

# THE PRONUNCIATION OF GREEK STOPS IN THE PAPYRI

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This paper presents evidence for the pronunciation of the consonants normally represented by  $\kappa$ ,  $\gamma$ ,  $\chi$ ;  $\tau$ ,  $\delta$ ,  $\theta$ ;  $\pi$ ,  $\beta$ ,  $\phi$  in the non-literary papyri from Egypt, and proposes a historical and bilingual approach toward the interpretation of the linguistic phenomena observed.<sup>1</sup>

The papyri, which date from the third century B.C. to the eighth century A.D., constitute our richest source for a very important stage in the evolution of the Greek language. They reflect the living Greek Koine at a time of transition from the highly inflected and syntactically complex dialects of the classical period to the more analytical language spoken in Greece today. Further, they reflect the Koine spoken and written within the confines of Greco-Roman Egypt, where it was subject to foreign influences.

Evidence for the pronunciation of the consonants during the period of the papyri is derived primarily from variations in spelling. These variations can be considered as spelling mistakes if viewed as departures from a traditional norm of orthography. An analysis of spelling mistakes in the papyri shows what phonological developments have taken place within the Greek language and to what degree the speech habits of non-native Greek speakers have introduced a foreign pronunciation.

The validity of spelling mistakes for determining the pronunciation of a dead language is based upon the observation that written symbols are not generally confused unless they represent the same speech sound. A sporadic interchange of letters could well have another explanation;

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but the frequent confusion of the same letters or groups of letters in document after document from various places and through several centuries must indicate that these written symbols have come to represent the same sound in the speech of the writers concerned.

This observation can be readily confirmed by an analysis of spelling mistakes today. I once made a study of spelling mistakes of boys at an English Grammar School and found that 94.2% of the mistakes represented the substitution of a letter or group of letters with precisely the same phonetic value as the correct spelling, e.g., *accomodate* (*m* and *mm* both = [m]), *orkestra* (*k* and *ch* here both = [k]), *reunight* (*-ight* and *-ite* both = [ait]). Only 5.8% of the mistakes were variants which did not accurately reflect the actual pronunciation, and these were usually readily explainable on orthographic grounds as visual spelling analogies (*hugh* for *huge*), inversions (*atmosphere* and *obvilion*), or dittographies (*accepteted*).

Spelling mistakes in the papyri are similarly instructive for the phonology of post-classical Greek, in which there was a disparity between spelling and pronunciation analogous to that in present-day English. Such a state of affairs in which there may be several spellings with the same phonetic value comes about within a language when there is a fixed conventional spelling system which then progressively fails to reflect a drastically changing pronunciation. The situation can be complicated further by the possibility of bilingual interference. This occurs, for instance, when a non-native speaker fails to perceive and produce sound distinctions in his acquired language which are unfamiliar because they do not correspond to sound distinctions in his own native language.

There are, of course, limits to the extent that spelling mistakes can reveal the pronunciation of a dead language; for neither the original sounds nor the transitional sounds can be assigned precise phonetic values. Phonemic oppositions, however, can be established; that is, a given sound can be distinguished from other sounds which are significant in the language at a particular place and time, and relative phonetic values for these sounds can be drawn up. In many languages, of which Greek is an outstanding example, the original oppositions can be reconstructed to a large degree by comparative and historical studies of the sound systems of related languages, and the present

sound system is easily observed in the modern spoken language. Thus the general framework of the sound system over the transitional period as a whole can be established.

This analysis of spelling mistakes in the papyri will first consider those involving  $\beta$ ,  $\gamma$ ,  $\delta$  alone, then those involving  $\beta$ ,  $\gamma$ ,  $\delta$  and  $\pi$ ,  $\kappa$ ,  $\tau$ , and finally those involving  $\phi$ ,  $\chi$ ,  $\vartheta$ .

### *Evidence for Voiced Fricatives*

The symbols for the classical Greek voiced stop consonants  $\beta$ ,  $\gamma$ ,  $\delta$  show variants not found in connection with the symbols for the corresponding voiceless stops  $\pi$ ,  $\kappa$ ,  $\tau$ . These variants seem at first sight to indicate that a distinction between voiced and voiceless stop consonants was still maintained. They indicate further that the sounds represented by these symbols have shifted from voiced stops to fricatives, i.e., /b g d/ to / $\underline{\beta}$   $\gamma$   $\delta$ /.<sup>2</sup> This phonetic shift is well known in the history of Greek phonology and is expected to have occurred in colloquial Greek during the time of the papyri. But the evidence indicates that, while the shift of the voiced labial /b/ is unconditioned, the shift of the voiced velar /g/ and dental /d/ is strictly limited to predictable phonetic conditions.

The sound represented by  $\beta$  seems to have shifted to the fricative[ $\underline{\beta}$ ] pronunciation which is attested as early as the fifth century B.C. in dialect inscriptions.<sup>3</sup> This pronunciation is indicated in the papyri by:

<sup>2</sup> The linguistic symbols used in this paper are those recommended by the International Phonetic Association. Symbols between diagonal lines represent *phonemes*, i.e., significant sounds in a language at a given period, capable of distinguishing one word from another; those within brackets represent phonetic values which may be sub-phonemic. A stop consonant is one in which there is complete stoppage of breath; labial, velar, and dental (palatal, etc.) refer to the points of articulation. Thus, /b g d/ are respectively bilabial, velar, and dental stops, like the initial sounds in English *bay*, *gay*, *day*. A fricative consonant is one in which there is only hindrance of breath so that friction results. Thus, / $\underline{\beta}$   $\gamma$   $\delta$ / represent respectively a voiced bilabial fricative (heard in Spanish intervocalic *b* or *v*), a voiced velar fricative (as in Modern Greek γάλα), and a voiced dental fricative (as in English *the*). Voiced and voiceless refer to the presence or absence of vibration of the vocal cords in the production of the sound, i.e., [b g d] are voiced stops, [p k t] voiceless stops; [ $\underline{\beta}$   $\gamma$   $\delta$ ] are voiced fricatives, [f x  $\vartheta$ ] are voiceless fricatives.

<sup>3</sup> Cp. E. Schwyzer, *Griechische Grammatik* i (München 1953) 207-8; M. Lejeune, *Traité de phonétique grecque*, 2ème éd. revue et corrigée (Paris 1955) §38; A. N. Jannaris, *An Historical Greek Grammar* (London 1897) §51. The first occurrence in Attic

1) transcriptions of Latin consonantal *u* (*v*) by Greek  $\beta$  with increasing frequency from the first century A.D. on, e.g., *Servicius* spelled  $\Sigma\epsilon\rho\beta\upsilon\kappa\acute{\iota}\omicron\upsilon\varsigma$  (SB 1088.2, A.D. 68), *evocatus* ἠβο[κᾶτ]ος (POxy. 33 = WChr. 20, iii.11-12, 2nd cent.), and *vicarius* βικαρίου (POxy. 1883.11, 2nd hand, with οὐικαρίου 2, 1st hand, A.D. 504);<sup>4</sup>

2) the occasional interchange of  $\beta$  with the second element of an *av* or *ev* diphthong (which was pronounced as a bilabial fricative), e.g., *προσαγόρεβε* (for *προσαγόρευσε* PJan. 101.9, 5th/6th cent.), or conversely *ράυδους* (for *ράβδους* PPar. 40, 41 = UPZ 12, 13.32, [40]; 25; 158 B.C.), and *ἐυδόμη* (for *ἐβδόμη* PLond. 1914.47, A.D. 335?);

3) the occasional insertion of  $\beta$  to represent a [w] glide between vowels, e.g., *προσαγορεύβομε* (for *προσαγορεύομαι* PRossGeorg. iii, 10.6, etc., 4th/5th cent.), *οἰκουσκεβῆ* (for *οἰκοσκευῆς* PLond. 1610.56, A.D. 709).<sup>5</sup>

One sound represented by  $\gamma$  in the papyri seems to have been a palatal fricative [j] attested elsewhere in Greek as early as the fourth century B.C.<sup>6</sup> This is indicated by:

1) an omission in Ptolemaic papyri of  $\gamma$  in *ὀλίγον* (PPetr. ii, 2 (1) = WChr. 337.16, 260 B.C. and eight other instances<sup>7</sup>);

2) an omission of  $\gamma$  or the following *i* in forms of *ὑγίης* and its derivatives from the second century B.C. on, e.g., *ὑ<γ>ιαίνομεν*, *ὑ<γ>ιαίνης* (PPar. 42 = UPZ 1, 64.3, 14, 156 B.C.), *ὑ<γ>ιαίνιν* (PFay. 127.3-4, 2nd/3rd cent.), *ὑ<γ>ιῆ* (POxy. 729.23, 2nd cent.), or *ὑ<γ>ι>αίνης* (PTebt. 12.13, 118 B.C.), *ὑ<γ>ι>ῆ* (PMich. 312.32, A.D. 34), and *ὑ<γ>ι>είας* (PMich. 496.6, 2nd cent.).

3) a converse insertion of  $\gamma$  before a front vowel in a few words, e.g., *ὑγι{γ}αίνις* (for *-ηις* PPar. 63 = UPZ 110, i.1, 5, 19, 165 B.C.), *μνα{γ}εῖα* (SB 7816 = PSI 1263.20, 2nd cent.), *μνα{γ}αῖον* (POxy. 905.6, A.D. 170);

inscriptions seems to be at the beginning of the first century A.D. (K. Meisterhans-E. Schwyzler, *Grammatik der Attischen Inschriften*, 3te Auflage [Berlin 1900] 77) as well as in Asia Minor inscriptions (E. Schweizer, *Grammatik der pergamenischen Inschriften* [Berlin 1898] 105).

<sup>4</sup> Graphs showing the increasing frequency of  $\beta$  for Latin *v* may be found in H. Zilliacus, "Till frågan om det grekiska B:s övergång till spirant," *Eranos* 33 (1935) 71-73.

<sup>5</sup> The examples cited are meant to be illustrative rather than exhaustive. All dates by centuries are A.D. unless otherwise noted.

<sup>6</sup> Cp. Schwyzler 209; Lejeune §38. A palatal fricative [j] is heard in the initial sound of English *yes*.

<sup>7</sup> E. Mayser, *Grammatik der griechischen Papyri aus der Ptolemäerzeit* i (Leipzig 1906) 163. The spelling *ὀλῖος* is frequent in Attic inscriptions from 300 B.C. on (Meisterhans-Schwyzler 75).

4) a transcription of the Latin *Traianus* with a  $\gamma$  representing the Latin consonantal *i*, e.g., *Τραγειανοῦ* (BGU 68.12, 25, A.D. 113/14).<sup>8</sup>

In other positions, the sound represented by  $\gamma$  might have been pronounced as a velar fricative [ɣ]. This is suggested by:

1) the occasional insertion of  $\gamma$  after a rounded vowel or diphthong in *-v*, e.g., *Εὐ{γ}εργέτιδι* (PTebt. 26.12, 114 B.C.), *εὐ{γ}εργετημένος* (POxy. 487.19, A.D. 156), *εὐ{γ}απόδεικτον* (probably for *εὐαπόδεικτον* PCairIsid. 62.16, A.D. 296), and *προσαγωρεύ{γ}ω* (for *προσαγορεύω* PSI 1430.10, 7th cent.);

2) the converse omission of  $\gamma$  in transcriptions of the Latin *Augustus*, e.g., *κλάσσης Αούστης* (BGU 741 = MChr. 244.6, A.D. 143/4), *Κωνσταντίνου Αούστου* (POxy. 1716.2, A.D. 333).

But a closer analysis of the positions in which these sounds occur, which are exactly the same positions in which evidence for a [w] vowel glide value of  $\beta$  was observed, suggests that after rounded vowels and diphthongs in *-v* the letter  $\gamma$  likewise served to represent the labial vowel glide [w]. This seems confirmed by the occasional insertion of  $\beta$  in identical words, e.g., *προσαγορεύβομε* (for *προσαγορεύομαι* PRossGeorg. iii, 10.6, 7, etc., eight times, 4th/5th cent.). Thus,  $\gamma$  seems to have served to represent both the palatal glide [j] and the labial glide [w] according to the rounded or unrounded quality of the preceding vowel.

A dental fricative represented in writing by  $\delta$ , although not so certainly attested elsewhere in the Koine,<sup>9</sup> seems indicated in the papyri

<sup>8</sup> A palatal fricative pronunciation would also well account for the fluctuation between  $\iota$  and  $\gamma$  in the representation of Egyptian *yod* in such names as 'Επιεύς/'Εργεύς from Egyptian *Ḥr-γ.w*. Cf. J. Vergote, *Phonétique historique de l'égyptien* i (Louvain 1945) 16-17. For occurrences of this name in the papyri, see F. Preisigke, *Namenbuch*, (Heidelberg 1922), and especially PRyl. 160-160d (first cent.).

<sup>9</sup> Early evidence in the classical dialects for a dental fricative is inconclusive (Schwyzer 208-9; Lejeune §49, n.1), and there are no indications of it in the Attic or Asia Minor inscriptions (Meisterhans-Schwyzzer 79, cp. 88-89; Schweizer 160-67); but a fricative pronunciation is indirectly reflected in transcriptions into Egyptian, e.g., Demotic *Tsgwl* for *Διοκλητιανός* (J. J. Hess, "Zur Aussprache des Griechischen [Griechische Umschriften demotischer Wörter]" *Indogermanische Forschungen* 6 [1896] 132), and occasional Coptic transcriptions of  $\delta$  by *z*, as in Sahidic *zeɣɣiɔc*, apparently for *διδυμιος* (K. Wessely, "Die griechischen Lehnwörter der Sahidischen und Bohairischen Psalmenversion," *Denkschriften der kaiserlichen Akademie der Wissenschaften in Wien*, Phil.-hist. Klasse 54, Abh. 111 [Wien 1910] 8; cp. H. P. Blok, "Die griechischen Lehnwörter in Koptischen," *Zeitschrift für ägyptische Sprache* 62 [1927] 49 ff.), and of prevocalic *σi*

in very restricted conditions, i.e. until Byzantine times only before *ι* (with or without a following vowel). This is indicated by:

- 1) the occasional loss of the following *ι* from the first century A.D. on, e.g., δ<ι>απέσηι (SB 7376.44, A.D. 3), δ<ι>ά (PRyl. 160c, ii.41, A.D. 32);
- 2) the writing of ζ for δι before a vowel, e.g., ζώρυγα (for διώρυγα PMey. 20.18, 3rd cent.), ζακοσίας (for διακοσίας POxy. 1646.31, 268/9 A.D.);
- 3) the interchange of δ and ζ, e.g., Σαράπιζι, λώδι[κ]α (for Σαράπιδι, λώδικα SB 7992.5-6, 13, 2nd/3rd cent.), ζειαβαλεῖν (for διαβαλεῖν POxy. 1158.22, 3rd cent.); ἀσπάδι (for ἀσπάζει POxy. 1670.24, 3rd cent.), σπουδάδεις, ρείδης, χρήδεις (for σπουδάζεις, ρίζης, χρίζεις POxy. 1069.10, 28, 32, 3rd cent.).

Only from the fourth century on is there an interchange of δ and ζ in other positions, e.g., σπούζασων, ζοῦῆναι (for σπούδασον, δοῦῆναι POxy. 1777.8, 9, with δοῦῆναι 14, 4th cent.), and δυγῶ (for ζυγῶ SB 9011.10, 5th/6th cent.).

The above evidence of spelling mistakes involving β, γ, δ suggests that the classical Greek voiced stops had, at least in certain conditions, shifted to fricatives. This shift was seen to be restricted for γ to an intervocalic position and for δ until Byzantine times to a position before *ι*; for β it was unrestricted in the transcription of Latin *ν* but restricted elsewhere to the intervocalic position after a rounded vowel or to the second element of a diphthong in *-υ*.

### *Conflicting Evidence for Voiced Stops*

In themselves, the above restrictions on fricatives could simply mean that the phonetic shift indicated was only beginning to take place. In this case, the restriction to certain phonetic conditions would represent the initial stages of the shift. However, there is much conflicting evidence from the same types of documents of the same time and place for an interchange of the symbols for the voiced stops with those of the corresponding voiceless stops, γ and δ with κ and τ respectively,

or ζ by Δ1, as in **ΣΥΜΠΟΔΙΟΝ** for *συμπόσιον* and **ΤΩΠΑΔΙΟΝ** for *τοπάζιον* (E. Crum, *A Coptic Dictionary* [Oxford 1939] sub Δ1), but also **ΔΟΠΑΤΙΟΝ** with assibilation of τ > c before ι (A. Böhlig, *Die griechischen Lehnwörter im sahidischen und bohairischen Neuen Testament* [München 1954] 110).

and less frequently  $\beta$  with  $\pi$ . This interchange occurs initially and medially, before and after vowels and consonants without apparent distinction.

Thus,  $\gamma$  is replaced by  $\kappa$  in such examples as the following:

- κόνατι (for γόνατι) *PRyl.* 160c, ii.16-17, A.D. 32  
 κείτονος (for γείτονες) *PRyl.* 160b.2, A.D. 37  
 ἀρκυρίου (for ἀργυρίου) *BGU* 86 = *MChr.* 306.38, A.D. 155  
 ἔκραψεν (for ἔγραψεν) *PRyl.* 161.31, A.D. 71  
 ὁμολοκῶ (for ὁμολογῶ) *BGU* 189 = *MChr.* 226.4, A.D. 7  
 θυκάτηρ (for θυγάτηρ) *SB* 1203.1

Conversely,  $\kappa$  is replaced by  $\gamma$  in such examples as the following:

- γαί (for καί) *PRyl.* 160c, i.8, A.D. 32  
 γυρίου (for κυρίου) *BGU* 975.12, A.D. 45  
 συγγεχοριγένε (for συγκεχωρηκέναι) *PMich.* 322a.40, A.D. 46  
 τόγου (for τόκου) *PPrinc.* 142.6, 10-11, ca. A.D. 23  
 πατριγῆς, βασιλιγῆ (for πατρικῆς, βασιλικῆ) *PMich.* 329-30.2, 6, A.D. 40  
 ἀγοούμεν (for ἀκούομεν) *PTebt.* 591, 2nd/3rd cent.

Similarly,  $\delta$  is replaced by  $\tau$  in such examples as:

- τοχῆς (for δοχῆς) *PTebt.* 131, 100 B.C.  
 τημοσίων (for δημοσίων) *PStudPal.* xxii, 20.15, A.D. 4  
 τραχμάς (for δραχμάς) *POxy.* 1646.31, A.D. 268/9  
 ἀντρός (for ἀνδρός) *PRyl.* 160c, ii.14, 33, A.D. 32  
 εἰτέναι (for εἰδέναι) *PPrinc.* 141.4, A.D. 23  
 ἀποτώσιν (for ἀποδώσειν) *PPrinc.* 142.9, ca. A.D. 23

Conversely,  $\tau$  is replaced by  $\delta$  in such examples as:

- δέλος (for τέλος) *WO* 1084.5-6, etc., 137/6 B.C.  
 ἀποδισάτωι (for ἀποτισιάτω) *PRein.* 11.21, 111 B.C.  
 δόκους (for τόκους) *PPrinc.* 141.3, A.D. 23  
 διμήν (for τιμήν) *PRyl.* 160.5, A.D. 29  
 μηδρός (for μητρός) *PRyl.* 160d, i.1 (twice), A.D. 42  
 ἀπαιδουμένων (for ἀπαιτουμένων) *PMich.* 256.7, A.D. 29/30

Evidence for an interchange of the symbols  $\beta$  and  $\pi$  is considerably less widespread, but instances are found in the same phonetic conditions. Thus,  $\beta$  is replaced by  $\pi$  in such examples as:

*πασιλι(κῆς)* (for *βασιλικῆς*) *PTebt.* 224, 108 B.C.  
*σεπάσμ(ιον)* (for *σεβάσμιον*) *PSI* 40.18, with *σεβαστόν* 12, 15, (16), A.D. 129  
*ἐνπολῆς* (for *ἐμβολῆς*) *SB* 5273.16, 17, but spelled correctly 5, 9, A.D. 487  
*ἀποβλαπέντων* (for *ἀποβλαβέντων*) *PSI* 71.7, 6th cent.

Conversely, *π* is replaced by *β* in such examples as:

*πέμβτης* (for *πέμπτης*) *BGU* 912.41, A.D. 33  
*βόλιν* (for *πόλιν*) *POxy.* 1070.36, 3rd cent.  
*ἄβαξ* (for *ἄπαξ*) *PLond.* 417 = *WChr.* 129 = *PAbinn.* 32.8, 12, ca. A.D. 346  
*βαρέσχ[ο]* (for *παρέσχον*) *PJand.* 17.7, 6th/7th cent.

This evidence for the confusion of the symbols for the classical voiced and voiceless stops seems to contradict the evidence adduced above of misspellings involving the symbols *β*, *γ*, *δ* which indicated a phonetic change of the voiced stops once represented by these symbols to fricatives. For unless the voiced stops continued to be pronounced as stop consonants and not as fricatives throughout the period of the papyri, they could hardly have been confused with voiceless stops. Moreover, many of these misspellings were found in similar positions and even in identical words as those indicating the shift of voiced stops to fricatives.

This discrepancy poses a major problem for the linguist. Either he must succeed in reconciling the conflicting evidence by distinguishing various causes simultaneously at work or he must logically reject a fundamental principle of historical phonology: that the pronunciation of a dead language can be determined within satisfactory limits by variations in spelling. I suggest the following approach to a reconciliation of the evidence.

### *Analysis of the Evidence*

The frequent unconditional interchange of *γ* with *κ* and *δ* with *τ* must indicate the complete identification of the voiced and voiceless phonemes originally represented by these symbols in a single velar /k/ and dental /t/ phoneme in the speech of the writers of the papyri in which these interchanges are found. The considerably less frequent interchange of *β* with *π* does not indicate complete identification.

A closer analysis of the positions in which this identification occurs as compared with those in which *γ* and *δ* gave evidence of a fricative



pronunciation shows that no interchange of  $\gamma$  and  $\kappa$  takes place in forms of  $\delta\gamma\eta\varsigma$  and its derivatives (where a palatal vowel glide [j] was indicated), and no interchange of  $\delta$  and  $\tau$  before prevocalic  $\iota$  (where the dental fricative was first indicated). This analysis is supported by documents in which both phenomena occur, e.g., *POxy.* 1646.31, A.D. 268/9, which has  $\tau\rho\alpha\chi\mu\acute{\alpha}\varsigma$   $\zeta\alpha\kappa\omicron\varsigma\iota\alpha\varsigma$  for  $\delta\rho\alpha\chi\mu\acute{\alpha}\varsigma$   $\delta\iota\alpha\kappa\omicron\varsigma\iota\alpha\varsigma$ , and *PRyl.* 160–160d, which provide evidence both for the loss of prevocalic  $\iota$  after  $\delta$  in  $\delta\langle\iota\rangle\acute{\alpha}$  (160c, ii.41, A.D. 32) and a very frequent confusion of  $\delta$  and  $\tau$ , e.g.,  $\acute{\alpha}\nu\tau\rho\acute{\omicron}\varsigma$  for  $\acute{\alpha}\nu\delta\rho\acute{\omicron}\varsigma$  (160c, ii.14,33). In addition, no writer shows both variants in a word elsewhere subject to both phenomena, e.g.,  $\acute{\alpha}\rho\langle\gamma\rangle\upsilon\rho\iota\kappa[\acute{\eta}]\nu$  (*PFamTebt.* = *PLBat.* 6.13,19, but correct 40, A.D. 113/14) vs.  $\acute{\alpha}\rho\kappa\upsilon\rho\acute{\omicron}\iota\omicron\nu$  (*BGU* 86 = *MChr.* 306.38, A.D. 155),  $\acute{\epsilon}\langle\gamma\rangle\rho\alpha\upsilon\epsilon\nu$  (*PMich.* 304.10, 1st cent.) vs.  $\acute{\epsilon}\kappa\rho\alpha\upsilon\epsilon\nu$  (*PRyl.* 161.31, A.D. 71), and  $\theta\upsilon\langle\gamma\rangle\acute{\alpha}\tau\eta\rho$  (*PTebt.* 397.29, A.D. 198) vs.  $\theta\upsilon\kappa\acute{\alpha}\tau\eta\rho$  (*SB* 1203.1).

This analysis leads to the conclusion that the voiced stops shifted to fricatives only in the restricted conditions observed above, but that elsewhere they remained stops and so came to be confused with the voiceless stops in the speech of the writers concerned. The several instances of conflicting phenomena in the same word indicate the existence of more than one system of pronunciation in Egypt during the time of the papyri. One writer's pronunciation extended the fricative to other positions while another's identified the voiced stop with the corresponding voiceless stop. It remains to determine the precise cause of such an identification.

### *Bilingual Interference*

This identification of voiced and voiceless is quite unknown in Greek. It reflects a pronunciation essentially different from that observed in Greek elsewhere in the Mediterranean world and unconnected with earlier Greek dialectal pronunciations or subsequent phonetic changes. It is impossible that in the direct line of linguistic development the voiced and voiceless stops could at one time have been identified in Greek. These stops were originally distinct, and their corresponding reflexes are distinct in Modern Greek today, even though the classical voiced stops shifted to fricatives. If, then, this confusion of voiced and voiceless stops does not fit into the general

pattern of development of the Greek language, it is quite possible that its presence in Egypt may be explained in terms of interference from the Egyptian language.

Egyptian interference in the Greek of the non-literary papyri is indicated by the fact that many documents which exhibit this confusion of the symbols for the voiced and voiceless stops can be shown on external grounds to have been written by Egyptians. The group of documents which perhaps displays confusion of stops in the highest degree is *PRyl.* 160–160d; these are bilingual Demotic-Greek contracts from Soknopaiou Nesos in the northern Fayum. Others are *BGU* 713, 854, 910–12. Several of the Michigan contracts from first-century Tebtunis (*PMich.* 249–356) are in part Demotic, and almost all are notarial documents drawn up in the village record office. The social milieu reflected in these documents is emphatically Egyptian, indicating that there was a substantial number of bilingual speakers. Once bilingualism in the papyri is indicated as a possibility, it is reasonable to look for causes in the native linguistic habits of Egyptian speakers of Greek which could account for the above confusion of stops.

The phonemic system of the Egyptian language spoken in Greco-Roman times had the following consonants in contrast with the Greek voiced and voiceless stops: /k, t, p; kj, tj; β/.<sup>10</sup> In no dialect at any time during the period of the papyri is there any evidence for distinct phonemes /g, d/. The Coptic letters ϣ and ⲁ occur (except after ⲛ) only in Greek loanwords, in which they interchange with the voiceless stops represented by Coptic κ and τ as frequently as in the Greek papyri.<sup>11</sup> The Coptic sound represented by the letter ⲃ, however, occurs as a distinct phoneme. Its pronunciation is known to be

<sup>10</sup> W. H. Worrell, *Coptic Sounds* (Ann Arbor 1934); W. Czermak, *Die Laute der ägyptische Sprache* (Wien 1931–4); J. Vergote, *Phonétique historique de l'égyptien i, Les consonnes* (Louvain 1945).

<sup>11</sup> Parallel interchanges in Coptic are found in Crum (above, note 9), where selected variant spellings are given at the beginning of the treatment of each letter; P. E. Kahle, *Bala'izah* (London 1954), where dialectal and orthographic variations in Coptic and Greek words are listed in the Introduction, Vol. i, for consonants, pp. 93–149, under the heading of the letter involved; Worrell (above, note 10) 99–114, where dialectal and vulgaristic misspellings in sixth and seventh century Theban documents and in a manuscript of the Sahidic Psalter are collated; Böhlig (above, note 9); Wessely (above, note 9); Th. Hopfner, "Über Form und Gebrauch der griechischen Lehnwörter in der koptisch-sa'idischen Apophthegmenversion," *Denkschriften der kaiserlichen Akademie der Wissenschaften in Wien*, Phil.-hist. Klasse, Bd. 62 [1918], 2 Abh.).

fricative [β];<sup>12</sup> and in both native Egyptian words and Greek loanwords it interchanges more frequently with ογ /w/ (and with ϣ /f/) than with π /p/, a proportion parallel to that observed in the Greek papyri. The appearance of ϣ and Δ in some Coptic words after ν does suggest that the velar stop was voiced [g] and the dental [d] as positional variants (allophones) of the phonemes /k, t/.<sup>13</sup>

This analysis of the Egyptian phonemic system contrasted with that of Greek illustrated by spelling variants in the papyri indicates in terms of bilingual interference that Egyptian speakers who did not have voiced stop phonemes in their native language seem to have failed in many instances to perceive and produce the Greek voiced-voiceless opposition in velar and dental stops. The symbols for labial stops were not so frequently confused because Coptic had in opposition to /p/ a bilabial fricative /β/, which Greek β seems to have come to represent.

Other variant spellings in the papyri which involve the omission of one or other of the symbols for voiceless stops κ, τ, π reflect the normal simplification of consonant clusters in speech, e.g., πέμ<π>του (*WO* 3.3; 4.4; A.D. 17/18), ἔπεμσας, etc. (*POxy.* 528.11-12, 19, 24, 2nd cent.); but the fairly frequent loss of τ following σ, e.g., ἐπισ<τ>όλιον (*PMich.* 500.3, 2nd cent.), πισσικίου (for πιστικίου *PCairIsid.* 48.2, 4; 49.5; A.D. 309), and the not uncommon ἐσσί (for ἐστί *BGU* 385 = *WChr.* 100.6, 2nd/3rd cent.; 602.8, 2nd cent.; *POxy.* 2154.18, 4th cent.), probably reflect an assimilation of [t] to [s] in this position. This is possibly caused by interference from Egyptian, in which Sahidic **caṭeεpe** and Bohairic **caṭeεpi** (= Greek στατήρ) in manuscripts of the New Testament<sup>14</sup> suggest a tendency to simplify this consonant cluster in initial position.

### *Aspirated Stops*

Variant spellings involving the symbols for the classical aspirated stops χ, θ, φ indicate some confusion of these with their corresponding

<sup>12</sup> Worrell (above, note 10) 40, 84, 88; Vergote (above, note 10) 11-17.

<sup>13</sup> Worrell 79-80; Vergote 103-4. Cp. Demotic transcriptions of Greek δ more frequently by *nt* than *t*, γ by *ng*, and ζ by *ns* (Hess [above, note 9] 123 ff.).

<sup>14</sup> Böhlig (above, note 9) 115.

voiceless stops  $\kappa$ ,  $\tau$ ,  $\pi$ .<sup>15</sup> But an analysis of the evidence strongly indicates restrictive phonetic conditions for the loss of aspiration.

The interchange occurs most frequently when the aspirate follows /s/, as in the following examples:

- $\tau\iota\theta\acute{\epsilon}\sigma\tau\omega$  (for  $\tau\iota\theta\acute{\epsilon}\sigma\theta\omega$ ) *PTebt.* 72.455, 456, 114 B.C.  
 $\acute{\alpha}\pi\epsilon\sigma\chi\eta\kappa\acute{\epsilon}\nu\alpha\iota$  (for  $\acute{\alpha}\pi\epsilon\sigma\chi\eta\kappa\acute{\epsilon}\nu\alpha\iota$ ) *PMich.* 344.7, 1st cent.  
 $\sigma\kappa\tilde{\omega}\sigma\iota\nu$  (for  $\sigma\chi\tilde{\omega}\sigma\iota\nu$ ) *POxy.* 1068.20–21, 3rd cent.  
 $\gamma\epsilon\acute{\nu}\epsilon\sigma\tau\epsilon$ ,  $\phi\epsilon\iota\lambda\omicron\pi\omicron\nu\epsilon\iota\sigma\tau\epsilon$  (for  $-\sigma\theta\alpha\iota$ ) *POxy.* 1069.3, 11, 25; 20; 3rd cent.  
 $\acute{\alpha}\sigma\pi\alpha\lambda\acute{\iota}\sigma\alpha\iota$  (for  $\acute{\alpha}\sigma\phi\alpha\lambda\acute{\iota}\sigma\alpha\iota$ ) *POxy.* 298.60, 1st cent.  
 $\epsilon\iota\sigma\pi\omicron\rho\acute{\alpha}$  (for  $\epsilon\iota\sigma\phi\omicron\rho\acute{\alpha}$ ) *PLond.* 1249.6, A.D. 345

It occurs next most frequently preceding another aspirated stop, as in the following examples:

- $\delta\iota\alpha\nu\epsilon\kappa\theta\acute{\epsilon}\nu\tau\epsilon\varsigma$  (for  $\delta\iota\alpha\nu\epsilon\chi\theta\acute{\epsilon}\nu\tau\epsilon\varsigma$ ) *PTebt.* 25.17, 117 B.C.  
 $\acute{\alpha}\kappa\theta\acute{\eta}\nu\alpha\iota$  (for  $\acute{\alpha}\chi\theta\acute{\eta}\nu\alpha\iota$ ) *PRyl.* 138.26, A.D. 34  
 $\acute{\epsilon}\kappa\theta\acute{\epsilon}\varsigma$  (for  $\acute{\epsilon}\chi\theta\acute{\epsilon}\varsigma$ ) *PTebt.* 591, 2nd/3rd cent.  
 $\omicron\pi\theta\alpha\lambda\mu\acute{\omicron}\nu$  (for  $\omicron\phi\theta\alpha\lambda\mu\acute{\omicron}\nu$ ) *PMich.* 241.10, 16, A.D. 16  
 $\pi\epsilon\mu\pi\theta\eta\sigma\omicron\mu\acute{\epsilon}\nu\omicron\upsilon\varsigma$  (for  $\pi\epsilon\mu\phi\theta-$ ) *BGU* 235 = *WChr.* 399.15, 2nd cent.

In the case of  $\theta$ , both aspirates often change to voiceless, e.g.,  $\sigma\upsilon\nu\tau\alpha\kappa\tau\acute{\epsilon}\iota\sigma\eta$  (for  $-\tau\alpha\chi\theta\acute{\epsilon}\iota\sigma\eta$  *POxy.* 1470.13, A.D. 336)  $\omicron\pi\tau\acute{\iota}\eta$  (for  $\omicron\phi\theta\acute{\epsilon}\iota\eta$  *POxy.* 1101.22, A.D. 367/70).

Other frequent occurrences are found in connection with a liquid or nasal, as in the following examples:

- $\kappa\acute{\epsilon}\kappa\rho\eta\kappa\alpha$  (for  $\kappa\acute{\epsilon}\chi\rho\eta\kappa\alpha$ ) *POxy.* 299.5, late 1st cent.  
 $\acute{\alpha}\pi\epsilon\lambda\tau\acute{\iota}\nu$  (for  $\acute{\alpha}\pi\epsilon\lambda\theta\epsilon\acute{\iota}\nu$ ) *PTebt.* 575, 2nd cent.  
 $\acute{\alpha}\pi\epsilon\lambda\tau\omicron\upsilon\sigma\alpha$  (for  $\acute{\alpha}\pi\epsilon\lambda\theta\omicron\upsilon\sigma\alpha$ ) *BGU* 380.3–4, 3rd cent.  
 $\xi\eta\rho\alpha\nu\tau\acute{\iota}\sigma\alpha\nu$  (for  $-\theta\epsilon\acute{\iota}\sigma\alpha\nu$ ) *POxy.* 53.10, A.D. 316  
 $\acute{\alpha}\phi\lambda\acute{\omega}\mu\alpha\tau\omicron\varsigma$  (for  $\acute{\alpha}\pi\lambda\acute{\omega}\mu\alpha\tau\omicron\varsigma$ ) *SB* 5174.16, A.D. 512  
 $\acute{\alpha}\mu\pi\acute{\omega}\tau\epsilon(\rho\alpha\iota)$  (for  $\acute{\alpha}\mu\phi\acute{\omicron}\tau\epsilon\rho\alpha\iota$ ) *PRyl.* 160b.6, A.D. 37

These phonetic conditions in which the symbols for aspirated and voiceless stops are found most frequently confused are known conditions for the loss of aspiration elsewhere in Greek. Loss of aspiration in dentals after /s/ is found frequently in Delphic inscriptions,<sup>16</sup> and

<sup>15</sup> Aspirated stops in Greek are voiceless stops accompanied by an explosion of breath in their pronunciation. The aspirated stops were distinct phonemes in classical Greek /kh th ph/ in opposition to the (unaspirated) voiceless stops /k t p/.

<sup>16</sup> E. Rüschi, *Grammatik der Delphischen Inschriften* (Berlin 1914) 193–4.

fluctuation in the use of  $\chi/\kappa$  and  $\vartheta/\tau$  in this position is observed in the Dura-Europos papyri.<sup>17</sup> The shift of  $\sigma\vartheta$  to  $\sigma\tau$  characterized Northwest Greek at an ancient date,<sup>18</sup> and sporadic occurrences of the loss of aspiration after /s/ in all three aspirated stops are observed in the Herculaneum papyri as well as in the case of  $\chi$  before  $\rho$ .<sup>19</sup> An aspirate immediately preceding another aspirate is thought always to have thrown forward its aspiration and become equivalent to the corresponding voiceless stop.<sup>20</sup> Loss of aspiration before and after nasals and at least before liquids is also found occasionally in the ancient dialects.<sup>21</sup>

Interchange of the symbols for the aspirated and voiceless stops in other positions is relatively rare in the papyri, but it does occur in such examples as the following:

ἐγδοκὴν (for ἐκδοκὴν) *PPar.* 63, iii = *PPetr.* iii, p. 18 = *UPZ* 110.86, 165 B.C.

κέωσιν (for χέουσιν) *PRyl.* 653.8, A.D. 320

ῥχου (for οἴκου) *PMich.* 274-5.9, A.D. 46/7

τέσθαι (for θέσθαι) *PTebt.* 5.225, 118 B.C.

τυγατρεί (for θυγατρί) *SB* 8013 = *PStrauss.* 131.18, with θυγ- 16, A.D. 363

θιμήν (for τιμήν: preceding word ends in -s) *SB* 4362.3, A.D. 145

καταροῦ (for καθαροῦ) *PSI* 30.4, A.D. 82

ἀπεληλύττειν (for ἀπεληλύθειν) *PMich.* 491.7-8, 2nd cent.

ἀπογράπομε (for ἀπογράφομαι) *PLBat.* v, ix.23; xii.21; xiv.28; A.D. 174

ἄφαντα (for ἅπαντα) *CPR* 223.28, 2nd cent.

This apparently unconditional interchange of the symbols for the

<sup>17</sup> E.g., ἀπεσκεκένε (for ἀπεσχηκέναι *PDura* 26), but ἀφείσθασθαι (for ἀφέστασθαι *PDura* 31) and κατεσθάθην (for κατεστάθην *PDura* 46), all private letters of the 3rd cent. A.D.

<sup>18</sup> Lejeune (above, note 3) §41. This phenomenon is considered by P. Kretschmer, *Einleitung in die Geschichte der griechischen Sprache* (Göttingen 1896) 13-14, as a Northwest Greek element of the Koine.

<sup>19</sup> W. Crönert, *Memoria Graeca Herculensis* (Lipsiae 1903) 81-85. For the loss of aspiration after /s/ in the papyri, see further S. G. Kapsomenos, "Ἐρευναι εἰς τὴν Γλῶσσαν τῶν Ἑλληνικῶν Παπύρων. Σείρα Πρώτη," *Ἐπιστημονικὴ Ἐπέτηρις* 7 (Thessaloniki 1957) 351-2; elsewhere in the Koine, K. Dieterich, *Untersuchungen zur Geschichte der griechischen Sprache von der Hellenistischen Zeit bis zum 10. Jahrhundert n. Chr.* (*Byzantinisches Archiv*, *Ergänzung der Byzantinischen Zeitschrift*, Heft 1, Leipzig 1989) 100; S.B. Psaltes, *Grammatik der Byzantinischen Chroniken* (Göttingen 1913) 95.

<sup>20</sup> Cp. Schwyzler (above, note 3) 210-11; Lejeune (above, note 3) §50.

<sup>21</sup> Lejeune §41. Cp. also Latin transcriptions such as *Trhaso*, *Mithridates*, *Clhoe* (Leumann-Hofmann-Stolz-Schmalz, *Lateinische Grammatik* (München 1928) 131.

aspirated and voiceless stops in the papyri is infrequent, but occurs often enough to be puzzling. Since aspirated and voiceless stops were thus seemingly identified in the speech of some writers, as voiced and voiceless stops were, a corresponding identification of aspirated and voiced stops by those same writers is expected. But there is no firm evidence of this. The only instances which occur with any regularity are forms of *οὐθείς*, *μηθείς*, etc., for *οὐδείς*, *μηδείς*. These do not represent an actual interchange of the symbols *δ* and *θ*; they are found in Attic and other dialects from 378 B.C. on, along with *ὄθ'* (for *ὄδε* before a rough breathing) and *οὐθ'* (for *οὐδέ* in the same position),<sup>22</sup> and represent the assimilation of /d/ before a rough breathing (the feminine is always *οὐδεμία*, etc.). These forms diminish in frequency in the papyri after the second century A.D.

There is no fully satisfactory explanation for the occasional interchange of aspirated and voiceless stops in the papyri in terms of bilingual interference. In the Bohairic dialect of Coptic, spoken throughout the Delta area, there were aspirated stop phonemes; in the other dialects, there were consonant clusters of a voiceless stop + aspirate.<sup>23</sup> In Bohairic, however, opposition between voiceless and aspirate occurred only in accented syllables, and the aspirates were themselves lost in late Byzantine times.<sup>24</sup> Confusion of aspirates with their corresponding voiceless stops, at least in the case of the dentals, is already found increasingly frequently in Demotic inscriptions, especially in words without a traditional orthography.<sup>25</sup> In Coptic documents, there are parallel interchanges of aspirates and voiceless stops, both in native Egyptian words and in Greek loanwords.<sup>26</sup> These interchanges are infrequent in comparison with the interchange of voiced and voiceless stops but proportionate to the frequency of the unrestricted interchange of aspirated and voiceless stops in the Greek papyri. This proportion

<sup>22</sup> Meisterhans-Schwyzler (above, note 3) 104; Schweizer (above, note 3) 112-14.

<sup>23</sup> Worrell (above, note 10) 85; Crum (above, note 9), sub X, Θ, Φ; G. Steindorff *Lehrbuch der Koptischen Grammatik* (Chicago, 1951) §7, 11; Vergote (above, note 10) 34.

<sup>24</sup> Vergote, *ibid.*

<sup>25</sup> *Ibid.*

<sup>26</sup> Kahle (above, note 11) §72 (*κ* > *χ*), §117B (*χ* > *κ*), §111A (*τ* > *θ*), §97A (*π* > *φ*), §116E (*φ* > *π*); Worrell (above, note 10) 99 ff; Böhlig (above, note 9) 108-9; Crum (above, note 9), under the individual letters.

lends support to a hypothesis of bilingual interference in the pronunciation of the aspirated stops. The relative infrequency of this interchange in the Greek loanwords in Coptic may be a result of the loanwords acquiring a spelling pronunciation within Coptic. Such a spelling pronunciation is indicated at least for the word  $\Theta\alpha\lambda\lambda\alpha\kappa\kappa\alpha$  in which initial  $\tau$  ( $\Theta$  being a monograph for  $\tau\zeta$ ) was mistaken for the feminine article, so that when it appears without the definite article, it is spelled  $\zeta\alpha\lambda\lambda\alpha\kappa\kappa\alpha$ .<sup>27</sup>

A closer examination of the evidence for the confusion of stops in the papyri reveals that documents which show an identification of voiced and voiceless stops do not generally confuse the aspirates with the voiceless stops. Thus, the interchange of voiced and voiceless stops in *PRyl.* 160–160d is extremely common, while the interchange of aspirates and voiceless stops occurs only in those restricted conditions in which aspirates tended to lose their aspiration. This distribution seems to indicate that while the writers of these bilingual contracts could not distinguish between the voiced and voiceless stops, they could and did distinguish between the voiceless and aspirated stops. Similar distributions are found in other papyrus documents showing confusion of stops. In terms of distinctive features, these speakers may have been able to perceive and produce the tense/lax opposition if not the voiceless/voiced.

There is little evidence in the papyri, even in Byzantine times, for the shift of the classical Greek aspirated stops to fricatives /x, θ, f/.<sup>28</sup> An occasional omission of an aspirate, e.g.,  $\pi\rho\omicron\langle\theta\rangle\epsilon\acute{\iota}\nu\alpha\iota$  (*POxy.* 1100.4, A.D. 206), seems to be a mere scribal error, especially since the omission tends to occur in the same positions in which an aspirate was seen to lose its aspiration, e.g.,  $\alpha\pi\acute{\epsilon}\sigma\langle\chi\rangle\alpha\mu\epsilon\nu$  (*PCairIsid.* 108.6, A.D. 276),  $\epsilon\rho\rho\omega\sigma\langle\theta\rangle\alpha\iota$  (*POxy.* 1069.34, 3rd cent.). Interchange of aspirates among themselves is too sporadic to warrant any phonological con-

<sup>27</sup> Steindorff (above, note 23) §74.

<sup>28</sup> For this shift, see Schwyzer (above, note 3) 204–7. Cp. Schweizer (above, note 3) 109–15, who finds evidence for a fricative pronunciation of  $\chi$  in Asia Minor by the second century B.C. and of  $\phi$  in S.W. Asia Minor by A.D. 150 (p. 111, Anm. 2). There is an indication of fricative  $\phi$  in Attica in A.D. 120 (Meisterhans-Schwyzler [above, note 3] 78). Transcriptions of  $\theta$  in Demotic may point to a fricative pronunciation of this aspirate before [i], as *psymtsy* (for  $\psi\mu\acute{\upsilon}\theta\iota\omicron\nu$ ) and *prtsytqw* (for  $\Pi\alpha\rho\theta\upsilon\kappa\acute{o}\varsigma$ , Hess [above, note 9] 130–32).

clusions, e.g.,  $\theta\acute{\epsilon}\rho$  (for  $\chi\acute{\epsilon}\rho$  *PMich.* 276.33, A.D. 47). Transcriptions of Latin *th* and *f* by  $\vartheta$  and  $\phi$ , e.g.,  $\Gamma\omicron\vartheta\vartheta\iota\kappa\omicron\upsilon$  *Gothicus* (*POxy.* 1631.35, A.D. 280), and  $\phi\alpha\mu\iota\lambda\iota\alpha\varsigma$  *familia* (*POxy.* 1712.3, A.D. 394), favor a fricative pronunciation of  $\vartheta$  and  $\phi$ ; but transcriptions are not cogent arguments for the pronunciation of a given time. For  $\vartheta$  and  $\phi$  were the symbols in the Greek alphabet most easily adopted to represent Latin *th* and *f*.

This paper will conclude by presenting a chronology of the sound changes observed and discussing the extent of bilingual interference in the Greek of the papyri.

### *Chronology of Sound Changes*

It must be remembered that precise time limits cannot always be assigned to sound changes in dead languages, even when evidence is derived from such a large corpus as the more than 20,000 papyri, whose spelling mistakes ensure amply wide empirical bases for grammatical conclusions. Phonetic changes may take place without being reflected in writing. Nor do sound changes always follow a direct line of development. The factor of bilingual interference further complicates the question, since the speech of bilinguals is apt to reflect approximate sounds which would not be confused in the speech of native Greek speakers. The evidence of the misspellings in the papyri must be evaluated carefully and a sound change recognized only where the frequency and regularity of variation demand an identification of the sounds represented by the symbols confused.

The shift of the classical voiced stop /b/ to a fricative /β/ is first attested in the second century B.C. but does not appear widespread until the first century A.D. The velar stop /g/ appears as a palatal fricative /j/ in forms of  $\omicron\lambda\acute{\iota}\gamma\omicron\varsigma$  in the third and second centuries B.C., in forms of  $\upsilon\gamma\iota\acute{\eta}\varsigma$  and its derivatives from the second century B.C. on, elsewhere only irregularly from the first century A.D. on. A bilabial vowel glide [w] appears occasionally from the second century B.C. on. The dental stop /d/ appears to have shifted to fricative /ð/ before prevocalic  $\iota$  from the early first century A.D. on, before every  $\iota$  and its equivalents (i.e., before /i/ as well as /j/) from the third century A.D. on, in other positions from the fourth century A.D. on.



Bilingual interference in stops begins with the identification of the dental stops /d/ and /t/ by many writers from the second century B.C. on and the corresponding identification of the velar stops /g/ and /k/ from the early first century A.D. on. The labials /β/ and /p/ are never widely identified, nor are the aspirated stops identified by more than a few writers with their corresponding voiceless stops. Aspirates lose their aspiration in predictable phonetic conditions throughout the period of the papyri. The aspirated stops do not seem to have shifted to fricatives in Egypt.

### *Extent of Bilingualism*

Evidence for bilingualism in the papyri naturally leads to the question of its extent. Can we distinguish in this linguistic situation between bilinguals whose Greek speech shows Egyptian interference and monolinguals whose writings offer no such evidence? Or was bilingualism so widespread in the community that its residual effects can be seen without distinction in writers of various backgrounds? These questions are difficult to answer for a number of reasons, primarily because of the difficulty of determining on external criteria the probable linguistic affinities and contacts of a given writer or scribe of a papyrus document. Further, since Greek spelling was traditional at this period, evidence for or against bilingualism is limited to relatively poorly written documents. Perhaps only this much can be said: that of all the papyri whose spelling deviates sufficiently from the traditional norm to reflect the writer's pronunciation, more than one in five shows some evidence, and one in ten unambiguous evidence, of Egyptian interference. This does not necessarily mean, of course, that only between 10% and 20% of the writers of the papyri were bilingual. It could possibly mean, on consideration of the above qualifications, that the majority of the writers were bilingual, at least in the sense of having residual interference phenomena in their language.

Interference phenomena, especially such unambiguous indications of Egyptian influence as the interchange of voiced and voiceless stops, occur mainly in documents which appear on external grounds to emanate from the Egyptian element of the population. On the other hand, interference phenomena are found also in documents which

seem not to be written by Egyptians, e.g., *BGU* 71, *POxy.* 1130, and *PFay.* 110-20.

Regarding the regional distribution of bilingualism in Egypt, interference phenomena seem most widespread in first and second century Soknopaiou Nesos, but cannot be restricted to this village. They are also quite common in contemporary documents from Tebtunis and other villages in the Fayum. As a general rule, even allowing for the distribution of the papyri discovered in various places, interference phenomena are less widespread farther south at this period, including Hermopolis and Oxyrhynchus, than in late Roman and Byzantine times, when bilingualism is at least as much in evidence in the Theban region as in the Fayum. In the earlier centuries, it is considerably more in evidence in documents written in villages than in the towns and nome-capitals, but in later times, no such disproportion is apparent.

Regarding the nature of the documents in which interference phenomena are reflected, contracts are in fact the group of documents which show the most evidence for bilingual interference. Interference phenomena are found both in bilingual contracts and those composed entirely in Greek; they are found in contracts of various types, including both private acknowledgments and contracts drawn up in the official record offices, and both in the body of contracts and in the signatures of the contracting parties. Evidence of bilingual interference is also found commonly in private letters, receipts, orders, accounts, and in petitions. These are written by persons with Greek and Egyptian names, by private and official persons from various social levels.

I hope that this paper on the pronunciation of Greek stops in the papyri will serve to illustrate the type of evidence for bilingual interference found in these documents, and to outline the rich possibilities a bilingual approach to Koine Greek offers, not only in Egypt, but wherever this common language of everyday commerce was adopted by speakers of other linguistic affinities.