too obvious that their authors are not logicians. Nor are the Epicureans much interested in logic (in the proper sense of formal logic), although they have some good things to say about what it takes to establish a generalisation on inductive grounds, and they quite rightly charge the Stoics with paying insufficient attention to confirmation theory.[104] All through the Hellenistic period serious logic is the preserve of the Stoic establishment (the political image is perhaps not inappropriate), which meant, as I have tried to explain, that the whole massive weight of the Stoic system stood against any further development of Aristotle's pioneering start.

With this last result we have come full circle. If one believes that an adequate philosophy of science must find a place for non-deductive as well as for deductive logic, one will conclude that, as logicians, Aristotle was a better friend to the sciences than Zeno and Chrysippus. If Aristotle's wisdom in these matters disappeared into the rhetorical tradition, rather than being taken up and developed by philosophers or scientists, a large share of the blame must rest with the authority of Zeno's work *On Signs* (DL VII 4) and the Stoic tradition generally.[105]

104. See Sedley's account in Chapter 8.

105. The length of this paper is a response, I hope a productive response, to the difficulty of some of the issues raised at the conference discussion and to an extremely penetrating set of criticisms from Jonathan Barnes. I am grateful also for comments on the first draft from Theodor Ebert, David Glidden, Jonathan Lear and an audience at Stanford University. In preparing the final version I had the advantage of being able to consult David Sedley's contribution in Chapter 8, to which I am enormously indebted even where I have favoured a different view.

8 On Signs

DAVID SEDLEY

1. *Philodemus, de Signis*

With the appearance in 1978 of Philip and Estelle De Lacy's second edition of Philodemus, *de Signis*, one which unlike its predecessors is based on adequate papyrological information,[1] the time is ripe for renewed discussion of this work and its place in Hellenistic philosophy. Its real title is Philodemus, *On* [. . .] *and Sign-inferences*. The missing word may be *phantasiai*, 'impressions', or *phainomena*, 'appearances', but this need not concern us now

1. P. and E. De Lacy, *Philodemus, On Methods of Inference* (Naples, 1978²). Marcello Gigante, director of the Centro Internazionale per lo Studio dei Papiri Ercolanesi, generously supplied the editors with the readings of the papyrus, and to this end was able to call upon the expert papyrological assistance of Francesca Longo Auricchio and Adele Tepedino Guerra. Previous editions and discussions had relied mainly on the 19th-century facsimiles: T. Gomperz, *Herkulanische Studien* I: *Philodem über Induktionsschlüsse* (Leipzig, 1865); F. Bahnsch, *Des Epicureers Philodemus Schrift* Περὶ σημείων καὶ σημειώσεων (Lyck, 1879); R. Philippson, *De Philodemi Libro qui est* Περὶ Σημείων καὶ Σημειώσεων (Dissertation, Berlin, 1881); id. 'Zur Wiederherstellung von Philodems sog. Schrift Περὶ Σημείων καὶ Σημειώσεων', *Rhein. Mus.* 64 (1909), 1–38; and the De Lacys' first edition (Philadelphia, 1941). A full bibliography on the *de Signis* can be found in M. Gigante (ed.), *Catalogo dei papiri ercolanesi* (Naples, 1979), 251–4. My debt to the De Lacys' lucid and scholarly book is enormous, and if I shall have more occasion to signal disagreement than agreement in this paper, that is merely because much of their contribution to our understanding of the work has become by now part of the common stock of knowledge. On the other hand, their text (indeed any papyrological text) should not be regarded as definitive. I propose several alterations to it in this paper, and it is only the current closure, pending repair, of the reading room at the Officina de Papiri Ercolanesi in Naples that has so far prevented me from checking all passages discussed against the papyrus. In the meantime I have been greatly helped by Francesca Longo Auricchio and Adele Tepedino Guerra, who have very kindly provided information from the notes which they took during their recent autopsy of the papyrus. But, except where indicated, the text followed in this paper is that of the De Lacys' second edition. I also take this opportunity to express my gratitude to Jonathan Barnes, Jonathan Lear and Malcolm Schofield for their enormously helpful written comments on the first draft of this paper, and to many participants at the Paris conference for the valuable criticisms which it received there.

because the surviving final part of the book seems concerned purely with sign-inference (*sēmeiōsis*), that is, the discovery of non-evident truths by means of evident signs.[2] Writing in the mid first century B.C., the author reports from his distinguished Epicurean master Zeno of Sidon (*c.*155–*c.*75 B.C.) the arguments of some contemporary adversaries, followed by Zeno's reply (1.1–28.13). There follows a further brief summary of the Epicurean position taken from the writings of an equally renowned, slightly younger, Epicurean, Demetrius Lacon (28.13–29.19). Finally he records an oral contribution on the same topic, probably from a third Epicurean whose name is not preserved in the text (29.19–38.22).[3]

The conventional identification of these opponents as Stoics has never received the full defence that it deserves.[4] It must be admitted that none of the terminology or philosophical examples attributed to them is so unmistakably Stoic as to settle the matter.[5] Nevertheless, I believe the convention to be correct. If a non-philosophical sect were contributing to this debate a medical school would be the likeliest candidate, but this is ruled out by the closing sentence of the book, in which Philodemus seems, with little enthusiasm, to defer discussion of medical handlings of the

2. I prefer not to use the De Lacys' translation 'inference', because, as we shall see in §3, the Epicureans recognise the 'elimination' method as a valid method of inference but deny that it is a *sēmeiōsis*, apparently because it cannot, in itself, reveal anything. The notion of revelation is fundamental to the Greek concept of a sign (*sēmeion*). Philippson's restoration of the title, Περὶ φα[ντασιῶ]ν κ[αὶ] ση[με]ιώσεων (*Rhein. Mus.* (1909), p. 3) gains support from Mario Capasso's recent discovery ('PHerc.671: un altro libro '*de Signis*'?', *Cron.Erc.* 10 (1980), 125–8) that PHerc.671 probably contains another book of the same work; for the word φαντασία features prominently in its meagre fragments.

3. There is a longstanding debate as to whether this third author is Zeno, Demetrius, or someone else (for a review see A. Angeli and M. Colaizzo, 'I frammenti di Zenone Sidonio', *Cron. Erc.* 9 (1979), 47–135, at pp. 60–1). The crucial introductory sentences in 29.19–24 tell us (reading τὰ for τὰ[ς in 22, and πλε[ίους for πλε[ῖστον): '[. . .] offered not these (replies) but ones more numerous which moved down from the most general to the most particular points. He elaborated them orally.' The lacuna at the beginning could easily hold a new name (*pace* Philippson, *Rhein. Mus.* 64 (1909), 38), or that of Zeno, or some phrase like 'He (Demetrius) on other occasions . . .' But although there is substantial doctrinal agreement between all three, I doubt if the anonymous source can be Demetrius, because Demetrius allows, while the anonymous source denies, that some 'insofar as' premisses are established by the elimination method (29.4ff.; 35.22–32). See further, §3 below, especially n. 61.

4. This was pointed out to me by Michael Frede.

5. For example *sunēmmenon* for 'conditional', attributed to them at 32.34, cannot be assumed to be exclusively Stoic by this date. Among the philosophical examples used, the best indication is perhaps the lengthy refutation of the Epicurean view that the sun is as small as it appears (9.8–11.8), said to be a Stoic preoccupation (DL VII 132).

topic to a subsequent book (38.22–32). The only contemporary philosophical opponents available to Zeno and Demetrius would be the Stoics, the Peripatetics, and the Academic sceptics. I have detected no links between the work of the *de Signis* opponents and that of Hellenistic Peripatetics. Nor would any Academic have advocated such positive doctrines as represented here before the secession of Antiochus, *c.*87 B.C.; and Antiochus' own epistemology was essentially derivative from that of the Stoics. Thus the Stoics seem the only serious claimants. Corroboration is found in the naming of Zeno's principal opponent as Dionysius (7.5–6; 11.13–14). It is a dishearteningly common Greek name, but the fact remains that among the 167 bearers of it listed by Pauly-Wissowa the only remotely plausible candidate is the Stoic Dionysius of Cyrene,[6] of suitable date to be a pupil of Diogenes of Babylon and Antipater of Tarsus (mid to late second century B.C.).

I shall therefore work from the hypothesis that the opponents are Stoics of the mid or late second century B.C., hoping that the hypothesis will find further confirmation in my attempt to relate their doctrines to mainstream Stoicism. At the same time I shall put into abeyance the widespread belief that Stoic doctrine on signs is under discussion by Sextus Empiricus throughout *M* VIII 141–298 and *PH* II 97–133. I have, for example, found little reason to attribute to the Stoics the technical distinction made there between indicative and commemorative signs. It is not used in accredited Stoic sources, or for that matter in the *de Signis*,[7] and is more familiar in medical theory (which itself is certainly included in the scope of Sextus' scrutiny).[8] On the other hand, the attack by

6. *Index Stoicorum Herculanensis* (ed. Traversa) 52, 6ff. Traversa suggests that the list in which Dionysius appears is of the pupils of Diogenes and Antipater. This is uncertain, but its position in the work is sufficient to determine the period to which it refers.

7. Indeed, in the *de Signis* it is a general Epicurean complaint that the Stoics do not bother to distinguish different kinds of signs (cf. 36.17–37.1), and the only such distinction attributed to them is that between the peculiar and the common sign, which I argue below to have had a special place in earlier Stoic epistemology. It will be clear from the following discussion that this distinction in several ways resembles that between indicative and commemorative signs; but for that very reason the Stoics are unlikely to have operated both concurrently.

8. E.g. *M* VIII 156. Here and at 176–91 he implies that the dogmatists under attack include *all* positive thinkers, including philosophers and medics. That Sextus' sign terminology is medical in origin is well argued by Philippson (*Diss.*, 59ff.); cf. also David K. Glidden, 'Skeptic Semiotics' (in *Riverside Studies in Ancient Skepticism*, ed. David K. Glidden (forthcoming)). Jacques Brunschwig, 'Proof defined' (*Doubt and Dogmatism*, ed. M. Schofield, M. Burnyeat, J. Barnes (Oxford, 1980), 125–60), at pp. 139–42,

Sextus on those who say that signs are intelligible, not sensible (*M* VIII 244–71; *PH* II 104–16), is indisputably aimed against the Stoics, and I shall be arguing that they may be earlier Stoics than those reported in the *de Signis*.

It seems to be common ground to the Epicureans and their Stoic adversaries that there are only two possible kinds of sign-inference (cf. 8.7–10). One is *ho kath'homoiotēta tropos*, the similarity method, which roughly speaking covers analogy and induction. This is the principal Epicurean method, but the Stoics reject it as invalid and restrict sign-inference to *ho kat'anaskeuēn tropos*, the elimination method. It is with this latter that we start.

2. *The elimination method*

The Stoics regard the elimination method as the only proper test (a) of a conditional, and (b) of a 'peculiar' sign (*idion sēmeion*) (32.31–3; cf. 1.1–19,[9] 14.2–11). How are these two related? The Stoic doctrine recorded by Sextus (*M* VIII 245–53; *PH* II 104–6) is that a sign is itself the true antecedent in a sound conditional, revelatory of the consequent. In the *de Signis* the position is slightly different: the relation of a sign to what it signifies is

makes an interesting attempt to locate the distinction between indicative and commemorative signs in early Stoic theories of demonstration, but I believe his arguments are now weakened by a forthcoming paper by Theodor Ebert, 'Die Dialektiker bei Sextus Empiricus', which persuasively transfers his key pair of texts, *PH* II 134–43 and *M* VIII 300–15, from the Stoics to the Dialectical school of Diodorus and Philo. Nor am I quite convinced that 'If a god has told you that *p*, then *p*' (*PH* II 141; *M* VIII 308–13) must exemplify arguments based on commemorative signs (Brunschwig, 142): if our acceptance of the conclusion depends on 'memory' and 'faith', and the argument is therefore 'non-revelatory', this is surely because in the case of any *conditioned* belief a valid syllogism can be constructed in its support but does not represent the way in which we came by it – we simply get into the habit of believing what gods tell us. The De Lacys (*op. cit.* (n. 1), 103 n. 42) discern an allusion to the indicative sign in Philodemus' use of ἐνδείκνυσθαι (*de Signis* 11.11, 13.26, 35.26), but this strikes me as entirely non-technical. That at *PH* II 101 the indicative sign is given the standard Stoic definition of a sign is sometimes held to support a Stoic origin, but, as Rieth (*Grundbegriffe der stoischen Ethik* (Berlin, 1933), 189) acknowledges, that same definition also underlies later medical talk of signs. At *PH* II 104ff. it appears that Sextus is taking his 'indicative sign' to be equivalent to what the Stoics simply call 'sign'; and even this match is imperfect, for the Stoic example at ib. 106 would be 'commemorative' by Sextus' definition (so too *M* VIII 252, 254).

9. I am inclined to put a colon after ἄδηλον in 1.17 and to restore what follows as 'ὃ γ[ίνε|ται] τῶι κ[ατ'ἀνασκ]ευή[ν τρό]πωι . . .'. This accommodates the enigmatic ΟΓ, accords well with the Oxford facsimile, and gives the sense which the reply in 14.2ff. requires. But the conjecture is provisional, pending examination of the papyrus. Francesca Longo Auricchio and Adele Tepedino Guerra (cf. n. 1 above) tell me that so far as they can judge from their notes on the papyrus it is palaeographically possible.

regularly expressed, not by the conditional 'If *p*, *q*', but by the so-called paraconditional 'Since *p*, *q*', whose twin truth-conditions are that if *p*, *q*, and that *p* (DL VII 71). This looks to me like an attempt to improve on the other account, which by expressing a sign as the antecedent in a conditional cannot include any indication that the antecedent is true, as it must be to be a sign. Thus we have some reason for thinking of Sextus' Stoic source as antedating Dionysius and the other Stoics of the *de Signis*. These latter, in taking on board the non-syllogistic form of argument 'Since *p*, *q*' were perhaps particularly in the debt of Dionysius' probable master Antipater, who contrary to Chrysippan orthodoxy had sanctioned 'single-premissed arguments'.[10]

Another small discrepancy between a sign and the antecedent of a conditional is that in the *de Signis* the sign and that which it signifies are not quite always represented as propositions but occasionally as things, the one apparent the other non-apparent (e.g. 6.1–32). This has the advantage of creating common ground for debate with the Epicureans, and is unlikely to confuse because the thing in question is always one whose existence is asserted by the corresponding proposition: the inference from *x* to *y* and that from 'There is *x*' to 'There is *y*' are treated as interchangeable. But at least as far as the Stoics are concerned it will be safest to regard the preferred propositional formulation as the more correct of the two.[11]

As for the 'peculiar' sign, this is explained (1.1–19; 14.2–11) as one which is cogent in that it cannot exist except together with the thing signified, by contrast with the 'common' (*koinon*) sign, which can do so, and which the Stoics for obvious reasons dismiss as defective. Now this distinction between peculiar and common

10. *M* VIII 443, *PH* II 167; Alexander *in Top.* 8.16ff., *in An. Pr.* 17.20; Apuleius, *de Int.* 184.19ff. (The usual version cited is '*p*; therefore *q*', but this could be argued to differ from 'Since *p*, *q*' in nothing but surface grammar.) I have let the foregoing paragraph stand more or less as in my original draft, although as a consequence of Myles Burnyeat's paper in this volume (esp. pp. 218–24) there is now much more that could be said about the connexion between the sign and the paraconditional.

11. At *M* VIII 254–6 the ground offered by the Stoics for making signs propositional is that the sign and what it signifies must be contemporaneous, which a present scar and a past wound are not, but which the propositions 'This man has a scar' and 'This man was wounded' are. On the other hand, where the things in question are themselves contemporaneous, as in all the *de Signis* examples, it may seem safe to relax the distinction. Here again I have let the foregoing paragraph stand more or less as I originally wrote it. But for a highly illuminating discussion of the relationship between the 'thing' and the 'proposition' analysis of a sign the reader can now be referred to Burnyeat's paper in this volume (pp. 211–14).

signs is a widespread one,[12] but normally the common sign is so called because it serves as the sign of a number of different things. A siren would be the common sign of an ambulance, a fire-engine and an air-raid, a yawn of tiredness and boredom. It is a feature of the *de Signis*, however, that the sign, of whichever kind, is judged as a sign of one thing only, and is 'common' if it is capable of existing with or without the existence of that thing. Whether or not it is, in that case, the sign of something else is immaterial.

For an explanation of this considerably less natural usage of 'common' we need look no further than the Stoics' postulation of 'signs peculiar to truth' and their consequent disparagement of 'common signs', by which they meant signs common *to truth and falsity*.[13] This abnormal use of 'common' arose out of the need to defend the Stoic infallible criterion of truth against the attacks of the New Academy,[14] and its use by Philodemus' adversaries in the *de Signis* is strong evidence for identifying them as Stoics.

The elimination method, then, is the proper test of that kind of sign which could not exist if what it signifies did not; or (if we think of signs as propositional) which could not be true if what it signifies were false. On the latter version a sign is equivalent to the true antecedent in a sound conditional, and the elimination method is also held to be the proper test of conditionals in general. How the method works is explained repeatedly in the *de Signis*. You hypothetically 'eliminate' (*anaskeuazein*, sometimes *anairein*) the consequent, and if you find that the antecedent is *merely thereby* 'co-eliminated' (*sunanaskeuazesthai*) you hold the conditional to be sound. In the special case of sign-discovery the principle is the same, but for 'consequent' substitute 'non-apparent thing' and for 'antecedent' 'apparent thing'. A connexion established by this test is said to hold 'necessarily' (1.12–19;[15] cf. 4.5–13).

12. E.g. Aristotle, *An. Pr.* 70b11–38; ps.-Aristotle, *Phgn.* 805b15–806a6; Cicero, *Part.* 34; Galen, *in Hipp. de Med. Offic.* XVIII B, pp. 640, 643–5 Kühn; *M* VIII 201–2. I owe all these references except the last to De Lacy, *op. cit.* (n. 1.), p. 91 n. 2. Cf. also *Rhet. Her.* 25, 39.
13. See especially Cicero, *Ac.* II 33–4, 36 (where both *nota* and *signum* translate σημεῖον). The speech derives from Antiochus, but is pure Stoicism from start to finish. Cf. also A. Graeser, *Zenon von Kition, Positionen und Probleme* (Berlin, 1975), 56–60. On this use of 'κοινὸν of A and B', cf. M. F. Burnyeat and others, *Notes on Zeta* (Oxford, 1979), 154.
14. Cf., in addition to the passages listed in the previous note, Cicero, *Ac.* II 35; *M* VII 164, 175; Augustine, *Acad.* 3.9.18 (=*SVF* I 59).
15. On the reading of 1.12–19, see n. 9 above.

Most modern interpreters, at least since Bahnsch in 1879,[16] have identified this *anaskeuē* method as 'contraposition'. The principle is then that any conditional 'If *p*, *q*' is to be tested by asking whether its contrapositive 'If not-*q*, not-*p*' is sound. This seems to me a wholly inadequate interpretation, for the law of contraposition holds good for any account whatsoever of conditional validity. Even a Philonian material implication like 'If it is day I am talking' (*PH* II 100) will, if true, yield the true contrapositive 'If I am not talking it is not day'. Yet this is hardly an instance of *anaskeuē*: if someone denies that I am talking he does not *thereby* deny that it is day. Admittedly at 11.26–12.36 Philodemus replies to an argument in which the Stoics had apparently cited the law of contraposition in support of (not, however, as being identical with) the *anaskeuē* method. But there the perfectly proper Epicurean reply is given that the law of contraposition is valid even for those whose use of conditionals does not conform to the *anaskeuē* method. To translate *anaskeuē* as 'contraposition' thus renders the passage unintelligible.

What we need is an interpretation of *anaskeuē* which will mark off a stricter kind of implication than, for example, the Philonian. And in fact it is tempting to recognise in it a test of *sunartēsis*, 'cohesion', now widely agreed to be Chrysippus' criterion of conditional validity.[17] *Sunartēsis* obtains when the contradictory of the consequent conflicts with the antecedent (*PH* II 111), and will therefore readily be established by a method in which you hypothetically eliminate the consequent to see whether the antecedent is thereby co-eliminated. Confirmation of this can be found in the pseudo-Galenic *de Optima secta*, noted for its Stoic leanings.[18] In chapter 6 (I 116.17ff. Kühn) the author is elucidating his own stipulation that a medical theorem must be consequential (*akolouthon*) upon the principles posited:

> So consequence must not be judged by co-existence but it is when on the elimination of one thing something else is necessarily co-eliminated, and

16. *Op. cit.* (n. 1), p. 8.
17. J. B. Gould, 'Chrysippus: on the criteria for the truth of a conditional proposition', *Phronesis* 12 (1967), 152–61; M. Frede, *Die Stoische Logik* (Göttingen, 1974), 80–93. In this identification I am essentially following Philippson (*Diss.*, 69–70) and the De Lacys (*op. cit.*, (n. 1), 210).
18. K. Deichgräber, *Die griechische Empirikerschule* (Berlin, 1930), 295.

one is posited when the other is posited,[19] that we must suppose this one to be consequent upon that one. And so too in general it is according to cohesion (*sunartēsis*) that anyone judging conditionals must make his verificatory judgement, if a consequential verification is required.

Here the association of the elimination method with *sunartēsis* is assumed as familiar.[20]

It is a matter of current controversy whether the 'conflict' invoked in *sunartēsis* is purely logical incompatibility or whether it extends to empirical incompatibility.[21] The former interpretation has been powerfully argued by Michael Frede, the latter no less powerfully by Richard Sorabji. We might hope to advance the debate by asking which interpretation these later Stoics favoured by choosing their 'elimination' terminology. We can start by noting that the background to the elimination method is primarily Aristotelian. In the *de Signis* (12.7–12, 25; 37.36–37) *anaskeuazein* is sometimes replaced by its synonym *anairein*, and under this alternative nomenclature the method is one used by Aristotle for establishing relativity. In the *Categories* (7b15–8a12) it is a mark of the relativity of two things that if one is 'eliminated' the other is thereby 'co-eliminated'. If this relation obtains symmetrically between them they must be co-ordinately relative (e.g. half–double, slave–master); if it is a one way relation they are related as prior and posterior (e.g. knowable–knowledge).[22] By some route this principle passed into the sceptical tradition, for it later

19. If, as the Greek strictly suggests, what is first 'eliminated' and what is first 'posited' are one and the same, the author will be requiring biconditionality. This is hardly likely, especially as the relation of consequence which he has particularly in mind is that between first principles and the theorems derived from them. He must simply be expressing himself unclearly, and be referring to the consequent in the first clause, the antecedent in the second. *De Signis* 33.1–7 may similarly seem to imply biconditionality, and to avoid the mistake we must take 'We cannot conceive that *p* but not-*q*, and vice versa' to mean 'We cannot conceive that *p* but not-*q*, or that not-*q* but *p*'. Logically the two are indistinguishable. but they would involve different mental operations: in the first case you imagine a world where *p*, and then try to imagine that not-*q* in it; in the second you imagine a world where not-*q*, and then try to imagine that *p* in it.

20. The same connexion may be implied at *de Signis* 37.6–9, but other occurrences of *sunartēsis* and cognate forms in the same work suggest that the Epicureans are not using it in its precise Stoic sense.

21. Notably Gould and Frede (n. 17 above), and R. Sorabji, 'Causation, laws and necessity', in *Doubt and Dogmatism*, ed. M. Schofield, M. Burnyeat, J. Barnes (Oxford, 1980), 250–82, esp. 266–70. For a review of current interpretations, see G. Verbeke, 'La philosophie du signe chez les stoïciens', in *Les Stoïciens et leur logique*, ed. J. Brunschwig (Paris, 1978), 401–24.

22. Cf. *Top.* 123a14–15, 141b28 (comparing *M* VIII 338–9, X 269); *Metaph.* K, 1059b30–1060a1.

becomes Sextus' standard method of establishing the relativity of a pair of concepts in the course of anti-dogmatist argument.[23]

Now the transfer of this same method by Philodemus' Stoics to the analysis of the interrelationship between propositions, rather than things or concepts, is no doubt innovatory. But we are bound to ask why the 'elimination' terminology commended itself to them in this new role. A plausible answer is that it had always been used in conceptual analysis, to establish a dependence such as could be grasped without going beyond inspection of the terms involved. To deny that there are masters *is*, at the same time, to deny that there are slaves. That a world without halves would be a world without doubles requires no empirical proof: it is enough to know what a half is and what a double is. Does an equally *a priori* relation underlie the conditionals and sign-discoveries which Philodemus' Stoics judge to pass the 'elimination' test? Emphatically, yes.[24] Rejecting the Epicurean inductive inference from the mortality of men within our experience to the mortality of men outside our experience, the Stoics teasingly offer alternative formulations which they judge valid, for example 'Since the men within our experience are mortal, so too if there are elsewhere men resembling the men within our experience in other respects and especially in respect of being mortal, they would be mortal' (2.36–3.4); or 'Since the men within our experience are mortal, and if elsewhere there are mortal men, they are mortal' (3.10–12); or again, 'Since all men resemble men within our experience also in respect of being mortal, all men must be mortal' (19.36–20.4). Finally, their own serious formulation of the argument is: 'Since men within our experience are mortal *insofar as* they are men, men everywhere are mortal' (3.30–5; cf. 35.2–3). It is clear that both the frivolous and the serious formations offered as valid share the characteristic of resting on a purely logical relation of entailment.

23. For *sunanairesis allēlōn* as the mark of co-ordinate relativity, *PH* III 101; *M* VII 395, VIII 164, IX 357, XI 90. For one-way *sunanairesis* as the mark of priority, *M* VIII 338–9, X 269. For the combination of both criteria, *M* X 267, 270 ('Pythagoreans'). For other uses of the same method to establish conceptual dependence, *PH* III 40, 130; *M* I 40, III 18, 94, VII 74 ('Gorgias'), VIII 60, IX 313, 406, X 236. (Note that at *M* X 267 *anaskeuazein* is used as a doublet for *anairein*). At *M* VIII 164 the principle is used to establish the relativity of 'sign' and 'thing signified' – not, as at first appears, a parallel for the *de Signis* elimination method, but Sextus' standard ploy for discrediting the assumption that the one can be known in advance of the other.

24. Cf. De Lacy, *op. cit.* (n. 1), 211: 'Stoic semiotic . . . requires that necessary truth must be *a priori* and analytic.'

It is, as a matter of fact, a feature of the above instances that the *form* of the premiss is regarded as in itself guaranteeing the truth of the conclusion: hence, for example, 'All x are F' presumably follows from 'Some x are F insofar as they are x' for all values of x and F. But it is scarcely credible that they should hold this to be the only kind of sound conditional, and we shall later see that the Epicureans, at least, understand the elimination method to extend to sign-inferences of the form 'Since there is x there is y', where it must be, as in Aristotle's and Sextus' usage of 'elimination', the *meaning* of the terms 'x' and 'y' that guarantees the dependence of the one on the other. What the Stoics would regard these two kinds of implication, the formal and the analytic, as having in common is no doubt that both are knowable *a priori*. Indeed, this *a priori* status is probably discernible in the regular description of the method: the stipulation that it must be *merely* in virtue of the elimination of 'q' that 'p' is co-eliminated appears to outlaw any considerations which cannot be extracted from our understanding of 'p' and 'q' themselves. There is, of course, a further question as to whether our understanding of 'p' and 'q' may not itself have an empirical origin, but it is precisely for not entertaining this possibility that, as we shall see (§3, below), the Stoics come in for criticism from the Epicureans.

The elimination method, then, establishes a connexion between two propositions which holds necessarily, is knowable *a priori*, and is determined either by the form of the propositions or by our understanding of the terms contained in them. It is hardly inappropriate to call such connexion logical. Of course, these considerations do not settle the debate about Chrysippan *sunartēsis*, for the most they could show is that Stoics two or three generations after Chrysippus were *interpreting* it in a strictly logical sense. Even this, however, already poses a threat to one of Sorabji's lines of argument, the claim that the logical–empirical distinction was not a sufficiently favoured one in antiquity to commend itself to the Stoics. We have at least seen evidence that a strictly logical class of relations was separated off. The task now is to rummage further through the wreckage of the *de Signis* for evidence of what belongs on the other side of the balance, and then to ask whether in this regard Philodemus' Stoics are reliable spokesmen for Chrysippus.

For this purpose, the crucial passage of the *de Signis* is 7.26–38,

which has been overlooked because editors have misconstrued its syntax[25] and consequently its meaning. It presents the second of three moves in which the Stoic Dionysius is quoted as replying to Epicurean counter-arguments:

> Again, when our people [the Epicureans] say that according to them even freaks bear resemblances in some respects – unless we are going to abolish the existence of the things in our experience which resemble them! – he [Dionysius] says, first, that the abolition will be by the elimination method; but that anyway it is sufficient, concerning these things and concerning those which derive from experience, for us to be convinced in accordance with probability, just as when we sail in summer we are convinced that we will arrive safely.

This dispute seems to originate from the Stoics' appeal to isolated phenomena, such as the magnet's unique power to attract iron, and the Alexandrian dwarf with the colossal head which withstood hammer-blows (1.19–2.25), as vitiating the inductive method. Freaks (*terata*), according to Aristotle, belong to the class of dissimilar things (*anomoia*, *GA* 770b3–5). But the Epicureans here reply to the Stoics that the dissimilarity is never total (cf. 15.13–16.1; no doubt the Alexandrian dwarf resembled other human beings in most respects and was therefore a proper subject for many inductive inferences) – unless, as they put it, the Stoics are going to abolish the familiar cases which the freakish cases resemble. The first part of Dionysius' reply is a joke at the Epicureans' expense: the form in which they have presented their reply is itself an instance of the elimination method, for they have defended their claim on the ground that its denial entails the abolition of something evident. But it is the second part of his

25. I follow the De Lacy text with the following alterations: remove commas in 28 and 29; alter full stop to comma in 32; and for ἐπαρκέ[σει] in 32 read ἐπαρκε[ῖν]. The De Lacys' construal and translation seem to me awfully hard on the reader, involving a curious mixture of direct and indirect speech, with φησιν implausibly delayed. Furthermore, they make οὐ] μὴν ἀλλὰ introduce the Epicurean reply, whereas the indications are that 7.5–8.21 contains Dionysius' arguments only, with the Epicurean reply beginning immediately (συνεχ[ῶς, cf. 16.5) after at 8.21. A further advantage of the version proposed here is that it matches closely the grammatical structure of Dionysius' preceding argument at 7.8ff. Its own linguistic difficulties are twofold. First, οὐχ in 30 should strictly be μὴ οὐχ, since it follows a negated verb of prevention – but Philodemus' use of negatives is notoriously irregular. Second, τε in 31 looks forward to an 'and', but is in fact answered by an adversative conjunction: for comparable shifts after τε, see Denniston, *The Greek Particles* (Oxford, 1954²), 513–14. In my translation I convey the shift by 'first . . . but . . .' It is entirely intelligible, given that there are two answers but that the second overrules the first. For this use of οὐ μὴν ἀλλά, see Denniston, *op. cit.*, 29 *fin.*

reply that concerns us now: anyhow, he adds, in certain areas of discourse including the present one there is no need for the elimination method since it is enough 'to be convinced (*pepeisthai*) in accordance with probability'.

There can be no doubt that the reference here is to the *pithanon*, or 'convincing', a concept which we tend to associate above all with Carneades' New Academy, but which is widely recognised as having been a direct borrowing from the Stoics.[26] The very example of the sea-traveller's optimism quoted in our passage is one used by Cicero on behalf of the New Academy to make the point that his own school's criterion of the 'convincing' plays a part in the Stoic epistemology adopted by his opponents:

> Even the sage whom your school brings onto the scene follows many things which are convincing but not known . . . After all, when the sage boards a ship he surely doesn't know and perceive in his mind that the voyage will be successful – how can he? But if he were now setting out from here for Puteoli, a journey of thirty stades, with an honest crew and a good steersman in the present calm weather, it would seem convincing to him that he would get there safely. (*Ac.* II 99–100)

Given the *de Signis* parallel, this can now be seen to be a standard Stoic example of proper resort to the 'convincing', and we may legitimately ask just how wide a sphere of operation they wished to grant to the principle. The convincing is officially defined as 'that which induces us to assent' (DL VII 75), but in fact three senses are distinguished (*M* VII 174–5).[27] The first of these is 'that which is true and appears true': 'obvious' or 'cogent' might be appropriate synonyms. The second is 'that which is false but appears true'; in this sense the Stoics often describe false arguments as 'convincing', meaning 'specious'.[28] The third, which is undoubtedly the important technical sense both for the Stoics and for Carneades, is one broad enough to embrace the first two, 'that which is common to both truth and falsity' – a usage which leaves it an open question whether the thing so described is true or false, but with the rider that 'as a general rule it is true' (or 'tells the

26. P. Couissin, 'Le stoïcisme de la Nouvelle Académie', *Revue d'hist. de la philos.* 3 (1929), 241–76; G. Striker, 'Sceptical strategies', in *Doubt and Dogmatism* (n. 21); M. F. Burnyeat, 'Carneades was no probabilist', in *Riverside Studies in Ancient Skepticism*, ed. D. K. Glidden (forthcoming).

27. The list is given by Carneades, but that he is borrowing it from the Stoics is clear not only because that is his standard method (see articles cited in previous note) but also because all three senses are found in Stoic usage but only the third in Carneades' own.

28. Plutarch, *Stoic. rep.* 1036 A, 1055 F; DL VII 75, 78; *SVF* III 228, 229a.

truth'). This last corresponds exactly to the *de Signis* passage, with its talk of being 'convinced in accordance with probability (*eulogia*)', for the probable (*eulogon*) is for the Stoics that which has more chances of being true than false (DL VII 76). *Pithanon*, in this sense, and *eulogon* are not synonyms – the former signifies that which persuades, the latter that which is likely to be true[29] – but it does seem that they were regarded as coinciding at least to the extent that everything *pithanon* is also *eulogon*.

It is in this third sense, 'convincing but fallible' that Chrysippus, I suggest, used the 'convincing' to mark off a mode of thought not strictly governed by logic. In a verbatim passage of his *On Lives* he distinguishes 'opposing *logoi*' from 'opposing *pithana*',[30] and in the titles of his works he mentions two kinds of conditionals, the one 'logical' (DL VII 194), the other 'convincing' (ibid. 190). Certain complex propositions can continue to be classed as 'convincing' even though the discovery of exceptions may render them false, for example 'If someone bore something, she is the mother of that thing' – the exception being that the bird is not mother of her egg (DL VII 75). And in his *Logical Investigations*, Book III, col. 13,[31] Chrysippus similarly lists the predicate 'walk, or, if not, sit' as a 'convincing' one, presumably because it covers the likeliest dispositions of a specified subject (a Greek philosopher during the hours of daylight?) but not quite all. That this *pithanon* classifica-

29. See Burnyeat, *art. cit.* (n. 26 above).

30. Plutarch, *Stoic. rep.* 1036 D–E: I follow Cherniss' Loeb text. For a comparable distinction between 'convincing' and 'demonstrative' see *PH* II 187.

31. I give my own reading of the papyrus, since Crönert's (on which *SVF* II, p. 109. is based) contains some serious misreadings:

> τὸ δὲ το[ι]οῦτο δ[ι]χῶς ῥηθήσ[ε]ται, "ἢ | [π]εριπάτει ἢ κάθου", ὧν τὸ μ[ὲν] | ἔσ[τ]αι τοιοῦτο, "[τ]ῶν [σημ]αινο|μένων τούτων τ[ι] ἐνφα[ί]γ|ο]||μεν οὐ προστάττεσθαι", τ[ὸ] | δὲ τοιοῦτο, "τοῦτο· εἰ δὲ μή, τοῦ|το". πότ[ε]ρον οὖν ταῦτα λέγο|μεν, ἢ ῥη[τ]έον κἀνταῦθα εἶ|να[ι δ]ὴ τὸ προσταττόμενον | ὂν τρόπον ἔτι τοιοῦτο ἀξί|ωμα, "περιπατεῖ Δίων, εἰ δὲ | μή, κάθηται"; καὶ κατηγόρη||[μ]α πιθανὸν εἶναι τοιοῦτο, |"περιπατεῖν, εἰ δὲ μή, καθῆσ|θαι"; εἰ δὲ τοῦτο, καὶ προστάτ||[τ]εσθαι τ[οιο]ῦτο πιθανότητί [τι]||νι; 'Something of the form "Either walk or sit" will turn out to have two senses, of which one will be of the form "We signify that one of these meanings is not being expressed as a command," the other of the form "(Do) this, or, if not, (do) this." Is that our claim, then, or are we to say that even here that which is commanded follows the pattern of a proposition of the form "Dion is walking or, if not, he is sitting"? And are we to say that there is a convincing predicate of the form ". . . walk, or, if not, sit", and, if so, that a command of the same form is issued with a certain convincingness?'

> All the punctuation here is my own, except the full stop and the final question mark, which correspond to *paragraphē* signs in the papyrus. My reading of the book's title confirms Crönert's, with the exception that it is followed by a γ, signifying 'Book III', and not an α(= 1).

tion is intended seriously, and is not merely a polite synonym for 'false', is clear from the puzzle which Chrysippus goes on to raise: is the corresponding imperative 'Walk, or, if not, sit' also to be classified as 'convincing'? We are of course only dealing with illustrative examples here,[32] but it was apparently Chrysippus' view that philosophers must at times be content with premisses which similarly fall short of infallibility: hence the titles of three of his works relating to matters of definition label their contents as merely *pithana* (DL VII 199–200).

I am not suggesting that Chrysippus had a separate and systematic theory of extra-logical discourse, for the classification of topics in the list of his works offers no such hint (DL VII 189–202). He was merely recognising that there are truths which are not logically demonstrable, and that if a philosopher is not to deny himself access to these he must at times be satisfied with the balance of plausibilities. Such laxity would not be permissible when establishing the foundations of a philosophical system (cf. Cicero, *Ac.* II 21–7), and we might reasonably expect it to be confined either to the collection of supplementary grounds for positions already formally established, or to philosophically more peripheral areas.[33] We would therefore do well to return to the *de Signis* passage, see what modes of thought are there relegated to the *pithanon*, and ask whether Chrysippus' view was the same.

The areas designated are 'concerning these things and concerning those which derive from experience (*peira*)' (7.33–4). By 'these things' might be meant either freakish cases or, more generally, arguments based on resemblance, such as the Epicureans are out to defend against the alleged counter-example of freaks. I find the passage easier to understand on the latter interpretation. The second area concerns 'things which derive from *peira*'. This term is a standard one in medical texts, where it tends to designate cumulative observation of conjunctions, e.g. that such-and-such a treatment is regularly followed by such-and-such a result.[34] The 'things derived from *peira*' will not be individual sensory cognitions, which the Stoics would anyway never have demoted to the status of *pithana*, but empirically based conditional judgements[35] such as 'If I take a walk I will feel better'. These two overlapping kinds of implication, from similarity and from empirical generalisation, correspond to those which the *de Signis* Stoics argue to lack complete cogency, and it is therefore hardly surprising if they place them in the sphere of the *pithanon*.

But a striking parallel can, I think, also be found in Chrysippus' own usage. It has often been noticed that, while his *sunartēsis* criterion for conditional validity demanded a necessary connexion between antecedent and consequent, he was in certain cases happier to express an implication as a purely material one by abandoning the 'If *p*, *q*' formulation in favour of the negated conjunction 'Not both (*p* and not-*q*)'. It is tempting to guess that these two kinds of implication are the proper formulations of, respectively, the 'logical conditional' (DL VII 194) and the 'convincing conditional' (ibid. 190),[36] and the guess finds strong support in the *de Signis* passage. For inference from similarity and inference from empirical generalisation about conjunctions of events, both of which are there relegated to the 'convincing', are precisely the two kinds of cases in which these material implications are recorded. First, the sorites is a classic example of argument from similarity – if 3 is few, 4 is few; if 4 is few, 5 is few; etc. – and the official Stoic formulation expresses each step as a material implication (DL VII 82), as it also did for certain closely comparable arguments.[37] Second, Chrysippus preferred the same

32. It is important not to be misled by the fact that the examples chosen are false *pithana*. The easiest way to exemplify a fallible proposition is with an actually falsifiable one. But the essential characteristic of a *pithanon* proposition is that there *could* be exceptions – not that there are.
33. For a complaint that Chrysippus overuses certain premisses of this kind, see Galen, *Plac.* V 213.12ff. (=*SVF* II 883), 502.1ff. Kühn.
34. See *s.v.* πεῖρα in Deichgräber, *op. cit.* (n. 18), index.
35. Cf. Galen X 126.8 Kühn (= fr. 45, Deichgräber, *op. cit.* (n. 18)): εὑρίσκεται μὲν γὰρ κἀκ τῆς πείρας τὸ ἀκόλουθον, ἀλλ' οὐχ ὡς ἐμφαινόμενον τῷ ἡγουμένῳ.
36. I mean that if one wanted to *assert the truth of* a conditional which one found convincing but recognised as fallible, the material formulation would be appropriate; not that the Stoics would recommend the same formulation for those *pithana*, like the hen–egg example, whose truth they did not wish to assert. There may be support for the identification at *M* IX 139, where an anti-Stoic argument probably deriving from Carneades formulates one step as a material implication and then infers that it will be *apithanon* to violate the step's conclusion. Carneades no doubt wanted, as often, to imitate Stoic logical form in refuting the Stoics. I am not clear on precisely what grounds the step is classed as *pithanon*, beyond the obvious fact that it is not cogent, but in any case, the range of *pithana* certainly exceeds the two special categories which I discuss in the present context. Cf. the texts cited in n. 33 above. They can even include insufficiently rigorous quasi-logical propositions, like the hen–egg example.
37. The two material implications used at Stob. *Ecl.* II 7 (*SVF* III 528) are appeals to parity of reasoning, and can therefore count as arguments from similarity. So can the argument at *SVF* II 665. The most problematic cases are Alexander, *Fat.* 207.4–21 and 210.14–28, where, as Sorabji rightly says, he 'oscillates between the two forms, without any obvious reason, in his report of some Stoic arguments' (*art. cit.* (n. 21), 270

formulation for astrological laws like 'If someone was born at the rising of the Dogstar, he will not die at sea' (Cicero, *Fat.* 14–16), where the criterion of implication must be regularly observed conjunctions, not entailment, and there is consequently the possibility of error.[38]

If actual exceptions were found then a material implication would be as effectively falsified as a strict implication,[39] so the point of the weaker formulation is to allow for the fact, not that there *are* exceptions, but at most that there could in theory be exceptions, that the implication is 'convincing' but not logically necessary. The distinction may at first sight offer no advantage, inasmuch as the substitution of material for strict conditionals within an argument will normally leave its proponent committed to precisely that same conclusion as before. But in the best documented case Chrysippus recommends the weaker formulation because it prevents the necessity of the antecedent from being transmitted to the consequent as it would be in the 'if' formulation (Cicero, *Fat.* 14).[40] It may be a necessary, because past, truth that Fabius was born at the rising of the Dogstar, but by sticking to material implication Chrysippus escapes the deterministic consequences of having to label it a necessary truth that Fabius will not die at sea. Could there be a similar motive in the case of the

n. 53). My suggestion would be that because Chrysippus insisted on material implication in the sorites this formulation simply became a matter of habit to later Stoics in sorites-like arguments, even where not strictly appropriate. I am less worried by Cicero's mention of medical and mathematical laws at *Fat.* 15–16 (cited by Sorabji, *art. cit.* (n. 21), 267): he is not saying that Chrysippus did, or did not, treat these as material implications, but is merely deriding his move by a rhetorical device: how silly it would be if all scientists talked the way Chrysippus recommends to the astrologers. An answer to Sorabji's argument on pp. 260–1 and 268 – why didn't Chrysippus express cause–effect relations as material implications? – is that the Stoics almost certainly saw such relations as necessary connexions, either between the 'perfect' cause and its effect (so M. Frede, 'The original notion of cause', in *Doubt and Dogmatism* (n. 21), 217–49, esp. 245ff.), or perhaps between the conjunction of all relevant causes and their effect. I agree with Frede that this necessity seems to be logical or conceptual, not empirical.

38. For astrological rules as fallible, see Cicero, *Div.* 1 24–5, 126. It may not be too fanciful to think of the Dogstar example and the stock example of the sea-traveller's optimism discussed above (Cicero, *Ac.* II 99–100) as interdependent. If it can never be more than *pithanon* that a sea voyage will end safely, it follows that the prediction that someone will not die at sea cannot be more than *pithanon*.

39. I here, as at several other points, correct the interpretation which I offered in 'Diodorus Cronus and Hellenistic philosophy', *Proceedings of the Cambridge Philological Society* 203 (n.s. 23) (1977), 74–120, esp. n. 97. I have (I hope) benefited from some invaluable criticisms of that paper sent to me by Richard Sorabji.

40. Cf. Frede, *Die Stoische Logik*, 103–4; I. Mueller, 'An introduction to Stoic logic', in *The Stoics* (Berkeley, Los Angeles and London, 1978), ed. J. M. Rist. 1–26 at pp. 18–20.

sorites?[41] If a truth can be known for certain (*katalēpton*), then so can all further truths which logically follow from it. But the same need not apply to truths which are no more than materially implied by it. Thus in the fallacious sorites, it may be knowable for certain that two is a small number, but the use of material implication in each step at least saves us from knowing for certain the obvious falsehood that every number up to a million is a small number. This would not solve the sorites itself, but it would blunt its attack on the crucial notion of cognitive certainty, which was thought particularly vulnerable to it (*M* VII 415–21).

What I propose, therefore, is a modified version of the interpretation defended by Frede. The two forms of implication mark a distinction, not exactly between logical and empirical connexion, but between logically necessary connexion on the one hand and convincing but fallible connexion on the other. One important subdivision of the latter is empirical connexion, but another equally important one is connexion through similarity.

Against Michael Frede's position it has been urged by Richard Sorabji that in at least one kind of strict conditional, namely that expressing a sign's relation to the thing signified, the Stoics use examples where the connexion could scarcely be called logical. Some of these (*M* VIII 152–5, 173; *PH* II 100, 102, 142) occur in passages whose Stoic credentials I have already questioned.[42] Only two (*M* VIII 252; *PH* II 106) occur in indubitably Stoic passages – 'If this woman has milk in her breasts she has conceived' and 'If this man has a viscid bronchial discharge he has a wound in his lungs' – and, as Sorabji himself acknowledges, both contexts represent the

41. Jonathan Barnes (in this volume, pp. 28–9) suggests that the negated conjunction formulation *strengthens* the sorites to the extent that, since it asserts less than a strict Chrysippan conditional, it is easier to support and harder to reject. My grounds for disagreement are: (1) This formulation of the sorites is used only by the Stoics, who hold the argument fallacious, and never by Carneades, who treats it as valid and therefore has something to gain from a dialectically more resilient version. (2) What *ground* would the Stoics offer for holding that 'not both (*p* and not-*q*)'? Either that 'if *p*, *q*', in which case there is no gain in stating this as a supplementary premiss rather than incorporating it directly into each step. Or, as I hold, some weaker ground than the strict conditional, in which case the 'if' formulation is not available to them anyhow. (3) If they saw the negated conjunction as dialectically more powerful than their regular conditional, why did they not use it more widely? In fact it is used in preference to the standard conditional only within a very narrow range of arguments. And since we know that in the astrological case Chrysippus chose it as a *weaker* form of connexion, and as more appropriate to the class of proposition at issue than strict implication, it seems reasonable to look for a comparable motive in the sorites-type cases.

42. Above, p. 241 and n. 8.

Stoics as committed only to a truth-functional criterion of the soundness of a conditional. It therefore seems entirely possible, as I have already suggested on other grounds, that these passages (*M* VIII 244–71; *PH* II 104–16) represent an early Stoic account of signs, one presumably antedating Chrysippus' authorisation of *sunartēsis* as the correct criterion.[43] There may be many other conditionals used by Chrysippus where the logical connexion could be thought questionable, for example 'If there is something which man cannot produce, then he who does produce it is better than man' (Cicero, *ND* III 25); but I have no doubt that Chrysippus hoped this was an analytic truth.

We may conclude this section by briefly characterising the Stoic notion of a sign. Only the 'peculiar' sign is regarded as valid. It is an infallible guide to what it reveals, being subject to the test of 'elimination'. It implies the truth of what is signified with the full logical necessity of the Chrysippan conditional. In this it contrasts with the 'common' sign, which probably belongs to the class of the convincing but fallible[44] and is, on the strict philosophical notion of a sign, no sign at all – 'for what could be more absurd than to say "This is a sign, or proof, of that, and I therefore follow it, but it could be that what it signifies is either false or nothing at all"?' (Cicero, *Ac.* II 36). A sign in the strict sense is more than a clue or hint; it is a watertight guarantee.

3. *The Epicurean response*

The Epicureans differ from the Stoics in playing down the importance of the deductive 'elimination method' and stressing that of the primarily inductive 'similarity method'. I avoid the De Lacys' translation 'analogy', because the method in fact avowedly spans the familiar Hellenistic distinction between simple resemblance and resemblance *mutatis mutandis*, 'analogy' (especially 37.24–9).[45] The former is exemplified by the inductive inference from the mortality of the men within our experience to the

43. The only two criteria of implication earlier than *sunartesis* listed by Sextus are the Philonian and the Diodorean (*PH* II 110–12; *M* VIII 265), so it would not be surprising if Stoics before Chrysippus used one or other of these. Indeed, the milk example had already been used by the Dialectical school of Philo and Diodorus (*M* VIII 423, in a passage which Ebert, *art. cit.* (n. 8 above) convincingly argues to be Dialectical).

44. Cf. Cicero, *Part.* 34.

45. Cf. *SVF* II 87 for the Stoics; DL X 32 for the Epicureans.

mortality of men outside our experience, the latter by analogical inference from the properties of perceptible bodies to those of atoms. In either case the formula used in the similarity method is 'Since x is F, y is F', the ground of implication being the resemblance of y to x. The Epicurean approach contains two main strands. They defend the similarity method against the charge that it lacks scientific rigour; and at the same time they try to show that the Stoic quest for a purely deductive scientific method is delusory since it cannot help relying on inductive premisses.

I begin with a brief look at those sign-inferences which they consider to depend solely on the similarity method. An example is 'Since Epicurus is a man, Metrodorus is a man' (14.2–27; cf. 12.14–31). The similarity between the two subjects is so strong that it becomes 'inconceivable' that an essential predicate of one should fail to belong to the other. This kind of inconceivability may lack strict logical force, but it is regarded as an entirely cogent criterion of inference,[46] and the best available (12.32–6; 33.1–9). Sometimes it establishes direct resemblances: to take a mathematical example, it is inconceivable that while the square of four in our world has an area equal to its perimeter its counterparts in other worlds should not (15.28–16.1). Sometimes the inference is analogical: it is inconceivable that while all phenomenal bodies have weight atoms should not (37.12–24).[47]

The favoured example of a sign-inference based solely on the similarity method is 'Since men within our experience are mortal, men outside our experience are mortal', and it is instructive to follow its role in the debate. First of all, it illustrates the Epicureans' grounds for defending the cogency of their method. The premiss that men within our experience are mortal embodies, they point out, extensive research and weighing up of evidence. Both historical records and current experience support it without

46. Strictly speaking, this inconceivability is the proper counterpart of 'elimination' in the elimination method, each functioning as the criterion of validity for its class of sign-inference; while 'similarity' matches Chrysippan *sunartēsis*, each of them describing the nature of the connexion between antecedent and consequent. Nevertheless, the 'elimination method' and the 'similarity method' of sign-inference *are* properly co-ordinate with each other, the apparent asymmetry resulting merely from the different shorthands used in naming them. 'Inconceivability method' would have restored symmetry but been too uninformative a title for the Epicureans to adopt.

47. This passage presumably gave one example of simple resemblance, one of analogy. The first is lost in the lacuna. The second is fragmentary, and it may be safer to discount the De Lacys' ingenious restorations in 19–20 and to take the preserved words at their perfectly satisfactory face value (cf. Philippson, *Diss.*, 39).

exception; it is seen to persist through all other variations in men's characteristics; and there is no known obstacle to believing it. It is the cumulative effect of these considerations that makes irresistible the conclusion that men outside our experience (even the British, if there are any – 5.33–6) are mortal. The false inductive inferences brought forward by the Stoics as counter-examples all fail to meet at least one of these requirements.

The second point to notice is the Epicureans' response when Dionysius offers them a lifeline. He observes that their inference can be made to conform to the elimination method by the reformulation 'Since men within our experience are mortal *insofar as they are men*, men everywhere are mortal' (3.30–5; cf. 35.2–3). Zeno's reply (16.29–17.11), as I understand it, is to insist on continuing to formulate it as an argument from similarity, while noting that Dionysius' version of the premiss is itself established only by inductive research conducted according to the similarity method. Dionysius' own opposing claim that his premiss is itself established by the elimination method – in other words that 'Men, insofar as they are men, are mortal' is an analytic truth (4.5–13; 6.32–7.5) – is discounted by Zeno without argument (17.8–11). and played down as only partially true by Demetrius (29.4–16). But the anonymous Epicurean whose views are reported in the last section of the book has more to say about this, and takes the battle right into the enemy's camp (33.21–36.7). He concedes that when the Epicureans use the formula of the similarity method they do *have in mind* the 'insofar as' premiss as a ground for the inference (33.24–32).[48] But, he adds, the notion of 'insofar as' should not itself be taken for granted, as it is by the Stoics. He distinguishes four uses of it (33.33–34.29): (1) Necessary concomitant, e.g. 'Men, insofar as they are men, are prone to disease and ageing'; (2) Definition and preconception (*prolēpsis*), e.g. 'Man, insofar as he is man, is a rational animal'; (3) Accident, e.g. 'Man, insofar as he is man, [walks whenever he wishes]';[49] (4) Necessary

48. 'For when we *say* that since things within our experience are of such a kind things outside our experience are of that kind, we are *judging* that it is insofar as things within our experience are what they are that something outside our experience is conjoined to them.' It is essential to take [κ]αθὸ and οὕτως as correlative in this way, rather than connect [κ]αθὸ to what precedes as the De Lacys do, in order to make the assertion match the example which follows.

49. In 34.15, if the next clause begins καὶ τὸ | συμβ]εβηκέ[ναι . . ., there is the right space for . . . | . . .] . ειν ὅτ[αν θέλητ. What the other verb is is anyone's guess: I understand from Francesca Longo Auricchio and Adele Tepedino Guerra (see n. 1 above) that the

concomitant of a property, e.g. '[A man, insofar as he] is foolish, is utterly unhappy'. The author observes that any of these four types can underlie sign-inferences,[50] and that not only (1) but also (2), (3) and (4) pick out some kind of necessary connexion. The reason why the Stoics think that an 'insofar as' clause must be included in the premiss, and that the inference will then be by the elimination method, is that they have given no thought to the precise senses of 'insofar as' and to how an 'insofar as' premiss is established[51] (34.29–35.4). In fact, he goes on, establishing the necessary connexion which 'insofar as' in all its senses marks can only be a painstaking empirical matter – even for apparently definitional properties like man's mortality (35.4–29).

This looks like a head-on confrontation between empiricism and rationalism. The Epicureans must have felt that in claiming that science could work purely by deduction from necessary truths the Stoics were failing to attach sufficient weight to the inductive element in the human learning process to which their epistemology paid lip service (*SVF* II 83; Cicero, *Ac.* II 21, 30). And one can see the point of their refusal to bow to Stoic pressure by reformulating the mortality argument into a deductively valid one: either way it rested primarily on the inductive similarity method, and nothing was gained by adopting a formulation which disguised this fact.

This leads us on to the central problem: why, in spite of all, do the Epicureans concede that some sign-inferences, including that of void from motion, do rely on the elimination method (12.1–14; 14.11–14; 35.29–36.7)? Jürgen Mau, following a suggestion by Bahnsch, interestingly argues that the object was to tease the Stoics by making the repugnant inference from motion to void look logically valid even on their own criterion.[52] And the De

letter before ειν appears to be δ or λ. In Epicurean usage συμβεβηκός is just 'property', with 'permanent property', or 'permanent concomitant', and σύμπτωμα, 'accident', as its two species (Demetrius Lacon ap. S.E. *M* x 219ff.; thus also Epicurus, *Ep.Hdt.*68–71, contrary to the usual interpretation); that the latter species is intended at 34.11ff. can be inferred from the contrast with 33.35–34.5, and was presumably made clear by the καθ' ὃν τρ[ό]πον clause qualifying it: 'that this is a property of that in the way in which . . .'

50. The De Lacys' punctuation may mislead: οὖν in 34.25 is resumptive after the long genitive absolute (Denniston, *op. cit.* (n. 25), 428–9), introducing the main clause. In 27–9 I would translate: 'We make sign-inferences according to each of them [viz. the meanings of 'insofar as'], whichever reason dictates' (see LSJ, *s.v.* αἱρέω A II 5).

51. λαμβάνομεν (34.33–4) = 'ascertain' (cf. 35.6), not 'understand'.

52. 'Uber die Zuweisung zweier Epikur-Fragmente', *Philologus* 99 (1955), 93–111.

Lacys may seem to lend support to this idea of a merely *ad hominem* move when they observe that on other occasions the void argument is treated as a purely inductive one (citing 8.21–9.8 and 35.32–36.7).[53] But the tease theory founders when we note that other inferences, including the non-partisan one from smoke to fire, are treated on a par with the void one (36.2–7); and it is therefore surely better to look for an interpretation which will not have Zeno basing the void argument on the similarity method at one moment and on the elimination method the next without apology or explanation. Part of the solution can be seen at 35.22–36.7, where we are told that the void and fire inferences rest purely on the elimination method and yet receive their confirmation from empirical observation of the regular dependence of motion on empty spaces, or that of smoke on fire. Indeed, it is a familiar assertion in the *de Signis* that the elimination method gets its confirmation from the similarity method (8.21–9.8; cf. 31.8–17), or, in more picturesque language, that what the former captures the latter puts under lock and key (33.1–9). The position must then be that 'If [or 'Since'] there is motion there is void' goes through trivially by the elimination method, thanks to the nature of motion as impossible except through empty spaces, but that that nature is one which we have learnt inductively. So too, even more controversially, 'If [or 'Since'] there is smoke there is fire' is guaranteed by the nature of smoke as the product of fire, but once again this nature can only be learned through empirical generalisation. The alleged Epicurean wavering on the status of the void argument is illusory, for those passages which seem to make it inductive are unmistakably describing how we discover the nature of motion as something impossible without empty space (8.21–9.8; 35.35–36.2), while those which link it to the elimination method are referring to the inference 'Since there is motion there is void' which that discovery licenses.

When and why do the Epicureans adopt this method, and how much are they conceding to the Stoics by so doing? The answer to the first question can be found at 37.1–38.8, if the text is properly

53. De Lacy, *op. cit.* (n. 1), p. 100 n. 35. Their further claim that at 37.36–38.8 yet another criterion, inconceivability, is used for the void inference, seems mistaken. What is argued there is that it is a consequence of the Stoics' neglect of differences between kinds of implication that in that case the mortality argument and the void argument will (counter-factually) rely on one and the same kind of inconceivability.

understood.[54] The anonymous Epicurean criticises the Stoics for failing to make two distinctions between different kinds of implication. The first distinction separates cases where the apparent thing is peculiarly connected to the non-apparent thing because of some sort of causal relationship, for example because the non-apparent thing is the material origin of the apparent thing, from cases where the basis of inference is resemblance, either direct or analogical. Now the second kind of case exactly matches those inferences for which, as we have seen, the Epicureans insisted on retaining the similarity method of inference. The first kind of case is expressly classed with the inferences for which the elimination method is sanctioned, exemplified elsewhere by those from motion to void and from smoke to fire; and the reason is clearly that in all these the premiss is linked to the conclusion not by any resemblance between their subject terms, but because the conclusion is explanatory of the premiss. It is evident that such inferences could not go through by the similarity method. But why did the Epicureans choose to assimilate them to the elimination method in particular, even though, as the smoke example gives away, the price was a much more hospitable interpretation of that method's scope than the Stoics permitted themselves? The answer, I suppose, is that they simply did not have available any method of scientific inference apart from similarity and elimination (cf. 8.7–10). A Stoic would have put the smoke inference, as one based on *peira*, into the class of *pithana*, thus denying it any scientific validity. But an Epicurean could not have followed him on that path without weakening many basic tenets of atomism, including the proof of void. Besides, the strength of the Epicurean inference lay in the supposition that the conclusion was uniquely

54. I construe 37.1–38.8 as a single argument, and 37.1–36 as a single sentence, consisting of a series of genitive absolutes, with the resumptive phrase at 29–30 introducing the main clause. The first genitive absolute (1–11) should not be made into an independent sentence by the emendation συ[ν]τίθεν<τ>αι: this introduces a quite misleading suggestion that it is the Stoics' view that is being quoted. Instead we should retain the MS reading and understand the ellipsis of καταξιουμένου in the clause at 9–12 (harsh Greek perhaps, but characteristic of the author's style, since there is a similar ellipsis of ῥηθήσεται at 38.2), and translate: 'Since some non-apparent things follow from apparent things in such a way as to have a peculiar connexion with them in that all things are products of the elements or of their compounds or connected to them in some other way, so that it is on the basis of the claim that the apparent things are eliminated if the non-apparent things are not posited that (it is claimed) to establish the following of invisible things from appearances; and since there is . . .' For the interpretation of 37.19–24 and 37.36–38.8, see nn. 47 and 53 above respectively.

explanatory of the premiss, whereas implications founded on *peira* could claim nothing more than regularly observed conjunction. So the necessary connexion claimed by the elimination method would naturally commend itself to them; and if they let its use spread to cases where the necessity barely looked logical, that was hardly surprising in view of their erasure of the boundary between conceptual and empirical truth.

To regain some of the ground conceded to the Stoics, the Epicureans make their relative valuation of the two stages in such inferences highly favourable to themselves. Only to the inductive stage, in which the similarity method is employed, do they grant the name of 'sign-inference', *sēmeiosis* (e.g. 9.3; 32.8–10), expressly withholding it from the stage governed by the elimination method (30.33–31.36; 32.8–10).[55] I interpret this as follows. The empirical process of establishing the nature of motion, including its inseparability from empty space, is in itself a sign-inference by the similarity method: Since all the many and varied moving objects within our experience share the characteristic of being unable to move without empty space, motion is impossible without empty space (cf. 8.32–9.3). The full inference which starts in this way and goes on, by the elimination method, to conclude that motion at the microscopic level implies empty space ('void'),[56] is, all the more, a sign-inference. But the extra element

55. At 31.8–17 the objection must be to some Epicureans' application of the word *sēmeiosis* to the elimination method. Were it to their recognition of the method's validity, there would be a glaring inconsistency with the position expressed elsewhere, as the De Lacys are forced to suppose there is (p. 122 n. 96). Philippson (*Rhein. Mus.* (1909), 37–8) curiously supposes the word τρόπος to be the main one at issue here, perhaps as a result of his misconstrual of *anaskeuē* as one kind – the strongest – of certainty attainable by the similarity method (*Diss.*, 41–2). At 32.8–10 I follow the De Lacys' punctuation and translate 'Again, that we speak of one method of sign-inference, the similarity method, not three'; but the evidential value is small since, as Malcolm Schofield rightly points out to me, it could also be punctuated to read 'Again, that we speak of the similarity method as one method of sign-inference, not three'. At any rate, the position is stated unambiguously at 30.33–31.1. The only threat of counter-evidence is at 31.36–32.2, which may appear to say that not all sign-inferences are by similarity; but I suspect that the proper emphasis is: 'They overlook the fact that we do not say that all sign-inferences by similarity are made by apprehending the *antecedent* sign, but only some.' It is hard to make more of this passage without knowing precisely what Philodemus means by 'antecedent' sign.

56. This argument appears to founder on the unacknowledged disparity between the relatively empty space of the macroscopic level and the absolute void of atomic physics. But if we take a thing's movement to be necessarily through space less solidly packed than the thing itself, then for an atom that can only be motion through absolute void.

of straightforward inference by the elimination method which is added at this second stage is not *in itself* a further sign-inference, since on its own it is powerless to reveal anything.[57]

4. *Epicurus on non-contestation*

Epicurus is agreed to have attached particular methodological importance to the twin principles of *epimarturēsis* and *ouk antimarturēsis*. I choose the almost literal translations 'attestation' and 'non-contestation', which provide the convenient cognate verbs 'attested' and 'uncontested'. (The verb 'contest' must be thought of here in the sense 'bring evidence against'.) Our only full account of these methods is provided by Sextus Empiricus at *M* VII 211–16 in the course of his historical survey of theories concerning the criterion of truth. It follows a very full and lucid summary of Epicurus' doctrine that all sensations are true (203–10).

I shall begin with some speculation about the historical credentials of this account, based on a close look at 213–14, which reads as follows:

> Non-contestation is the following (*akolouthia*) from that which is apparent of the non-apparent thing posited and believed. For example, Epicurus, in saying that there is void, which is non-apparent, confirms this through the self-evident fact of motion. For if void does not exist there ought not to be motion either, since the moving body would lack a place to pass into as a result of everything's being full and solid. Therefore the non-apparent thing believed is uncontested by that which is apparent, since there is motion. Contestation, on the other hand, is something which conflicts with non-contestation. For it is the elimination (*anaskeuē*) of that which is apparent by the positing of the non-apparent thing. For example, the Stoic says that void does not exist,

57. This seems to be the gist of the difficult 31.1–8: there are three species of 'antecedent' sign (cf. 32.11–12), that is, in addition to 'similar' signs, also 'dissimilar' signs (presumably as in most inferences by the elimination method, e.g. motion as a sign of void) and even 'opposite' signs (e.g. going up as a sign of imminent coming down, or night of day?); but if these latter two 'are to be demonstrative of anything, they must necessarily receive the addition of signs which proceed [retaining πορευομένων at 31.5–6] on the principle of similarity'. If that is the correct interpretation, the Epicureans apparently deny that an inference by the elimination method is in itself a sign-inference, yet allow that its premiss may be a sign: a delicate position, which the Stoics are said not properly to appreciate (32.8–13). The point, I imagine, is that although the sign-inference which leads us from motion to void is incomplete without its similarity method stage, so that the elimination method stage does not on its own qualify as a sign-inference, nevertheless, *within* the two-stage inference it is motion that operates as the sign of void; and motion is a 'dissimilar' sign operating by the elimination method.

judging something non-apparent, but once this is posited about it[58] that which is apparent, namely motion, ought to be co-eliminated (*sunanaskeuazesthai*) with it. For if void does not exist, necessarily motion does not occur either, according to the method already demonstrated.

With all the talk of elimination and co-elimination we seem to be in familiar country here. The non-contestation of a true belief and the contestation of its contradictory are established by one and the same inference process, as the last phrase declares. At first this is identified merely as the *akolouthia* of the non-apparent from the apparent. The *de Signis* (37.1–24) has told us that such *akolouthia* can be either by the elimination method or by the similarity method, choosing the void argument as its prime example of the former. Similarly here the void example is chosen, and in the second stage the *akolouthia* is expressly treated as being by the elimination method. This is strong evidence that Sextus' source does not antedate the debate of the late second century B.C. reported in the *de Signis*.[59] Indeed, the source is widely held to be none other than Demetrius Lacon, one of the Epicurean participants in that debate. The one serious ground for this[60] is that Demetrius is the only Epicurean source whom Sextus cites by name elsewhere (*PH* III 137 = *M* X 219; *M* VIII 348), probably, as Natorp suggests, because Sextus is drawing on his school's founder Aenesidemus, who will in turn have drawn on Demetrius as the leading Epicurean of his own day. The presumed authority of Demetrius had helped establish this passage's reputation as a safe guide to Epicurus' methodology, albeit couched in the terminology of a later age.

58. I.e. 'once it is posited that void does not exist'. See W. Heintz, *Studien zu Sextus Empiricus* (Halle, Saale, 1932), 104–6. Because what is posited is, in the example given, negative, the author feels free to treat it as an elimination and to speak of the apparent thing being 'co-eliminated'. But since it might in another case be positive the actual definition of contestation cannot speak of *co*-elimination: so *anaskeuē* there should not, as often, be emended to *sunanaskeuē*.

59. Cf. Heintz, *op. cit.* (n. 58), 112–13. There is no evidence for use of the 'elimination' terminology in the context of signs at an earlier date, and I hope that §2 has established that it cannot at all events antedate Chrysippus' analysis of the conditional.

60. Natorp's only evidence specific to this passage (*Forschungen zur Geschichte des Erkenntnisproblems in Alterthum* (Berlin, 1884), 260) is that the example of the void inference given there was also used by Demetrius (as cited at *M* VIII 348) – hardly impressive evidence, considering that both the other Epicureans quoted in the *de Signis* use it too. Crönert (*Kolotes und Menedemos* (Leipzig, 1906), 121) only makes matters worse when in Natorp's support he points out two parallels between the examples in *M* VII 203–16 and those used in the *de Signis*, for the *de Signis* passages come in the section deriving from Zeno of Sidon and not in that from Demetrius.

But there is one serious objection. In the *de Signis*, as we have seen, the role of the elimination method is carefully circumscribed. Although it sanctions the formal step from 'There is motion' to 'There is void', this is not in itself a sign-inference but a trivial inference which for 'confirmation' relies entirely on empirical inquiry conducted according to the similarity method. The passage in Sextus is formally correct in making the void inference go through by the elimination method; but any of the Epicureans reported by Philodemus would be horrified by the false emphasis with which this is done, particularly by the assumption that it is the inference from motion to void that in itself 'confirms' the existence of void.[61] The source is more likely to be someone drawing on the Epicurean material cited in the *de Signis* but with little or no personal involvement in the controversy. Such a source could well be misled by a passage like *de Signis* 12.1–14 into supposing the void inference to rely purely on the elimination method, provided that he did not scrutinise the broader context too carefully. There is, indeed, one outstanding candidate for this role – Antiochus of Ascalon, like Demetrius a contemporary of Aenesidemus. That Antiochus' *Canonica*, apparently a history of theories of knowledge, was the source for at least some of this historical section of *M* VII seems beyond doubt.[62] The history of the Academy at 141–89 bears his hallmark,[63] and he is cited in it once by name (162). Shortly after, at 201–2, his words on Asclepiades are quoted verbatim from his *Canonica*. Then follows the section on Epicurus (203–16), itself followed by accounts of the Peripatetics and Stoics (217–60) which Hirzel has with good reason also identified as Antiochean.[64] If,

61. If I were defending Demetrius' authorship I might be tempted to argue that he is slightly more favourable to the elimination method than the other Epicureans in the *de Signis*, inasmuch as he allows that some 'insofar as' premisses are established by it (29.4–16; cf. n. 3 above). But Philodemus gives no hint of any significant dissension between Demetrius and the others, and I would guess that his point here is that some of these premisses could not be confirmed inductively but rest purely on word meaning, e.g. 'A husband, insofar as he is a husband, is married'. In any case, his comment has nothing to do with the class of inferences to which the void one belongs.

62. See the very full arguments of Hirzel, *Untersuchungen zu Cicero's philosophischen Schriften* III (Leipzig, 1883), 493–524.

63. For example, the account of Plato at 141–4 is out to make him anticipate Stoic epistemology, seizing on the word *perilēptikos* in the *Timaeus* and scandalously equating it with the Stoic term *katalēptikos*. Antiochus is notorious for his conflation of Platonism with Stoicism.

64. Hirzel, *op. cit.* (n. 62), 508–19.

then, the passage on Epicurus is flanked on either side by material from Antiochus, and if our description of its sources as a non-combatant observer of the *de Signis* debate fits Antiochus, we had better fear the worst.[65] For Antiochus' doxographical reporting of his other predecessors does not reveal him as a man of much intellectual conscience. Fortunately he is at his most unscrupulous when grinding his own historical axe about the unity of the Platonic tradition from Plato to the Stoics. In the present passage he has no apparent motive for distortion. Nor, on the other hand, was he likely to be intimately acquainted with Epicurean philosophy, and we must face up to the possibility that his summary contains misunderstandings. The ease with which we have seen him anachronistically attributing contemporary Epicurean terminology to Epicurus himself does not augur well.

At least his division of labour between attestation and non-contestation seems right. Antiochus (if I may now so call him) strongly implies that attestation by something self-evident is required for beliefs which are directly verifiable through sense-perception, such as the belief that the man approaching is Plato, which is confirmed when he draws close enough to be recognised; while non-contestation by things self-evident is the proper test of a belief about *ta adēla*, naturally imperceptible things such as atoms and void and the causes of celestial phenomena. Epicurus' own usage seems to match this division.[66]

But how about the passage on non-contestation and contestation which we have already examined? That for a belief about the imperceptible to be 'contested' by phenomena is for it to be somehow incompatible with them seems unexceptionable. But then we would expect non-contestation to be a lack of such incompatibility, in other words *consistency*, between the belief and the phenomena, whereas Antiochus defines it as the *following* of the belief from the phenomena. Can this be right? Antiochus is fortunate to have a powerful ally in Gisela Striker.[67] If non-

65. Another pointer to Antiochus as source of this passage is the constant stress on *enargeia*: cf. its frequency (Latin *perspicuitas*) in Lucullus' Antiochean speech, Cicero, *Ac.* II 11–62. On this see H. Tarrant, 'Philo of Larissa on the self-evident' (forthcoming).

66. For attestation of something perceptible, see *Sent.* 37. For non-contestation of something *adēlon* by the *phainomena*, see *Ep. Hdt.* 47, 48, *Ep. Pyth.* 88, 92.

67. G. Striker, 'Κριτήριον τῆς ἀληθείας' (*Nachr. der Akad. der Wiss. in Göttingen* I, Phil.-hist. Klasse (1974), 47–110), 73–80. In this respect she is followed by W. Detel, 'Αἴσθησις und Λογισμός. Zwei Probleme der epikureischen Methodologie', *AGP* 57 (1975), 21–35.

contestation meant consistency, she points out, then '*q*' would be true whenever it was consistent with phenomena, '*p*', even if it did not follow from them. But to say that '*q*' does not follow from '*p*' is to say that 'not-*q*' is consistent with '*p*'. Thus both '*q*' and its negation would be consistent with '*p*', and would, absurdly, both be true. Her solution is that non-contestation fluctuates between the senses of 'following' and 'consistency'. Wherever Epicurus allows a plurality of alternative theories, as he does for the explanation of celestial phenomena, each theory is merely consistent with the phenomenon, but, for that very reason, is not true but only possible. In atomic physics, on the other hand, where he holds only one explanation to be acceptable for each phenomenon, the correct theory will be uncontested by the phenomenon in the 'stronger' sense of following from it.

This is an attractive and economical interpretation, for which Antiochus should be grateful, but I am not persuaded that it is right. First, Epicurus tells us that a certain process of judgement, if it is uncontested, gives rise to truth (see below, and cf. *M* VII 211; DL X 34), but on the proposed interpretation wherever 'uncontested' carried its prima facie meaning of 'consistent' the belief in question turns out to be not true but only possible, whereas in precisely the cases where the belief is held to be true 'uncontested' has to be understood in the rather strained sense of 'following from'.[68]

Second, the interpretation supposes the 'phenomenon' against which a theory is checked to be the very phenomenon which it is designed to explain, or which serves as its principal sign or evidence. But Epicurus says repeatedly that what we must check theories about the causes of celestial phenomena against is *similar phenomena within our direct experience* (*Ep.Hdt.*80; *Ep.Pyth. passim*). It is because these similar phenomena are variously caused that a

68. He also speaks of *sumphōnia*, 'consistency' (e.g. *Ep. Pyth.* 86–7, 93); lack of conflict (ibid. 99); and the removal of obstacles (ibid. 91). Striker (*op. cit.* (n. 67), 76 n. 3) cites R. Robinson, *Plato's Earlier Dialectic* (Oxford, 1953²), 126–9, as arguing for a similar slide between 'be consistent with' and 'follow from' in Plato's use of *sumphōnein* at *Phd.* 100A. But the slide would be a rather blatant one for Plato to hope to get away with, and the use of the word in the sense 'follow from' is, I believe, unattested. What Plato must mean is that in any inquiry about, say, explanations (100 A 5–6) you first posit whatever set of Forms seems appropriate (100 A 3–4; cf. 100 B 3–7), e.g. in aesthetic inquiry the Beautiful and the Ugly, and then put down as true any explanatory judgements in that field which *fit in with* the existence of those Forms, e.g. 'This is beautiful because of the Beautiful', and as false any which do not *fit in with* the existence of those forms, e.g. 'This is beautiful because of its shape and colour'.

plurality of explanations for their celestial analogues can be entertained. Moreover, there is good reason for understanding similarly the 'non-contestation' of the unique explanations insisted on in atomic physics (*Ep.Pyth.*86). At *Ep.Hdt.*47, in the discussion of the simulacra which account for vision, Epicurus says, 'Next, that the simulacra are unsurpassedly fine is uncontested by any phenomenon'; and the fuller version in Lucretius (IV 110–28) offers just the sort of supplementary arguments which this phraseology leads us to expect, such as the parallel of barely visible insects whose guts and eyeballs, not to mention their soul atoms, must be far below the threshold of perception – proof not that the theory is true but that it *could* be true. In the next paragraph Epicurus invokes non-contestation in support of his theory that simulacra can form spontaneously in mid air,[69] and once again Lucretius at the corresponding point (IV 129–42) offers in evidence only a familiar analogue, the spontaneous formation of clouds into the images of giants and monsters.

The obvious difficulty is that such comparisons could hardly provide the principal grounds for holding the theories in question, especially as more direct proof is generally available. But was the method ever intended as the basic tool of discovery? Epicurus tells us (*Ep.Hdt.*51) that error arises not through the mental or sensory apprehension of impressions, but through a distinct but related process, apparently one involving judgement about those impressions (cf. ibid. 50):

> It is through this process, if it is unattested or contested, that falsehood arises, and, if it is attested or uncontested, truth.

Since all these truth and falsity conditions seem to presuppose investigation they can hardly be necessary conditions. That would leave uninvestigated beliefs without any truth value at all – which, apart from its intrinsic implausibility, would conflict with Epicurus' definition of 'true' as 'whatever is as it is said to be' (*M* VIII 9). But if, on the other hand, they are sufficient conditions, we run into the problem that, as we have seen, neither the name 'non-contestation' nor the way in which the method is used offers anything like a sufficient condition for truth. To escape the impasse, we had better suppose that these conditions only come into operation after the judgemental 'process' has done some of the work. A scientific belief is assumed to have enough theoretical merit or explanatory power to have commended itself in the first place. It is only for such beliefs that non-contestation by phenomena is invoked as a sufficient condition of truth.

69. *Ep. Hdt.* 48: 'And there are swift formations of them in the space around us because they do not need to be filled out in depth, and other ways in which things of this kind are produced (for none of these is contested by our perceptions), if one is considering how to bring clear and matching images from external things to us.'

In the examples discussed above, the incredible fineness of simulacra and their ability to form spontaneously in mid air are obviously not asserted merely on the ground that analogous phenomena like tiny insects and cloud pictures show them not to be impossible. They start out as planks in a complex theory designed to explain sensory and mental mechanisms, and are required within that theory to allow for, respectively, the enormous speed of simulacra (*Ep. Hdt.*47; *Nat.* II 16 IV–V = 24.36–7 Arr., 2nd ed.; Lucretius IV 176–216) and the occurrence of fantastic dream images (Lucretius IV 722–48). It is as a confirmatory check on these elements in the theory that parallel phenomena must be cited, in order to show that in addition to their explanatory power they are intrinsically possible.

It may sometimes seem that a theory is itself necessitated by its principal sign without further ado,[70] for example that the existence of void follows necessarily from the existence of motion (*Ep.Hdt.*40; Lucretius I 329–45), so that additional confirmation is superfluous. But even here the inference collapses if phenomena prove *horror vacui*, or provide instances of motion without void. So a further phenomenon must be cited in refutation of *horror vacui*, namely the experiment in which two flat plates, pulled apart, create a momentary void between them (Lucretius I 384–97); and alleged examples of motion without void, like the fish's passage through water, must be discounted (ibid. 370–83).

If it is asked why Epicurus placed such stress on this particular feature of his methodology, an answer can be glimpsed in his distinction between the explanations of celestial phenomena, a plurality of which are consistent with phenomena within our experience and must therefore be accepted, and the basic tenets of physics, where only one story is consistent with familiar phenomena. For it has not escaped the notice of commentators on the

70. This may sometimes be by the 'contestation' of its contradictory, as explicitly at *Ep. Hdt.* 55 and implicitly elsewhere – cf. Striker, *op. cit.* (n. 67), 80 – but there is no ground for equating the contestation of 'not-*p*' with the non-contestation of '*p*'.

Letter to Pythocles that a good many of the alternative explanations listed are those propounded by Presocratic philosophers, for whom Epicurus had considerable respect.[71] Epicurus recognises that nearly all the theories under consideration have sufficient explanatory force, and knows no way of choosing between these except by testing them for consistency with more familiar phenomena. Unfortunately most pass that test too, and all of those must therefore be accepted as true, if not in our world then at any rate in some part of the universe, whose infinity guarantees that all possibilities are realised (Lucretius v 526–33).[72] If, then, the multiple-explanation principle is an answer to the problem of choosing between existing cosmological doctrines of equal explanatory power, it may well be that a similar motivation lies behind the claim that for the basic laws of physics only one theory is consistent with phenomena. For Epicurus did not regard his own system as definitively established until he had shown rival physical theories to fail the test of consistency with phenomena. Books XIV and XV of his work *On Nature* were probably devoted to this enterprise,[73] and are represented for us in Lucretius by the refutations of Heraclitus, Empedocles and Anaxagoras (I 635–920).[74] Thus Epicurus' methodology arises from something resembling the celebrated sceptical *diaphōnia* argument: many philosophers have equally satisfactory explanations of the phenomenal world, but since they cannot all be true why accept any of them? Epicurus' answer is twofold. Sometimes there is indeed no way of choosing between them, but in that case we are not compelled to take the self-destructive step of disbelieving them all. Instead, thanks to the infinity of the universe, we can believe them all.[75] Sometimes, on the other hand, there is ground for choosing between them, for despite their equal explanatory power there may only be one of them which is consistent with the entire range of phenomena.

71. See under the various names of the Presocratics in the *Index nominum* to H. Usener's *Epicurea* (1887). I have argued against the convention that Epicurus despised all other philosophers and denied any debt to them in 'Epicurus and his professional rivals' (in 'Etudes sur l'épicurisme antique', ed. J. Bollack, A. Laks, *Cahiers de Philologie* I (1976), 119–50).

72. Where a plurality of uncontested explanations is found for a single *class* of phenomena, e.g. weather-signs, lightning (*Ep. Pyth.* 98–102), they are accepted as all concurrently true even within our world. It must be where they all account for an individual, if recurrent, phenomenon, e.g. the waxing and waning of the moon (ibid. 94–5), that not more than one is held to be true in our world, and the others true for similar phenomena elsewhere. Lucretius' methodological pronouncement at v 526–33, and his parallel of the corpse for which we can easily list the possible causes of death and know that only one is true, yet cannot say which it is (VI 703–11), matches the second kind of case, but not the first.

73. My guess is that Book XIV, whose surviving last part includes a critique of Plato's theory of the elements, was aimed against the monists (cf. 29.16 Arr. 2nd ed) and pluralists, represented in Lucretius by Heraclitus and Empedocles respectively, while Book XV was aimed against Anaxagoras (Claire Millot, in her edition of Book XV, *Cron. Erc.* 7 (1977), 9–39, does not take this view; but note the four occurrences of *homoiomereia* and the indications in frr. 24 and Q that the views of other physicists are under scrutiny). The two books are linked, in a scholion on *Ep. Hdt.* 40, as returning to Book I's distinction between a compound and its elements – a theme likely to occur in a scrutiny of rival theories of the elements.

74. Here, as perhaps also at *Ep. Hdt.* 55 and *Ep. Pyth.* 90, a false theory is often shown to be 'contested' by the very phenomena which it is supposed to explain, and not merely by the analogous phenomena invoked when establishing non-contestation. This asymmetry is not surprising. Non-contestation is a yardstick for theories whose explanatory power is already acknowledged, which naturally entails their being thought consistent with the phenomena of which they are explanatory. So the further test required is consistency with phenomena *in general*. Contestation is used against someone else's false theory, and might well include a demonstration of inconsistency with the phenomenon of which it is alleged to be explanatory.

What emerges, then, is the very close dependence of Epicurus' 'non-contestation' and 'contestation' on the problems which faced him as a cosmological theorist establishing his own system. He can be congratulated on his insight that scientific theories lend themselves to falsification more readily than to verification, and it is a pity to resort to an interpretation which robs him of it. A wide gulf lies between his methodology and Antiochus' interpretation of it. Antiochus clearly started with some general information about Epicurus' terminology and usage, and, in characteristically unhistorical fashion, delved into contemporary Epicurean tracts for further elucidation. Not finding there the crucial term 'non-contestation', he mistakenly identified it with the current Epicurean preoccupation *sēmeiōsis*, of which he had achieved a rather superficial understanding. He thus confused a method of confirmation with a method of discovery. If he had read more carefully, he would have found his Epicurean contemporaries perfectly well aware of the purely confirmatory role of non-contestation:

> They are also mistaken not to see that we ascertain that there is no obstacle resulting from appearances. For it is not enough to accept the minimal swerves of atoms on the grounds of chance and free will, but it

75. This interestingly parallels Epicurus' response to the sceptical argument from conflicting sense-impressions. The sceptic says 'Disbelieve them all', Epicurus replies 'Believe them all': see G. Striker, 'Epicurus on the truth of sense-impressions', *AGP* 59 (1977), 125–42, esp. 136–8.

is necessary to show in addition that no other self-evident fact whatever conflicts with this. (*de Signis* 36.7–17)[76]

76. Cf. Lucretius III 216–93. The swerve theory is developed for its explanatory power, but in addition it must be shown that phenomena do not prove it impossible: phenomena do conflict with big swerves in the trajectories of falling bodies, but not with a swerve by the minimal unit of distance (ibid. 244–50). For further appeals to non-contestation in the *de Signis*, see e.g. 8.1–13; 13.1–8; 15.19–28; 21.12–16; 32.24–7; 35.21–3.

9 Confirmation et disconfirmation[1]

JEAN-PAUL DUMONT

Vu de loin, l'objet de la présente étude m'avait inspiré une opinion anticipée ou, pour parler comme Epicure, un *prosdoxazomenon* qui ne s'est pas confirmé ensuite par une vue rapprochée.[2] Mais encore faut-il que je commence par rappeler les raisons qui m'ont suggéré l'hypothèse fausse dont j'étais parti. Ensuite, dans un second moment, nous étudierons les pièces principales du dossier, pour mesurer quels aspects de l'hypothèse méritent soit d'être conservés, soit d'être rejetés. Cette méthode n'a rien ici qui devrait choquer, puisqu'elle est celle pratiquée par Epicure lui-même lorsqu'il a à traiter de ces objets invisibles, cachés ou obscurs que sont les *adēla*.

La Canonique d'Epicure ou, si l'on préfère, bien que le terme n'ait rien d'épicurien, sa logique, a donné lieu à peu d'études qui soient satisfaisantes et complètes. La brève analyse de Michele Giorgiantonio[3] se borne pour ainsi dire à constater que pour Epicure l'unique critère de la vérité est constitué par la sensation, formule dont l'exactitude est incontestable puisqu'elle est confirmée par le corpus épicurien; mais il ne parvient pas à se sortir heureusement du problème que suscite le caractère contradictoire des sensations, et surtout il n'examine pas la procédure plus complexe de l'*epimarturēsis* (confirmation), de l'*antimarturēsis* (dis-

1. On a, par commodité, conservé le mot anglais 'disconfirmation', pour désigner la procédure d'ἀντιμαρτύρησις en général, par laquelle une opinion se trouve infirmée. Le lecteur français voudra bien nous pardonner cette habitude, peut-être fautive, prise lors des discussions du colloque.
2. Doivent être ici remerciés, pour leur aide amicale et collégiale, et la part qu'ils ont prise à la discussion de ce propos, avant, pendant et après le colloque: MM. M. Burnyeat, D. Sedley, Mme G. Striker et M. M. Schofield.
3. M. Giorgiantonio, 'Il fondamento della logica di Epicuro', *Sophia* 1–2 (1958), 111–14.