kazan School: Kruszewski's theory of alternations

Kruszewski (1967 [1881]: 28–37) made a distinction between two major categories of phonological alternations: divergents and

correlatives, the latter one being further divided into two sub-types. Divergents are characterised as closely related (phonetically)[4] and the cause of this alternation as such is based on phonetic grounds. Moreover, the contexts in which an alternation takes place are visible and can be well defined, and the alternation itself is exceptionless. Divergents are modifications (fission) of one and the same sound, and not two or three distinct sounds. In modern terms, divergents would be regarded as allophones of a single phoneme. One of Kruszewski's examples is the rule of Surface Palatalisation[5] in Russian, which states that consonants become palatalised before front vowels *e* and *i* (1a). The process is not active in the context of back vowels (1b).

(1) a. Т'ексас [t'e] "Texas"; на свет'е [t'e] "world" (loc.sg.)
     b. света [ta] "world" (gen.sg.)

The alternants of the second category are called correlatives. This type of alternations is not purely phonetic but is conditioned by morphological categories. Furthermore, the alternating sounds are not as similar as those from the first category. They are not considered modifications of one sound, but separate sounds. In modern terms, they would be regarded as two phonemes, since they contrast meaning, as I explain below.

As has already been mentioned, correlatives are further divided into two subtypes. One of the examples of the alternations that belong to the first subtype, presented by Kruszewski, is the process called Velar Palatalisation in Russian, via which *k, g,* become *č, ž* before, in Kruszewski's terms, *palatal vowels* (the notion that Kruszewski uses interchangeably with *front vowels*). Yet, it is only through historical research that we can discover that the front

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[4] Kruszewski's theory of alternations seems to resemble the claims of Natural Generative Phonology, according to which all phonological rules should be grounded in phonetics.

[5] This is how the process would be called today. Kruszewski did not use this name.

vowels were a triggering factor of that process. Synchronically, there are numerous exceptions to this generalisation, as can be observed in: *руки* "arm" (nom.pl.) and *боги* "god" (nom.pl.), in which we would rather expect to find *č* and *ž* instead of *k* and *g*. Furthermore, even though one can still find the alternations: *k : č, g : ž* in conjugation, it is not the case in declension. There are instances in which *k, g* are followed by front vowels and *č, ž* followed by back vowels. Furthermore, *k, g* may become *k', g'* and not *č, ž*, e.g. *Коск'ин* [kɔsk'in], *Браг'ин* [brag'in] (proper names). The same process occurs in foreign words such as *г'еограф'ия* [g'ɛɔgraf'ija] "geography" (nom.sg.).

In Kruszewski's view, the alternations belonging to the second subtype of correlatives develop out of the second category, which happens after language users start to associate certain morphological differences with semantic ones. The crucial difference between the first and the second subtype of correlatives is that the latter are exceptionless within their restricted morphological scope. Kruszewski gives the examples of German umlaut, as in (2).

(2)

singular	plural	diminutive
a. Haus "house"	Häus+er	Häus+lein
b. Rad "bicycle"	Räd+er	Räd+lein
c. Loch "hole"	Löch+er	Löch+lein
d. Buch "book"	Büch+er	Büch+lein

The morphological motivation in this case is the one stated in (3).

(3)

$$\text{the stem} \quad \begin{Bmatrix} a \\ o \\ u \\ au \end{Bmatrix} \rightarrow \begin{Bmatrix} ä \\ ö \\ ü \\ äu \end{Bmatrix} \quad + \text{-er, -lein}$$

Though Kruszewski himself does not refer to this process, the alternations involved in what we know as Second Velar Palatalisation

seem to serve as good examples of the second subtype of correlatives. Velar stops *k* and *g* alternate with dental affricates *ts* and *dz*, respectively. The context of the alternation is morphologically restricted in Polish, namely, the affricates occur before *e* and *ɨ* in the nominative case of plural masculine nouns, dative and locative cases of singular feminine nouns, as well as in a couple of deadjectival adverbs, as shown in (4) below. The instances of *k* and *g* occur elsewhere.

(4) a. rzeka [žɛka] "river" (nom.sg.fem.) – rzece [žɛts+ɛ] "river" (loc. sg.fem.)
   b. noga [nɔga] "leg" (nom.sg.fem.) – nodze [nɔdz+ɛ] "leg" (dat. sg.fem.)
   c. rybak [rɨbak] "fisherman" (nom.sg.masc.) – rybacy [rɨbats+ɨ] "fishermen" (nom.pl.masc.)
   d. daleki [dalɛk'+ɨ] "remote" (Adj.nom.sg.) – dalecy [dalɛts+ɨ] "remote" (Adj.nom.pl.)

The alternation is exceptionless, although restricted morphologically. In Kruszewski's view, the alternants of this type are distinct phonological segments.

1.2. The Prague School: functionalist structuralism

The opposition is the key concept in the Prague School of phonology (Trubetzkoy 1971 [1939]). On this basis, the distinction between phonetic sounds is made depending on their position in the sound system and their potential contrastive or non-contrastive function in a given language.

Let us consider the example of Polish labial stops *p* and *b*. In a pair of words such as *prać,* "to wash", and *brać*, "to take", we see that the choice between *p* and *b* results in the change of meaning. As there are no other labial stops in Polish, this opposition is classified as bilateral. The only distinction between the segments is that of the voice parameter, and there is no third

degree of voicing in Polish. Thus, the distinction between *prać* and *brać* is actually stated in terms of features rather than whole segments. Other pairs of stops exhibit the same type of contrast: velar *k* and *g* in *kra* "ice float" and *gra* "game" and dental *t* and *d* in *trzeć* "to rub" and *drzeć,* "to tear". Yet, these sounds can also be analysed with regard to their place of articulation. Within this opposition, there are three sounds that contrast meaning: the labial stop *b* in *bo* "because", the dental stop *d* in *do* "to" and the velar stop *g* in *go* "him". In the case of voiceless stops, the situation is equivalent, as the following contrasts can be observed: *pory* "season" (nom.pl.), *tory* "track" (nom.pl.) and *kory* "bark" (gen.sg.). This type of opposition is classified as multilateral, as there are three members and three distinctive places of articulation.

The oppositions can also be isolated or proportional. Trubetzkoy (1971 [1939]: 70) points to the German *l–r* pair as an example of the isolated opposition, since there is no other pair of phonemes in this phonological system that would exhibit the same contrast. Proportional oppositions, on the other hand, bring out the contrast that occurs in other pairs of phonemes in a given language, such as the abovementioned oppositions: *t–d, k–g* and *p–b*. The idea of a proportional (symmetrical) system of oppositions remained in the phonological theories and was used as an argument in the process of establishing the phonemic inventory in a given language (Rubach 1982: 25).

Other types of sets that Trubetzkoy analyses are privative, gradual and equipollent oppositions. Privative oppositions refer to the presence or absence of a given feature. There are no "mid" values: a sound can be either voiced or voiceless, rounded or not rounded, nasal or not nasal. Thus, the *p–b, t–d* or *k–g* oppositions are privative in terms of voice. If a feature under analysis can be graded, the opposition is called gradual, as in the case of the vowel height (*e–i*). Finally, equipollent oppositions involve sounds that are "logically equal", as they do not share any feature that would be labelled as privative or gradual (*p–t, f–k).*

Oppositions are employed to define the phoneme, that is, a functional, abstract unit that encompasses only the features that are distinctive in the system of oppositions. Let us focus on one of the examples given above, namely, *prać,* "to wash" and *brać,* "to take". These two labial stops cannot replace each other without changing the meaning of the word, which means that they occur in what would later, in structuralist phonology, be called contrastive distribution. Consequently, they are classified as the phonemes of Polish. In the Prague School framework, the phoneme is a minimal phonological unit, which can be decomposed into features that are not independent entities. The phoneme contains only relevant properties. Combinatory variants of the phoneme occur in mutually exclusive contexts, while facultative variants occur in the same contexts.

Trubetzkoy (1971 [1939]: 46–49) presents three fundamental rules that must be followed in order to establish the status of a given segment:

> (Rule I) Two sounds of a given language are merely optional phonetic variants of a single phoneme if they occur in exactly the same environment and are interchangeable without a change in the lexical meaning of a word. (Rule II) If two sounds occur in exactly the same position and cannot be interchanged without a change in the meaning of the words or without rendering the word unrecognisable, the two sounds are phonetic realisations of two different phonemes. (Rule III) If two sounds of a given language, related acoustically or articulatorily, never occur in the same environment, they are to be considered combinatory variants of the same phoneme (Trubetzkoy 1971 [1939]: 46–49).

The distinction between "altering the meaning" and "making the word unrecognisable" is exemplified by the German *a–i* alternation in pairs of words such as *Lippe,* "lip" – *Lappe,* "Sami" and *Fisch,* "fish" – *Fasch.* In the former pair, the replacement of a vowel alters the meaning of the word, while in the latter, it only makes the word unrecognisable. Contextual variants of the same phoneme are supposed to be phonetically similar.

Fischer-Jørgensen (1975: 26) emphasizes the superiority of Trubetzkoy's explanation of phonetic similarity as compared with other phonological schools in which the same notion is used. In Trubetzkoy's view, phonetically similar sounds should possess common properties which distinguish them from all other sounds in a given language. For instance, in spite of their virtually complementary distribution, it would not be possible to subsume English *h* and *ŋ* under one phoneme, since they share only the consonantal feature.

However, there are contexts in which the voice opposition between *p* and *b* in Polish disappears, or rather becomes *suspended*. The voicing contrast is neutralised (suspended) in the case of obstruents that occur in word-final position before a pause and word-medially before voiceless obstruents. Thus, the phonetic form of the word *chleba,* "bread" (gen.sg.), is [xlɛba] and the pronunciation of *chlebek,* "bread" (nom.sg.dimin.), is [xlɛbɛk], whereas the pronunciation of the nominative singular form *chleb* is [xlɛp] and the pronunciation of *chlebka* (gen.sg.dimin.) is [xlɛpka]. To account for these facts, Trubetzkoy created the notion of the archiphoneme, which encompasses the features common to both members of a pair, with the neutralised feature being unspecified. Here, the archiphoneme is represented by the capital letter P, specified only for the "labial" and "stop" features. In Trubetzkoy's view, archiphonemes are separate objects in the phonological network, that is, they coexist with "regular" phonemes, transcribed with small letter symbols. In the example under consideration, it is the feature "voice" that is left unmarked. The representation of positions in which the obstruents *p* and *b* can occur is presented in (5) below.

(5) Lexical form: {b+a} {b+e} {b #} {b+k}
    Phonemic form: /b+a/ /b+e/ /P#/ /P+k/
    Phonetic form: [b+a] [b+e] [p#] [p+k]

The archiphoneme P represents the neutralisation of the contrast between /p/ and /b/, hence its lack of value for voicing.

Trubetzkoy claims that only bilateral oppositions may become neutralised. Thus, *p* and *b* can be neutralised, because the only feature that they do not share is "voice". This combination of features does not occur in other phonemes in Polish. Thus, neutralisation would not be possible between e.g. *p* and *k* .

Neutralisation may be context-determined or structure-determined. Context-determined neutralisation is conditioned by the immediate phonemic environment, while structure-determined neutralisation—by the position in the word or syllable. The process of Final Devoicing (FD) can serve as the example of structure-determined neutralisation. In Polish, voiced obstruents devoice word-finally, as shown in (6).

(6) a. kro**w**a [v] "cow" (nom.sg.) – kró**w** [f] "cow" (gen.pl.)
    b. obstr → obstr / __ #
     [+voice] [-voice]

In German, on the other hand, devoicing takes place syllable-finally.

(7) a. Ma**g**deburg [k] "Magdeburg"
    b. obstr → obstr / __ $)_\sigma$
      [+voice] [-voice]

Only minimal contrasts are covered by neutralisation, that is, phonemes that undergo neutralisation should share common qualities that do not occur in other phonemes. The common features are symbolised by the archiphoneme.

The Prague School of phonology is the study of representations rather than rules. Access to the rules is indirect, as they are encoded in the representation, namely, in the concepts of neutralisation, the archiphoneme and the morphophoneme. The morphophoneme is a complex unit consisting of a list of alternating phonemes in a given morpheme, together with the contexts in which they occur. For instance, the morpheme *mrok,* "darkness", has different phonemic realisations depending on the morphological context in which it occurs.

(8) a. mro**k**+u [k] "darkness" (gen.sg.)
    b. mro**k**+i [k'] "darkness" (nom.pl.)
    c. mro**cz**+ny [č] "dark" (Adj.)

Morphophonology as a discipline situated between morphology and phonology has a separate status in the Prague School system. Trubetzkoy intended to develop the concept of morphophonology in the second volume of *Grundzüge*, which was never written. Morphophonology deals solely with morphological conditioning of the alternation, e.g. if a given segment occurs only in a specified morphological class.[6] Neutralisation and the archiphoneme are phonological rather than morphophonological tools. The same applies to the alternation between variants of the same phoneme. Morphophonology deals with the alternations between independent phonemes.

1.3. Distributional structuralism

To review the major principles of the descriptivist-structuralist analysis, let us consider the variants of the sound [t] in English. We notice that in certain contexts the pronunciation of this consonant varies, as shown in (9).

(9) a. eighth [eɪt̪θ]: dental [t̪]
    b. country [kʌntrɪ]: postalveolar [t̠]
    c. that chair [ðæt̠ t͡ʃeə]: palato-alveolar [t̠]

The sound [t] is always dental before dental [ð] or [θ] (9a); it is postalveolar before postalveolar [r] (9b) and palato-alveolar before palato-alveolar [t͡ʃ] (9c). Elsewhere, the place of articulation of [t] is alveolar. Distinct variants of [t] occur in clearly defined contexts and they are mutually exclusive. This type of distribution

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[6] Anderson (1986: 113) points to the similarity with one of the subtypes of correlatives in Kruszewski's framework.

is called *complementary*. Contextually-conditioned variants of [t] constitute allophones of this phoneme. The other type of distribution by which sounds may be classified as allophones of the same phoneme is defined as *facultative* (*free variation*). This distribution is illustrated by the word-final voiceless stop in the English word *let*, where the stop can be pronounced with or without glottalisation, that is, as [letˀ] or [let], respectively. The glottalised variant is the allophone of the plain voiceless stop [t], as it is pronounced in isolation.

The final type of distribution is called *contrastive*.[7] To show what is at stake, let us focus on the distribution of the dental stops *t* and *d* in Polish. In a pair of words such as *tom* [tɔm], "volume" and *dom* [dɔm], "house", the change of the word-initial stop produces a change of meaning. The two sounds form a *minimal pair* and, therefore, they constitute separate phonemes. One minimal pair is enough to establish the phonemic status of the relevant sounds. This follows from the principle called *once a phoneme, always a phoneme* (Pike 1947: 96):

> [...] when, by contrast in identical environments, two segments are once proved to be phonemically separate, they must each be considered as phonemically distinct wherever they occur, regardless of the mechanical, arbitrary, or grammatical substitutions which they may undergo elsewhere (Pike 1947: 96).

However, there is a context in which the contrast between the analysed dental stops disappears. Let us consider the relevant examples in (10).

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[7] However, contrastive distribution alone is not enough to indicate the status of given sounds. Another requirement is that of *phonetic similarity*. The classic example is the complementary distribution of [h] (never in final position in a word) and [ŋ] (never in initial position) in English. Given the distributional procedure alone, these two sounds should be recognized as allophones of one phoneme. This solution would be odd, so the way to avoid it is to state that these sounds differ too much to be subsumed under one phoneme. The problem with the procedure is that the term *phonetic similarity* is never precise.