



**LACUS  
FORUM  
XXXIII**

*Variation*



UNIVERSITY OF  
**TORONTO**

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## VARIABILITY IN TRUBETZKOY'S CLASSIFICATION OF PHONOLOGICAL OPPOSITIONS

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[A] phonemic system presupposes a system of oppositions... But *opposition* is not exclusively a phonological concept, it is a logical one, and the role it plays in phonology is strongly reminiscent of its role in psychology. It is impossible to study phonological oppositions (of which phonemes are only the terms) without analyzing the concept of the opposition from the point of view of psychology and logic.  
(Trubetzkoy 2001[1936]:15)

THE PHONOLOGIST WHO DID THE MOST to establish contrast as an organizing principle of phonology was N. S. Trubetzkoy. One of his key insights is that the determination of contrastive features in an inventory is not self-evident, but must be established by the analyst on the basis of the patterning of the phonological system (the 'system of oppositions'). He showed that phonological systems with similar-looking inventories could have very different contrastive structures.

This is one sense in which Trubetzkoy's classification of oppositions allows for *variability*: the contrastive features of a given set of phonemes are not determined by their phonetics, but may vary depending on phonological patterning.

There is a second, less desirable, sense in which Trubetzkoy's classification of phonological oppositions can be said to admit of variability. I will argue that Trubetzkoy's account of contrastive relations in *Grundzüge der Phonologie* (1939) is crucially incomplete, and admits of ambiguity as to what he really intended. I will show that when we make explicit what he omitted, we find that he was operating with two incompatible approaches to determining contrastive features. I will also propose that one of these methods is deficient, while the other one represents a genuine insight into the patterning of phonological systems.<sup>1</sup>

1. OPPOSITIONS AND PHONEMIC CONTENT. Every phoneme of a language enters into an *opposition* with every other phoneme. It is important to bear in mind that an opposition is a relation between a *pair* of phonemes.

Another important notion is that of *phonemic content*: 'By phonemic content we understand all phonologically distinctive properties of a phoneme, that is, those properties which are common to all variants of a phoneme and which distinguish it from all other phonemes of the same language, especially from those that are most closely related' (Trubetzkoy 1969:66). According to Trubetzkoy, phonemic content is closely tied up with the system of oppositions: 'The definition of the content of a phoneme depends on what position this phoneme takes in the given phonemic system, that is, in final analysis, with which

Feature	Marked	Unmarked
[obstruent]	obstruents	sonorants
[nasal]	nasals	liquids
[lateral]	laterals	rhotics

**Table 1.** Markedness of features of German /r/.

p	pf	t	ts	k					
b		d		g					
	f		s š	x h					
	v		z						
<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="border: 1px solid black;">m</td> <td style="border: 1px solid black;">n</td> <td style="border: 1px solid black;">l</td> <td style="border: 1px solid black;">r</td> <td style="border: 1px solid black;">ŋ</td> </tr> </table>					m	n	l	r	ŋ
m	n	l	r	ŋ					

**Figure 1.** German consonantal phonemes.

other phonemes it is in opposition... Each phoneme has a definable phonemic content only because the system of distinctive oppositions shows a definite order or structure' (67–68).

The above remarks suggest that the phonemic content of a phoneme, that is, the set of its distinctive (contrastive) properties, ought to *derive* from its position in the system of distinctive oppositions. Therefore, we need a way to determine a phoneme's position in the system of oppositions *before* we have determined its distinctive properties. But Trubetzkoy does not explicitly show us how to do this.

Consider, for example, his comments on the German phoneme *r*. Trubetzkoy (1969:67) observes that the phonemic content of German *r* is 'very poor, actually purely negative: it is not a vowel, not a specific obstruent, not a nasal, nor an *l*.' How did Trubetzkoy arrive at this conclusion? First, he is assuming a theory of *markedness* wherein one value of a feature is *marked* (positive) and the other is *unmarked* (negative). Based on his remarks, he assumes the markedness values in **Table 1**; the feature names are not Trubetzkoy's, but I have chosen them so that the marked value is the positive (+) one.

Markedness is one ingredient we require to reconstruct Trubetzkoy's analysis, but we need to answer a further question: how did he pick these particular features, and only these, to distinctively characterize German *r*? One way we can arrive at this result is by successively dividing up the inventory by features following the order given in **Table 1**. Consider the consonantal inventory of German; the phonemes shown in **Figure 1** are those listed by Trubetzkoy, and the layout of the chart is based on his remarks.

We can distinguish /r/ from every other phoneme by this procedure:

1. First, divide the inventory by the feature [obstruent], which distinguishes between obstruents and sonorants (lightly shaded box in the chart). Since *r* is a sonorant, this feature distinguishes it from all obstruents, which no longer need be considered with respect to uniquely characterizing *r*.
2. Among the sonorants the feature [nasal] eliminates the nasals (inner box), leaving *r* in contrast only with *l*.

3. The final feature, [lateral], distinguishes between *l* (circled) and *r*, and leaves them both with a unique set of features.

The above procedure meets the requirement that the phonemic content of a phoneme, that is, the set of its distinctive (contrastive) properties, follows from its position in the system of distinctive oppositions. Moreover, in this procedure, 'the system of distinctive oppositions shows a definite order or structure.' The order in question is the order of the features, which gives structure to the inventory. But Trubetzkoy does not explicitly follow this procedure in *Grundzüge*. Some of his other examples do not appear to work the same way.

2. BILATERAL AND MULTILATERAL OPPOSITIONS. Trubetzkoy (1969:68) classifies oppositions in terms of their 'basis of comparison', those properties that the opposition members share: whether the shared properties are unique to those two members or not. '[I]n the case of *bilateral* oppositions... the sum of the properties common to both opposition members, is common to these two opposition members alone... The basis of comparison of a *multilateral* opposition, on the other hand, is not limited exclusively to the two respective opposition members.'

A question immediately arises: In comparing the opposition members, do we consider *all* their properties, or only their *distinctive* properties? Trubetzkoy's initial answer is decisive: 'Of course, only the phonologically distinctive properties are to be considered' (68). But, he goes on, 'some nondistinctive properties may be taken into consideration if, on the basis of these properties, the members of the opposition in question are placed in opposition with other phonemes of the same system.' This is not entirely clear to me, but Trubetzkoy gives an example, this time from French: '[T]he opposition *d-n* (as in French) is to be considered bilateral because its members are the only voiced dental occlusives. Yet neither voicing nor occlusion is distinctive for *n*, as neither voiceless nor spirantal *n* occur as independent phonemes' (69).

This statement makes us doubt a number of principles that we posited on the basis of the German example. First, Trubetzkoy here understands a feature to be distinctive in a phoneme *only if* there is another phoneme in the language that is identical with respect to *all* its properties except for that feature. This notion of how to arrive at distinctive features is different from the procedure we used above, using a series of ordered features.

If we used that procedure here, we could, for example, order the feature [voiced] first, distinguishing between voiced (shaded) and voiceless consonants, as shown in **Figure 2a** (overleaf).

Since both *d* and *n* are voiced, following this division we would only have to subsequently distinguish among the voiced consonants. Continuing to use Trubetzkoy's terms, the next feature could be [occlusive], which we apply (shaded boxes in **Table 2b**, overleaf) to the set of voiced consonants (we are not concerned with voiceless consonants, which are no longer relevant to distinguishing *n* within the inventory). Finally, the feature [dental] (vertical box in **Table 2b**) narrows the set to just *d* and *n*.

Note that under this procedure the features for voicing and occlusion *are* distinctive for *n*; in fact, together with [dental], they are the *only* distinctive features so far assigned to *n*.

p	t	k
b	d	g
f	s	ʃ
v	z	ʒ
m	n	ɲ
	l	
		j

b	d	g
v	z	ʒ
m	n	ɲ
	l	r
		j

**Figure 2a.** French consonantal phonemes (left). **2b.** Voiced consonantal phonemes (right).

But this conclusion contradicts Trubetzkoy's statement that 'neither voicing nor occlusion is distinctive for *n*, as neither voiceless nor spirantal *n* occur as independent phonemes.' How, then, did he arrive at this result?

The above statement suggests a different method for arriving at distinctive features, which we can describe as follows: Pick a phoneme and compare it with every other phoneme in turn. Any feature that is required to distinguish a pair is distinctive for the phoneme in question.

Let us apply this procedure to French *n*. We observe the following contrasts:

1. *n-m* are distinguished by [dental] (or another place feature).
2. *n-d* are distinguished by [nasal].
3. These two features suffice to distinguish *n* from every other segment as well, regardless of any other distinctions that may exist.

From this procedure it indeed follows that 'neither voicing nor occlusion is distinctive for *n*, as neither voiceless nor spirantal *n* occur as independent phonemes.'

3. TWO APPROACHES TO FINDING DISTINCTIVE FEATURES. We have now discovered two methods of assigning distinctive features to phonemes; these methods give different results:

1. Feature ordering
  - a. Put the available features in an order.<sup>2</sup>
  - b. Divide the inventory on the basis of the first unused feature.
  - c. Go to the next feature on the list and repeat (b) in each subinventory until all phonemes have been distinguished.
  - d. For each phoneme, designate as contrastive those features that were assigned to it in the course of this procedure.
2. Pairwise comparisons
  - a. Compare every phoneme with every other phoneme in turn.
  - b. For each pair, designate as contrastive a feature that distinguishes them.

p	t	c	k	
b	d	ʃ	g	
	ts	tš		
f	s	š	x	
v	z	ž		ɦ
m	n	ɲ		
	r	ř		
	l			
		j		

**Figure 3.** Czech consonantal phonemes: ɦ in a separate laryngeal series.<sup>3</sup>

It is not clear which of these, if any, Trubetzkoy had in mind. The example with German *r* works well with the first method; but this method fails to give the result Trubetzkoy arrived at for French *n*. For this case we require the second method. So let's see if the second method also gives us Trubetzkoy's analysis of German *r*.

Recall that Trubetzkoy assigns German *r* the distinctive (negative) features nonlateral, nonnasal, and nonobstruent. We have seen that *l-r* are distinguished by the feature [lateral]. But except for this pair, the pairwise method yields unclear results. What feature distinguishes *r* from *ɲ*, for example? It could be [nasal], as in Trubetzkoy's analysis; but it could also be an occlusion feature (nasals are stops, in contrast to *r*), or a place feature. Similarly, *r* may be distinguished from *z* by [obstruent], as in Trubetzkoy's analysis, but this is not the only feature that distinguishes these phonemes; other candidates are [strident], or place of articulation. Such choices arise with respect to almost every opposition.

There are two problems with supposing that the pairwise comparison method is the method Trubetzkoy had in mind. First, as we have just seen, pairwise comparisons do not always yield a clear result. In comparing two phonemes that differ by *more* than a single feature (the majority of oppositions), we don't know which feature is the contrastive one and which are redundant.

There is a second major problem with attributing the pairwise comparisons method to Trubetzkoy. For though some of his examples, like the case of French *n*, do seem to assume pairwise comparisons, or something like them, many more examples in *Grundzüge* are totally incompatible with this method.

Consider, for example, his treatment of German and Czech *h*. According to Trubetzkoy (1969:69), German *h* does not take part in any bilateral oppositions. In particular, it is not in a bilateral opposition with *x*: *h* is laryngeal and *x* is dorsal, and so there is no set of features that the two share exclusively. Looking at the Czech consonant inventory in **Figure 3**, one might suppose that Czech *h* (more properly, *ɦ*) is similarly isolated.

However, Trubetzkoy (1969:124) proposes that it forms a bilateral opposition with *x*. His reason is that the distinction between these phonemes can be neutralized, for they behave phonologically like a voiced-voiceless pair, like the other such pairs in Czech. 'The *h* in Czech thus does not belong to a special laryngeal series, which does not even exist in that language. It belongs to the guttural series, for which, from the standpoint of the Czech

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s	ʃ	x
v	z	ʒ	ɦ
m	n	ɲ	
	r	ř	
	l		
		j	

**Figure 4.** Czech consonantal phonemes: h part of the guttural series.

phonological system, only the fact that lips and tip of tongue do not participate is relevant.' That is, we should diagram the Czech consonants as in **Figure 4** rather than as in **Figure 3**.

While I think that Trubetzkoy is entirely correct in making this distinction between German *h* and Czech *ɦ*, the difference in their contrastive status does not emerge from pairwise comparisons of the phonetic properties of these phonemes with other phonemes in the system. Rather, it is the *phonological behaviour* of these phonemes that is the key to the analysis of their phonological content. Whereas pairwise comparison tells us nothing about the difference between the German *h-x* opposition and the Czech *ɦ-x* opposition, we can use feature ordering to implement Trubetzkoy's analysis and capture this distinction. In German, if the feature [laryngeal] is ordered relatively high in the list, it will distinguish *h* from every other consonant, including *x*; therefore, *h* participates in no bilateral oppositions. In Czech, [laryngeal] would be lower in the order; instead, a feature [guttural] (perhaps characterized negatively as [noncoronal] and [nonlabial]) and the voicing feature are ordered higher. As there are no distinctive place differences between *ɦ* and *x*, their opposition is bilateral.

As Trubetzkoy (2001: 20) remarked in his 1936 article addressed to psychologists and philosophers, the correct classification of an opposition 'depends on one's point of view'; but 'it is neither subjective nor arbitrary, for the point of view is implied by the system.' Feature ordering is a way to incorporate 'point of view' into the procedure of determining contrastive properties. Different orders result in different contrastive features, as is the case with German *h* and Czech *ɦ*.

4. CONTRAST VIA FEATURE ORDERING. Though he did not follow this approach consistently, there are places in *Grundzüge* where Trubetzkoy explicitly recognizes the feature ordering principle. In his discussion of the Polabian vowel system, Trubetzkoy (1969:102–3) explicitly refers to a hierarchy of contrasts: a 'certain hierarchy existed' whereby the back ~ front contrast is higher than the rounded ~ unrounded one, the latter being a subclassification of the front vowels. Trubetzkoy's analysis suggests that the features are ordered into the (partial) hierarchy: [low] > [back] > [rounded]; under this analysis, the vowel system is as in **Figure 5**.

	[-back]		[+back]
	[-rounded]	[+rounded]	
[-low]	i ê e	ü ö	u o a
[+low]	a		

Figure 5. Polabian vowel system: [low] > [back] > [rounded].

	Labial	Apical	Sibilant	Dorsal
voiceless stops	p	t	ts	k
voiceless fricatives	f	θ	s	x
voiced fricatives	v	ð	z	γ

Figure 6. Greek: major place, voicing, occlusion > minor place.

Trubetzkoy's rationale for this analysis is that in Polabian, palatalization in consonants is neutralized before all front vowels and before 'the maximally open vowel *a* which stood outside the classes of timbre.' Our analysis in Figure 5 captures the notion that *a* 'stood outside the classes of timbre' by ordering [low] before [back]: thus, *a* has no contrastive value for front/back or unrounded/rounded. Trubetzkoy cites, as further evidence, the fact that the oppositions between back and front vowels are constant, but those between rounded and unrounded vowels of the same height are neutralizable after *v* and *j* to the unrounded vowels *i* and *ê*. Because [back] is ordered ahead of [rounded], 'the properties of lip participation were phonologically irrelevant for the back vowels.' That is, they have no contrastive value for [rounded].

It is possible to adduce many more examples from *Grundzüge* where feature ordering, though not referred to explicitly, allows us to capture Trubetzkoy's analysis in a systematic way. I will conclude with Trubetzkoy's discussion of the different types of oppositions that bilabial and labiodental consonants enter into in Greek and French. As with German and Czech *x* and *h*, the question to be answered is: are bilabials and labiodentals to be classified as a single contrastive place of articulation, or two?

In Greek, labials and apicals differ in both place and occlusion, so the major contrast could be based on either of these properties. Trubetzkoy appeals to 'parallel' relations between stops and fricatives at different places. In the sibilant and dorsal series, /ts s z/ and /k x γ/, respectively, the contrast is unambiguously one of stop versus fricative, since stops and fricatives occur at exactly the same place of articulation. By parallelism, Trubetzkoy proposes that the same contrast should apply to the ambiguous cases, which leads to the conclusion that the minor place splits are phonologically irrelevant. The Greek consonant contrasts can thus be represented as in Figure 6.

In French, however, Trubetzkoy (1969:126) argues for a split labial series. 'For in the entire French consonant system there is not a single phoneme pair in which the relation spirant : occlusive would occur in its pure form.' Trubetzkoy argues that place should take

	Bilabial	Labiodental	Dental	Alveolar	Prepalatal	Dorsovelar
voiceless	p	f	t	s	ʃ	k
voiced	b	v	d	z	ʒ	g

**Figure 7.** French obstruents (based on Martinet 1964:65).

priority over occlusion in this type of case. As Trubetzkoy does not give a chart, I adapt the one in **Figure 7** from Martinet (1964), whose analysis is clearly influenced by Trubetzkoy.

We can express the above analyses formally if Greek and French have different orderings of the occlusion feature, which we can call [continuant], relative to the minor place features that distinguish bilabial from labiodental place:

#### Variable feature ordering

French: minor place features > [continuant]

Greek: [continuant] > minor place

Moreover, Trubetzkoy's discussion of these cases suggests a principle that guides the choice of ordering: Place features take scope over occlusion (French) *unless* an occlusion contrast is needed anyway (principle of parallelism, Greek).

5. CONCLUSION. I have argued that Trubetzkoy, despite his many contributions to our understanding of how contrasts work in a phonological system, did not explicitly work out a procedure for determining which features of a phoneme are contrastive and which are redundant.<sup>4</sup> When we try to deduce what he had in mind from the particular analyses presented in *Grundzüge*, we find that his results sometimes appear to presuppose a procedure involving pairwise comparisons of phonemes. I have tried to show that this method is not an adequate way to determine contrastive features (see further Dresher 2002). Hence, I conclude that Trubetzkoy's analysis of these cases, such as French *n*, is incorrect. The feature ordering approach to determining contrastive specifications, however, is more promising (Dresher 2003a, b, Dresher & Zhang 2005), and is the method that can be reconstructed as underlying many of Trubetzkoy's most interesting analyses.<sup>5</sup>

This approach was later taken up by Jakobson, Halle and Fant (1952). Jakobson and Halle (1956) argued for it under the name 'dichotomous scale.' This theory disappeared from phonology in the early 1960s, but has recently been revived in the project on *Markedness and the Contrastive Hierarchy in Phonology* at the University of Toronto: [www.chass.utoronto.ca/~contrast/](http://www.chass.utoronto.ca/~contrast/) (Dresher & Rice 2002; see also Hall 2007 for a recent synthesis).

<sup>1</sup> I am grateful to an anonymous reviewer and to participants at the Thirty-Third LACUS Forum for comments. I would also like to thank the members of the project on Markedness and the Contrastive Hierarchy in Phonology (co-PI: Keren Rice) for much help over the years. This research was supported in part by grants 410-99-1309 and 410-2003-0913 from the Social Sciences and Humanities Research Council of Canada.

- <sup>2</sup> The particular order is crucial, because different orders can yield different contrastive features. The procedure in 1a does not specify what the order is, or how to discover it. This is a job for the analyst and the learner.
- <sup>3</sup> Trubetzkoy does not provide an explicit account of the Czech phoneme inventory; **Figure 3** and **Figure 4** are based on Hall 2007:38. There are other differences between the German and Czech arrangements that illustrate the same point as that shown by *b*. For example, Trubetzkoy (1969:125) proposes that the German bilabials *p*, *b*, and *m* form a series distinct from the labiodentals *v*, *f*, and *pf*; he makes no such claim for Czech, where the labial consonants presumably make up a single series, what Trubetzkoy considers the usual situation. See further the discussion of Greek and French labial consonants below.
- <sup>4</sup> Thanks to William Sullivan for reminding me that Trubetzkoy died before he was able to complete his book. This fact may account for some of the inconsistencies noted here.
- <sup>5</sup> A reviewer asks if there will always be one correct feature order for a given language, and whether phonemes can be cross-classified for particular features, rather than these features applying in a strict order. These are interesting questions that can only be answered by research into phonological systems. The question of whether phonology admits of unique solutions is an old one that arises in many different theoretical frameworks (cf. Chao 1934).

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