Greek Dialect Vowel Systems, Vowel Dispersion Theory, and Sociolinguistic Typology

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Abstract

Vowel dispersion theory supposes that vowels are distributed in vowel space so as to maximise contrasts. Using a sociolinguistic-typological approach, this paper hypothesises that this supposition, while supported by a great deal of evidence in general, may be more true of some language varieties than others. In particular it may be more true of standardised varieties. This suggestion is discussed using evidence from nonstandard dialects of Greek which appear to adhere to vowel dispersion theory less well than Standard Greek.

Keywords

Crete; Greek dialects; maximal dispersion; Sfakia; sociolinguistic typology; sufficient dispersion; vowel dispersion theory

The vowel system of Standard Modern Greek is strikingly ordinary, and, as argued below, almost predictable.¹ Nonetheless, there is much of interest in examining Greek vowels, not just in terms of their phonetic properties and positioning relative to one another but for what they tell us about sociolinguistic typology and how it can affect phonological systems, especially when regional dialects are brought into the picture.

The vowels of Standard Greek² are usually represented phonologically as /i, e, a, o, u/. Joseph and Philippaki-Warbuton (1987: 236) describe these vowels as “high front, mid front, open low, mid back rounded” and “high back rounded” respectively (see also Mackridge 1985; Koutsoudas and

¹ It seems to be agreed that relatively little research has been done on the vowels of Modern Greek. Fourakis et al. (1999) tell us that, when it comes to vowels, “the literature on Greek is limited”.

² The term ‘Standard Greek’ is not an uncomplicated one, especially as far as phonetics is concerned. For example, the pronunciation of Greek by educated speakers is by no means identical between Athens and Thessaloniki, to take just one obvious example (cf. Trudgill 1999 on Standard English).

Koutsoudas 1962). That is, the system consists of five vowels that are roughly equidistant from one another. We can thus represent the Greek vowel system using the traditional vowel trapezium as in Figure 1.

This is confirmed by acoustic work such as that of Jongman et al. (1989), who show that the five Greek vowels are well separated in vowel space, allowing for maximal contrast. Fourakis et al. (1999), in a follow-up acoustic study, support this. They compare their results with those of Bradlow (1995) for Spanish, which has a very similar 5-vowel system; and the same picture emerges for Greek from Sfakianaki (2002).

When viewed in a cross-linguistic perspective, the 5-vowel system found in Greek turns out to be rather banal and expected. In two papers, Schwartz et al. (1997a; 1997b) examine the vowel systems of the 317 languages in the *UCLA Phonological Segment Inventory Database* (UPSID), and show that, out of the 100 languages which have five vowels, 97% have /i, e, a, o, u/.

There are various theories of vowel space that would appear to motivate the prevalence of this Modern Greek-type 5-vowel system. In particular, the Vowel Dispersion Theory of Liljencrants and Lindblom (1972) claims that a number of typological trends in the phonetic structure of vowel inventories can be explained on the basis of the assumption that the phonetic realisation of vowel categories is “maximally dispersed in the available auditory space”. As Fourakis et al. (1999) say, in both Greek and Spanish the vowels “occupy positions in the acoustic space that provide for maximal contrast” (40).

Figure 1. Standard Greek vowels.

It is this principle of *maximum dispersion* which means that if a language has three vowels, they are extremely likely to be /i/, /a/, /u/; that if a language has five vowels, like Standard Modern Greek, they are extremely likely to be /i/, /e/, /a/, /o/, /u/; that if a language has seven vowels they will tend to be /i/, /e/, /ɛ/, /a/, /ɔ/, /o/, /u/; and so on. The suggestion is that the maximal dispersion of vowels in phonological space leads to maximal contrast and thus to maximal efficiency of communication: “distinctive sounds of a language tend to be positioned in phonetic space so as to maximise perceptual contrast” (Johnson, 2000: 1). Dispersion theory “when applied to vowel inventories of languages, suggests that each vowel acts as a repeller in a dynamical system” (Fletcher and Butcher, 2002: 1).

The aforementioned work of Schwartz et al. offers cross-linguistic support for this view of vowel dispersion across vowel space. They found that besides the 97 (out of 100) languages in the UPSID sample with Greek-type 5-vowel systems, there are 14 languages which have 3-vowel systems, of which 100% have /i, a, u/. And of the 41 languages which have seven vowels, 23 (56%) have /i, e, ɛ, a, ɔ, o, u/. An additional 110 languages have 4-, 6-, 7-, 8- or 9-vowel systems which are totally symmetrical. In total, then, of the 317 languages, 244 i.e., about 77%, would appear to support the maximal dispersion hypothesis in that their vowel systems are symmetrical. (There are also other theories that provide a rationale for the distribution of vowels across the vowel space, such as the *sufficient dispersion hypothesis*, as we see further below.)

Other linguistic typologists, following from early work on vowel systems by Trubetzkoy (1939), have provided empirical and theoretical confirmation that this hypothesis about the even distribution of vowels across the vowel space is basically correct (Crothers 1978; Disner 1984). Crothers’ survey shows that the most frequent vowel patterns in the world’s languages are those where vowels are maximally different from one another, and that “the arrangement of vowel qualities is determined to a large extent simply by the number of vowels; for a given number of vowel qualities, only one or two arrangements occur with any frequency in the world’s languages” (Crothers 1978: 100).

Furthermore, these considerations find support in what might be called “linguistic common sense”. That is, the whole point of a vowel is to be different from other vowels. We might expect, then, other things being equal, that in any given language, vowels should be as distinct from one another as possible and be distributed relatively evenly across vowel space. Linguists would be very surprised indeed if, in a language with three vowels, those vowels were /i/, /ɪ/ and /i/.³

³ Vowels can of course differ from one another in various ways such as length, movement (diphthongisation), and nasalisation as well as quality. In this paper I focus mainly on quality.

A number of things follow from this principle of distinctiveness. One is that a change in the phonetic quality of a particular vowel may lead, through chain shifts, to changes in the quality of other vowels in order to retain maximum distinctiveness, as outlined by Martinet in his study of the economy of phonological changes (1955; 1962), and as was subsequently illustrated in further detail by many other scholars, notably Labov (1994). The English Great Vowel Shift is a very well-known example. Another consequence is that languages with fewer vowels are able to permit greater variation in the realisation of those vowels, allophonic or otherwise, than languages which have a larger number.

Whatever the exact status of the theories governing the distribution of vowels, Standard Modern Greek is a clear example of a language making maximal use of the vowel space for the five vowels it has. Typically, 5-vowel systems are very stable, and very common; and they also, as we have seen, appear to make maximum usage of available vowel space. We are not at all surprised that the Standard Greek system consists of a close front unrounded vowel, a close back rounded vowel, an open central vowel, and, in between, equidistant from these, a mid front unrounded vowel and a mid back rounded vowel – in order, so it seems, to maximise distinctiveness. The vowel system of Greek thus appears to offer a perfect illustration of the validity of the vowel dispersion hypothesis.

Interestingly, however, when one shifts attention away from the standard Greek language and onto regional dialects, the picture changes appreciably in ways that challenge any notion of dispersion-related contrast in vowels. I now present evidence from a Greek dialect with a 5-vowel system which is not such a perfect illustration of the hypothesis – where the five vowels are not maximally dispersed. The dialect concerned is that of the Sfakia area of southwestern Crete, and its striking vowel system is auditorily readily apparent to anyone with a minimum of phonetic training. During the course of my work on this dialect (see Trudgill 1989; Trudgill and Mansfield 1994), it became clear that in the Traditional Dialect of much of the province of Sfakia, the high vowels /i/ and /u/ are where one would expect them to be, but the other three vowels are not. The low vowel /a/ is very back [ɑ], especially for older dialect speakers. And the mid vowels are actually much closer than mid, and closer even than Cardinal 2 and 7 – approximately [ɛ, ɔ]. There is, of course, some allophonic variation, but these approximate descriptions hold in general. In other words, large areas of phonetic space in the vowel trapezium go, as it were, unused.

Notice, by the way, that any phonological presentation of the facts concerning this vowel system, of the sort you would find in USPID, would miss this point. The unfilled area of vowel space in the Cretan dialect is not apparent from any classical phonological statement about the Sfakian vowel system.

If we say that the Sfakian system consists of /i, e, a, o, u/, this looks totally unexceptional; it is only a *phonetic* examination of the relative locations of /e/, /a/ and /o/ which shows up the skewing – which leads one to wonder how many other such asymmetries may actually be concealed by the same symbols in the UPSID data base.

We can represent this particular southwest Cretan system using the traditional vowel trapezium as in Figure 2.

In order to produce a clearer comparison of Standard Greek with this Cretan dialectal system, I now supplement my auditory description of the Sfakian dialect with a pilot acoustic analysis, which can be used for a comparison with the analyses made for Standard Greek by Fourakis et al. and Jongman et al. This acoustic analysis is based on the speech of only one (male) speaker, from formant scores averaged out from only four tokens per vowel. It can therefore by no means be taken as the last word on the subject. However, its main purpose is to give confirmation to my auditory analyses, which are based on decades of familiarity with the dialect.⁴ The speaker is a shepherd from Chora Sfakion, and the data is from a field recording made in the village.⁵ Thus, the

Figure 2. Sfakian Greek vowels.

⁴ They are also based on many decades of training and practice in phonetic transcription.

⁵ The recording was carried out by Nikos Vergis of the University of Crete, a native of the island. I am very grateful to him for his work.

Figure 3. Vowels in Spanish (Bradlow 1995); Standard Greek (Fourakis et al. 1999); Standard Greek (Jongman et al. 1989) [JFS-Greek]; and Sfakian Greek [squares added]⁶

analysis is of casual, unmonitored, conversational speech in a non-laboratory situation, and so it can most usefully be compared with the analyses made by Fourakis et al. of stressed, non-focus vowels in rapid speech (although their samples were read from written texts in a laboratory situation).

This preliminary acoustic analysis does indeed support the auditory analyses: the Sfakian vowels are less symmetrical and less equally dispersed than the Standard Greek vowels, as is shown in Figure 3, where the Sfakian vowels are shown relative to the vowels of Standard Greek and Spanish as discussed by Fourakis et al., and where the impression of “unused vowel space” is strengthened.

Interestingly, it is also the case that there are other nonstandard Greek dialects which have obviously asymmetrical, non-maximally dispersed systems. While the dialect of Sfakia can be shown to be asymmetrical on phonetic grounds, these other dialects tend to be asymmetrical from a phonological point of view as well. For example, according to Newton (1972: 46–9), “in the dialects of Thessaly, Macedonia and Thrace, a low front vowel [æ]⁷ occurs in contrast with [a]”. These dialects, then, obviously have a 6-vowel system: the five vowels of Standard Greek plus the additional /æ/, which was diachronically developed by assimilatory monophthongisation out of /ea/ sequences, as for example in /kræta/ ‘meats’, which provides a minimal pair with /krata/

⁶ Adapted from the figure in Fourakis et al. (1999).

⁷ Newton actually writes [æ].

‘hold’. This 6-vowel system is clearly less than totally symmetrical: according to Newton’s description, the system has three front vowels, /i, e, æ/, one low central vowel /a/, and only two back vowels /u, o/, as portrayed in Figure 4.

Drettas (1999) shows that the Pontic dialect of Chaldia, to the south of Trapezounta/Trabzon, also has this same 6-vowel system, including /æ/, e.g. /ta-xorafæ/ ‘the fields’ (p. 94).

The same sorts of monophthongisation processes have also given rise to other asymmetrical Greek vowel systems, which are to be found, again according to Newton (1972: 47), “in at least parts of Macedonia and Thessaly”. For example, Velvendos (near Kozani) and Tyrnavos (near Larissa) have 8-vowel systems (see figure 5). These dialects not only have the additional vowel /æ/ but have also added the front rounded vowels /y/ and /ø/ (Tzartzanos, 1909). Newton shows that these, too, have developed as a result of the monophthongisation of diphthongs, in this case /jo/ > /y/; /jo/ > /ø/; /eo/ > /ø/:

/saly/ *salio* ‘saliva’

/panaøts/ *Panayotis*

/korøʃ/ *koreos* ‘bed-bug’ (Newton 1972: 49).

The presence of front rounded vowels in varieties of Greek is particularly noteworthy because these vowels are typologically very rare indeed, occurring in only about 9% of the world’s languages, according to the data presented in Maddieson (1984: 248–51).

Figure 4. The 6-vowel system from Thrace.

Figure 5. The 8-vowel system from Vevendos.

We can therefore pose the important question that is central to this paper: Is it a coincidence that it is Standard Greek vowels which form a symmetrical, maximally-dispersed system, and the vowels of certain nonstandard dialects which do not? We now turn to this, ultimately, as I argue, sociolinguistic, issue.

Sociolinguistic perspectives

As has been outlined above, vowel dispersion theory is based on the common sense of linguists which derives from our widespread knowledge of the world's languages, as well as from more recent empirical and experimental research. As Butcher (1994: 32) states, the theory "is fairly widely accepted". In the context of the present paper, however, there is an interesting question which remains unanswered. Given that, as Schwartz et al. (1997a; 1997b) have shown, a majority of languages seem to fit in with the maximal dispersion theory, why are there some languages, as they have also shown, that do not? Why does Sfakian Greek have large unused areas of vowel space, while Standard Greek does not? Why do some dialects have asymmetrical systems, and others not? And why *those* dialects and not others?

I now try to tackle these questions from the perspective of *sociolinguistic typology* (Trudgill 2002). Sociolinguistic typology investigates the hypothesis

that the distribution of linguistic features over languages may not be totally random, when viewed from the perspective of the social structures of the communities in which they are spoken. Sociolinguistically informed linguistic typology is therefore concerned with whether there are any social determinants of linguistic patterning, and, if so, what these determinants might be: the issue is whether it is possible to suggest that certain linguistic features are more commonly associated with certain types of society or social structure than others.

One preliminary indication that sociolinguistic typology might have a contribution to make to our discussion of Greek vowel systems comes again from the work of phoneticians. For instance, we can note that the legitimacy of the maximal dispersion theory has been queried by Butcher (1994), who has analysed vowel formant patterns of a number of indigenous Australian languages with small vowel systems, including Arrernte, Warlpiri, and Burarra. These languages have two, three, and five contrastive vowels, respectively. Butcher finds that rather than actually illustrating maximum dispersion relative to size of vowel inventory, the acoustic vowel spaces of these languages tend to be “compact” compared to languages with large vowel inventories like English or Swedish: they do not make use of the entirety of vowel space. The three vowels of Warlpiri can be symbolised as [ɛ̞, ɤ̞, ɐ̞], very different from the [i, u, a] that the principal of maximum dispersion would predict.

Butcher suggests that they therefore illustrate the principle of *sufficient* dispersion, as opposed to *maximum* dispersion. The claim is that, in these languages, articulatory economy counterbalances the perceptual demands for a contrast. This thesis has subsequently been strengthened by e.g., Fletcher and Butcher (2003), for three further languages of northern Australia: Kayardild, Dalabon, and Mayali.

Another series of challenges to the theory of maximal dispersion is provided by languages which, like the Greek dialect of Sfakia, have “holes” in their vowel systems. For example, Maddieson (1984) describes Gilyak, a language isolate spoken in outer Manchuria, as having no vowels at all in the vicinity of /e/. An additional striking piece of evidence is provided by Jackson (2003), who has described Pima, an Uto-Aztecan language spoken in Arizona. This language, like other closely related languages in the area, also has a “missing vowel” with, as it were, a hole in the vowel system: the vowels are /i, a, o, u, ʊ/, with again nothing in the vicinity of [e]. Jackson writes that while:

simple theories of vowel dispersion (e.g. Liljencrants and Lindblom 1972) explain the cross-linguistic tendencies of vowel inventories by predicting a set of vowels which is maximally dispersed in the available formant space, such models do not predict languages with relatively uneven distributions or unfilled perimeters of the vowel space; the fact that such languages exist shows that other considerations

besides maximal distinctiveness are responsible for the distribution of vowels. More complex theories of vowel dispersion (Lindblom and Maddieson 1988; Schwartz et al. 1997b) respond to this by including both dispersing forces (such as maintaining maximal distinction) and attracting forces (such as articulatory simplicity or auditory salience).

However, he continues: “although such theories allow for multiple vowel systems with the same number of vowels – which simpler theories did not do – *large unfilled areas of vowel space are still predicted to be relatively rare*” [my italics].

From a sociolinguistic perspective, we can now see that it may well be relevant that maximal dispersion theory was initially developed on the basis of the vowel systems of standard varieties of large European languages. Such varieties tend to be the outcome of situations characterised by a large degrees dialect contact and dialect mixture. Maybe then, since dialect mixture has been shown to have certain linguistic consequences (see below), concentration by phoneticians on such varieties originally produced a skewed and somewhat sociolinguistically naïve picture. It may not be immediately obvious that acoustic phonetic research can benefit from being more sociolinguistically sensitive; but perhaps, too, it is not a total coincidence that some of the linguists such as Butcher and Jackson who have queried and modified the original dispersion theory are scholars who have been working on small, nonstandardised, low-contact indigenous languages spoken in remote communities in Australia and the USA.

But why should it not just be a coincidence? The probability is that one of the real sociolinguistic stories here is the balance so insightfully outlined by Butcher between *articulatory economy*, of the sort represented by the usage of smaller areas of vowel space as in Warlpiri and Sfakia, and *perceptual demands for a contrast*. These two principles are clearly in conflict. Dressler (1984: 31) says that phonological processes “serve the communicative function of language by serving their proper functions: pronounceability and perceptibility”, but that “the goals of better perception and better articulation often conflict with each other”. Indeed, efficient communication generally is said to result from achieving an *equilibrium* between the needs of the speaker and the needs of the listener. The speaker wants to communicate quickly, or at least with little effort, while the listener needs enough information to process the message accurately. Martinet (1962) argued that in spoken communication a dynamic equilibrium exists between the needs of the speaker to speak quickly and easily, on the one hand, and the needs of the listener to comprehend what is being said, on the other. This was of course not a totally new insight. More than a hundred years ago, Gabelentz (1901: 256) made a similar point,

contrasting the drives to *Bequemlichkeit* and *Deutlichkeit* in language – the twin but conflicting drives towards *ease* and *clarity*. The speaker wants to communicate with little effort, while the listener needs enough information to process the message accurately.

However, a sociolinguistic typology which considers the different social matrices in which linguistic changes and structures occur suggests that there may be more to it than just that (Trudgill 1996): specifically that in some sociolinguistic contexts the equilibrium may be skewed in favour of the drive towards *Bequemlichkeit*, and in others in favour of *Deutlichkeit*. Dressler and Wodak (1982), for example, have argued that formal speech situations are typically those where the needs of the speaker are subordinated to the needs of the hearer, while in casual situations the balance is tipped in the other direction. Now if it is true that formal situations occur more frequently in some societies than others, then we can suppose that the balance between the needs of the speaker and hearer will not necessarily be constant between one society and another.

Similarly, Bernstein (1971) distinguished between what he called ‘elaborated’ and ‘restricted’ codes. Speakers of ‘restricted code’, he claimed, give relatively little background information when speaking and take a fund of shared knowledge for granted. Bernstein’s insight here was to note that speakers from communities where people are relatively unused to communicating with interlocutors from outside their own social networks, who have relatively little contact with members of other groups, are more likely to use ‘restricted code’, even where this may not be appropriate. On the other hand, speakers who are used to communicating with interlocutors with whom they share relatively little background information are more aware of the need not to take too much common knowledge for granted.

I would argue here that just as less information generally, as in ‘restricted code’, needs to be imparted in small non-fluid communities with large amounts of shared background information than in larger, more fluid ones, less *phonetic* information, in particular, is also necessary for successful communication in such communities. Flemming (2004) points out that “most phonetically-driven or functionalist theories of phonology propose that two of the fundamental forces shaping phonology are the need to minimize effort on the part of the speaker and the need to minimize the likelihood of confusion on the part of the listener”. But in some social contexts, I would suggest, the need to avoid the “likelihood of confusion on the part of the listener” is going to be greater than in others. In small communities with tight social networks and large amounts of shared information, this likelihood will be relatively low. The equilibrium therefore swings in favour of the speaker, who can get away

with producing less phonetic information without thereby increasing the risk of not being comprehended.

Different degrees of phonetic information may manifest themselves in various ways. For example, Dressler (1984) has suggested that fortitions can be regarded as serving the needs of the listener, while lenitions can be regarded as serving the (“often conflicting”) needs of the speaker. And another manifestation lies in the way in which fast speech processes can reduce the amount of phonetic information available, and may therefore also be more likely to occur in some social contexts than others (Trudgill, 1996). In smaller communities, the dynamic equilibrium might be weighted somewhat in favour of the needs of the speaker, since the listener, more often than in other communities, may already have a good idea of what is going to be said, and fast speech phenomena might, consequently, be more common. This can have structural consequences. One of the developments that occurs in linguistic change is that fast-speech phenomena become institutionalised, and may eventually become slow speech phenomena as well. According to Dressler (1984: 34), “a typical scenario of diachronic change consists in the generalisation of assimilatory processes which are first limited to casual speech into more and more formal speech situations until they become obligatory processes”.

The point about the balance of the equilibrium is also relevant to the typology of vowel systems. Because of the large amounts of knowledge shared among participants in a community where speakers are frequently in communication with one another, the fact that less phonetic information is required in such social contexts from speakers extends, crucially, to acoustic information about which vowel is which. The drive to maximise distinctiveness in vowel systems will therefore be reduced in small, stable communities, particularly if these are relatively isolated, with relatively few external contacts.

On the other hand, in contexts where speakers and listeners do not know each other well and do not have a large body of shared information, the equilibrium must swing the other way, in favour of the listener.

This will be particularly so in contact situations where native speakers of different languages and dialects are involved. Here, the equilibrium will be disturbed, and the conflict complicated, by the needs of non-natives. This is because the needs of non-native learner–listeners are greater, often much greater, than those of native language and dialect speakers. There is a considerable body of work which demonstrates this point in connection with the comprehension of foreign languages, but the same will apply, if to a lesser degree, to dialect comprehension also. Weber & Cutler (2004) say:

Listening in one’s native language is effortless; but listening to a second language can be distressingly hard work. Unfamiliar words, unknown idioms, and hitherto

unencountered accents can at any moment present new challenges. Speech can seem unnervingly fast, because procedures for segmenting speech of the native language into words fail to work with the second language. The experience of being tired out by simply listening, for instance to a lecture or a theatre, is one that many second-language listeners have undergone.

Greater difficulties in comprehension are experienced by non-native listeners, because they typically require more information than natives. There is considerable experimental evidence to show that non-natives do much worse than natives in less-than-ideal conditions in comprehension tasks (see for example: Florentine, 1985; Nabelek & Donahue, 1984). Meador et al. (2000) write that “research has shown that non-native speakers are less ‘tolerant’ of masking noise than are native speakers when faced with the need to comprehend connected speech materials”. And Gaies et al. (1977) tell us that “the less proficient in a language a listener is, the more difficult it is for him or her to comprehend a message in which the natural redundancy of language is reduced through the distortion of the conducting medium”. More phonetic and phonological information is therefore required.

Phonological information is also *relatively* more important for non-natives than for natives. According to Dalton & Seidlhofer (1994: 26), because non-natives typically lack all the background knowledge that natives have, contextual information is much less available to them: “Just how much implicit knowledge feeds into our communication with others becomes evident as soon as we enter a different dialect area ...”.

We can therefore conclude that it is natural that perceptual demands should be favoured in high contact situations involving large fluid communities, non-native speakers, and small amounts of shared information. So, in high-contact situations the maximal distinctiveness of vowels is more important, and the likelihood of the principle of maximal dispersion being adhered to is greater. Standard varieties – very many of which have arisen out of urbanisation, dialect contact, koineisation and new-dialect formation processes (Trudgill 2004) – are therefore more likely to have systems such as the symmetrical 5-vowel system of modern Standard Greek which are maximally dispersed, where vowels can be distinguished from one another by listeners with the greatest degree of clarity.

Indeed, an increase in language contact and dialect contact situations generally in the modern world are likely to lead to a chronological increase in degree of adherence of vowel systems to the principle of maximum dispersal. For example, earlier forms of Greek had vowel systems which were much more complicated and less symmetrical than that of Modern Greek (Allen 1987). Joseph (1990) states that “the vowel system of Ancient Greek

was most complex”; and Allen indicates in fact that Attic Greek during the 400s BC probably had no fewer than 22 distinctive vowels. Crucially, the systems of short and long vowels were both asymmetrical, with systemic gaps:

y i		
e		o
	a	
y: i:		u:
e:		
ɛ:		ɔ:
	a:	

There were also numerous diphthongs: Joseph lists the original short diphthongs as having been: /ei, ai, oi, ou, eu, au, yi/, although by the classic period this subsystem too had also become asymmetrical as a result of the fact that /ei/ and /ou/ had been lost. And then there were the long diphthongs /e:i, a:i, o:i, e:u, a:u/, also not an entirely symmetrical system.

Later, movement in the direction of a more maximally dispersed system began. By about 200 BC (Browning, 1983), the Greek long vowel system had become more symmetrical, though the short vowel system had not:

y i		
e		o
	a	
y: i:		u:
e:		ɔ:
	a:	

However, by the time of the Hellenistic koine that provided the basis for all varieties of modern Greek except Tsakonian (Joseph, 1990; Browning, 1969), a system had developed which was a much “better” dispersed, and without vowel length or diphthongs:

y i	u
e	o
	a

The important point for our purposes is precisely that this was the system found in a *koiné* – a variety which was very much the result of contact. This

contact was, first, dialect contact leading to dialect mixture, dialect levelling and new-dialect formation, as speakers from different parts of Greece came into contact, for example perhaps in Alexander's army, and then in the empire that resulted from his conquests (Bubenik, 1993; 2007; Horrocks, 1997), very much as a new variety of English developed in, say, New Zealand, as a result of colonisation from Britain (Trudgill, 2004). Secondly, there was considerable language contact resulting from the Greek conquests and the subsequent use of Greek as the lingua franca of the eastern Mediterranean, Middle East, Central Asia and northern India. Many factors will have led to this simplification of the vowel system (see Trudgill, 1986; 2004); but our discussion thus far suggests that one of the major factors was the drive to favour 'clarity' over 'ease' that occurs in contact situations, leading to the maximising of the dispersion of vowels.

On the other hand, low-contact situations which favour 'ease' over 'clarity' will correspondingly tend to have the reverse kind of consequence. Innovations which convert symmetrical systems into asymmetrical systems, with a reduction in the degree of vowel dispersion, are more likely to occur in low-contact, stable communities with tighter social networks and large amounts of shared information. We know that the northern Greek dialect vowels /æ/, /y/ and /ø/ are innovations in the varieties in which they occur, arising as they do out of the monophthongisation of certain diphthongs. And it is obviously relevant that the less than maximally dispersed systems which these particular innovating monophthongisations gave rise to represent assimilations such as /ea/ > /æ/; and of course, assimilations are changes which favour ease of articulation.

Conclusion

Sociolinguistic typology supposes that different types of social structure may, to a certain extent, produce or coincide with certain types of linguistic structure, as I have argued with respect to Greek elsewhere (Trudgill 2001; 2004b). The suggestion in this particular case is that it is no coincidence that it is the nonstandard dialect of a geographically peripheral, remote mountainous region that has a relatively asymmetrical system, and the standard dialect which does not; that the vowel system of Standard Greek is symmetrical and maximally dispersed, while the Sfakian dialect vowel system is not only asymmetrical but also has large unfilled areas, with its vowels being merely *sufficiently* rather than *maximally* dispersed; that it is the dialects of Velvendos and Tyrnafos which have innovating non-maximally dispersed 8-vowel systems, including /ø/ and /y/, and not the dialect of, say, Thessaloniki. It is not a coincidence that it is

Standard Greek which is relatively orthodox in terms of its vowel system, and well behaved in terms of vowel dispersion theory, and that it is some of the nonstandard varieties which are more aberrant. We can suppose that we are most likely to find the principle of *maximum dispersion*, as initially adumbrated by Liljencrants and Lindblom, at operation in varieties such as standard varieties which are the outcome of contact and which are spoken in larger communities with relatively loose social network structures; and we are most likely to find *sufficient dispersion*, of the type demonstrated by Butcher, in smaller, low-contact and tightly networked communities, such as Sfakia.

Acknowledgements

I am very grateful for help with this paper that I have received from Andy Butcher, Janet Fletcher, Mark Janse, Ken Lodge, Nikos Vergis, and most especially Brian Joseph.

References

- Allen, William Sidney. 1987. *Vox Graeca* (3rd edn.). Cambridge: Cambridge University Press.
- Bernstein, Basil. 1971. *Class, codes and control*. London: Routledge.
- Bradlow, Ann. 1995. A comparative acoustic study of English and Spanish vowels. *Journal of the Acoustic Society of America*, 97: 1916–1924.
- Browning, Robert. 1983. *Medieval and Modern Greek* (2nd edn.). Cambridge: Cambridge University Press.
- Bubenik, Vit. 1993. Dialect contact and koineization: the case of Hellenistic Greek. *International Journal of the Sociology of Language* 99: 9–23.
- Bubenik, Vit. 2007. The rise of the koine. In A. Christidis (ed.), *A history of Ancient Greek: from the beginnings to late antiquity*, 342–345. Cambridge: Cambridge University Press.
- Butcher, Andrew. 1994. On the phonetics of small vowel systems: evidence from Australian languages. In R. Togneri (ed.), *Proceedings of the 5th Australian International Conference on Speech Science and Technology* (vol. I: 28–33). Canberra: Australian Speech Science and Technology Association.
- Cauldwell, Richard. 1998. Faith, hope and charity: the vices of listening comprehension. *The Language Teacher*, 22/7: 7–9.
- Crothers, John. 1978. Typology and universals of vowel systems. In J. H. Greenberg, C. A. Ferguson, & E. A. Moravcsik (eds.), *Universals of Human Language. Vol. 2: Phonology*, 93–152. Stanford: Stanford University Press.
- Dalton, Christiane and Barbara Seidlhofer. 1994. *Pronunciation*. Oxford: Oxford University Press.
- Disner, Sandra Ferrari. 1984. Insights on vowel spacing. In I. Maddieson (ed.), *Patterns of sounds* (ch. 9). Cambridge: Cambridge University Press.
- Dressler, Wolfgang U. 1984. Explaining natural phonology. *Phonology Yearbook*, 1: 29–51.
- Dressler, Wolfgang U. and Ruth Wodak 1982. Sociophonological methods in the study of sociolinguistic variation in Viennese German. *Language in society* 11: 339–370.

- Drettas, Georges. 1999. The Greek-Pontic dialect group. In A. Christidis (ed.), *Dialect enclaves of the Greek language*. Athens: Ministry of Education, 15–24; 91–100.
- Flemming, Edward. 2004. Contrast and perceptual distinctiveness. In B. Hayes, R. Kirchner and D. Steriade (eds.), *Phonetically-based phonology*, 232–276. Cambridge: Cambridge University Press.
- Fletcher, Janet and Andrew Butcher. 2002. Vowel dispersion in two northern Australian Languages: Dalabon and Bininj Gun-wok. In C. Bow (ed.), *Proceedings of the 9th Australian International Conference on Speech Science and Technology*, 343–348. Melbourne: Australian Speech Science and Technology Association.
- Fletcher, Janet and Andrew Butcher. 2003. Local and global influences on vowel formants in three Australian languages. In M. J. Solé, D. Recasens, & J. Romero (eds.), *Proceedings of the 15th International Congress of the Phonetic Sciences*, 905–908. Barcelona. CD-ROM.
- Florentine, Mary. 1985. Speech perception in noise by fluent, non-native listeners. *Proceedings of the Acoustic Society of Japan*, 26: 1–8.
- Fourakis, Marios, Antonis Botinis and Maria Katsaiti. 1999. Acoustic characteristics of Greek Vowels. *Phonetica*, 56: 28–43.
- Gabelentz, Georg. 1901. *Die Sprachwissenschaft: ihre Aufgaben, Methoden und bisherigen Ergebnisse*. (2nd edition.) Leipzig: Tauchnitz.
- Gaies, Stephen, Harry Gradman and Bernard Spolsky. 1977. Toward a measurement of functional proficiency: contextualisation of the noise test. *TESOL Quarterly* 11: 51–57.
- Horrocks, Geoffrey. 1997. *Greek: a history of the language and its speakers*. London: Longman.
- Jackson, Eric. 2003. Dispersion in the vowel system of Pima. Paper presented at the UCLA LASSO Conference, October 2003.
- Johnson, K. 2000. Adaptive dispersion in vowel perception. *Phonetica*. 57: 181–188.
- Jongman, Allard, Marios Fourakis and Joan A. Sereno. 1989. The acoustic vowel space of Modern Greek and German. *Language and Speech*, 32(3): 221–248.
- Joseph, Brian. 1990. Greek. In Bernard Comrie (ed.), *The major languages of Eastern Europe*, 144–173. London: Routledge.
- Joseph, Brian and Irene Philippaki-Warbuton. 1987. *Modern Greek*. London: Croom Helm.
- Koutsoudas, Andreas and Olympia Koutsoudas. 1962. A contrastive analysis of the segmental phonemes of Greek and English. *Language Learning*, 12: 211–230.
- Labov, William. 1994. *Principles of linguistic change*. Oxford: Blackwell.
- Liljencrants, Johan and Björn Lindblom. 1972. Numerical simulation of vowel quality systems: the role of perceptual contrast. *Language*, 48: 839–862.
- Lindblom, Björn. 1986. Phonetic universals in vowel systems. In J.J. Ohala & J.J. Jaeger (eds.), *Experimental phonology*, 13–44. Orlando: Academic Press.
- Lindblom, Björn and Ian Maddieson. 1988. Phonetic universals in consonant systems. In L. Hyman and C. Li (eds.), *Language, speech and mind*, 62–78. London: Routledge.
- Mackridge, Peter. 1985. *The Modern Greek Language*. Oxford: Oxford University Press.
- Maddieson, Ian. 1984. *Patterns of sounds*. Cambridge: Cambridge University Press.
- Martinet, André. 1955. *Economie des changements phonétiques*. Berne: Francke.
- Martinet, André. 1962. *A functional view of language*. Oxford: Oxford University Press.
- Meador, Diane, James Flége and Ian Mackay. 2000. Factors affecting the recognition of words in a second language. *Bilingualism: Language and cognition*, 3: 55–67.
- Nabelek, A.K., & A.M. Donahue. 1984. Perception of consonants in reverberation by native and non-native listeners. *Journal of the Acoustic Society of America*, 75: 632–634.
- Newton, Brian. 1972. *The generative interpretation of dialect: a study of Modern Greek phonology*. Cambridge: Cambridge University Press.
- Schwartz Jean-Luc, Louis Jean Boe, Nathalie Vallee and Christian Abry. 1997a. Major trends in vowel system inventories. *Journal of Phonetics*, 25(3): 233–253.

- Schwartz Jean-Luc, Louis Jean Boe, Nathalie Vallee and Christian Abry. 1997b. The dispersion-focalization theory of vowel systems. *Journal of Phonetics*, 25(3): 255–286.
- Sfakianaki, Anna. 2002. The acoustic characteristics of Greek vowels produced by adults and children. In M. Makri-Tsilipakou (ed.), *Selected papers on theoretical and applied linguistics from the 14th International Symposium*, 383–394. Thessaloniki: Aristotle University.
- Trubetzkoy, N. S. 1939. *Grundzüge der Phonologie*. Travaux du Cercle Linguistique de Prague 7. Prague.
- Trudgill, Peter. 1986. *Dialects in contact*. Oxford: Blackwell.
- Trudgill, Peter. 1989. The sociophonetics of /l/ in the Greek of Sphakiá. *Journal of the International Phonetics Association*, 15(2): 18–22.
- Trudgill, Peter. 1996. Dialect typology: isolation, social network and phonological structure. In G. Guy, J. Baugh and D. Schiffrin (eds.), *Towards a social science of language: papers in honour of William Labov. Vol. 1: variation and change in language and society*, 3–22. Amsterdam: Benjamins.
- Trudgill, Peter. 1999. Standard English: what it isn't. In T. Bex and R. J. Watts (eds.) *Standard English: the widening debate*, 117–128. London: Routledge.
- Trudgill, Peter. 2001. Greek dialects: linguistic and social typology. In A. Ralli, B. Joseph and M. Janse (eds.), *Proceedings of the First International Conference of Modern Greek Dialects and Linguistic Theory*, 263–272. Patras: Patras University Press.
- Trudgill, Peter. 2002. Sociolinguistic typology. In J. K. Chambers, P. Trudgill and N. Schilling-Estes (eds.), *The handbook of language variation and change*, 707–728. Oxford: Blackwell.
- Trudgill, Peter. 2004a. *New-dialect formation: the inevitability of colonial Englishes*. Edinburgh: Edinburgh University Press.
- Trudgill, Peter. 2004b. The impact of language contact and social structure on linguistic structure: focus on the dialects of Modern Greek. In B. Kortmann (ed.), *Dialect meets typology: dialect grammar from a cross-linguistic perspective*, 435–451. Berlin: Mouton de Gruyter.
- Trudgill, Peter. 2009. Sociolinguistic typology and complexification. In G. Sampson, D. Gil and P. Trudgill (eds.), *Language complexity as an evolving variable*. Oxford: Oxford University Press.
- Trudgill, Peter. forthcoming. *Sociolinguistic typology: language in contact and isolation*.
- Trudgill, Peter, & Peter Mansfield. 1994. A sex-specific linguistic feature in a European dialect. *Multilingua*, 13(4): 181–186.
- Tuten, Donald. 2003. *Koineization in mediaeval Spanish*. Berlin: Mouton de Gruyter.
- Tzartanos, Achilleus. 1909. *Peri tis sinchronou Thessalikiis dialektou*. Athens.
- Weber, Andrea and Anne Cutler. 2004. *Journal of Memory and Language* 50: 1–15.
- Winford, Donald. 2003. *An introduction to contact linguistics*. Oxford: Blackwell.