THE SIMPLE-VOWEL AND SEMI-VOWEL PHONEMES OF ENGLISH

JOSEPH A. PERRY, JR.

Kenneth L. Pike, commenting on some of the uncertainties in phonemic theory and, in particular, on the "differing interpretations of English vocoid glides", wrote that an investigator "seldom finds [the difficulties of interpreting characteristic structural sequences in other languages] as strikingly [severe] as in English" (Pike 1947:63-64). The variety of interpretation of English vowel sounds is illustrated in Figure 1 where six vowel systems are compared. Each of the vowel systems is shown to consist of what may be called simple vowels and compound vowels. When the second elements of the compound vowels are consistently semi-vowels the system is then called 'a binary vowel system'.

What is immediately evident in Figure 1 is the symbolic economy of the Trager and Bloch (1941) system which manifests only six holes in its structural pattern. This might lead us to speculate: 'would it be possible to construct a more economical binary vowel system for English, than that of Trager and Bloch, employing five simple vowels and three semi-vowels (plus /r/) and, in addition, displaying no holes in its structural pattern?'

An English binary vowel system which satisfies these conditions is summarized in Figure 2. With this system it is possible to symbolize every distinctive opposition of the vowel sounds of the English language as a whole. These symbols represent the overall norms of current usage; they are not intended to be used to transcribe semiologically non-distinctive dialect differences which are better handled with phonetic transcription. In the figure, the two top rows demonstrate contexts without *r*-coloring, the bottom three rows demonstrate contexts with *r*-coloring, and the top row shows the twenty basic simple and compound vowel symbols.

The simple vowel phonemes, in the first column, are represented by the letters /i e u o/ and /a/, and pronounced, respectively, as the vowel sounds in *bit*, *bet*, the unstressed and stressed schwa sounds in *above*, and the vowel sound in *balm*. The semi-vowel phonemes are symbolized by /w y/ and /h/ which represent glides of labialization, palatalization, and pharyngealization, respectively. The fourth semi-vowel, /r/, has a special status in that it can follow another semi-vowel as exemplified in the lower three rows.

Henry Sweet (1888)

V	Vj	Vi	Və	Vw	Vu	Va
i	ij		iə			
e		ei				
æ						
ə		əi	əə		əu	
u			uə	uw		
o					ou	
a		ai			au	aa
ɔ		ɔi				
ɛ			ɛə			

(plus r)

Daniel Jones (1917)

V	V:	Vi	Vu	Və
i	i:			iə
e		ei		
æ				
ɑ	ɑ:			
ɔ	ɔ:	ɔi		ɔə
o			ou	
u	u:			uə
ʌ				
ə	ə:			
a		ai	au	
ɛ				ɛə

(plus *)

Daniel Jones (1931)

V	V:	Vi	Vu	Və
i	i:			iə
e		ei		eə
a	a:	ai	au	
o	o:	oi	ou	oə
u	u:			uə
ʌ				
ə	ə:			

(plus *)

Leonard Bloomfield (1933)

V	Vj	Vw
i	ij	
e	ej	
ɛ		
a	aj	aw
ɑ		
ɔ	ɔj	
o		ow
u		uw

(plus r)

Trager and Bloch (1941)

V	Vj	Vw	Vh
i	ij		ih
e	ej		eh
a	aj	aw	ah
o	oj		oh
ə		əw	əh
u		uw	

(plus r)

Trager and Smith (1951)

V	Vy	Vw	Vh
i	iy		ih
e	ey		eh
æ			
ɨ			
ə			əh
a	ay	aw	ah
u		uw	uh
o	oy	ow	oh
ɔ			

(plus r)

IPA narrow	Sweet	Jones (1917)	Jones (1931)	Bloomfield	Trager-Bloch	Trager-Smith
ɪ	i	i	i	i	i	i
i	ij	i:	i:	ij	ij	iy
ɪɚ	iər	iə*	iə*	ijr	ijr	ihr
ɛ	e	e	e	e	e	e
eɪ	ei	ei	ei	ej	ej	ey
ɛɚ	ɛər	ɛə*	eə*	ejr	ejr	ehr
æ	æ	æ	a	ɛ	a	æ
ɑ	aa	ɑ:	a:	a	ah	a
aɪ	ai	ai	ai	aj	aj	ay
ɑʊ	au	au	au	aw	aw	aw
ɒ	o	ɔ	o	ɑ	o	ɔ
ɔ	ɔ	ɔ:	o:	ɔ	oh	ɔh
ɔɪ	ɔi	ɔi	oi	ɔj	oj	oy
oʊ	ou	ou	ou	ow	əw	ow
ɔɚ	ɔr	ɔə*	oə*	ɔr	ohr	ɔhr
ʊ	u	u	u	u	u	u
u	uw	u:	u:	uw	uw	uw
ʊɚ	uər	uə*	uə*	uwr	uwr	uhr
ʌ	a	ʌ	ʌ	o	ə	ə
ə	ə	ə	ə			
ɜ	əə	ə:	ə:	r̩	əhr	əhr
aɪ	əi					
ɑʊ	əu					
ɛ	ɛ	ɛ				
ɑ		ɑ				
o		o				o
a		a				
ɪə					ih	
ɛə					eh	
ɨ						ɨ

Fig. 1. Six vowel systems compared to show variety of interpretation of English vowel sounds.

Context		Simple vowel phonemes		Compound vowel phonemes					
				Labial /Vw/		Palatal /Vy/		Pharyngeal /Vh/	
Without R-coloring	Free or checked	/i/	b*i*t	/iw/	d*ue*	/iy/	s*ee*	/ih/	col*o*nel
		/e/	b*e*t	/yuw/*	*you*	/ey/	s*ay*	/eh/	b*a*t
		/u/	*a*bove	/uw/	d*o*	/uy/	wr*i*ter	/uh/	b*u*ll
		/o/	ab*o*ve	/ow/	kn*ow*	/oy/	b*oy*	/oh/	b*a*ll
		/a/	b*al*m	/aw/	n*ow*	/ay/	r*i*der	/ah/	b*o*mb
	Prevocalic			/iw/	d*u*ality	/iy/	triv*i*a		
				/yuw/*	m*ew*ing	/ey/	ch*a*otic		
				/uw/	d*o*ing				
				/ow/	*o*asis	/oy/	l*oy*al	/oh/	dr*aw*ing
		/a/	n*a*ive	/aw/	v*ow*ing	/ay/	b*i*as		
With R-coloring or centering	Free or checked			/iwr/	l*ure*	/iyr/	h*ere*	/ihr/	k*er*nel
				/yuwr/*	*you're*	/eyr/	h*air*	/yuhr/*	p*ure*
		/ur/	col*or*					/uhr/	p*oor*
				/owr/	h*oar*se	/oyr/	c*oir*	/ohr/	h*or*se
		/ar/	*car*	/awr/	fl*our*	/ayr/	h*ire*		
	Prevocalic	/ir/	sp*ir*it	/iwr/	l*ur*id	/iyr/	h*ear*ing	/ihr/	p*urr*ing
		/er/	m*err*y			/eyr/	M*ar*y	/ehr/	m*arr*y
		/ur/	*ar*ound					/uhr/	t*our*ing
		/or/	h*urr*y					/ohr/	b*or*ing
		/ar/	ch*arr*y	/awı/	d*owr*y	/ayr/	h*ir*ing	/ahr/	*or*ange
	Disyllabic			/iwur/	s*ewer*	/iyur/	k*eyer*		
				/yuwur/*	f*ewer*	/eyur/	pl*ayer*		
								/ohur/	dr*awer*
				/awur/	pl*ower*	/ayur/	h*igher*		

* Holes in pattern filled with prevocalic y-glides.

Fig. 2. An English binary vowel system employing five simple vowels, three semi-vowels, plus /r/.

In the second column, the labialized vowels are formed from a simple vowel plus /w/. The key words give their values. Where /ew/ would occur there is a hole in the pattern, but on historical grounds /yuw/ fills this position since it evolved in part from Middle English /ew/. Notice in particular that /iw/, /yuw/, and /uw/ represent unique distributions of sounds which have distinct norms in the overall pattern of English even though they share member dialect variants. For example, the symbol

/yuw/ represents the distribution of sounds which always has a prevocalic *y*-glide in all dialects whereas the symbol /uw/ represents the distribution of sounds which never has a prevocalic *y*-glide. The symbol /iw/ represents the more inclusive distribution of sounds in which the prevocalic *y*-glide is optional.

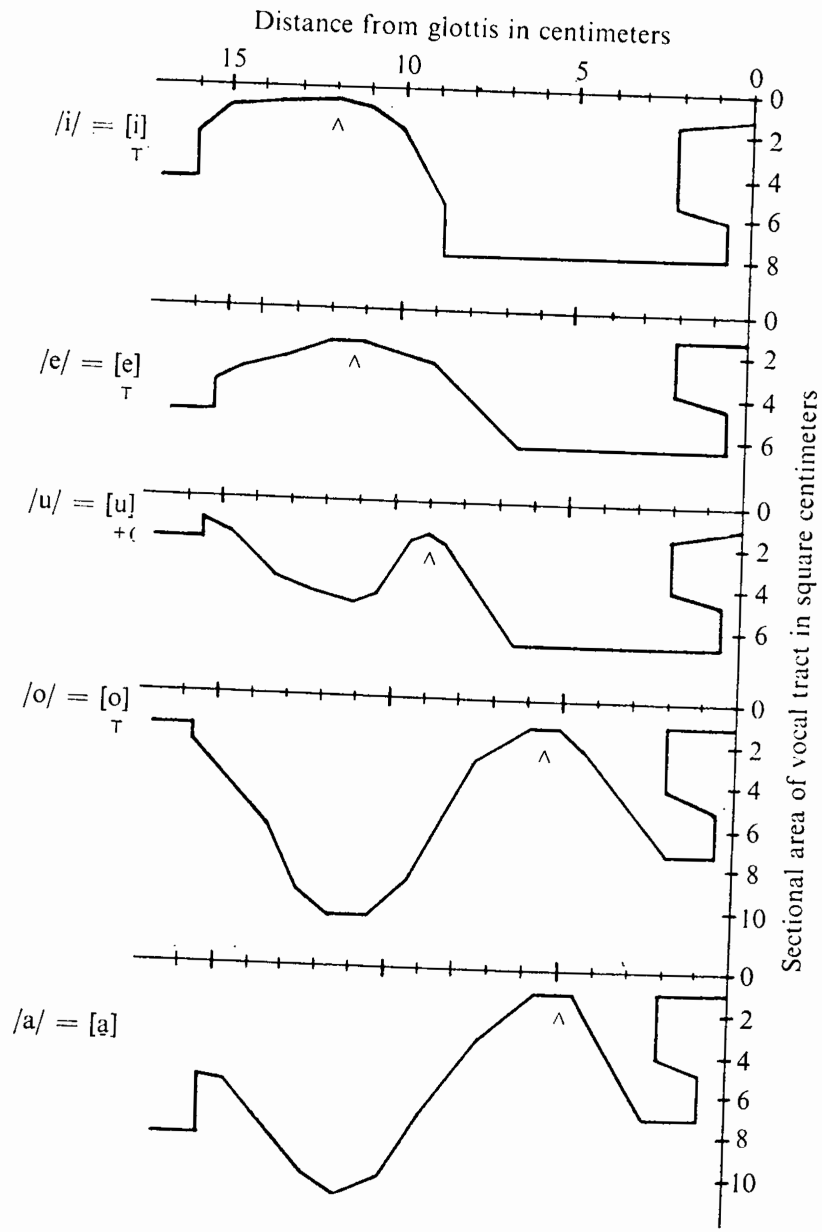

Fig. 3. Sectional area functions of the vocal tract for five Japanese vowels (adapted from Chiba and Kajiyama 1958).

In the third column, the palatalized vowels are formed from a simple vowel plus /y/. The so-called long-*i* of conventional spelling has two symbolic representations here: /uy/ and /ay/. Because a vowel tends to be of shorter duration before an unvoiced consonant, /uy/ occurs regularly in this position in some dialects of English. Before voiced consonants or in final position, however, the tongue has adequate time to glide the whole excursion, and the phonemic form is /ay/. Between these two in the structural pattern lies /oy/ whose initial simple vowel is pharyngealized, redundantly, to avoid confusion with its neighbors.

In the fourth column, the pharyngealized vowels are formed from a simple vowel plus /h/. Chiba and Kajiyama (1958:37-39) distinguished between vowels spoken with what they called "soft voice" and "sharp voice". They described 'sharp voice' as being a drawing back of the tongue "so as to diminish the space between it and the back wall of the pharynx". They added that "the most characteristic example of [a vowel pronounced with 'sharp voice'] can be found in the English vowel æ." This seems to justify the use of the compound symbol /eh/ to represent this sound.

One may ask if there is any other physiological or acoustic evidence for postulating such a system of vowels. Chiba and Kajiyama, using x-ray photography and palatography, made accurate measurements of the vocal tract for the pronunciation of the five Japanese vowels shown in Figure 3. In these vocal tract area functions, notice how the maximum constriction of the tongue, indicated by the caret, occurs at a position closer to the glottis for each vowel in the series. This behavior offers a clue

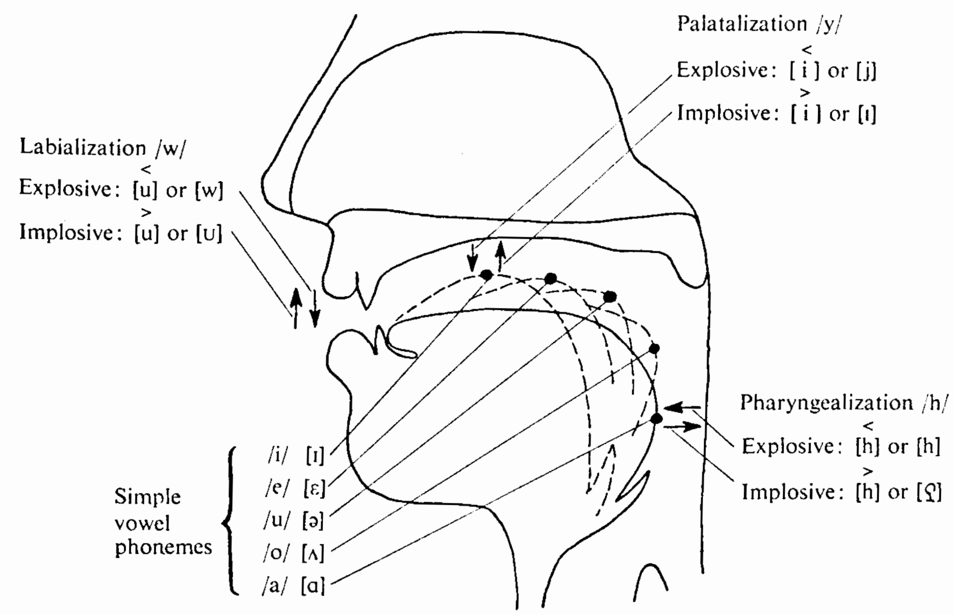

Fig. 4. Physiological interpretation of the English simple vowel and semi-vowel phonemes. Simple vowels (dots) tend to be static. Semi-vowels (arrows) are dynamic. Prevocalic semi-vowels are explosive. Post-vocalic semi-vowels are implosive.

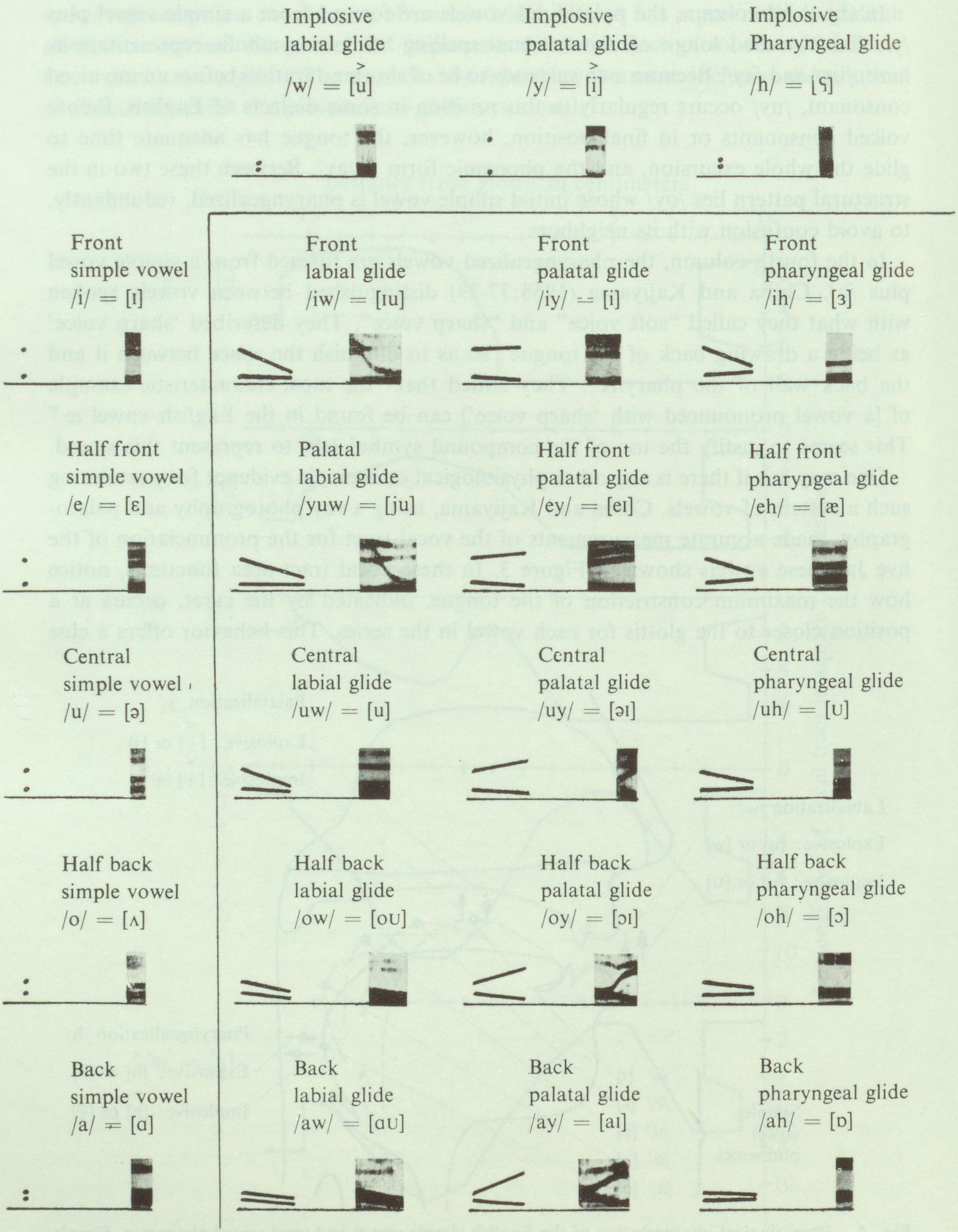

Fig. 5. Sound spectrograms of the simple vowels, semi-vowels, and compound vowels with inductive generalizations of formant behavior. Since no spectrogram of [ʕ] is available a spectrogram of [ɒ], which approximates it closely, is inserted in the [ʕ] position (Spectrograms from Potter, Kopp, and Green 1947).

concerning the articulation of the corresponding English simple vowel series. Figure 4 shows how the postulated English simple vowels, where their relatively static nature is indicated by the dots, may be physiologically distinctive. The semi-vowels, which have a dynamic nature, are indicated by the arrows. After the manner of de Saussure, the semi-vowels are distinguished as to explosive and implosive variants. In post-vocalic position a semi-vowel must be implosive (de Saussure 1959:60).

Sound spectrograms of the English simple vowels, semi-vowels, and compound vowels have been arranged in Figure 5 to reveal, if possible, any acoustic patterns. The dots in this figure generalize the positions of the two lower formants for each simple vowel and semi-vowel. It is evident that the formants for the simple vowel series contract as the tongue constriction approaches the glottis. Palatalization causes the formants to spread; pharyngealization, to contract. For labialization both formants approach the bottom of the spectrogram. These generalizations were used to construct the compound-vowel formant transitions indicated by the bars, which may be compared with the actual spectrograms. The disparity between the generalized formant transitions and the actual spectrograms is generally a result of assimilation.

In conclusion, then, it appears that the overall pattern of English vowel sounds tends to fit a structural pattern consisting of five simple vowels compounded with three semi-vowels plus /r/.

East Providence, Rhode Island

REFERENCES

Bloomfield, L.
1933 *Language* (New York).
1935 "The Stressed Vowels of American English", *Language* 11:97-116.
de Saussure, F.
1959 *Course in General Linguistics* (New York).
Chiba, T. and M. Kajiyama
1958 *The Vowel: Its Nature and Structure* (Tokyo).
Jones, D.
1950 *The Phoneme: Its Nature and Use* (Cambridge).
1967 *An Outline of English Phonetics*, 9th edition (Cambridge).
Pike, K.L.
1947 *Phonemics: A Technique for Reducing Languages to Writing* (Ann Arbor).
Potter, R.K., G.A. Kopp, and H. Green
1947 *Visible Speech* (New York).
Sweet, H.
1888 *A History of English Sounds from the Earliest Period with Full Word-lists* (Oxford).
Thomas, C.K.
1958 *An Introduction to the Phonetics of American English* (New York).
Trager, G.L. and B. Bloch
1941 "The Syllabic Phonemes of English", *Language* 17.3:223-246.
Trager, G.L. and H.L. Smith, Jr.
1951 *An Outline of English Structure* (Washington, D.C.).
Trubetzkoy, N.S.
1969 *Principles of Phonology* (Berkeley).

Truby, H.M.
1962 "Synchronized Cineradiography and Visual-Acoustic Analysis", *Proceedings of the IVth International Congress of Phonetic Sciences*, Helsinki, 1961 (The Hague). pp. 265-279.

[no author]
1968 *Van Nortrand's Scientific Encyclopedia* (Princeton).

Ward, I.C.
1958 *The Phonetics of English* (Cambridge).

DISCUSSION

NASH (Puerto Rico)
Do you contrast between [spelling] *b-a-l-m* and *b-o-m-b?*

PERRY
If you mean in my own pronunciation, I do not. Leonard Bloomfield, however, did distinguish between these vowels in his Chicago variety of American English (Bloomfield 1935). Persons who do contrast these words pronounce them as [bɑm] and [bɒm].

NASH
I'm from Chicago too and I couldn't tell those words apart by pronunciation.

PERRY
Since I do not normally use this distinction in my own speech I may not have pronounced them with enough difference for you to hear the contrast. Also, since Americans generally do not observe this contrast in their speech, their auditory mechanisms may not be 'tuned' to hear it. There are only a few minimal pairs in English that are distinguished by the contrast [ɑ] versus [ɒ], that is one reason why I represent the [ɒ] sound with the compound symbol /ah/. Thus the contrast [ɑ] versus [ɒ] has a low phonological burden in American speech especially where postvocalic /r/ is not dropped. Conversely, in the *r*-dropping dialects, in both America and Great Britain, this contrast has a high phonological burden because such pairs as /part/ *part* vs. /paht/ *pot* are pronounced respectively as [pɑt] versus [pɒt]. A person who pronounces postvocalic /r/ generally pronounces this pair as [pɑɹt] versus [pɑt], respectively. Persons who still use the old Chicago dialect and pronounce this pair as [pɑɹt] versus [pɒt], interestingly enough, need never worry about being misunderstoodo n either side of the Atlantic.

As a follower of de Saussure, I distinguish very carefully between *language (langue)* and *speech (parole)*. Therefore, I believe that idiolectal and dialectal variations come under the heading of speech. Daniel Jones' specification that a language is an idiolect, in his definition of the phoneme (Jones 1950:9), has caused most of the confusion concerning the phoneme. I feel that a language must be defined, for the purposes of

linguistic science, as the summation of all mutually intelligible dialects and idiolects in the global community. When I use the terms 'dialect' and 'idiolect' I am referring only to variations of 'accent' and not of 'idiom'. (I am indebted to J. Derrick McClure for pointing out to me that in British usage 'dialect' has the connotation of both 'accent' and 'idiom', unlike American usage.)

Since my analysis is a supradialectal analysis, that is, it accounts for the underlying semiological distinctions of the English language as a whole, the distinction /a/ [ɑ] versus /ah/ [ɒ] must be retained.

WELLS (London)
Quite apart from the problem of defining the phoneme, and leaving aside the question of whether Perry is dealing with phonetics or phonology, it should be pointed out that his analysis fails to account for certain systemic vowel contrasts in English accents. Examples include:
/ʌ/ vs. /ə/ in my speech, for instance;
/æ/ vs. /æ:/ in some Eastern U.S. and Southern English speech;
/eɪ/ vs. /e:/, e.g., *straight* vs. *late*, in many accents of England;
further, it is false to claim that the vowel of *car*, when pronounced in RP, has either *r*-colouring or centring — phonetically at any rate; and Perry leaves us with the pseudo-problems imposed by the overdifferentiation his system involves (e.g., the Scots vowel of *food* and *good*) has to be identified either as /u/ or as /uw/, when in fact this contrast does not exist in Scots.

PERRY
Mr. Wells, as do too many phoneticians, has the mistaken notion that phonemes must be real speech sounds, when in actuality phonemes are PSYCHOLOGICAL, or conceptual, categories built up in the minds of the native speakers of a given language by articulatory and auditory repetition. On the other hand, real speech sounds (i.e., phones) are PHYSICAL categories. My analysis does account for all SEMIOLOGICALLY distinctive contrasts. In particular, Mr. Wells overlooked the fact that I represented the norm [ʌ] by /o/ and the norm [ə] by /u/. I agree that this distinction is necessary because of minimal pairs such as *discus* versus *discuss*. Length is not semiologically distinctive in English as a whole (i.e., in a supradialectal analysis). In the rare cases where it is impressionistically, or stylistically, distinctive, such as in Scots, it can usually be explained on a more abstract (e.g., morphemic) level cf grammatical analysis. In RP postvocalic /r/ may be dropped completely or pronounced as a linking-*r*, which I did fail to mention, as well as be realized as [ə]. The phonemic representations of the vowels in the words *food* and *good* are respectively /uw/ and /uh/ in ALL dialects of English. It is the PHYSICAL, or stylistic, realizations of these sounds which diverge from the norms [u] and [ʊ], or converge with ɪespect to each other, in Scots.

Since I reject the 'physical' view of the phoneme and since my analysis is based on a particular interpretation of the phoneme, a brief exposition of this view would be appropriate here. My overall concept of the phoneme takes the form of a statistical, or mathematical abstract model of psychological reality in the same sense that, for example, in electrical engineering, resistance is an abstract idealized model of a real resistor. Because the detection of real neurological signals is presently impossible we must determine phonemes in some surrogate manner, the most useful of which at present is a functional or operational procedure. Thus, from the functional aspect, the phoneme has two basic levels. On the less abstract level we have UNIT PHONEMES and on the more abstract level we have SIMPLE PHONEMES. The latter are derived from the former, taking into consideration: complementary distribution; positional, conditional, free, idiolectal, and dialectal variation; complete, progressive, and regressive assimilation; commutation and partial identities; phonological burden; cross-correlation of articulatory features; ambiguity of sequences; pattern congruity and symmetry; symbolic economy; and articulatory and acoustic tendencies.

Specifically, UNIT PHONEMES are those speech-sound segments which result from the segmentation of the words of a given language at each and every consonant-vowel and vowel-consonant onset. In effect, this 'gross' segmentation process separates the vowel unit-phoneme segments from the consonant unit-phoneme segments. It follows, then, that unit phonemes can be elementary or composite speech sounds.

A SIMPLE PHONEME, which is on a more abstract grammatical level than a unit phoneme, is a phonological unit that, "from the standpoint of a given language, cannot be analyzed into still smaller distinctive units. Accordingly the [simple] phoneme is the smallest distinctive unit of a given language" (Trubetzkoy 1969:35).

COMPOUND PHONEMES, which are on the same abstract grammatical level as simple phonemes, are those unit phonemes which are represented by sequences of simple phonemes, or those unit phonemes which are not simple phonemes. The phonemic nomenclature is borrowed from Bloomfield. (Bloomfield 1933:90-125).

Because there are many conflicting premises concerning the phoneme, it must be considered from all viewpoints posited by our predecessors and extreme care must be exercised in the acceptance or rejection of each of these premises. For each of us, trying to understand the phoneme is like solving a jigsaw puzzle that at present has too many pieces. Our task, then, is to retain those premises which are compatible, and to discard only those premises which contradict a rigorously unified conception of the phoneme. One premise of the phoneme that, as Dr. Truby has emphasized at this Congress, must be rejected is the 'physical' or 'family-of-sounds' notion of the phoneme. It must be rejected because it is not compatible with the psychological, abstract, and functional views of the phoneme. In addition, a phone, not a phoneme, is a 'family of sounds'. The distinction psychological, or abstract, versus physical, or concrete, is the very key by which we can clearly keep apart phonemics from phonetics.

GRAHAM STUART (Silver Spring, Md.)

One suspects that Mr. Perry confounds the problem of phonologic description with the elaboration of graphic systems. It is always possible to encode a given paradigm of categories into sequences of members of a smaller paradigm. If letter combinations may be used without restriction, the Latin alphabet will suffice for the notation of systems having any number of phonemes. The popularity among language teachers of the Smith and Trager type notation for English is quite understandable: it can be written on an ordinary typewriter. This consideration has no relevance for phonological description however.

Since the chart showing his analysis of the English vowel system which Mr. Perry presented by lantern slide was not altogether legible, not all the details of his 'binary vowel system' are clear to me. However, his idea of an inter-dialectal or supra-dialectal phoneme system, which he shares with Smith and Trager, is a contradiction of the structural principle and must be rejected for reasons which I think unnecessary to state here. Otherwise, it is apparent that his interpretation suffers from the same conflicts with phonological reality as all similar systems from Sweet on. The two most important of these conflicts are the following.

1. Sequences of vocalic quality are represented when there is no phonetic diphthong (as in *iy* for the vowel in *beet*) or where a phonetic diphthong alternates with a monophthong so that the diphthongal element cannot have distinctive function (as in RP *car* [ka:] or [kaə]). Mr. Perry, if I understand him correctly, also would represent as a sequential unit the simultaneous distinctive feature of 'pharyngealization' (i.e., having a minimal pharyngeal cavity) in e.g., the vowel in American *pot*, which he would transcribe /paht/. This is all inconsistant with (a) the idea of the phoneme as a SIMULTANEOUS set of distinctive features and the word expression as a SEQUENCE of phonemes and (b) the practice of representing the sequentiality of phonemes with the sequentiality of letters.

2. The treatment of the so-called 'long' or 'tense' vowels as complex, and based on the corresponding 'short' or 'lax' vowels by the addition to them of an element of diphthongization (or any other element of added complexity) is clearly in conflict with the phonological facts revised by neutralization. In the RP usage, stressed closed syllables may contain any of the following phonemically simple vowels, opposed in pairs of 'long' and 'short', as indicated: /i ~ ɪ, e ~ ɛ, ɑ ~ æ, ɜ ~ ʌ, ɔ ~ ɒ, u ~ ʊ/. In stressed open syllables, these oppositions of 'long' and 'short' are neutralized and the archiphoneme realized with the phonetic type of the 'long' vowel in each opposition. Unless the phonological system of English has an economy which perversely insists upon the realization of distinctive articulatory gestures especially in positions where they cannot have any distinctive function, the 'long' vowels must be simpler in terms of articulatory effort than their 'short' counterparts. We say that the 'long' vowels are UNMARKED. It is, accordingly, in conflict with the phonological facts to represent them as their corresponding 'short' vowels plus a diphthongal off-glide.

PERRY

According to Trubetzkoy's definition of the phoneme: the "smallest distinctive [phonological] unit of a given language", I would say that the smallest possible paradigm would be the optimum phonemic paradigm for a given language (Trubetzkoy 1969:35). Could "the elaboration of graphic systems" for English be an indication that the optimum set of phonemes is yet to be determined?

There is a definite limit to how far one can "encode a given paradigm into sequences of members of a smaller paradigm". The phonemicist has to stop at that point where no more unit phonemes can be analyzed into sequences of simple phonemes, keeping in mind that a simple phoneme must be a unit phoneme in some context of the language and that it is not merely an isolated distinctive feature. Thus the isolated feature 'voicing' could never be considered a simple phoneme of English since it does not occur as a unit phoneme in any context. The unit phoneme /b/, for example, could not be represented by the sequence */pV/, where the symbol */V/ represents this hypothetical simple phoneme, because */V/ never occurs as a unit phoneme in English. In English */V/ is an isolated feature; it is not a simple phoneme. On the other hand, pharyngealization is more than an isolated feature in English; it is both the simple phoneme and unit phoneme /h/. Prevocalically /h/ is [h], an explosive pharyngeal glide accompanied by the surface feature of glottal friction; postvocalically it is [ʕ], an implosive pharyngeal glide where glottal friction is absent. The widespread notion that /h/ has the articulation of the following vowel seems to be erroneous. X-ray movies indicate to me that /h/ is pharyngeal, both prevocalically and postvocalically.

The particular symbols one employs in symbolizing phonemes, indeed, is of no consequence. But if the size of the paradigm of simple phonemes can be reduced to within the range of the unaugmented Latin alphabet I see no reason for retaining the International Phonetic Alphabet for PHONEMIC transcriptions. The sufficiency of the ordinary typewriter in this case is an incidental bonus for employing phonemic transcription. On the other hand, for phonetic, stylistic, or comparative transcription the International Phonetic Alphabet is without equal. It is appropriate here to quote what Leonard Bloomfield had to say about symbols used in transcription (this was written before the convention was established of inserting phonemic transcription between slant brackets):

> Any transcription shocks and offends all but the few readers who have been inured of the free use of graphic symbols ('algebra'). When old-established renderings, such as [det] *debt* or [kam] *calm* are denounced as dangerous innovations, the critics' choice of examples may perhaps give us a clue to the real difficulty: can it be that the disconcerting factor is really the absence of the letters *b* and *l*? Unaccustomed use of the symbol [o] is especially annoying, perhaps because this letter, whose shape resembles the shape of the lips in the utterance of its name, plays a dominant rôle in our first learning of the alphabet and retains this rôle in the graphic fetishism of later life.
>
> The *shapes* of the graphic symbols scarcely deserve discussion...But the *distribution* of the symbols is another matter. The theorist whose ratiocinations lead him to demand one and the same symbol for the vowels of *calm*, *psalm* and of *cam*, *Sam*, or to replace the symbol [č], as in *catch it*, by the symbols [t] plus [š] or the equivalent, will end with a sorry mess on his hands. (Bloomfield 1935:98)

Mr. Stuart's distaste for the representation /kar/ for RP [kɑ:] or [kɑə] or the representation /biyt/ for RP [bit] is most likely a symptom of "graphic fetishism". Clearly, the phones [:] and [ə] are the RP allophones of the phoneme /r/. The stylistic distinction between the temporally short [i] in *beet* and the temporally long [i:] in *bee* is a result of the shortening effect of vowels in English preceding unvoiced consonants, and is merely a surface contrast having no semiological value whatsoever. Daniel Jones (Jones 1967:82), Ida C. Ward (Ward 1958:82), and Charles K. Thomas (Thomas 1958) all admit to the very marked tendency for the vowel which I indicate /iy/ to be phonetically realized as [ɪi] in some instances. This justifies for me the use of the symbol /iy/ to represent all stylistic variations of the type [i], [i:], [ɪi], and [ɪj] in English.

Graphic fetishism is probably the main reason why the segment which I call a unit phoneme has generally received no attention in phonological theory. Once we learn the alphabet—any alphabet—we are no longer unbiased or naive enough to perform phonemic analyses because alphabetic traditions cause us to make incorrect subjective judgements about the abstract sounds of language *(langue)*. For example, from the time we learn to read we analyze the initial sound of *play* as the sequence /pl/ but a preliterate native speaker, who had never been exposed to alphabetic writing, would not and could not perform this analysis on his own; he would be reinventing the alphabet. Dr. Truby demonstrated at the IVth Congress of Phonetic Sciences that this initial "sequence" is in reality a single sound (Truby 1962). Thus, the unit phoneme /pl/ is realized generally as [p͡l]. Would Mr. Stuart insist that we design a new letter for the International Phonetic Alphabet to represent this simultaneously-lateralized labial stop plosive so that his transcription would agree with the "phonological facts"? The point, in any case, is this: synchronic [p͡l] and sequential [pl] alternate stylistically with one another as realizations of the unit phoneme /pl/, but the stylistic distinction [p͡l] versus [pl] never serves in English to trigger a semiological distinction, that is, there can never be ambiguity between these two sounds as far as meaning is concerned. In the same manner, we never have to distinguish between synchronic [i] and sequental [ɪj]. Likewise, we can represent the vowels of *beet* or *bee* by the same symbol /iy/. Thus even the 'narrowest' of 'phonetic' transcriptions is somewhat phonemic because of our alphabetic traditions with the Latin and International Phonetic alphabets.

To me, Mr. Stuart's interpretation of the phoneme seems to be a 'physical' one; therefore he believes that a phonemic transcription must record overt stylistic variations of an idiolect or dialect *(parole)* instead of the covert semiological invariants of a language *(langue)*. The problem that the phonemicist wishes to solve is not one of devising a smaller paradigm from a given paradigm but of determining a single covert invariant paradigm from several stylistically variant overt paradigms of the dialects and idiolects of a given language.

Mr. Stuart's comments concerning "the phonological facts revealed by neutralization" do not apply to my system of vowel phonemes: /ɪ, ɛ, ə, ʌ, ɑ/, because Mr.

Stuart's "phonological facts" describe the system: /i ~ ɪ, e ~ ɛ, ɑ ~ æ, ɜ ~ ʌ, ɔ ~ ɒ, u ~ ʊ/. In Trubetzkoy's words: "The question whether the "strong" or the "weak" [or the "long" or the "short", if you will] opposition member of a correlation...is unmarked can, in the final analysis, be determined objectively *only* from the functioning of the *particular* phonemic system [my italics]" (Trubetzkoy 1969:146). Thus any real speech sound, or phone, is a summation of redundant attributes, or features, and those features which we choose to make primary is arbitrary and will determine whether a given feature, from the standpoint of the corresponding member of the archi-phoneme, will be marked or unmarked.

Since Mr. Stuart seems to be familiar with the Trager and Smith analysis he ascribes the weaknesses of that system to mine. I disagree likewise on many points with the analysis and procedures of Trager and Smith. For example, it is highly doubtful that English has a high central vowel phoneme [ɨ], that both [ə] and [ʌ] are members of the same phoneme, and that the postvocalic /h/ phoneme (realized prevocalically as a glottal fricative) is a centering or lengthening of the preceding vowel. Further, I dislike their practice of transcribing dialect differences within slant brackets. A fundamental distinction between phonemic and phonetic transcription is that in the former the symbols have variable values whereas in the latter the symbols have constant values. So, if any comparative transcriptions are to have any real value at all they must be phonetic ones, that is, they should employ symbols of the IPA between square brackets.

I cannot fathom how a system of vowel phonemes which is founded on the natural structure of English as a whole can be a "contradiction of the structural principle". One of the primary distinctions between phonemics and phonetics is structure. Any phonological description of a language has to relate the overt or surface realizations (phones) to the covert or underlying structure (simple phonemes). And as I understand the term 'phonology', it is the general study of all phases of speech and voice science whether or not the sounds are considered from the standpoint of language. Phonemics, the semiological branch of phonology, is considered from the standpoint of language *(langue)*. The other branch, phonetics, deals with stylistic matters arising from the extreme variation of speech *(parole)*. So, when Mr. Stuart uses the terms "phonologic[al] description", "phonological reality", and "phonological facts", and while doing this refers to stylistic variations (e.g., the RP alternation between [kɑː] and [kɑə] for /kar/), it seems to me that he should be using the terms 'phonetic description', 'phonetic reality', and 'phonetic facts'. One other important difference between phonemics and phonetics can be found in the distinction between discrete (or integer) quantities and continuous quantities. In a mathematical analogy we find that the concrete quantitative phenomena in the physical world can be represented abstractly with numerical integers in some consistent system, e.g., binary, ternary, decimal, etc., assuming the proper units of measurement. Numerical integers have no value when external to a system; they require opposition in some system to function. In a similar way, simple phonemes are integers which are used in opposition

with one another in a system to represent the real speech sounds which occur in the continuum of the speech of a given language.

From the standpoint of communication theory, all the native speakers of a language must use the same simple phonemes, otherwise effective communication would be impossible. All the native speakers of the language contribute their fair share in the grand design of the natural agreed-upon system of their language. It is this covert natural system that has to be discovered by the phonemicist. Using an interdisciplinary approach, I have tried to be objective in uncovering this natural system of English. Whether I have succeeded or failed will be determined by 'the elaboration of graphic systems' that follows my small contribution to the phonemic description of English.

I would only suggest that we keep in mind the parallel between number systems and phoneme systems, since both numbers and phonemes are discrete integers taken from a continuum of values, and they are "system[s] of [abstract] symbols [which humans use] for meaningful communication" (Van Nostrand 1968:374).