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Christopher Hutton

Definition in Theory and Practice

Language, Lexicography and the Law

Definition in Theory and Practice

Also by Roy Harris

Rethinking Writing

The Necessity of Artspeak

The Semantics of Science

Definition in Theory and Practice

Language, Lexicography and the Law

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Preface

This book is concerned with words insofar as they are related to definitions, and concerned with definitions insofar as they are related to words. There are, it need hardly be said, many other aspects of both words and definitions; but they do not need extensive consideration here. It is sufficient that one recognize a relationship of some kind between words and definitions, and be prepared to attempt an elucidation of it.

Etymologists, who are the archaeologists of the verbal world, tell us that the term *definition* comes from the Latin *definitio*, itself connected to the verb *definire*, said to mean 'delimit, determine, circumscribe, set bounds to'. So some idea of pinning down or making explicit what would otherwise be elusive or vague seems to be the basic motivation for the existence of such a word. This accords with the long history of *definitio* as a technical term in Western logic, where it features as a prerequisite for the operations set out in the Aristotelian syllogism. Traditionally, there were supposed to be 'rules' of definition, and we shall comment on them in due course.

The relationship between words and definitions succeeded in capturing the attention of some of the outstanding thinkers in the Western tradition. This alone should ensure that the topic is well worth the scrutiny of their intellectual heirs and successors. However, the last general book to be published in English on the theory of definition was Richard Robinson's *Definition* (1954). Although we shall have occasion to refer to Robinson's book in several places, we do not think it can still be regarded as a satisfactory introduction to the subject today, for various reasons. Robinson's approach to the subject was that of a philosopher writing in the heyday of 'ordinary language philosophy', and concerned mainly with definitional issues that would or might affect the philosophical treatment of traditional philosophical questions. His coverage of other areas was somewhat perfunctory. Two such areas in particular would nowadays be regarded as weak. These are (1) lexicography, with its associated problems of semantic theory, and (2) the law, with its associated procedures for determining the application of terms for legal purposes.

In our view, both of these areas are important. The actual practice of lexicographers cannot be ignored in any modern literate society, while the law is one of the major supercategories (along with science, history, religion and the arts) that provide the intellectual framework for all modern thinking. Both, therefore, in view of their practical importance in current educational and

social affairs, merit special treatment. We have accordingly adopted a tri-partite structure for the present book. In Part 1 we shall deal with general questions relating to the theory and typology of definition; in Part 2 with dictionary definitions; and in Part 3 with definitions in jurisprudence.

A few preliminary comments about our approach are in order here. Unlike Robinson, we assume that any satisfactory account of definition will have to be based on some specific theory of language. Robinson seemed to suppose that all definitions have a bi-partite structure, comprising a correlation between just two independently given items. (On one hand the form: on the other hand the meaning. Or, here the *definiendum*: there the *definiens*. As if the definitional universe consisted of an infinity of possible pairs, each singleton looking for its partner.) From this assumption was derived the plan of Robinson's book. It led directly to his exhaustive classification of definitions into (1) word-thing definitions, (2) word-word definitions, and (3) thing-thing definitions. But it was never very clear what linguistic or epistemological theory underlay and justified this classification.

The theory we adopt here is an integrationist theory (Toolan 1996; Harris 1998; Harris and Wolf 1998; Harris 2006a, 2006b). Exactly how integrationism impacts on our endeavour will emerge in detail in the following chapters. In general terms, the relevant feature of integrationism is the basic assumption that all signs (not only linguistic signs) are semantically indeterminate. In this perspective, semantics is the study and practice of human attempts to impose some degree of communicational determinacy on signs. The successes, failures and limitations of such efforts are, in our view, central to the enterprise of definition.

An integrationist approach to our subject seems particularly appropriate for the following two reasons. First, although all the familiar supercategories of the modern world are, at least to some extent, linguistic constructs (as argued in Harris 2003, Harris 2004, Harris 2005), the law is unique among them in the extent to which it relies overtly upon the possibility of determining verbal meanings. Appeal to the dictionary has become one of the features of contemporary jurisprudence. This presupposes the possibility of integrating lexicographical practice with legal practice. Second, the law is in any case a practical, institutionalized attempt to implement one particular type of integrational procedure; namely, integrating (1) the past verbal activities of legislators and testators with (2) the present and future activities (verbal or non-verbal) of all those affected or potentially affected by (1). The form such integration will take, or should take, it is the function of judges and courts to decide. Without that integrational function, the law would have no *raison d'être*.

Attempts to supply a theory of definition have a long history. But so too has scepticism about definition. This ranges from claims that certain words have meanings that cannot be defined to postmodernist rejections of determinacy for all words and all types of definition. Indeterminacy, however, is a more complex issue than may at first sight appear. The 'radical indeterminacy' recognized by integrationists differs in fundamental respects from the

indeterminacy acknowledged by many philosophers, critics and legal theorists. We shall consider these differences in detail later.

Whereas for Robinson the kind of definition that he and others call 'stipulative' is one which features as no more than a sub-class of 'word-thing' definitions, as far as integrationists are concerned – on the contrary – it stands in the forefront of the whole topic. For if sense cannot be made of introducing a meaning by 'stipulation', one might as well give up on any other kind of definitional endeavour. Failure to recognize the centrality of this question accounts, in our opinion, for most of the difficulties that theorists of definition have encountered. We endorse the view of the commentator who observed:

The problems of definition are constantly recurring [. . .] although there is a widespread tendency to assume that they have been solved. Practically every book on logic has a section on definition in which rules are set down and exercises prescribed for applying the rules, as if the problems were all settled. And yet, paradoxically, no problems of knowledge are less settled than those of definition, and no subject is more in need of a fresh approach.

These words were written some forty years ago (Abelson 1967), but they are no less apt today. The 'fresh approach' that the writer wished for is one we hope this book will provide. At least, we shall ask some questions about definition that have never been asked before. Whether our answers are plausible must be left for our readers to decide.

Except where otherwise indicated, the translations we provide for texts in languages other than English are our own.

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I. Definition and Theory

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Chapter 1

On Stipulative Definition

What people mean by what they say or write is an unending source of contention. After losing a recent libel suit, a well-known publicist is reported in the London press (*Daily Telegraph* 3 February 2005) as saying: 'I have lost this on what I could have meant rather than what I did mean.' In other words, he denies that he meant what he was interpreted as meaning, while conceding in effect that what he said could have meant what the court construed him as meaning.

In an ideal world, presumably, there would never be any doubt about what we mean by what we say. So court cases of this kind could never arise. The problem of definition, unfortunately, takes its place in a world that is far from ideal.

How far from ideal is evident not only from the fact that the loser in this case had to pay out a sum said to be in the region of a quarter of a million pounds for one misconstrued meaning but also from the fact that the press was noticeably reluctant to report the exact words in contention. Presumably this was because the newspapers feared the charge of repeating the libel. Here we pass all the way from a level of discourse where occasional misunderstandings occur, but often pass unnoticed, to a level of discourse that is booby-trapped throughout by legalities of definition.

How, then, is it possible to distinguish between (1) what people mean by what they say or write, and (2) what they might have meant? That question is at the heart of any theory of definition.

* * *

Is it possible to preclude possible misinterpretation by stating the correct or intended definition in advance? Many speakers and writers seem to have believed this, and the result is what is commonly known nowadays as 'stipulative definition'. Perhaps the earliest authority to make extensive and systematic use of it for expository purposes is Euclid. In his *Elements*, a numbered list of relevant definitions (*horoi*) regularly precedes every topic discussed. A famous example is his Definition 15 in Book I: 'A circle is a plane figure contained by one line such that all the straight lines falling on it from one point among those lying within the figure are equal one to another.' For Euclid, definitions are to be distinguished from postulates (*aitemata*) and from common notions (*koinai ennoiai*). An example of the former is 'All right angles are equal to one another' and of the latter 'If equals are subtracted from equals, the remainders are

equal'. In drawing these distinctions Euclid appears to be following Aristotle (*Posterior Analytics*). Definitions, postulates and common notions jointly make up what Euclid regards as having to be taken for granted in geometry.

Euclid's thinking marks a stage at which geometry was being transformed from a collection of empirical observations about measurement into an axiomatic system. Ideally, such a system would consist of the minimum number of basic assumptions, plus the minimum number of steps or procedures required to derive deductively therefrom all the truths of geometry. The role of definitions would be to supply precise meanings for all terms entering into propositions otherwise unprovable. Euclid's progress towards setting up such a system, although an impressive intellectual achievement, leaves a great deal to be desired and was criticized even in antiquity. His definitions have aroused much controversy. From their form it is not obvious what exactly their epistemological status is. Some critics have maintained that Euclid's so-called definitions tacitly rely on a prior intuitive grasp of the notions being presented: 'they reduce to simple empirical descriptions' (Blanché 1970: 21). It is certainly open to doubt whether anyone totally unfamiliar with what a circle is would be able to work it out just from Euclid's definition. It is also arguable that this definition comprises or conflates two quite different notions: (1) that it is actually possible for there to be a figure having the properties mentioned, and (2) the proposal that such a figure should be called (for purposes of exposition) a *circle*. (1) is clearly an assertion that is either true or false, whereas (2) is merely a linguistic proposal contributing nothing at all to the content of geometry. In other words, the objection would be that Euclid confuses definition of a geometrical term with 'real definition' (see Chapter 3).

Aristotle had already made the point that if a geometer's best attempts to draw a certain geometrical figure always contain minor imperfections or inaccuracies, that does not invalidate the definition of the figure in question. In *Posterior Analytics* (I.10.76b. 35ff.) he denies that definitions are hypotheses, 'for they do not assert either existence or non-existence'. Definitions (*horoi*) 'need only to be understood'. This is the source of the claim constantly reiterated later throughout the Western tradition that a definition has no truth value. Whatever view Euclid himself may have taken of the matter, it seems clear that many writers would never have proposed stipulative definitions had they not supposed that these were more than convenient pieces of nomenclature, bearing no relation to the facts of the matter under discussion. On the contrary, their motivation is in many cases quite patently to assist in revealing truths that would otherwise risk being obscured for want of terminological clarity.

A straightforward example of such a case, far removed from the ambitious enterprise of Euclid, is Sir James Frazer's definition of *myth*, *legend* and *folk-tale*. In the Introduction to his edition and translation of Apollodorus, Frazer wrote:

As the distinction between myth, legend, and folk-tale is not always clearly apprehended or uniformly observed, it may be well to define the sense in which I employ those terms.

By myths I understand mistaken understanding of phenomena, whether of human life or of external nature. . . .

By legends I understand traditions, whether oral or written, which relate the fortunes of real people in the past, or which describe events, not necessarily human, that are said to have occurred at real places. . . .

By folk-tales I understand narratives invented by persons unknown and handed down at first by word of mouth from generation to generation, narratives which, though they profess to describe actual occurrences, are in fact purely imaginary, having no other aim than the entertainment of the hearer and making no real claim on his credulity. (Frazer 1921: xxvii–xxix)

It would be absurd to suppose that Frazer introduces these stipulative definitions just for his own terminological convenience, without any implication that they correspond to any actual distinctions detectable among the innumerable accounts which go to make up humanity's vast repertoire of stories.

Stipulative definition is the practice advocated by Bacon in *The Advancement of Learning* when he enjoins his readers in all controversial matters to define their terms at the outset, in order to avoid misinterpretations: for

. . . words, as a Tartar's bow, do shoot back upon the understanding of the wisest, and mightily entangle and pervert the judgment. So as it is almost necessary in all controversies and disputations to imitate the wisdom of the mathematicians, in setting down in the very beginning the definitions of our words and terms that others may know how we accept and understand them, and whether they concur with us or no. (Bacon 1605: 2. xiv.11)

A long line of eminent writers seem to have followed Bacon's advice. Hobbes in *Leviathan* declares:

By Manners, I mean not here, Decency of behaviour; as how one man should salute another, or how a man should wash his mouth, or pick his teeth before company, and other such points of the *Small Moralls*; But those qualities of man-kind, that concern their living together in Peace, and Unity. (Hobbes 1651: I.xi)

Adam Smith in *The Wealth of Nations* forewarns his reader:

By the money-price of goods, it is to be observed, I understand always the quantity of pure gold or silver for which they are sold, without any regard to the denomination of the coin. (Smith 1776: I.v)

Kant in his *Critique of Pure Reason* announces:

By the term 'knowledge *a priori*,' therefore, we shall in the sequel understand, not such as is independent of this or that kind of experience, but such as is absolutely so of *all* experience. (Kant 1781: Introduction, I)

Unfortunately, it is not always so clear that the stipulative definition succeeds in elucidating the meaning intended. It may even happen that the definition itself begs more questions than it answers. For example, in *Aesthetics and History*, Bernard Berenson writes:

By 'spiritual significance', on the other hand, I mean to designate whatever affords us the prospects of easing the dead weight of matter, whatever gives us the hope that our lives will amount to something more than the unwinding of the coil of energy which we brought with us at birth; but promises that our activities will be progressively directed toward the building of a social structure where it will be safe and praiseworthy to live free from care, and greed and cunning; where being will count more than doing, the intransitive more than the transitive; where man may dwell once more in an earthly paradise, but this time feeding as sinlessly from the tree of knowledge as from the tree of life, and blessed by the gods revealed by his own consciousness and conscience. (Berenson 1950: 109)

It seems to us to be dubious whether this definition makes Berenson's use of the expression *spiritual significance* any the less obscure, particularly in its application to works of art.

Our list of examples might easily be continued down to the present day. If stipulative definition were no more than a literary practice confined to the works of scholars it might not be of great practical importance; but such definitions are commonplace in many mundane circumstances. They occur, for example, in insurance policies and legal documents of all kinds – their purpose being to avoid potential misapprehensions concerning the commitments of the parties involved. Arguably, the very notion of a binding contract, whether commercial or political, implies the acceptance of such definitions, even if they are not always made as explicit as they might be. In other words, without the possibility of stipulative definitions it seems that not merely the arts and sciences but the social order itself would lack a sound foundation.

* * *

There is a wide gamut of purposes to which stipulative definition may be put. The most trivial of these is simply as a rhetorical device to delimit a certain field of discussion. For example, in his Gifford Lecture of 1972 on 'The frontiers of psychology', Christopher Longuet-Higgins began by announcing:

This year our subject is *The Development of Mind*. In case, by some oversight, we should fail to define 'development', let me say at once how I shall be using the word. I want to use it in its biological sense – or, rather, in its two biological senses. The first sense occurs in the name developmental psychology, which is the study of mental development in the individual from conception to senility. . . .

The other biological sense of the word 'development' is the evolutionary sense. Two billion years ago, we believe, there was a *primaeval* soup in which the first living things assembled themselves. Whatever one's views about the nature of mind, one can hardly deny that there is a good deal more mental activity going on now than there was then. (Longuet-Higgins 1973: 1)

It is quite clear that what Longuet-Higgins is doing is something which has little in common with what Frazer attempts in the passage cited earlier. There is no concern to distinguish an idiosyncratic or potentially contentious meaning of a term from some more widely accepted or less contentious meaning. Moreover, it is difficult to see that what Longuet-Higgins calls two different 'senses' of the word development are actually different at all. In short, the speaker could have said all he wanted to say simply by announcing that he was going to talk about the development of mind in the individual human being as well as in living creatures in general. The resort to stipulative definition is just window dressing.

Likewise, we find the historian D. C. Somervell stating:

The title of this book is *A History of Western Europe*, a term that can be variously defined. We take it here to include France, Italy, and Germany; it obviously does not exclude Holland and Belgium, Spain and Portugal, but these are not Great Powers. Our principal study will be the development of France, Italy, and Germany, their relations with each other, and with their other neighbours. (Somervell 1928: 7)

Here the author is not seriously attempting to redefine the term *Western Europe*, but simply announcing the limits of his own discussion.

William Whewell proposes a stipulative definition of *experience* in his *Philosophy of the Inductive Sciences*:

I here employ the term Experience in a more definite and limited sense than that which it possesses in common usage; for I restrict it to matters belonging to the domain of science. In such cases, the knowledge which we acquire, by means of experience, is of a clear and precise nature; and the passions and feelings and interests, which make the lessons of experience in practical matters so difficult to read aright, no longer disturb and confuse us. We may, therefore, hope, by attending to such cases, to learn what efficacy experience really has, in the discovery of truth. (Whewell 1847: I.62)

Similarly, in *The Laws of Nature*, the distinguished physicist Sir Rudolf Peierls warns his readers:

When we speak here of matter we mean by this only inanimate matter. The laws of nature which will be discussed throughout this book do not include a description of life or of living beings. (Peierls 1955: 15)

J. B. Priestley's book *The English Novel* begins:

What is a novel? Sometimes people use the term to describe only certain kinds of fiction. Thus, if a story is filled with tea parties, they will call it 'a novel'; but if it is filled with sea fights, they will call it 'a romance.' When I talk of novels in these chapters, however, I mean any and every kind of fiction. The only definition of the novel I can offer is that it is a narrative in prose treating chiefly of imaginary characters and events. Some novels, such as Scott's *Kenilworth* or Thackeray's *Esmond*, do show us actual historical personages, but nevertheless they all contain far more fiction than fact.

(Priestley 1927: 5)

All the above cases may be described as *ad hoc* definitions, set up arbitrarily to suit the purpose to hand, but claiming or implying nothing further.

* * *

A more serious purpose may be discerned in G. E. Moore's stipulative definition of the word *voluntary* in the opening chapter of his book *Ethics*. Moore sets out a particular theory of ethics as follows:

This theory starts from the familiar fact that we all very often seem to have a choice between several different actions, any one of which we might do, if we chose. Whether, in such cases, we really do have a choice, in the sense that we ever really *could* choose any other action than the one which in the end we do choose, is a question upon which it does not pronounce and which will have to be considered later on. All that the theory assumes is that, in many cases, there certainly are a considerable number of different actions, any one of which we could do, *if* we chose, and between which, therefore, in *this* sense, we have a choice; while there are others which we could not do, even if we did choose to do them. It assumes, that is to say, that in many cases, *if* we had chosen differently, we should have acted differently; and this seems to be an unquestionable fact, which must be admitted, even if we hold that it is never the case that we *could* have chosen differently. Our theory assumes, then, that many of our actions are under the control of our wills, in the sense that *if*, just before we began to do them, we had chosen not to do them, we *should* not have done them; and I propose to call all actions of this kind *voluntary* actions.

(Moore 1912: 10–11)

The reader may initially be puzzled to understand exactly what is at stake here. The example does not have the triviality of Longuet-Higgins' definition of *development*, nor the obvious contentiousness of Frazer's definition of *myth*. The stipulative definition of *voluntary* that Moore proposes seems at first sight entirely uncontroversial, but on closer inspection it turns out not to be so, as Moore goes on to point out.

It should be noticed that, if we define voluntary actions in this way, it is by no means certain that all or nearly all voluntary actions are actually themselves chosen or willed. It seems highly probable that an immense number of the actions which we do, and which we *could* have avoided, *if* we had chosen to avoid them, were not themselves willed at all. It is only true of them that they are 'voluntary' in the sense that a particular act of will, just before their occurrence, would have been sufficient to *prevent* them; not in the sense that they themselves were brought about by being willed. And perhaps there is some departure from common usage in calling all such acts 'voluntary'. I do not think, however, that it is in accordance with common usage to restrict the name 'voluntary' to actions which are quite certainly actually willed. And the class of actions to which I propose to give the name – all those, namely, which we could have prevented, *if*, immediately beforehand, we had willed to do so – do, I think, certainly require to be distinguished by some special name. (Moore 1912: 11)

In short, the purpose of the stipulative definition is to draw attention to a distinction that is blurred in the common usage of the word *voluntary*. This distinction, as one might expect, will turn out to play a significant role in Moore's account of ethics.

* * *

Different again is Darwin's stipulative definition of *natural selection*. For here is a case in which one can scarcely speak of 'common usage' at all until Darwin's theory focused attention upon that expression.

This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or the Survival of the Fittest. Variations neither useful nor injurious would not be affected by natural selection, and would be left either a fluctuating element, as perhaps we see in certain polymorphic species, or would ultimately become fixed, owing to the nature of the organism and the nature of the conditions. (Darwin 1859: 81)

Darwin proceeds to deal with various objections to, and misunderstandings of, the term *natural selection*. In particular he is at pains to make it clear that *selection* here does not imply conscious choice. He goes on to disavow any intention on his part to attribute to Nature a purpose, and supplies to this end two more stipulative definitions:

it is difficult to avoid personifying the word Nature; but I mean by Nature, only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us. (Darwin 1859: 81)

The way Darwin chooses to formulate his definition of *natural selection*, by coupling it with *survival of the fittest*, raises further questions. Does *natural selection*, as defined, mean the same as *survival of the fittest*? If not, what is the connection between them? Are these two separate definitions, or alternative versions of a single definition?

To the related expression *struggle for existence* Darwin devotes a separate section of Chapter 3, which begins:

I should premise that I use this term in a large and metaphorical sense including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny.
(Darwin 1859: 68)

Whatever one makes of this, it is clear that a series of stipulative definitions is being put in place to support the main argument of *The Origin of Species*. The chain leads back in assured steps to the point of departure for any nineteenth-century naturalist: namely, the understanding of Nature herself.

The effect of adopting stipulative definitions can often be to turn what look at first sight like empirical claims into tautologies. Thus in the example cited above, the proposition that 'variations neither useful nor injurious are not affected by natural selection' is not, as it might seem, the summary of many careful investigations carried out by the naturalist: the proposition is already self-evidently true once Darwin's definition of *natural selection* is accepted.

In this perspective, stipulative definition emerges as a tactic deployed to support a certain line of argument when appeal to observation runs out. (For it would be a gross mistake to suppose that natural selection is observable, however many observers are available, and however many opportunities of observation.) More importantly, in the case of *natural selection* one sees stipulative definition serving to introduce at one stroke a new concept immediately applicable throughout several separate domains of scientific inquiry. And that immediately puts *natural selection* in a different class from any of the other examples considered so far.

* * *

It is interesting to ask how Darwin's use of stipulative definition relates to the modern proliferation of scientific terminology. New discoveries in botany, biology, physics, chemistry and many other fields have called for names, where previously no name existed. Every proposal of such a neologism constitutes, in practice, a stipulative definition. Some individual or group of individuals must at some point make a proposal to the effect that the newly recognized phenomenon (variety, species, force, particle, process, etc.) shall be called by a certain term. The term in question thus acquires by stipulation its definition. Whether such a neologism gains general acceptance is another question,

and how it does so is another question again. But its introduction is a matter of stipulation. Names do not drop out of thin air.

In some cases, what is named is an already existing type of observable physical object hitherto unnamed (as in the discovery of a previously unknown kind of plant or insect). This is the model of nomenclature encapsulated in the biblical story of Adam naming the animals. The animals already existed, regardless of what Adam stipulated their names to be.

In other cases, what is named is a 'theoretical object', previously unnamed because the need to identify and discuss it had not yet arisen. In this second type of case, it is the function of a stipulative definition to formalize this recognition. Typical theoretical objects are units of measurement and hypothetical causes. In Genesis, God never asked Adam to name theoretical objects. But since antiquity it has often been assumed that theoretical nomenclature is some kind of extension of Adamic nomenclature. Whether that is the case raises a whole raft of questions that are very pertinent to definition.

It has sometimes been argued that stipulating new names for new theoretical objects is not merely a convenience but an essential part of the advancement of science. Kelvin in his famous paper on electrical units of measurement lamented the lack of a name for the reciprocal of resistance, and proposed one:

How much we owe for the possession of names, is best illustrated by how much we lose – how great a disadvantage we are put to – in cases in which we have not names. We want a name for the reciprocal of resistance. We have the name 'conductivity,' but we want a name for the unit of conductivity. I made a box of resistance coils thirty years ago, and another fifteen years ago, for the measurement of conductivity, and they both languished for the want of a name. My own pupils will go on using the resistance box in ohms, rather than the conductivity box, because in using the latter it is so puzzling to say 'The resistance is the reciprocal of the sum of the reciprocals of these resistances.'

(Kelvin 1883: 133–4)

Kelvin's suggestion was to write the word *ohm* backwards, thus yielding *mho* as the name of the unit that was missing. He added modestly:

I do not say that *mho* is the word to be used, but I wish it could be accepted, so that we might have it at once in general use. We shall have a word for it when we have the thing, or rather, I should say, *we shall have the thing when we have the word.*

(Kelvin 1883: 135–6. Our italics.)

The neologism *mho* had some success in scientific circles, but was eventually replaced by *siemens* (named after Ernst Werner von Siemens) as the unit of electrical conductance.

Sometimes what is stipulated is the meaning not of a single word or phrase, but of an entire statement. There is the seventeenth-century example of Robert Boyle's defence, in Part 2 of *The Sceptical Chymist*, of the claim that fire does not necessarily dissolve a substance into its ultimate constituents. This was a live issue in the experimental chemistry of the day.

Boyle writes:

That I may not make this paradox a greater than I needs must, I will first briefly explain what the proposition means, before I proceed to argue for it.
(Boyle 1661: 63)

Boyle focuses upon two possible misinterpretations. The first is the following:

. . . I do not mean that anything is separable from a body by fire, that was not materially pre-existent in it; for it far exceeds the power of meerly naturall agents, and consequently of fire, to produce anew, so much as one atome of matter, which they can but modifie and alter, not create; . . .
(Boyle 1661: 63)

The second misapprehension is described thus:

Nor does the proposition peremptorily deny, but that some things obtained by the fire from a mixt body, may have been more than barely materially pre-existent in it, since there are concretes, which before they be exposed to the fire afford us several documents of their abounding, some with salt, and others with sulphur.
(Boyle 1661: 63)

Boyle then sums up his stipulation:

That then which I mean by the proposition I am explaining, is, that it may without absurdity be doubted whether or no the differing substances obtainable from a concrete dissipated by the fire were so existent in it in that forme (at least as to their minute parts) wherein we find them when the analysis is over, that the fire did only disjoine and extricate the corpuscles of one principle from those of the other wherewith before they were blended.
(Boyle 1661: 64)

So here a stipulative definition is deployed even when there is no apparent doubt about the *bona fides* of the relevant individual terms (*fire, body, natural agent*, etc.).

* * *

Two hundred years after Boyle, Ruskin took Mill to task for failing, in his *Political Economy*, to give an adequate definition of *wealth*. In the 1871 edition of *Munera Pulveris*, Ruskin complains:

'Every one has a notion, sufficiently correct for common purposes, of what is meant by wealth,' wrote Mr. Mill, in the outset of his treatise; and contentedly proceeded, as if a chemist should proceed to investigate the laws of chemistry without endeavouring to ascertain the nature of fire and water, because every one had a notion of them, 'sufficiently correct for common purposes.'

But even that apparently indisputable statement was untrue. There is not one person in ten thousand who has a notion sufficiently correct, even for the commonest purposes, of 'what is meant' by wealth; still less of what wealth everlastingly is, whether we mean it or not; which it is the business of every student of economy to ascertain. (Ruskin 1871: §§1-2)

Having taken this intellectual high ground, Ruskin could hardly shirk the task of providing his own stipulative definitions of *wealth*, *money*, *riches* and various other terms, which he proceeds to do in the opening chapter ('Definitions') of *Munera Pulveris*. It is on the basis of these definitions that he attacks the economic theorists of his day for being 'without exception, incapable of apprehending the nature of intrinsic value at all.'

* * *

At the opposite end of the spectrum from plugging perceived gaps or remedying uncertainties in scientific or technical vocabulary comes the deployment of stipulative definition for a much more ambitious and dramatic purpose: introducing a new scientific framework altogether. This has much more in common with Euclid's original attempt to systematize the whole of geometry. The classic modern case is Einstein's stipulative definition of *simultaneity*. This was not a question of opting for one of a number of definitions already in circulation; nor of modifying one of them for the author's special purposes. It involved claiming that all previous definitions were inadequate, i.e. based on fundamental misapprehensions about the nature of time.

Nothing as revolutionary as this applies to the majority of stipulative definitions. In Chapter VIII of *Relativity*, Einstein introduces the problem by considering what it means to say that two flashes of lightning occurred simultaneously. He dismisses with something like contempt the suggestion that the meaning is clear from the words in which the statement is expressed. This will not pass muster in physics: the physicist needs a practical test procedure which will show whether the two flashes of lightning were simultaneous or not. And this in turn reflects back upon the definition of *simultaneity*.

We thus require a definition of simultaneity such that this definition supplies us with the method by means of which, in the present case, he [sc. the physicist] can decide by experiment whether or not both the lightning strokes occurred simultaneously. (Einstein 1961: 22)

At this point in the argument, Einstein goes out of his way to emphasize that this is not a matter of devising some special terminology of interest only to physicists; for he adds:

As long as this requirement is not satisfied, I allow myself to be deceived as a physicist (and of course the same applies if I am not a physicist), when I imagine that I am able to attach a meaning to the statement of simultaneity.

(Einstein 1961: 22)

It is worth pausing to note the implications of this. What Einstein is saying is that we do not discover the definition of simultaneity by looking up *simultaneity* or related words in a dictionary. For there we might find, for instance, that *simultaneous* means 'occurring at the same time'. But that brings us back to square one. We are no further forward in knowing how to determine whether two flashes of lightning occur 'at the same time'.

Einstein goes on to consider a practical proposal for determining whether one flash of lightning at point *A* is simultaneous with another flash of lightning at point *B*. The observer is placed exactly at the mid-point *M* of the distance between *A* and *B*. An arrangement of mirrors allows both *A* and *B* to be kept under continuous observation. Then, if the observer at *M* sees a flash of lightning at *A* occurring concurrently with a flash of lightning at *B*, the two flashes are counted as being simultaneous.

But this will not quite satisfy Einstein either. For the experiment depends on assuming that light travels the distance *AM* at the same velocity as it travels the distance *BM*. Unfortunately, no such assurance can be given without a means of measuring time. But then we are back to the problem of simultaneity, where we began.

The only way out of this circle, according to Einstein, is to recognize that requiring the time taken for light to travel from *A* to *M* to be the same as the time taken for the light to travel from *B* to *M*

is in reality neither a *supposition* nor a *hypothesis* about the physical nature of light, but a *stipulation* which I can make of my own freewill in order to arrive at a definition of simultaneity. (Einstein 1961: 23. Italics in the original.)

Under the terms of this stipulation, the problem is solved, given what the physicist demands of a definition.

There is only *one* demand to be made of the definition of simultaneity, namely, that in every real case it must supply us with an empirical decision as to whether or not the conception that has to be defined is fulfilled.

(Einstein 1961: 23)

This demand is the cornerstone of Einstein's theory of relativity.