Definitions and the Problems of Foreclosure

One of the ways in which we endeavour to achieve clarity in communication and to avoid misunderstandings is to define our terms at the outset, with the idea of making it clear what it is we are talking about, although attaining exactness in the matter is often admittedly problematic. It seems perverse in the extreme to cast any doubt on that ambition. Indeed is not being careful to make ourselves clear a matter of common politeness (a universal principle of language use according to Brown and Levinson 1987)? Yet it can be argued, and I shall argue, that in certain circumstances the demand for a univocal definition at the outset of an inquiry can prove to be a hindrance rather than an advantage.

Once again we have some ancient Greeks to thank – or to blame – for some unequivocal statements of the need for definitions, so our first task must be to review this evidence, probe its motivations and evaluate the consequences, for philosophy and mathematics as well as for science. It was Aristotle's view (*Metaphysics* 987b1–7) that Socrates was the first person to direct attention to universals and to definition, and Xenophon, for instance (*Memorabilia* I 1.16), confirms that that was a preoccupation of his.

Socrates himself left no writings. So saying quite how he went about his search for the defining characteristics of things is a matter of interpreting our secondary evidence – the so-called Socratic question, recently reopened in spirited fashion by Rowett (2018) who drives a far bigger wedge between the historical Socrates and how he is represented by Plato, and between both those two and Plato's own opinions and methodology, than has generally been assumed. Yet from my point of view here that issue may be bypassed in that whether or not the picture we have of Socrates in the early dialogues of Plato is historically accurate, those works confirm that the problems they raise were a matter for debate in classical Athens.

Throughout those dialogues of Plato he is represented as buttonholing anyone he came across and interrogating them on matters of philosophical, generally ethical or epistemological, importance. In the *Laches* for example

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the opening exchanges focus on educating young men, but that turns quickly to the question of what excellence or virtue itself (*aretē*) is, which the discussants then narrow down to consider one particular type, namely *andreia*, 'manliness' or courage. Since Socrates' interlocutors include a couple of famous generals, Nicias and Laches, the expectation is that they will know the answer. But Laches' first offering is that the person who stays in the battle line, facing the enemy and not taking to flight, is courageous (190e). While Socrates agrees that that is true, he insists that it will not do as an account of what 'courage' is, since you can be courageous not only in battle, but in facing dangers at sea, in disease, in poverty, in political affairs, in relation not just to what is painful or fearful but in resisting desires and pleasures. So he wants an answer that will cover all such types (191de). He even supposedly helpfully illustrates what he is after with a non-moral example, 'quickness', whether in running or speaking or learning or playing a musical instrument, where he gives 'the ability to do many things in a short time' (192ab) as a model for the kind of reply he wants for 'courage'.

Similarly in the *Meno* where again the topic they discuss is 'virtue', Meno says he has no difficulty in telling Socrates what the virtue of a man is, and again that of a woman, or that of a child, where again the answer will be different for a male child and for a female, as will the answer in the case of the virtue of a slave and that of a free man (71e). There are indeed lots of virtues, varying according to activity and age and so on. To that Socrates protests that he did not ask for a swarm of virtues but was after the respect in which they are all alike: just as if one is asked for a definition of 'health' or of 'strength', the answer should pick out the same character wherever it appears. He even suggests that the same applies in the case of 'bees', where what is at stake is what all bees have in common, thereby anticipating a problem we shall come back to, that of defining a species of animal.

So not only particular instances, or tokens, are rejected, but also specific types, in the search for the universal definition that covers all and only what the term corresponds to. But that presupposes that there is just one characteristic that every token and specific type exemplifies, a view that was famously rebutted by arguments in Wittgenstein (1953: para 66–7). Consider 'games', he suggested,

> I mean board-games, card-games, ball-games, Olympic games, and so on. What is common to them all? Don't say: 'There *must* be something common, or they would not be called "games"' – but *look and see* whether there is anything common to all. – For if you look at them you will not see something that is common to *all*, but similarities, relationships, and a whole

series of them at that . . . I can think of no better expression to characterize these similarities than 'family resemblances'; for the various resemblances between members of a family: build, features, colour of eyes, gait, temperament, etc. etc. overlap and criss-cross in the same way. – And I shall say: 'games' form a family.

Socrates, to be sure, does not take Wittgenstein's route. Dialogues such as the *Laches*, *Euthyphro*, *Lysis*, *Meno*, end in *aporia*, perplexity. The discussants are unable to give a satisfactory account, where the expectation is that this should be a definition, of the moral virtue, courage, piety, friendship, virtue itself, that they have been discussing. There is no doubting the deep concern with moral education that is here attributed to Socrates, and so with the importance of finding positive answers to his questionings. However, he is certainly made to protest that he is well aware that he himself knows nothing 'so to speak' (Plato, *Apology* 22d). When we are told by both Plato and Xenophon that the Delphic oracle proclaimed that 'no one is wiser' than Socrates, he is represented as concluding that the one respect in which he surpasses others in wisdom is that he recognises his own ignorance (*Apology* 20e–21b). To what extent this is to be treated as a case of his well-known 'irony' continues to be disputed (Vlastos 1991). But while he is consistently represented as objecting to relativist views, that would have it that right and wrong are purely a matter of convention or what people choose to believe, neither Plato nor Xenophon provides much help if we seek positive statements concerning the objective moral standards the historical Socrates was committed to.[1]

So how far Socrates himself built up positive positions starting from his quest for definitions is problematic. But we are on rather more solid ground when we consider Plato's own development. As has often been noted he nowhere sets out what interpreters are used to calling his Theory of Forms, so all sorts of questions remain unanswered, over the scope of the theory, and on the relationships between the Forms and the particulars that participate in, or imitate, them. Equally it would be rash to attempt to identify one single motivation for Plato's dualist metaphysics with its fundamental ontological contrast between the invisible, intelligible world of Being and the perceptible world of Becoming (*Phaedo* 79a). Equal sticks or stones will be equal in some respect, but unequal in others: but that would never be true of equality itself (*Phaedo* 74bc). Individual instances or particular types of beautiful object will be beautiful in some respects but

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[1] On the basis primarily of Xenophon's reports (e.g. *Memorabilia* I 4.4ff., IV 3.3ff.) Sedley (2007) argues that Socrates did hold that the world exemplifies providential design.

ugly in others, beautiful at one time but not at another, to some people but not to others. But beauty itself suffers no such limitations (*Symposium* 210e–211e). Thus one assumption that remains constant throughout his expositions is that of the singularity of the Forms that constitute the true realities behind the appearances. The Forms enter into relationships with other Forms, but each is unique and uniquely characterisable, ideally, in the kind of definition that Socrates was represented as seeking but failing to find.

But that prompts or presents us with a quite subversive thought. Insofar as the type of definition that is being presupposed is mistaken, to that extent an important element in the construction of the whole Platonic ontology has to be called into question. Perhaps the easiest case to illustrate this relates to knowledge itself, the topic of a sustained discussion in Plato's *Theaetetus* which again ends without a positive conclusion.[2] The objection would be that in such an instance trying for a single account, one that would capture the essence of every type of cognition we can recognise as 'knowledge', is massively mistaken. Not only is 'knowing that' different from 'knowing how' but each of those comes in a great many varieties, differentiated, for example, in the extent to which a verbal account of the knowledge type can be given. How does one put into words what knowing how to ride a bicycle consists in? Defining a colour, such as red, by a certain wavelength of light is all very well but does not help anyone to recognise that particular hue, where we are reduced, rather, to ostensive definition, pointing to an example. In such cases a concern for non-verbal understandings goes beyond Wittgenstein's preoccupation with the meanings of terms in the paragraphs in which he discusses family resemblances, though it shares with his view there both the negative point that there is no one thing that links all the instances and types, and the positive one that to answer the question we must 'look and see'.

The demand for a single univocal definition is particularly problematic when we are dealing with moral virtues. But such a demand was not limited to such cases. We have noticed that Socrates is made to offer a definition of 'quickness' in the *Laches* and he presupposes that one of 'bee' is possible in the *Meno* where at 74b–76d we are also given attempted definitions of 'figure' and of 'colour', just as we are of 'mud' in the *Theaetetus* 147c. So we should ask how the insistence on the answer picking

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[2] Quite how Plato himself meant this aporetic conclusion to be interpreted remains a key problem in the understanding of his later metaphysics. For one very clear statement of the range of possibilities see Burnyeat 1990.

out the one common characteristic of the definiendum works out outside the particularly disputed domain of ethics (e.g. Robinson 1953: ch. 5, cf. 1950).

We can examine how the ancient Greeks got on in two other subject areas especially, animal taxonomy and mathematics. In the former, attempts were made to define particular species and indeed to construct an overall classification of animals by means of the method of Collection and Division. Once again Plato is our richest early source. Collection aimed to establish more or less inductively the overarching genus in question which was then to be divided and subdivided until the infima species was reached. The mode of division that was favoured for logical reasons was dichotomy, that proceeded by way of the division of a higher species into two groups that were supposed to be mutually exclusive and exhaustive. But it was soon realised that this was hard to apply in practice, even in such a simple case as the definition of human as rational two-legged animal.[3] Indeed Aristotle devoted three chapters of his *Parts of Animals* I (chh. 2–4) to a devastating critique of dichotomous division, among other things because it has to appeal to divisions of negative characteristics (or 'privations') such as 'non-rational', 'legless' or 'bloodless'.

Yet that certainly did not lead Aristotle himself to renounce the whole ambition to seek definitions in zoology. There is a well-known and fundamental tension, here, between what in his account of scientific inquiry Aristotle set down as the ideal, and his actual practice when he grapples with the complexities of the data he is confronted with in the inquiry into nature. His account of method, in the *Posterior Analytics* (as we have seen), insists that strict demonstration depends on two features, valid deductive arguments, and self-evident primary premises, identified as axioms, hypotheses and, precisely, definitions. These had in principle to be primary, true, necessary, better known than and prior to the conclusions and they themselves had to be indemonstrable, for if they can be demonstrated, they should be, and then they would not be primary. But while as we saw he offered some reasonable mathematical examples of self-evident axioms (notably the equality axiom) the application of these principles in zoology was problematic in the extreme. The overall classification of animals that we find reasonably consistently expressed in the zoological treatises is not arrived at by some process of division and does not yield

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[3] Both humans and birds are 'two-footed', but Aristotle insists that bipedality in the two cases differs (*Parts of Animals* 643a3f.). When he considers this question at *Parts of Animals* 693b2ff. he points out that the legs of birds bend inwards (backwards), those of humans outwards (forwards).

definitions of animals that conform to the ideal of *per genus et differentiam*.[4] In fact that classification is under considerable pressure in efforts to cope with animals that fall outside the main groups, described in some cases as 'dualisers' in that they share some but not all of the characteristics of different groups (Lloyd 1996b: 72ff.).

Worse still, while the traditional view was that animals move independently, but plants are stationary, that idea was confronted by creatures that seem to be neither animal nor plant, sponges, ascidians, jellyfish, sea anemones and others. The pinna for example seems to be rooted and cannot live when detached from its anchorage. That would make it a plant, but it is usually classed among the testacea, one of the main groups of 'bloodless' animals. When we look more closely we find that Aristotle has in fact four criteria to distinguish plants and animals: does the kind have some means of self-preservation? Does it produce residue? Is it able to perceive? Can it live detached? But while perception is often cited as the chief criterion separating animals from plants – for unlike some other Greeks including Plato (*Timaeus* 77ab) he did not think plants perceive – in the case of the jellyfish or holothuria he explicitly denies that they perceive (*Parts of Animals* 681a17–20). Yet when he says that these holothuria live 'as plants that are detached', by the detachability criterion they class as animals. Faced with the difficulty of arriving at a definite verdict in several such instances Aristotle twice states that nature moves in a continuous sequence from plants to animals and indeed from the inanimate to the animate (*History of Animals* 588b4–18, *Parts of Animals* 681a9–b12).

Presented with the challenge of finding any satisfactory definition of a species of animal that fits the canonical form in Aristotle's zoology (there are none), scholars have backtracked and turned their attention to his accounts of the parts of animals, for they are recognised as one of the main ways of differentiating them. But here too we face difficulties. We remarked that Aristotle distinguishes 'blooded' from 'bloodless' animals. But the latter have what is said to be 'analogous to blood', and similarly what is 'analogous to a heart' and 'analogous to flesh'. This is important because 'flesh' is either the organ or the medium of touch, the basic mode of cognition that Aristotle

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[4] Thus he regularly identifies the main groups of blooded animals as humans, viviparous quadrupeds, oviparous quadrupeds and footless animals, birds, fish and cetacea. Similarly he recognises four main classes of 'bloodless' animals, namely those conventionally translated 'cephalopods', 'crustacea', 'testacea' and 'insects', though as I shall be noting shortly, he considers some kinds to fall outside those groups and indeed to be in some sense intermediate between animals and plants. Moreover none of the informal accounts offered of these main groups conforms precisely to the ideal pattern set down in the *per genus et differentiam* formula.

generally refers to in his attempts to distinguish animals from plants. Yet sameness 'by analogy' is a weaker relationship than sameness 'in genus' or 'in species' and as such does not meet the usual criteria for standard definitions. When discussing definition in general, for example in the *Metaphysics*, he insists on form as the proper definiendum, though he allows that, for complex wholes, the account should pay attention also to the matter (Lloyd 1996b: 52–4). But in practice in the area of the inquiry into nature that he engaged in most systematically, namely what we call zoology, we find that his account deviates from the ideal he sets out in the *Posterior Analytics*. Yet instead of lamenting that he did not in practice live up to those ideals, we should rather congratulate him for a much richer discussion of the phenomena than would have been the case had he done so.

The difficulties that Aristotle's zoological investigations illustrate should not be put down to the primitive state of the discipline, although he was indeed very much a pioneer in the field. Nowadays we have to be sure a battery of techniques to enable us to delineate different kinds of animals and plants, from phyla, through orders, families, genera down to species, far more securely than he did. Yet that certainly does not mean that all the problems of classification presented by those kingdoms can now be said to have been resolved, while ever since Darwin there can be no question of any assumption of the permanence of the species we identify. The need to 'look and see', to undertake as wide-ranging a survey of the empirical data as possible, is still the watchword, which should carry due warnings against the dangers of premature definitive conclusions.

But while zoology and other areas of the inquiry into nature, such as the classification of stones or minerals, presented obstacles to those ancient Greek theorists who wished to insist on univocal definitions, mathematics was, to be sure, a far more promising field. Most of Aristotle's actual examples when he sets out his ideal in the *Posterior Analytics* come from mathematics, and Euclid was to take up the challenge, in the *Elements*, of setting out more or less the whole of mathematics as known at the time in a single axiomatic-deductive structure, where, as with Aristotle's schema, definitions figure among his primary premises. Now Euclid does not leave evidence as to how he viewed his primary principles, so an element of uncertainty clouds this issue. But first there is no suggestion that he or anyone else in antiquity contemplated the possibility of non-Euclidean geometries that denied the parallel postulate.[5] On the other hand several of

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[5] *Pace* several strenuous but misguided efforts to see him as doing so (Toth 1967, 1977). When Aristotle notes the possibility of denying that the internal angles of a triangle sum to two rights (e.g. *Posterior*

his definitions were anything but universally agreed among earlier and contemporary Greek mathematicians and this may be taken to suggest that he is exercising choice between alternatives. Two instances of this are the very first two definitions in Book 1 of the *Elements*. Others had defined a point as 'a monad having position', rather than as 'that which has no part' (as in Euclid), and while Euclid has a line as 'breadthless length' we hear of others who thought of it as the flux of a point.[6] That does not show that he was in any doubt about the truth of the definitions he opted for. But he can hardly have been unaware that they were, up to a point, open to question and not exactly entirely 'self-evident'.

At this point some might be tempted to conclude that this obsession with definition is an exceptional, peculiarly ancient Greek, phenomenon, on a par with and connected to their preoccupation with axiomatic-deductive demonstration.[7] But that would be premature. The demand not just to explain terms but to give them strict definitions may be thought to presuppose a situation of formal debate that will not necessarily be found in every human group. But as we have noted before, a fondness for well-regulated discussion is not confined to literate societies and we do indeed find that clarity and being able to classify affairs correctly are held up as virtues of good speaking in some predominantly oral groups.[8] However, to help assess the pros and cons of the Greek concerns with definition we should turn rather, as we have before, to the evidence from a comparably sophisticated society such as ancient China.

Although classical Chinese has often been accused of being a hopelessly ambiguous language, that, as I have argued before, is just blatant prejudice. If Chinese speakers and writers certainly exhibit considerable skill in exploiting the range of interpretations of communicative exchanges for rhetorical purposes, there are plenty of occasions when they seek clarification of the meanings of statements and of individual expressions within them. A large section of the Mohist canon, the *Mozi*, dating from the late

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Analytics 93a33ff.) he does so only to show up the contradiction that would involve. The parallel postulate, stating that non-parallel straight lines meet at a point, is indeed the foundational principle on which the whole geometry of the *Elements* is based.

[6] With Euclid I Definition 1 (point) compare the Pythagorean definition cited by Proclus *In Euc. El.* I 95.21, and with Definition 2 (line) compare the view implied in Aristotle *On the Soul* 409a4.

[7] As we have noted before, there were indeed many other contexts in which a concern for account-ability (*logon didonai*) manifested itself in classical Greek city states, notably in the *euthuna*, the scrutiny to which magistrates were subjected at the end of their tenure of office, in particular in connection with its financial aspects: see Lloyd 1979: 252–4.

[8] Thus to cite Gluckman (1967: 276f.) on the Barotse again, they use a distinctive term for the ability to classify affairs which they recognise as one of several special virtues in an orator.

fourth or early third century BCE, consists of definitions or rather glosses on key terms or phrases with explanatory comments, even though this material is particularly difficult to assess given the fragmentary and corrupt character of our extant texts (Graham 1978, 1989: 137ff., Johnston 2010).[9]

Then starting with the *Erya*, composed some time in the third or second century BCE, dictionaries were compiled providing more glosses especially of obscure words found in the principal canons, such as the *Shi* (*Odes*, or *Book of Poetry*). In such works we do not find overall general rules that stipulate the form that explications of meanings have to take. In practice, sometimes synonyms or near synonyms are offered, sometimes just examples, sometimes explanation that proceeds by analogy.[10] However, the interest in clarifying meanings is obvious even without anything that corresponds to a *theory* of definition.

It is especially where a writer introduces a new term with a particular sense in context that the need for such a clarification is felt and met with an explanation. We have already seen one example of this, in Chapter 3, where the mathematical commentator Liu Hui glosses a pair of terms used in the discussion of the addition of fractions. To quote the full text (I 9, Qian 1963: 96): 'Every time denominators multiply a numerator which does not correspond to them, we call this "homogenize" (*qi* 齊). Multiplying with one another the set of denominators, we call this "equalize" (*tong* 同).'[11] Yet what we do not find, in any of the pre-modern Chinese mathematical texts, is any statement of the need for definitions that are to fulfil the requirements of the primary self-evident premises of axiomatic-deductive

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9. Some of the terms explicated are relatively straightforward: in A 26 we are told that 'benefit' is what one is pleased to get, and in A 54 'centre' is that from which all lengths are the same. Others are much more opaque. Thus in A 83 'connection' is glossed as 'exact, appropriate, necessary' and in the accompanying explanation of 'necessary' we have (in Graham's translation, 1989: 143): 'what is of the sages, employ but do not treat as necessary. The "necessary", admit and do not doubt. The converse apply on both sides, not on one without the other.' Graham's own gloss continues: 'Here, "when one is necessarily absent without the other" allows one-way dependence, the "converse" requires two-way. The pronouncements of the sages, instructive as they are, are without the certainty of the logically necessary.' Students would evidently require and receive oral explanations to supplement the written texts, though it is notable that Graham's deploys the notion of 'logically' necessary for which there is no equivalent in those texts.

10. In a famous instance of the last, in the first-century BCE text, the *Shuo Yuan* (II.8, 87.22ff.) when a king reprimands one of his advisers, the philosopher Hui Shi, for always using analogies, Hui Shi replies (using an analogy indeed) by showing that the only way to understand one particular term (*dan* 彈: it is some kind of stringed instrument) is by saying what it is like (namely a bow, but with a string made of bamboo).

11. Note that these are not universal definitions of the terms *qi* and *tong*, but rather explanations of their use in this particular mathematical context. Liu Hui is similarly careful to gloss the terms he uses for particular geometrical solids, the *yangma* 陽馬, *bienao* 鼈臑 and *qiandu* 塹堵 in his investigation, in chapter 5, of the volumes of pyramids: see Chemla and Guo 2004: 903, 970, 1017.

demonstrations. But then as we have pointed out before, the construction of that model for inquiry in ancient Greece was not an entirely unmixed blessing, in that its recurrent weaknesses, in relation to the difficulty of meeting the twin criteria of indemonstrability and self-evidence, were often underestimated.

It is time then to take stock. Definitions can serve several different roles in investigations. Much depends on whether they are construed as needed at the start of an inquiry, or as a summation of the conclusions of one. In the latter position the result of any complex research is unlikely to be fully captured by a simple statement defining one key term or even a set of them, although clarification of such may indeed be a part of the positive outcome. The danger remains that a crisp definition will secure its crispness at the price of eliding the nuances in the discussion that precedes it.

In the former position, at the start of an inquiry, we should distinguish. On the one hand a provisional statement of what it is that the study is addressing can be useful, though the emphasis may often need to be on its very provisionality.[12] We may have some more or less vague intuitions on the question of what distinguishes the living from the inanimate: but much of what we thought on the subject may have to be revised as the study proceeds.

On the other hand we have seen that when definitions form part of the primary premises of an axiomatic system, revision is not envisaged and would in fact jeopardise their whole *raison d'être*. In such a role a definition may achieve clarity: but it will also inevitably constrain the subsequent investigation, which will be limited to what can be strictly deduced from the primary principles. Euclid's *Elements* provides the most striking ancient example that illustrates this trade-off between restriction and incontrovertibility. In this case we may consider that the limitations of the axiomatic framework do not unduly undermine the effectiveness of his demonstrations. But if Socrates in his quest for moral virtues and Plato in his for knowledge (for instance) had succeeded in fixing on a definitive statement, that would have been bought at the cost of foreclosing on the possibility of further insights. Similarly Aristotle's actual accounts of animals are all the richer and more informative courtesy of his departing from the ideal of definition to which he himself officially subscribed.

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[12] Rowett (2018: 23) draws attention to a further use of definition at the outset of a discussion where it sets out a hypothesis concerning the sense of a term that is subsequently to be tested and may well be rejected.

Evidently many discoveries in any inquiry, including both science and moral philosophy, depend on a certain suspension of the rules that have been laid down by some scholars, especially in Western traditions, in the interest of an ultra-strict notion of definition. We should not approach the study of what makes an animal an animal with some ready-made definition *per genus et differentiam*, nor even set a definition in such a form as our goal. Nor can we say that there is nothing further to learn about 'courage' once we have settled on some definition. Nor should our present understanding of the range of 'games' preclude admitting others that we have not yet personally encountered or imagined.

The leitmotiv of my discussion of 'science' itself in these studies presupposes that we may well have more to learn even there, not just in the many particular areas where there is ongoing research, but in our understanding of the range of what should count as 'scientific' in the first place. To acknowledge the semantic stretch of many of our key concepts is, we may submit, useful in that it will help to keep us alert to new possibilities even as we have to learn to live without the certainties that have in the past been offered as the goal by traditional models.