

## FEATURES, MARKEDNESS, AND SHORTHAND

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1. The reduction of human speech to a written form has proceeded along a number of different courses, ultimately resulting in a codified visual representation of the language in question. Among the languages which evolved an alphabetic writing system, the need has often been felt to establish a quicker and more abbreviated form of writing, in order, for example, to transcribe language with the rapidity characterizing normal speech. The resulting concept, that of a 'shorthand' notation, is very old,<sup>1</sup> and the demand for efficient and economical shorthand systems has grown in proportion to the active use and development of written language. The past two centuries have witnessed a tremendous upsurge in the invention, investigation, and development of shorthand systems, based on a variety of fundamental principles, but sharing the common goal of providing an abbreviated symbolic code isomorphic to the spoken language. Emerging as the most successful and widely used of such systems, particularly as applied to English, is the so-called Gregg Shorthand System, invented by John Robert Gregg in 1888 and subsequently revised in numerous minor details. The success enjoyed by the Gregg system may be directly traced to the ease with which it may be learned and the transcription speeds which may be attained; these factors, in turn, follow from the formal nature of the system itself. Gregg's shorthand system is not founded on arbitrary bases, but on a series of formal and theoretical principles having their ultimate origin in the structure of human language in general, and the English language in particular. An analysis of the formal code embodied in this system may be carried out along the same lines used in investigating spoken language, and the results obtained thereby serve to illuminate some of the interrelationships between the verbal and the written sign. Some aspects of such an analysis are pursued in the remainder of this paper, although only a single aspect of the theory of shorthand codes is touched upon. Attention is restricted to the Gregg system for reasons of cogency and clarity; a comparative study of other systems, including languages designed for the blind, would be, while of the greatest interest, voluminous in nature. In addition, the Gregg shorthand method represents the most systematic and uniform shorthand code presently available, and hence provides an excellent point of departure.

2. A key problem facing anyone attempting to formulate a shorthand system is precisely what relative proportions of phonetic, phonemic, and orthographic data should go into the finished product. The earliest shorthand methods consisted merely of abbreviated forms of the standard orthography. Later it became apparent that, particularly in English and French, much greater efficiency could be achieved by means of a system based primarily on *phonetic* data, since the orthography is both misleading and exceedingly redundant. Phonetically-based shorthand alphabets are not without their inherent difficulties, however, as pointed out, for example, by Henry Sweet (1892: ix):

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1 The first attested shorthand system is that of Marcus Tullius Tiro, a freed slave of Cicero. Shorthand came into more extensive use in the early days of the Christian Church: it is thought that St. Luke recorded the Sermon on the Mount in shorthand, and definite proof exists that the Epistles of St. Paul to the Colossians were transcribed in shorthand.

It is now generally acknowledged that the most efficient shorthands are those on a phonetic basis. But, on the other hand, having to master phonetic spelling is a serious hindrance; and it is often desirable to transcribe spelling rather than pronunciation.

Sweet's solution was to establish a shorthand system consisting of two alphabets: a phonetic alphabet and an orthographic alphabet, thus meeting all practical needs. Such a system is of course highly uneconomical, and was not destined for success. The problem still remains, however, and in a language such as English, the choice of one alternative over the other carries serious methodological consequences. Gregg, in keeping with the spirit of the times, was unreservedly in favor of a shorthand alphabet based on pronunciation; in this respect he was in legion with the abundance of putative spelling reformers dismayed with English orthography. At the same time, he was keenly aware that an overabundance of phonetic detail can cause even the best system to become bogged down. What separates Gregg from his predecessors is his attention to the *phonological* aspects of language in developing his shorthand method. Although not a linguist, Gregg had a firm intuitive grasp of many of the fundamental principles underlying phonological theory. He knew, for example, that one phoneme<sup>2</sup> may have a variety of phonetic representations, which should be grouped under the same symbol. More importantly, Gregg realized that certain phonological oppositions are much more productive than others, having a greater *functional yield*, as it were. This fact enabled Gregg to systematically derive an alphabet in which graphic confusions would not seriously impair the intelligibility of the finished result.<sup>3</sup> Earlier attempts at setting up shorthand systems along these lines had been based merely on the statistical frequency of the various letters as they appear in printed texts. This often resulted in cumbersome representations; for example in one system, the letter *h*, whose actual phonetic value is almost nil in British English, was depicted by four separate symbols! Gregg, however, utilized a more elaborate procedure, based not only on statistics, but also on the relative phonological prominence of the various oppositions. He assigned statistical weights not only to individual sounds, but also to *pairs* of sounds forming an opposition when similar characters were to be used.<sup>4</sup>

In considering these tables, it is important to keep in mind that where the letters are arranged in phonetic pairs – *p, b; t, d*; etc. – and are represented by the same character (distinguished either by thickness or by length) their importance is increased or decreased in exact ratio to the *combined frequency of both letters*.

3. Gregg's shorthand alphabet differs from other systems in another way, in that not only are phonetic or phonemic units represented by means of single characters, but certain common combinations of sounds are also depicted by a graphic unit.<sup>5</sup> The most commonly employed consonantal characters of the Gregg shorthand system are illustrated in Figure 1, together with the approximate phonemic entities to which they correspond.

<sup>2</sup> This term of course was not used by Gregg, but the phonemic principle is clear in all of his work.

<sup>3</sup> Gregg noted, for example, that 'if *French* becomes *Frensh* or even *Frenj*, it does not matter in the least.'

<sup>4</sup> Leslie (1964: 73). All subsequent references to Gregg's writings will be from this anthology.

<sup>5</sup> Such graphic combinations are not to be confused with the 'brief forms,' which represent common words by means of a truncated visual representation.

/p/	/b/	/t/	/v/	/z/	/ /
(	(	)	)	z	δ
/k/	/g/	/l/	/r/	/nt/	/mt/
⌒	⌒	⌒	⌒	⌒	⌒
/t/	/d/	/td/	/ʒ/	/č/	/j/
/	/	/			
/m/	/n/	/mn/	/ng/	/nk/	/h/
—	—	—	↘	↘	●

Figure 1

Excluded from this chart are some of the more esoteric combinations or variants, exhibiting the graphic equivalent of *sandhi* phenomena, whose study belongs properly to the domain of stenography.

Among the characters listed in Figure 1, those for /t/, /d/, /td/, /θ/, /δ/, /nt/, /nd/, and /mt/ : /md/ are upward strokes, being joined to the following character at the top; while the characters for /p/, /b/, /s/ : /z/, /ʒ/, /č/, and /j/ are downward strokes, being joined to the next character at the bottom of the stroke. The remaining characters, with the exception of that representing /h/, are horizontal strokes proceeding uniformly from left to right. This method of execution and joining permits considerable variation in the actual shape of each character, and eliminates the potential confusion between characters of similar superficial appearance. From this chart it may be seen that the characters may only be defined *dynamically*, with reference to the surrounding context, and *relationally*, with reference to the other characters; taken as individual signs they are without positive significance.<sup>6</sup> The relational aspect of the Gregg shorthand characters is the fundamental property which formally unites them most strongly with the phonemic systems of spoken language, since phonemes also possess no absolute defining characteristics which may be identified in isolation, but are perceived only in relation to the other members of the system. This is, in fact, a fundamental property of sign-systems in general, as noted, for example, by Hjelmlev (1961: 45):

... any sign is defined relatively, not absolutely, and only by its place in the context ... in absolute isolation no sign has any meaning; any sign-meaning arises in a context, by which we mean a situational context or explicit context, it matters not which, since in an unlimited or productive text (a living language) we can always transform a situational into an explicit context.

Even a cursory glance at Figure 1 reveals a number of formal defining properties. The most striking observation is that, except in the pairs /s/ : /z/ and /θ/ : /δ/, the phonological opposition *voiced-voiceless* is represented in the characters as a difference in length between otherwise identical strokes. This fact is not coincidental because, as noted above, Gregg was aware of the great similarity among pairs of segments differing only in voicing, referring to such pairs as 'cognates.' Through purely pragmatic considerations based on rough calculations of functional yield, Gregg chose to represent the pairs /s/ : /z/ and /θ/ : /δ/ by means of a single character each, since in cases of apparent homophony the differences may generally be resolved by context.<sup>7</sup> In those few cases where the

<sup>6</sup> Even the dot-character must be interpreted relationally, inasmuch as when occurring at the beginning of a word it stands for /h/, while at the end of a word it abbreviates the suffix *-ing*.

<sup>7</sup> The different forms available for the representation of /s/ : /z/ and /θ/ : /δ/ exist merely to facilitate joining of different types of characters, and are without theoretical significance.

phonological distinction must be noted explicitly, a small dash is generally inserted by the voiced member of each pair.

4. Although Gregg's assignment of long and short characters to voiced and voiceless segments respectively was based merely on statistical incidence, this distribution is of greater theoretical significance in view of the theory of *markedness* as applied to phonological structure. As long ago as the work of Trubetzkoy (1939), it was recognized that certain phonological oppositions could be represented as differing only in the presence or absence of a given feature, known as the 'mark' of the opposition. Trubetzkoy's procedures for determining the marked member of an opposition were based solely on language-specific criteria and claimed no absolute status for the notion of markedness. It was later noted by Jakobson (1941) that certain aspects of the theory of markedness were of a more universal nature, serving to constrain the distribution of phonemes in any given system. Jakobson's claims that certain segments may be regarded as more nearly 'optimal' than others has given rise to the modern theory of markedness in phonology, whose basic tenets are put forth most clearly in Postal (1968: Chap. 8) and in Chomsky and Halle (1968: Chap. 9). It is now asserted that for each phonological feature in each environment, there is one value which is to be considered *unmarked*, with the remaining values being specified as *marked*. One consequence of such a phonological theory is that certain segment-types emerge as 'optimal' in containing a maximum number of unmarked feature-values. Unlike Trubetzkoy's notion, however, the current theory of markedness entails a language-independent status for marked and unmarked segment-types. In particular, it is claimed that, all other things being equal, voiceless obstruents are unmarked, while the corresponding voiced segments are marked (Chomsky and Halle 1968: 406). In Gregg's shorthand system this dichotomy is clearly indicated by the extra measure of length generally afforded to voiced obstruents; we may speak of the characters as being correspondingly marked and unmarked with respect to length. The markedness inherent in Gregg's system is manifested even more clearly in those cases in which it is necessary to distinguish /ð/ and /z/ from their voiceless counterparts: in these cases a dash is placed under the voiced member, clearly indicating the marked status of voicing within this system.

Of equal theoretical interest with respect to the notion of markedness is Gregg's representation of the liquids /l/ and /r/. For Gregg, the pair of English liquids also represented 'cognates,' in the same fashion as the voiced and voiceless obstruents (p. 73) and are thus represented by means of two similar characters differing only in length. Interestingly enough, however, Gregg chose to represent /r/ as the 'unmarked' member of the pair rather than /l/, in contrast to the current theory of markedness, in which /l/ is the unmarked liquid (Chomsky and Halle 1968: 407). This is significant since Gregg's system was based solely upon statistical considerations of relative phonological importance in English, while the markedness values found in more recent studies are based on wider observations. Phoneticians are generally unanimous in considering the English /r/ to be an unusual segment-type, hence the resulting markedness values; within the English language, however, the phonological importance of /r/ is at least as great as that of /l/. This discrepancy highlights the difference between universal notions of markedness and language-specific considerations, since the latter clearly take precedence in developing an alphabetic notation.

In others ways, Gregg's system of shorthand characters follows the universal theory of markedness; for example in opposing /n/ to /m/ as the unmarked and marked nasal phonemes respectively,<sup>8</sup> and in regarding the fricative /s/ as unmarked with respect to the affricates /ç/ and /ʃ/.

<sup>8</sup> Gregg was certainly not the only inventor of a shorthand system who was aware of such phonological correspondences. Isaac Pitman, the inventor of another shorthand method enjoying

This convergence between the markedness inherent in Gregg's system and more universal notions of markedness is hardly surprising, since the universal theory stems precisely from an examination of many language-specific systems. It is probably also not coincidental that the most recent formulations of markedness have derived much of their motivation from observations of English and other similar languages. Regarded in this manner, Gregg's assignment of markedness follows from more universal notions of phonological structure, which in turn result from calculations of the type employed by Gregg in designing his alphabet.

5. Compared with the representation of the consonants, the vowels find a simple portrayal in the Gregg system, as illustrated in Figure 2.

/a/	/o/
/e/	/ɔ/
○	⊂
/i/	/u/
/ɛ/	/ʌ/
○	⊃

Figure 2

It may be seen that the vowel characters exhibit a much closer relationship with English orthography than do the consonant symbols. The large circle represents those sounds generally written with an *a*, including the vowel sounds in the words *at*, *art*, and *ate*. The small circle represents vowel sounds generally written with an *e* or with a 'short *i*,' exemplified by *pit*, *let*, *seat*. The upward hook finds its orthographic equivalent in *o*, including such forms as *pot*, *door*, and *boat*. The downward hook stands for *u* or *oo*, including the sounds in *luck*, *book*, and *pool*. Gregg reckoned that since the orthography allowed for considerable phonemic overlapping, a shorthand representation based on the same principles would serve all practical purposes. Inasmuch as each of the vocalic symbols stands for a number of different phonological segments, it is impossible to consider a one-to-one pairing of markedness values between the written signs and the phonological structure of English. Regarding each character as a graphemic entity, however, the assignment of markedness values is easy enough. The small circle was considered by Gregg to represent the optimal vocalic character; consequently the most prevalent vowel phonemes are subsumed under this symbol. Following closely behind is the large circle, ranking second on the scale of ease of production. The upward open loop was felt to be more nearly optimal than the downward open loop; thus the hierarchy is completed.

It should be noted that, although each one of the vowel characters represents more than one vowel phoneme, there is still a definite correlation between the shorthand symbols and the phonological structure of the actual vowel system being represented. Most significantly, the closed circles are characteristic of *unrounded* vowels, while the open hooks stand for *rounded* vowels. Once again, this correspondence is far from coincidental, for Gregg applied his rudimentary knowledge of phonetics in developing his system (p. 95):

great popularity, once noted, for example, that 'M and n are not only side by side in the alphabet, but like loving sisters, they walk through the language hand in hand. These affinities must be regarded in the selection of signs to represent them' (Leslie 1964: 90).

The vowels are classified scientifically in accordance with the nature of the sounds. The *lingual vowels* (a, ä, a, i, e, e), so called because they are formed mainly by the modulation of the tongue, are expressed by *circles*, the *labial vowels* (o, aw, o, oo, oo), so called because they are formed mainly by the modulation of the lips, are expressed by *hooks*.

Moreover, in addition to the orthographic basis for the vowel characters, there is a great deal of phonetic similarity between the vowels associated with each symbol, grouping the vowels into four *natural classes* defined by the two feature-pairs *high-low* and *rounded-unrounded*. In general, the phonemic diphthongs are depicted by a (sometimes abbreviated) combination of the two vowels involved.

6. Given the preceding schematic outline of the Gregg shorthand alphabet, it is possible to proceed to an analysis of the individual characters in terms of their defining features. Just as phonological segments may be regarded as simultaneous bundles of *distinctive features*, so each symbol of the shorthand alphabet is the union of a number of clearly definable distinctive features; this fact separates the Gregg system from most of its predecessors, in which the symbols had a largely or totally arbitrary basis. Fundamental to the analysis of the shorthand symbols in terms of features is the notion of the *binarity* of distinctive features. Modern phonological theory has assumed, although not always with irrefutable justification, that the distinctive features comprising phonological segments are binary in nature, being defined in an all-or-none fashion. The concept of binarity has its roots in information theory, and it has been applied to the study of language with a great deal of success, although questionable areas still remain. Since the Gregg shorthand alphabet is constructed as a formal, information-carrying code, one may hope to provide an analysis in terms of binary features. Such an analysis turns out, in fact, to stand up more easily on its own merits than do corresponding binary analyses of actual phonological systems, indicating once more Gregg's grasp of some of the fundamental principles of both formal codes and natural languages.

Before commencing, it is necessary to add a word concerning the actual shape of the characters. The system under consideration was designed to yield maximal efficiency of transcription, and was engineered to overcome the shortcomings of earlier systems. Foremost in Gregg's system is the great number of curved lines, for as the inventor noted (p. 59): 'The most important element of longhand or shorthand ... [is] the *predominance of curve motion*.' The primary concern was to facilitate the joining together of the symbols, and consequently the most common combinations largely dictated the shape of the individual characters. The most important combinations were *l* and *r* preceded by *p*, *b*, *f*, *k*, or *s*, hence the curved shape of these forms. The vowel symbols were similarly designed to join smoothly with the more common consonantal symbols. In the case of the pairs */s/ : /z/* and */θ/ : /ð/*, two symbols were allotted to each group, thus facilitating a greater number of usable graphic combinations.

The first major division which may be discerned in the shorthand alphabet is that between vowels and consonants. The vowels are all characterized by having the form of a loop, either open or closed, while the consonant symbols are either straight lines or more gradual arcs. This suggests a basic class feature which may be termed *loop*. Using this feature, vowels will be specified as [+loop], while consonants will be [-loop]. A natural break is thus achieved, allowing for the possibility of two different sets of features to fill in the remaining specifications, one set for the vowels and one for the consonants. The representation of vowels by means of loops was not original with Gregg, but came from earlier shorthand systems, particularly those of French inventors. Gregg's vocalic system, however, is the most readily analyzable in terms of distinctive features.

Within the class of vowel symbols, the definition of distinctive features leaves little room for choice. The most obvious feature is that separating the circles from the hooks, and may be termed *closed*; thus the circles are [+closed], and the hooks are [-closed]. Between the two closed loops there is also a difference in size, suggesting the feature *large*, with obvious assignment of values. In the case of the open loops, size is by and large irrelevant, as long as the basic shape of a loop is preserved. Instead, the critical feature is the orientation of the opening. This difference defines a feature such as *upward*, with the *o*-hook being specified as [+upward], and the *u*-hook as [-upward]. Grouping together all of the feature specifications for the vowels, we may represent this subsystem by means of a feature matrix, as shown in Figure 3.

	/e/	/i/	/o/	/u/
	/a/	/e/	/o/	/u/
closed	+	+	-	-
large	+	-		
upward			+	-

Figure 3

Among the consonant characters, definition of features also proceeds in a straightforward manner. Based on the visual form of the symbols, perhaps the most obvious distinction is between straight lines and curved lines. Since preference is given to curved strokes within the Gregg system, this suggests the employment of a feature *curved* to separate the two main categories of consonantal characters. This dichotomy affects all the symbols with the exception of the dot-character, which right from the beginning will be placed outside the scope of the distinctive feature analysis.

Within the class of [+curved] symbols, a further distinction exists concerning the relative orientation of the arc. The curved strokes are generally arranged in pairs, with one member of the pair being the mirror-image of the other. This distinction applies to both horizontal and vertical strokes. One method of depicting this mirror-image opposition is by means of the feature *oriented*. In choosing values for this feature, we are led by Gregg's own theory, which considered the leftward vertical curve and the downward horizontal curve to be more easily executable than their mirror-image counterparts. Thus, the symbols for */p/*, */b/*, */l/*, and */r/* will be specified as [+oriented], while the characters for */f/*, */v/*, */k/*, and */g/* will be [-oriented]. Depending on the choice of symbols used, the pairs */s/ : /z/* and */θ/ : /ð/* may be represented as either [+oriented] or [-oriented].

Perhaps the most important distinction among the consonant symbols, from a functional point of view, is that concerning the place of attachment to the following character. As noted above, some of the symbols are upward strokes, while others are made in a downward direction. The direction taken by the stroke determines the point at which the following character is to be joined: in a downward stroke the following character is attached at the bottom, while in an upward stroke the next symbol appears at the top. One may, again based on Gregg's calculations, express this distinction by means of the feature *downward*. The symbols for */t/*, */d/*, */td/*, */θ/ : /ð/*, */nt/ : /nd/*, and */mt/ : /md/* are thus [-downward], while */s/ : /z/*, */f/*, */v/*, */p/*, */b/*, */s/*, */ç/*, */j/*, */ng/*, and */nk/* are [+downward]. Among the horizontal consonant characters, the manner in which the following symbols (especially vowel symbols) are attached demands that the characters for */l/* and */r/* be specified as [+downward], while those for */k/* and */g/* are [-downward]. Similarly, the straight horizontal strokes representing */m/*, */n/*, and */mn/* must be considered as [-downward]. Here it should be mentioned that, among

the upward curved symbols, the value for [+oriented] is, in keeping with the general philosophy behind the Gregg shorthand system, that corresponding to the right half of an oval: thus, the characters for /nt/, /mt/, and the appropriate symbol for /θ/, etc., are all [+oriented]. Speaking of these configurations, Gregg noted (p. 90): 'You will notice that the curve used for -ent, -end is the finishing curve of the oval, and of nearly every letter in longhand. It is particularly fitting, therefore, that it should express -ent, -end, -mt, -md, which are generally terminal.' In standard shorthand practice, the [+oriented] character for /θ/ : /δ/ occurs before the symbol for o, l, and r, and the [-oriented] variant occurs in the remaining environments.

Another important distinction which occurs in the shorthand alphabet is that between the horizontal and the vertical orientation of the strokes. Here the choice of one feature over the other is quite arbitrary: we shall choose the feature *horizontal*. In this fashion, the characters for /p/, /b/, /s/, /t/, etc., will be [-horizontal], while /k/, /l/, etc. will be specified as [+horizontal]. In the case of pairs like /t/ vs. /č/, /n/ vs. /ng/, etc., the specification for the feature *downward* will account for the distinction; thus, there is no need to posit more than a horizontal-vertical distinction. In practice, the actual orientation of such strokes with respect to the horizontal and vertical axes varies considerably, since it is the point of adjunction with the surrounding characters which is of primary importance.

The final matter which must be dispensed with concerns the length distinctions occurring among the consonant characters. Among some of the symbols, two distinctive degrees of length are distinguished, while other sets exhibit a three-way length distinction. At this point the question naturally arises of whether a binary analysis may be legitimately extended to cover the three-way length contrast, or whether, to the contrary, length might best be described by means of a single ternary feature. From a formal standpoint, there is no reason, other than elegance of presentation, which argues that the binary analysis must be preserved at all costs. There are, however, purely internal considerations which suggest that a pair of binary distinctions more adequately describes the data. In the practice of shorthand, the shortest segments, such as those representing /s/ : /z/, /š/, etc. tend to be drawn quite minutely. Gregg's own writings offer numerous statements as to the status of the short characters; for example, in speaking of the stroke for /š/, he remarked (p. 84): ... the tick for *sh* [is] a mere drop of the pen, such as is used in the first part of the bookkeeper's checkmark.' Similarly, when speaking of the *s*-curve, Gregg noted (p. 86): 'In consonance with the curvilinear theory, it ought to be represented by a *curve*, but a *full-size* curve for such a common letter would militate against compactness and facility in many words.' On the other hand, the longest characters, representing /j/, /td/, /mn/, etc. are generally quite exaggerated, in order to separate them from their shorter counterparts. The symbols of intermediate length vary, especially when there are few if any characters which might be confused, as in the case of /θ/ : /δ/. Among the characters exhibiting only a twoway length distinction, this dichotomy is generally resolved as one of medium length vs. extra-long. Such observations suggest that two separate features are involved, which may be termed *short* and *long*. Only in cases where a three-way length contrast is involved may a character be distinctively specified as [+short]; otherwise only the feature *long* is employed. In actual practice, the absolute length of any given stroke is determined by a number of practical factors; for example, since upward strokes are more difficult to control, the symbol for /td/ is generally written longer than the symbol for /j/, in order to ensure distinctness. For the sake of reference, the feature specifications for all the consonantal characters are reproduced in Figure 4.

	z δ														nd md								
	p	b	f	v	s	θ	š	č	j	t	d	td	k	g	l	r	m	n	mn	nt	mt	ng	nk
curved	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+	-	-	-	+	+	-	-
horiz.	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	+	+
downward	+	-	+	+	+	-	+	+	+	-	-	-	-	+	+	-	-	-	-	-	-	+	+
long	-	+	-	+	-	-	-	+	-	-	+	-	+	+	-	-	-	+	-	+	-	+	+
short	-	-	-	-	+	-	+	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-
oriented	+	+	-	-												+					+	+	

Figure 4

7. Having thus tentatively established a set of feature specifications, it is possible to pursue the notion of markedness a bit further, this time solely in terms of the shorthand code itself. As in the theory of markedness applied to phonological systems, the resulting values are partly a function of statistical observations and partly a reflection of the inherent 'naturalness' or ease of production of a given emic entity. The markedness value of a segment or character is a composite of the markedness specifications of the individual features of which it is composed. Thus a given character may be marked for one feature but unmarked for another, providing thereby a gradation of overall segmental markedness values. This gradation makes it possible to arrange the characters in a hierarchy based on relative markedness, a hierarchy which of course refers back to the original observations of Gregg and other inventors of shorthand systems.

Within the shorthand alphabet, the dichotomy *vowel-consonant* is weighted in favor of the former group, in keeping with the basic predominance of curvilinear motion. Since this dichotomy is effected by means of the feature *loop*, we may say that the unmarked value of *loop* is [+loop]. Within the class of vowel symbols, assignment of markedness values may be undertaken along the lines suggested earlier. Hence, the unmarked value for the feature *closed* will be [+closed]; furthermore, among the [+closed] characters, the unmarked value for *large* is [-large]. Similarly, among the [-closed] characters, the feature *upward* has the unmarked value [+upward]. Thus, the markedness values reflect the vocalic hierarchy originally proposed by Gregg.

Turning now to the consonant characters, it is again possible to unequivocally assign values of markedness. In keeping with the curvilinear principle, the unmarked value of *curved* is [+curved]. Within the [+curved] characters, those bearing the specification [+oriented] are unmarked for the latter feature. For the entire group of consonant characters, as noted above, [+horizontal] is the unmarked value. Among the [+horizontal] strokes, the unmarked specification for *downward* is [-downward]; on the other hand, [-horizontal] segments require [+downward] as the unmarked value. The assignment of markedness values for the feature *downward* is thus a context-sensitive function, in contrast with the remaining specifications, which are context-free. Finally, it is noted that the unmarked values for *short* and *long* are [+short] and [-long], respectively.

A comparison of the overall markedness values arrived at within the shorthand system and more universal considerations of markedness reveals a rather striking correspondence, once again highlighting the non-arbitrary nature of the shorthand alphabet. In those cases where discrepancies arise, however, it should be kept in mind that the primary basis for the shorthand alphabet is the phonotactic structure of English, which is in itself a coherent system, not to be confused with so-called 'universal' phonological systems such as those defined by the theory of markedness.

8. The preceding sections have attempted to demonstrate, in an exceedingly rudimentary fashion, that a shorthand system may be fruitfully analyzed along the same lines as an actual phonological system. It has been seen, for example, that the shorthand alphabet under consideration may be logically decomposed into a series of distinctive features, arranged in a hierarchy of markedness. These striking parallels between shorthand and the structure of natural languages suggest that the study of the former might profitably utilize the methodology of the latter. In practice, however, shorthand is generally taught as an arbitrary code, a new alphabet to be learned, much the same as learning the Cyrillic or the Sanskrit alphabet. Shorthand courses are often taught concurrently with courses in typing, which employs a relatively arbitrary spatial code, and hence the notion of the arbitrariness of the shorthand alphabet is reinforced. Only the most obvious patterns are pointed out to the students, who thus approach the topic in a totally mechanical fashion, unaware of the inner structure of the system they are learning.

The fact that the Gregg shorthand alphabet (and others as well) is indeed a tightly-structured system indicates that elements of linguistic theory should be incorporated into the teaching and practice of shorthand. A more thorough knowledge of the workings of the system cannot but help the student gain a firmer grasp of its practice, and many methodological difficulties may be lessened or overcome by viewing the shorthand characters as bundles of distinctive features. Further research into the formal structure of presently available shorthand systems can lead to additional improvements and conceivably even to new systems. The ultimate synthesis of shorthand systems and linguistic theory should be regarded as an imperative goal, since both domains deal with human linguistic expression. The preceding remarks, representing a first attempt at such a synthesis, have been highly tentative, trying to compare the original theory of shorthand with more recent developments in linguistic theory. It is hoped, however, that at least one direction for future investigation has been suggested.

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