II
An Outline of the History of (Logical) Dialectic

G. Priest and R. Routley

In this essay we trace the historical development of the notion of dialectic. This is a thorny job. Dialectic has long meant a variety of different things. (This was already recognized in third century AD[1] but is even truer now.) Moreover, as we shall see, it is a notion that has repeatedly tended to be generalized, often in unilluminating ways. For example, sometimes dialectic has been identified with logic,[2] sometimes with debate, and more recently it has been equated with scientific method and even with certain philosophical theories. However, dialectic *in stricto sensu* has always been a much tighter subject. It comprises methods, characteristically of argument or analysis, and at its core lies the notion of contradiction. (That this core encapsulates the strict sense of dialectic is the view even of Soviet philosophy.[3]) Moreover, even though the notion of dialectic has evolved, it has remained throughout a method—one of the fundamental methods of philosophical argument and analysis of concepts or situations, with its central concern always remaining the use and function of contradictions therein. Thus the role of contradiction in this methodological context not only defines our subject but provides the historical backbone of our account.[4]

Contradiction in itself has become a slippery notion. However, we will understand it in the precise logicians' sense: a contradiction is a pair of contradictory statements, characteristically of the form A and ~A (i.e. it is not the case that A). The notion has certainly been generalized, especially in the last hundred and fifty years. However, we will discuss this later. Till then, 'a contradiction' means a pair of statements of the form A, ~A.

1. The origins of dialectic in Western philosophy[5]

No adequate account of dialectic can omit Heraclitus (*c.* 500 BC), to whom the dialectical law of unity or interpenetration of opposites, is commonly ascribed. But it is obviously difficult to attribute views, with reasonable assurance, to a somewhat cryptic poet/philosopher, most of whose work has been lost. However, it is generally agreed that one of Heraclitus' basic

doctrines was that everything is in a continuous state of change.[6] It follows that everything that is, must cease to be. Thus everything changes into its opposite; life becomes death, hot becomes cold,[7] etc. On this basis it is argued that the world is a unity of opposites.[8] (This is later to become a principal point of 18–19th century German dialectic.) So far this allows the opposites to occur at different times. However, certain fragments strongly suggest that opposites can be realized at the same time too. For example:

> Things taken together are whole and not whole, something which is being brought together and brought apart, which is in tune and out of tune: out of all things can be made a unity, and out of a unity all things.[9]

Thus Heraclitus may have been the first (at least in the West) to assert that there are some true contradictions. He was certainly a source of important methodological principles included in later dialectic: the dynamic principle, the unity of opposites, and perhaps the holistic principle.

But it is not to Heraclitus, but to Zeno of Elea (*c.* 460 BC) that dialectic—really negative or destructive dialectic—is often traced. In fact, it is reported that Aristotle claimed that Zeno was the inventor of dialectic.[10] What Aristotle seems to have meant is that Zeno was the first person to use the method of argument we now call *reductio ad absurdum.* That is, Zeno attacked the views of his opponents, and especially their supposition of plurality, by trying to show that they lead to absurd or contradictory conclusions,[11] and accordingly had to be rejected. This, at any rate, is the orthodox construal of what Zeno was up to. (Hegel, as we shall see, had another.)

As is well known, Zeno was a student of Parmenides, who held that the world was one changeless unity. Since Zeno's arguments attempt to show that plurality and change involve contradiction it seems reasonable to suppose, as is orthodoxly assumed, that Zeno was arguing in favour of Parmenides' position. It may well be that in arguing against the possibility of motion, Zeno also took himself to be attacking Heraclitus' position. However, Heraclitus would perhaps not have been too worried by Zeno's arguments. Indeed he might well have welcomed them as extra support for the unity of opposites: change does require the (simultaneous) realization of opposite states. In any case, Zeno's paradoxes of motion have been important in the history of dialectic; in particular they have been widely accepted in the Hegelian and Marxist traditions as valid arguments showing that motion, and more generally change, involves contradictions essentially. It will therefore pay us to consider Zeno's arguments, or rather standard reconstructions of them, if briefly.[12] The two major arguments are (i) the Racecourse, and (ii) the Arrow. For the third argument, Achilles and the Tortoise, is a variant of the Racecourse, and the fourth, the Stadium, is commonly said to be somewhat obscure.

(i) *The Racecourse.* This argument runs as follows: Suppose that an object is in motion from A to B. Before the object arrives at B it must arrive at a point half-way between A and B. Before it reaches this point it must reach a point half-way between it and A. Before it reaches this point it must reach a point half-way.... Thus before it reaches B it must complete an infinite number of motions. But this is impossible since one can do only finitely many things in any finite time.

The argument is ingenious, but it is doubtful that it succeeds. The received opposing[13] view is that it is quite possible to do an infinite number of things in a finite time provided the acts are part of one *continuous* action. There is perhaps no sense in which this can be proved other than tendentiously (e.g. by an appropriate definition of continuity), and conceivably Zeno had some additional arguments against it. However, so long as sound arguments for the finitude assumption are lacking, the received move successfully defuses the paradox.

(ii) *The Arrow.* This argument goes as follows: Suppose an object is in motion from A to B. Consider any instant of the motion. At that instant, since it *is* only an instant, the object makes no progress on its journey. But the motion is composed of such instants. Hence, it makes no progress at all, i.e. it never moves.

Again, it is doubtful that the argument succeeds. It assumes that if the distance moved at any point is zero, the distance moved at any sum of points is zero. Plausible though this is, the principle is now rejected if the sum has the right size of infinity. Technically, that an uncountable set of points, each with measure zero, can have non-zero measure can be shown given a suitable definition of 'measure'.[14] The fact that this is surprising may be put down to the fact that our intuitions, drawn from finite cases, often break down where infinitudes are concerned.

Because crucial assumptions on which they are based can be readily rejected we are unable to endorse Zeno's arguments. However, in the present context that does not matter so much. The important point of this section is simply that originally dialectic was conceived as a method of argument showing that certain views entailed contradictions.[15]

2. The development of dialectic in Greek philosophy

Thus conceived, dialectic was practised widely, amongst post-Zenonian philosophers. In particular, Euclides of Megara (*c.* 400 B.C.) was fond of "attacking demonstrations not by the premisses but by the conclusions", meaning, presumably, that Euclides attacked his opponents' positions by drawing consequences from them.[16] In fact, members of Euclides' school,

the Megarians, were called dialecticians, presumably because they practised dialectic.

At much the same time but in another place (around Athens), the Sophists were using a similar technique (sometimes called 'anti-logic') which consisted of drawing out the contradictions latent in popular or other beliefs.[17] The technique was a slight generalization of the Zenonian one, in that the dialectician did not have to produce a single continuous argument to a contradiction, but was allowed to argue by posing a series of yes/no questions leading the holder of the belief in question to admit that his views contained a contradiction.[18] Thus the dialectician actually showed that a set of beliefs, rather than just a single belief, was inconsistent. (However, in virtue of the logical equivalence between a finite set of beliefs and their conjunction, this modification is not very important.) It was through this slight generalisation also that the discussive component entered into the dialectical argument technique. (The word "dialectic" itself comes from διαλέγεσθα meaning "discuss".) The same technique, now normally called "elenchus", was used by Socrates.[19] Socrates' 'mission' was to show people that they didn't really know what they claimed to know.[20] To this end the sophist-style dialectical argument was a very effective weapon.

Important steps in the development of dialectic occurred at the hands of Socrates' pupil, Plato. What, in the hands of Socrates and the Sophists was a weapon for showing negative results, Plato turned into a methodological approach for determining positive ones.[21] The point of the exercise was to delineate a *Form*, usually in the form of a real definition. To this end a hypothesis was put up, and this was examined for contradictions or other unacceptable consequences. (For example in the *Theaetetus* (151 e), Theaetetus defines knowledge to be perception from which Socrates draws conclusions which force its abandonment.) If these were found a new hypothesis was produced and the procedure repeated. If a hypothesis could be found which did not have unacceptable consequences, this was taken to be a correct definition (at least tentatively).[22] This process is illustrated in many of Plato's dialogues. Platonic dialectic was essentially a sequence of Zenonian dialectical arguments with a certain *telos*.[23]

There is another important feature of the Platonic dialectic, which though never perhaps stated explicitly by Plato is nonetheless visible in his dialogues. That is, that very often, when a hypothesis is refuted, a new one is *not* produced *de novo* but the old one is modified in such a way as to preserve its insights whilst trying to accommodate what has been learnt from the dialectical criticism. For example, in the *Euthyphro*, the first definition of "piety" mooted is that piety is that which the gods love. However, since the gods may disagree, it follows from this that an act may be both pious and impious. The definition of "piety" is then changed to "what *all* the gods love".

The features of the Socratic [sic] dialectic are these: (1) it starts with a partial definition; which (2) on examination contradicts itself; (3) the further definition which reconciles the contradiction, though it negates the initial definition as such, yet contains modified and absorbed within it the grain of truth which the definition held.[24]

Obviously we are here not too far removed from what will be Hegel's notion of *Aufhebung*.[25] At any rate this fact gives the dialectic a certain appearance of convergence.

The method of hypothesis therefore seems to be a method of *approximation*, though there is no such description of it in the dialogues. We are continually making alterations in our whole set of opinions, according as contradictions are revealed among them by the powers of deduction. In this manner we render them more and more adequate as time goes on.[26]

Two further points should be made about Platonic dialectic. The first, and minor, is that it is possible that the Platonic dialectic is due to Socrates. Socrates is certainly shown as practising it in some of the dialogues. It is notoriously difficult to determine what the historical Socrates actually did. Our interpretation of the situation seems to us the most plausible. However, nothing much hinges on this for our purposes. The second, and more important, point is that Plato's conception of dialectic was not a uniform or stable one. In some of the later dialogues Plato applies the term "dialectic" to another method of finding correct definitions. This is the method of "division and collection",[27] essentially finding a definition by producing a taxonomic tree. While such a search procedure can be usefully combined with the dialectical procedures of earlier dialogues, the extension of the term to apply to these taxonomic methods on their own, does suggest that by this time Plato was taking the term "dialectic" as a general word of commendation[28]—a phenomenon not unknown in this century with certain Marxists.

3. Dialectic in later Greek and Medieval philosophy

Dialectic undergoes no very substantial development, but shows progressive degeneration, in Greek philosophy after Plato. Most of what is said rings the changes on either the Zenonian concept or the Platonic. Moreover both have a tendency to be diluted or else generalized in such a way as to render them near-trivial, and often banal.

Thus Aristotle generalized and weakened the sense of "dialectic": dialectic is, for him, the science of arguments from non-evident premisses.[29] More

exactly, Aristotle takes dialectics to be a form of reasoning distinguished by the fact that its premisses are "probable", i.e. held but not proven. Thus "[dialectical reasoning] is distinguished from demonstrative reasoning ... by reference to the premisses from which it starts": dialectic for Aristotle means reasoning which takes men's convictions for its premisses; the premisses of the demonstrative syllogism are "true and primary".[30] Since one cannot prove an opinion by reasoning from it, the point, presumably, of dialectical reasoning (if it has a point—Aristotle says it may be merely mental gymnastics)[31] is to refute it. This suggests that Aristotle's dialectic is just a variant of Zeno's. The point is borne out by the fact that in the main place where Aristotle himself uses (as distinct from discusses) dialectical reasoning (namely *Metaphysics* Γ) the arguments are all variants of *reductio*.

However, according to Aristotle, dialectic can also be useful in determining the first principles of science (which cannot, by definition, be demonstratively proved).[32] This would appear to be an echo of the Platonic dialectic. Thus: " 'Reasoning' [Aristotle] says 'is dialectical if it reasons from opinions that are generally accepted ...' *Topics* 100^a 30. And as we read him we constantly observe Aristotle establishing his results by the gradual development of a more comprehensive and coherent theory through the criticism and modification of other men's conflicting doctrines. In respect of its method an Aristotelian treatise is a Platonic dialogue stripped of its dramatic [and discussive] form and reduced to more or less continuous lecture notes".[33]

Although the Stoic conception of dialectic was also continuous with the Platonic, and evidently (and acclaimedly) evolved from the Socratic dialectic, the notion of dialectic was again not so much enriched as markedly watered down. Dialectic was one of two branches of logic[34] and was conceived of very generally, to include reasoning or what we would now call logic, but was much more like the Platonic dialectic.

... in Stoicism, as Plato, dialectic is a science which has the real nature of things as its field of study.[35] Note that dialectic means the same procedure in both systems. For Plato the dialectician is someone who arrives by a process of question and answer at true definitions, and who discovers in this way what things are. The Stoics recognised question and answer as one of the methods dialectics uses but ... [not as] the only proper way of philosophy.[36]

In fact anything that concerned "knowledge of what is true, false or neither true nor false" or of "words, things and the relations which hold between them"[37] seems to have been thought part of dialectics. Thus dialectics becomes just a general name for semantics, epistemology and metaphysics.[38] Whilst it is understandable that it should have been generalized in this way it is clear that this empties the precise notion of dialectic of interest. Dialectic,

a powerful method founded by Zeno, and reaching its zenith with Plato, ends in Greek philosophy impotent.

Medieval philosophy—though, it is now beginning to emerge, a highly creative period in general—accomplished little of value for the notion of dialectic. "Dialectic" was commonly used, as by the Stoics, as a blanket term for logic and semantics.[39] But even where the method of dialectic was that of "trying to discover the truth by discussion which would reveal the unacceptable consequences of various suggestions", the method was quite inadmissibly restricted. For it "was not dialectic as the Greeks knew it", for the reason that the medieval schoolmen were constrained to "reach conclusions consistent with revelation".[40] Since Socrates' "willingness to question all accepted ideas and rely on reason so far as he could", to follow the method to whatever unpalatable places it led, was an important part of his dialectical method, medieval dialectic at its best was not Socratic dialectic.[41] It is not surprising, given the medieval educational curriculum, that the term "dialectic" was also transferred to refer to a certain form of discussion, method or debate, especially in the universities, whose stylized form was obviously a somewhat debased descendant of Platonic dialectics.[42]

4. Kant and Fichte

The next major step in the development of dialectic was brought about by Kant. Dialectic had degenerated so much at the hands of Aristotle and the medievals that Kant thought the natural meaning of "dialectic" to be more or less synonymous with sophistry:

> However various were the significations in which the ancients used 'dialectic' as the title for a science or art, we can safely include from their actual employment of it that with them it was never anything else than a *logic of illusion.* It was a sophistical art of giving to ignorance, and indeed to intentional sophistries, the appearance of truth, by the device of imitating the methodical thoroughness which logic prescribes, and of using its 'topic' to conceal the emptiness of its pretentions.[43]

Kant, rightly dissatisfied with this, decided to use "dialectic" for critical argumentation which aims at showing incorrectness.[44] (In this of course he was merely returning the word closer to its Zenonian meaning.) Specifically in the part of the *Critique* called the "Transcendental Dialectic", Kant aims to show that certain kinds of arguments, commonly used in metaphysics are incorrect. The most crucial part of this is the section called "The Antinomy of Pure Reason". In this section Kant produces four pairs of arguments, the antinomies, each pair for a contradictory conclusion. Although similar to *reductio ad absurdum* arguments, their interpretation,

according to Kant, is much more sophisticated. According to Kant, neither of each antinomic pair is fallacious in any straightforward sense: they are not mere sophisms, but in some sense, a product of reason itself.[45] Kant is obviously skirting the paraconsistent position. However this is not his conclusion. What it is, is best explained by considering one of the antinomic pairs. Consider the first antinomic pair (which is fairly typical). It is as follows:

(i) The world has a beginning in time.
Proof. Suppose not. Then before any particular event an infinite number of events must have occurred. Thus a whole infinite sequence of events has occurred. But it is impossible that an infinite sequence be completed. Contradiction.

(ii) The world has no beginning in time.
Proof. Suppose not. Then there was a time when nothing existed. But nothing can come into existence out of nothing. Hence the world did not start to exist. Contradiction.[46]

Now first of all, let us make it clear that we think that both of these arguments are incorrect: the first because an infinite sequence can often be completed, as Zeno's arguments reveal; the second because if the world had a beginning, it was coincident with that of space-time.[47] However, the defectiveness of the arguments is not to the point here. Both arguments employ the notion of a certain totality, of all events, or of all events before a certain time. Now although we might experience each event, we can not experience the totality. In Kantian jargon, each event is given to us by an intuition, whereas the totality is an object constructed in reason alone. Now Kant defuses the arguments by insisting that our concepts can legitimately apply only to objects of intuition,[48] i.e. experiences, and not to the likes of infinite totalities. To see what this means, consider argument (ii). It appeals to the principle "nothing comes from nothing", i.e. "every object has a material cause". This, according to Kant is true, but "everything" must be understood as everything given in experience. Thus the move to "the totality had a cause" is incorrect. In a similar way in (i) we cannot apply the principle "If A_1 occurs before t and A_2 occurs before t and ... then the sequence A_1A_2 ... occurs before t" where the sequence is an infinite one, not given to us in experience. Thus what Kant took this and the other antinomies to show is that certain *a priori* principles, whilst true enough, can be applied only to things experienced, i.e. that the quantifiers in the principles must be taken as restricted to experiences only.

The crux of Kant's position is that *reason and its categories are dependent for content on experience.* Indeed that is what Kant takes the antinomies to show.[49] However, it is difficult to find a direct argument for this assumption

other than some very general empiricism. Once empiricism is openly rejected and reason, far from being parasitic on experience, is admitted to lead a life of its own, Kant's position on the antinomies collapses. Reason, by unimpeachable arguments, produces contradictions, which must therefore be true. This line of thought is of course precisely that pursued in post-Kantian German idealism, and especially by Hegel.

The lynch pin between Kant and Hegel is Fichte. In his *Science of Knowledge* Fichte starts from the position that philosophy should be a science, and that means, according to him, that it should all follow (in some sense) from some basic proposition.[50] Of course, this idea of science is perhaps naive, but that doesn't matter in the present context. What is the basic proposition of philosophy? Here Fichte turns to Kant. He criticizes Kant's postulation of the thing-in-itself as totally spurious.[51] This leaves the other part of Kant's ontology, the transcendental ego. Thus Fichte's basic postulate: the existence of the ego thinking about (positing) itself. Here, however, the ego faces a problem. You can not think about, or have a conception of something unless it is in opposition to something else. (Compare Spinoza: *omnis determinatio est negatio.*) So at least thought Fichte. Hence the ego, to think itself, must posit something different, the non-ego, against which it can conceive itself.[52]

But, this realizes a contradiction. This is precisely reason leading a life of its own (cf. the last paragraph on Kant). For the ego must make itself non-ego. It is therefore both ego and non-ego. As Fichte puts it:

> insofar as the not-self is posited [in the self] the self is not posited in the self[53]

but

> insofar as the not-self is to be posited [in the self], the self must be posited therein.[54]

Thus the self is both posited and not posited and the posited is both self and not-self. As Fichte puts it a few lines later, "self = not-self and not-self = self".[55] Moreover the contradictions do not stop here. For "the second principle [i.e. the positing of the non-ego] annuls itself, and it also does not annul itself".[56]

Fichte calls the positing of the ego and non-ego the "thesis" and "antithesis", respectively. The contradiction that these produce has to be "resolved" in a "synthesis". Exactly what this means is, to say the least, somewhat obscure. The ego and the non-ego cannot co-exist (unlimitedly). Each has to "limit" the other, i.e. each has to "abolish the reality" of the other,[57] "not *wholly* but in *part* only".[58] What this seems to mean is something like this. Suppose government X declares itself to have jurisdiction over a country (the thesis). Government Y then declares itself to have jurisdiction

(the antithesis). The synthesis is obtained by partitioning the country into two halves, one under the jurisdiction of X and one under that of Y. Or, perhaps better, each accepts restricted and non-overlapping jurisdiction (as in the case of State and Federal governments). Exactly how this metaphor is to be cashed out in Fichte's case is a more difficult matter which we need not resolve here. However, we shall return to the subject of syntheses when we discuss Hegel. For the present we will simply note that in some sense the contradiction is resolved in the third phase of the dialectic. According to Fichte the new synthetic state will produce *its* negation, there will be a new synthesis and so on.[59] However, Fichte does not fill out the details much further. The stage is now set for the synthesis of the whole of dialectic so far: Hegel's.

5. Hegel

Hegel starts from the notion of the Fichtean ego. However, under the prompting of Schelling this has become something much grander, world spirit or *Geist. Geist* is a difficult notion and we do not need to go into it now.[60] But we may, as a first approximation think of it as bearing the same relation to the physical universe as a person's thought does to his or her body (provided we think of thought in Aristotelian, not Cartesian terms). For this reason we will translate "Geist" as "Thought". Thought has a certain essence and this is expressed in its *telos*, namely to come to think (understand) itself. To this end, it, like the Fichtean ego, posits its opposite, Nature (the material world). For reasons we have already discussed in Fichte, this realizes a contradiction. Finally the contradiction is resolved. What this means is *not* that the contradiction disappears but that Thought comes to see that the contradictories are identical, that Thought and Nature are not only different but are the same too. This is Hegel's notorious thesis of the identity of identity and difference.[61] To see this is at once to resolve the contradiction[62] and to see what Thought is, thus realizing the *telos* of Thought.

We can hardly claim that this notion of a resolution of a contradiction is transparent. However, an analogy from paraconsistent theory will shed light on it. Consider a paradoxical sentence, say '$\{x: x \notin x\} \in \{x: x \notin x\}$'. Call this R. From R we can deduce the negation of R. (R posits its negation). But from $\sim$R we can deduce R. Thus though we normally assume that a proposition has a very different sense from its negation, in this particular case R and $\sim$R, since they entail each other, express, so to say, the very same proposition. Thus the negation of R is exactly the same as R, i.e. the opposite of R is identical with itself. To see how a sentence can mean the

same as its negation is to see how a contradiction is possible and hence for it to be understood (resolved). We might also think of the deduction

R
⋮
~R
⋮
R

in Hegelean terms. The deduction is a movement through negation, and the negation of negation. The final R returns us to our starting point but at a "higher level" since we now see that R and ~R are identical.

The formal similarity between the structure of paradoxical deductions and the movement of Thought is remarkable. In not noticing it (perhaps historically excusable) Hegel undoubtedly missed a trick. The analogy may help to show how something can be at once identical and different to itself. Whether it actually says anything for Hegel's position (as opposed to just making it intelligible) is another matter, which we are content to leave open here.

Anyway this fundamental, we could say 'global', dialectic is not to be realized in a trice. It is to be realized after a long development. Thought goes through a whole series of stages to reach its *telos*. The progression here is not a temporal one but one of "logical" development. (However, as we shall see in a moment, it is connected with a temporal one.) Take any category of Thought (such as being, cause, infinity). This category contains a contradiction. (One might say that being part of the whole it reflects the global contradiction.) Here Hegel shows the influence of Kant. For Hegel, the Kantian antinomies are just the tip of an iceberg; extended, antinomic arguments show that all our categories are inconsistent, in the sense that any category must apply to things to which the contradictory category applies.[63] By analysis of the contradiction in a category we are led to posit another which "transcends" (*aufhebt*) the old. (Thus, for example, analysing being we determine that there are things which must both be and not be. We posit the category of *becoming* to apply to these. The contradiction is thought of as realized at the moment of change.) However, this new category is itself contradictory and so the development progresses until we arrive at the most fundamental of categories, the Absolute Idea,[64] which is the category with which Thought can think itself. (It applies to the "biggest contradiction of all".)

We could call this progression Hegel's logical dialectic, as opposed to the global dialectic. The logical dialectic is explained, appropriately enough, in his *Logic*. (Whether Hegel is always successful in showing that a certain

category is inconsistent is yet another matter we will not detour to discuss. But it is extremely doubtful that he is.) There is also a third dialectic to be found in Hegel. Thought, it will be recalled, is embodied in Nature and in particular, in man and his institutions. Thus, the logical dialectic is mirrored by a parallel development in man and his consciousness. This is a historical development, and we could call it Hegel's historical dialectic. It is explained in his *Phenomenology, Philosophy of History* and several other books. The progression proceeds in the familiar dialectical way. The culture and the institutions of a certain epoch contain contradictions. They therefore pass away and are replaced by a new culture and institutions which resolve the contradictions and transcend (*aufheben*) the old. But what do "contradiction" and "transcend" mean here? It is easy enough to see what inconsistent categories are—those that force there to be objects like Thought which have inconsistent properties, i.e. which force simple inconsistency. But what is it for an institution to be inconsistent?

Hegel catches a number of things under this rubric. However, the most important and fundamental seems to be something like this. An institution, like any human product, has a *telos*. If the realization of that *telos* requires the production of factors or situations, which inhibit or prevent the realization of that *telos*, we have a contradiction.[65] Hegel's most famous illustration of this kind of situation is the master/slave predicament.[66] To realize himself (the *telos*) a man requires the recognition of other men. To this end they are captured and enslaved. But this makes them less than men. Thus their recognition will not serve its required end. *In nuce* the *telos* requires us to possess the free. Obviously an impossible requirement.[67]

This notion of contradiction is obviously related to the proper notion, of a sentence of the form $p \,\&\, \sim p$. However it is obviously a slight displacement of the notion. Hence, the notion of transcendence must be slightly displaced too. The institution which transcends the old does so by minimally changing either the means or the end so that the contradiction is overcome. In this sense, the "contradiction" is defused and the old system is "preserved" whilst at the same time destroyed. But again we will not sidetrack to discuss Hegel's illustrations of this historical process, which range from convincing to unconvincing.[68]

By now it should be clear that Hegel's dialectic is a development of that of Kant and Fichte. A little reflection shows it to be a development of Greek dialectic too. Hegel's insistence that things are in a continuous process of development is of course Heraclitus' flux, and his insistence on the realization of contradictions is Heraclitus' principle of the unity of opposites.[69] Zeno's dialectic is cited with approval by Hegel. Hegel endorses Zeno's paradoxes. Zeno of course thought they showed motion to be impossible. Hegel, who took motion to be actual, thought they showed that motion, and change in general, realizes contradictions.[70] Zeno's argument therefore played the same role as Kant's antinomies. As for Plato's dialectic, it is

clear that Hegel's logical and historical dialectics are just Plato's dialectic transposed into different keys. Both are the attainment of a certain *telos* by the successive transcendence of contradictions.[71]

Before we leave Hegel, there is one final point worth emphasizing. As we have seen, Hegel accepts the view that reality is inconsistent, that there are true contradictions. In fact he criticizes Kant frequently for holding that contradictions are only "in thought". For Hegel, because of his idealism, the categories of thought *are* the structure of reality. Inconsistent categories are therefore inconsistent reality.[72] This has been too much for some commentators, especially Anglo-American ones, to stand. Many have *assumed* that contradictions cannot be true and then (mis)applied the principle of charity to suggest that when Hegel asserts that reality is inconsistent or even asserts a bald contradiction,[73] he cannot mean what he says. Not surprisingly, this results in gross distortion of Hegel's views. Hegel can be properly understood only from a paraconsistent point of view (which is *not* of course, to say that a paraconsistentist *must* agree with all of his zany metaphysics). When it is actually argued that Hegel could not have meant what he said, the arguments are usually bad. The most frequent one is the artless, "but a contradiction implies everything".[74] Not only is this false, but there is no reason to suppose that Hegel held it to be true, and reason to suppose that he did not. What is even worse, Popper, for one, *assumes* that Hegel does mean what he says about contradictions and so writes him off for just the artless reason.[75]

6. Marx and the Marxists

Around the turn of this century, Hegel's views were influential in many places, especially Britain. What happened, however, was that British Hegelians such as Green took up Hegel's idealism but left his dialectic.[76] Perhaps the major exception was Bradley who endorsed Hegel-type arguments to the end that space, time, causality and other categories are inconsistent, but who could not brook the view that reality is inconsistent, and who therefore consigned the whole lot to the realm of appearance.[77]

If we wish to see further developments in dialectic we must look not to the Hegelians, but to Marx and his successors. Marx transformed Hegel's dialectic by 'demystifying' it. What this means we will now see. Take first Hegel's global dialectic, that is, the movement of Thought, to non-Thought, with the corresponding synthesis. Marx, in effect, changes "Thought" to "Man". The dialectic of Man then goes as follows. Man has a certain essence (i.e. defining property), which is his labour. However, this alienates itself, i.e. comes to exist over and against Man. Alienated labour (objectified

labour) is of course just capital (essentially, the labour theory of value) which exists in the form of private property. This is the fundamental opposition, between worker and capital. The synthesis is obtained in a communist society where private property disappears, Man labours for himself again and thus his essence is returned to him. In fact the goal of history is this synthesis: the production of Man as he ought to be.

The reinterpretation of Hegel is obviously substantial. However the important thing to note is that the alienated state is still a contradictory one, in the literal sense. For in the alienated state man loses his essence (loses his "species life"). Yet of course the essential properties are precisely those which, by definition, can not be lost. Contradiction. For example, in the Paris Manuscripts, Marx writes:

> Estrangement (Alienation) is manifested in the fact that *my* means of life belong to *someone else*... but also in the fact that everything is itself something different from itself—that my activity is something different from itself.[78]

Of course it is still my activity, otherwise *it* would not be different from itself. Hence we have a contradiction. In fact it is just Hegel's identity of identity and difference: my work is both identical with itself and different from itself.

The theory of alienation is discussed mainly in Marx's earlier writings. It does not appear a great deal in his later writings and the question of how much it is presupposed is a moot one which we need not discuss. The relevant dialectical material of the later works, especially *Capital*, derives not so much from Hegel's global dialectic but from his historical dialectic. In fact this dialectic is much the same as the Hegelian one except that economic factors become dominant. Thus, for example, the famous passage in the Preface to the *Critique of Political Economy* which cites the contradiction between the forces of production and the relation of production is exactly of this kind. The forces of capitalist production have a certain *telos*. These produce bourgeois relations of production. However, ultimately these prevent the realization of the *telos*. The system of capitalist production therefore ceases, and a new one is formed which preserves a certain amount of the old (particularly the forces of production) whilst getting rid of some of the rest (particularly the relations of production). As another example, consider the use of machinery in capitalist production.[79] The *telos* of capitalist production is the making of profit, which is a certain form of surplus value. To this end, when machinery is developed which is less expensive than a human worker, a manufacturer will employ it to realize more profit. But of course all capitalists will eventually do the same thing. Eventually therefore the manufactured article in question will contain less human labour, have less value, and hence less surplus value. Thus the amount of profit realized in the long run is *less*. The system of production

in furtherance of its *telos*, produces factors which actually inhibit the realization of the *telos*. Thus Marx says:

> Hence there is an immanent contradiction in the application of machinery to the production of surplus-value, since, of the two factors of the surplus-value created by a given amount of capital, one, the rate of surplus-value [crudely, profit divided by wages] cannot be increased except by diminishing the other, the number of workers.[80]

There is then, a quite determinate sense of "contradiction" other than the literal sense to be found in Marx's writings. Moreover, Marx follows Hegel's apparent lead in broadening the sense of 'contradiction' to other cases. For example, in the *Poverty of Philosophy* he says:

> Meanwhile the antagonism between the proletariat and the bourgeois is a struggle of class against class, a struggle which carried to its highest expression is a total revolution. Indeed, is it at all surprising that a society founded on the opposition of classes should culminate in brutal contradiction, the shock of body against body, as its final *denouement*?[81]

On another occasion Marx describes the fact that the means of production in capitalism are worked socially but owned privately as a contradiction:

> ... this expropriation [of the means of production] appears within the capitalist system in a contradictory form, as appropriation of social property by a few ...[82]

Clearly these two uses of "contradiction" have only loose connections with contradiction in the strict sense. One may put them down to a loose form of expression, or possibly just to polemics (something never completely absent in Marx's writing). However they and occurrences like them began a tendency (or at least accentuated a tendency already to be found in Hegel) to expand the sense of contradiction beyond legitimate logical limits.

This extension, and erosion, of the notion of contradiction has been taken further by other Marxists. For example, in *Anti-Dühring* Engels uses the term "contradiction" both in the sense of logical contradiction[83] and in the other senses we have encountered.[84] But, he also uses it to describe the fact that man's potential knowledge is unlimited whilst his actual knowledge is limited.[85] This is accompanied, inevitably, by an even more dismaying stretching of the notion of negation.[86]

The notion of contradiction, and therewith negation, is stretched further again by Lenin who lists as examples of contradictions:[87]

> In mathematics: + and −, and differential and integral.
> In mechanics: action and reaction.
> In physics: positive and negative electricity.
> In chemistry: the combination and disassociation of atoms.
> In social science: the class struggle.

(However there are precedents for some of these in Hegel.[88]) Other Marxists use the term "contradiction" not only for any pair of contradictory categories, whether or not it can be shown that there is some one thing to which both apply, but even as regards any opposing forces or tendencies.[89]

The heterogeneity of all these things need hardly be emphasized. In this way the notion of contradiction has been emptied of much of its content. Consequently dialectic, the "science of contradictions", too has become generalized and diluted to the point, we think, where its essence has been lost. Part of the reason for this seems fairly obvious. The ideology of consistency has affected even dialecticians to the extent that they can no longer believe that Hegel and Marx meant what they actually said.[90]

But part of the reason is also that dialectic as a method again achieved honorific status (in certain circles). Accordingly, though there was some attempt to tighten up the method by formulation of some older principles as dialectical "laws", dialectic was extended to cover more and more favoured enterprises, notably science. Engels seems to have had a prominent role in this, by first simplifying Hegel—"according to Hegel dialectics is the self-development of the concept"— and then under the materialist transformation, which was alleged to put Hegel on his head, grossly changing the notion: "dialectics reduced itself to the science of general laws of motion, both of the external world and of human thought ...."[91] Lenin follows suit and equates the dialectical method with scientific method, sometimes localized to sociology:[92]

> ... what Marx and Engels called the dialectical method is nothing more or less than the scientific method in sociology... It all amounts to regarding social evolution as a natural-historical process of development.

This sort of generalization can be to some extent accommodated by amended accounts of scientific method and science in terms of a less corrupted notion of dialectic, though such a reverse procedure assumes (what is at best decidedly dubious) that "science always means the discovery of contradictions, inherent in all products of nature—and in society too".[93] And since Lenin the degeneration of dialectic from a comparatively tight and powerful method has, for the most part, continued within the wider Marxist tradition. (Just one important example is in Sartre, 1976.)

7. Summary and prospects

It will be clear that dialectic, as befits a theory of development, has developed markedly over two and a half thousand years of philosophy. We have isolated two major phases: Classical Greek philosophy and Modern German philosophy. Although they are very different, one is the development of the other, and there is an important parallel between the phases. Both started off concentrating precisely on contradiction within the setting of (perplexing) arguments. Both then developed into a theory of development in which contradiction plays the central role. Finally, both went into a period of decline when the specific essence of dialectic, literal contradiction, was forgotten, and consequently dialectic became a subject of high generality but little content. All this we have documented.

Of course the evolution of dialectic will continue and we think that we are at the start of a new phase of growth, during which symbolic logic will play a fundamental role. It will again start with a concentration on contradiction itself within the framework of argument procedures, especially convincing arguments which lead to contradiction. To an extent this has already happened with the matter of logical paradoxes and of paraconsistent logic. However it is also evident that a correct understanding of the history of dialectic is essential for further progress. To this end an analysis of the history of dialectic, and particularly Hegel's dialectic, using the techniques of modern logic is essential. From what has been said it is obvious that such an analysis will have to accommodate the notion of a true contradiction. Thus paraconsistent logic will be essential here too.[94] This analysis has already started, but remains in its earliest stages.[95] Where the whole modern study will take us, we can only speculate.

Notes

[1] By Alexander of Aphrodisias: see Long, 1974, p. 101.
[2] See Kneale and Kneale, 1962, p. 7.
[3] 'In its proper meaning, dialectic is the study of contradictions *within the very essence of things*.' Lenin quoted by Stalin, 1973, p. 305. Lenin goes on of course to say how much more than this core dialectic comprises.
[4] This is the reason that we qualified 'Dialectic' within the adjective 'Logical' in the title of the paper. Of course, were dialectic to be synonymous with logic (which it was at one time) both 'logical dialectic' and 'dialectical logic' would be pleonasms. But dialectic and logic parted company certainly by the third century AD when the term 'logic' appeared in approximately its modern sense. See Kneale and Kneale, 1962, p. 7.
[5] The practice of dialectic in Eastern thought is certainly older: see e.g. chapter I, sect. 2.

[6] See e.g. the fragment on p. 381 of Kirk, 1954.
[7] Kirk, 1954, p. 134.
[8] See the fragment in Kirk, 1954, p. 88.
[9] Kirk, 1954, p. 168.
[10] This is reported by both Sextus Empiricus (*Adversus Mathematicos* vii, 7) 1912–54, and Diogenes Laertius (1951, vii, 57 and ix, 25). See Kneales, 1962, p. 7.
[11] Kneales, 1962, p. 7.
[12] The arguments are set out simply in Vlastos, 1967.
[13] Vlastos, 1967.
[14] The treatment of sets of measure zero in contemporary measure theory does, however, rely essentially on what amount to paradoxes of implication, and is accordingly open to serious objections from a paraconsistent stance: see the Appendix to Routley, 1980. There is sufficient evidence, moreover, that alternative measure theories can, like alternative logics, be devised. Zeno's summation principle can presumably be incorporated in the framework of such a theory. So there are presumably coherent theories in which some of Zeno's paradoxes are accepted. The question then becomes: which of the measure theories is true? For a further discussion of the arrow paradox, which concedes greater force to it, see Priest, 1985a and Peña, 1980.
[15] 'It seems then that the first precise meaning of the word "dialectic" was *reductio ad impossibile* in metaphysics.' Kneales, 1962, p. 9. Negative dialectics had a similar role in Nāgārjuna's thought.
[16] Kneales, 1962, p. 8.
[17] See Kerferd, 1967.
[18] See the section "Socratic Method" in Ryle, 1967.
[19] Ryle, 1967.
[20] See Robinson, 1953, p. 13.
[21] The Kneales, 1962, pp. 9–10, claim that this is difficult to understand, and mysterious. However, as we shall see, it is quite straightforward. The Kneales run into trouble through presupposing a dubious positive/negative distinction, linking *reductio* arguments and refutations as negative invariably with negative results. But Zeno's procedure already indicates how results such as Parmenides' thesis that motion is impossible, a thesis of high generality, can be enforced by dialectical methods, e.g. supposing the opposite and deriving unacceptable conclusions.
[22] See Robinson, 1953, p. 107.
[23] Those who are familiar with Popper's account of science can not fail to notice similarity here.
[24] Mure, 1932, p. 29.
[25] Those familiar with Lakatos' account of the growth of mathematics in 1976 will also notice a similarity with the way theorems are modified, on his account, in response to counter-examples.
[26] Robinson 1953, p. 108.
[27] Kneales, 1962, p. 9. The Kneales go on to say, uncharitably and incorrectly, that:

> the only feature common to Plato's use of the term "dialectic" seems to be that it signifies a co-operative method of philosophical investigation, involving a search for definitions, and approved by Plato at the time of writing.
>
> But the co-operative method remains specifically a *discussive* one, taking a definite question and answer form; it involves more than a search for definitions, but inquires into the nature of things; and it does not comprise merely what is arbitrarily approved of by Plato. The method of division, e.g., retains a crucial feature of the earlier wider procedure, namely the rejection of unacceptable alternatives.

[28] Thus there is some basis, especially in Plato's later work, for Robinson's overstatement: "The fact is that the word 'dialectic' has a strong tendency in Plato to mean 'the ideal method, *whatever that may be*'. In so far as it was thus an honorific title, Plato applied it at every stage of his life to whatever seemed to him at the moment the most hopeful procedure". Robinson 1953, p. 70.

[29] Kneales, 1962, p. 10.

[30] Long, 1974, p. 122.

[31] Ross, 1923, p. 56.

[32] Ross, 1923, pp. 56–7.

[33] Mure, 1932, p. 217.

[34] The other being rhetoric. See Long, 1974, p. 121.

[35] In total contrast to Aristotle's account where dialectic is not a science, has no specific subject matter, and is chauvinistically defined in terms of *human* procedures and assumptions.

[36] Long, 1974, p. 122.

[37] Long, 1974, p. 122.

[38] Even more disconcertingly, the Stoics characterize dialectic, like logic, in several non-equivalent ways, so it appears: Firstly, the Stoics define dialectic as the *science of speaking well*, and make speaking well consist in speaking things that are true and fitting (cited, though with reservations, in Long, 1974, p. 102; the source is Diogenes Laertius, who however conflates this account with a narrowly semantical one: see 1951, p. 742). On *this* account, dialectic includes not only semantics broadly construed but also pragmatics and rhetoric and elements of epistemology. By contrast, however, the most widely attested Stoic definition of dialectics is as "the science of things true and false and neither true nor false", which is rather a semantical or metaphysical account. On yet a third, and more Platonic, Stoic account of dialectics, "of the two forms of inquiry which fall under the virtue [of dialectic], one considers what each thing that exists is [its real definition], and the other what it is called [its nominal definition]" (Diogenes Laertius, 1951, 7.83). And, fourthly, it is also said that "Chrysippus agreed with Plato and Aristotle that the philosophical argument, formally conducted, is the only proper procedure for the demonstration of truth. . . . called the expert in this a dialectician" (Long, 1974, p. 113). In later Stoicism the notion degenerates entirely. Long, (1974, p. 108) gives a "catalog of dialectical virtues" attributed to Chrysippus-Stoic dialectical virtues in his account, since Long goes on to call Stoic dialectic "Chrysippian dialectic". Long then suggests (p. 117) and claims (p. 120) that this is explicit in Epictetus: indeed (Long, 1974, p. 123ff.) "dialectic may be regarded as a method of self-discovery"—because it "contributes to the understanding of man himself and of the rationality of the universe"!

[39] See for example the discussion of Abelard's *Dialectica*, Kneales, 1962, p. 204ff.

[40] The quotes are from Kneales, 1962, p. 203.

[41] The fact that everything is open to dialectical assessment, and revision, does not of course imply that beliefs and assumptions cannot be adhered to, until shown faulty. It is no criticism of the Socratic technique that Socrates had (if he did) "firm belief in supernatural agencies which transcended reason and which it would be both foolish and dangerous to disregard": Zaehner, 1974, p. 13.

[42] See Hall, 1967, and Kneales, 1962, pp. 202–3, who describe the procedure as follows: all philosophy (and most else) was "studied by consideration of *questiones*. At the beginning of each *quaestio* authorities who oppose, or seem to oppose, each other are set in array, and then the teacher shows his mastery by producing distinctions of meaning that suffice to solve the problem and dispose of all difficulties" (Kneales, 1962, p. 202).

[43] Kant, 1950, A61 B86.

[44] Kant, 1950, A62 B86.

[45] Kant, 1950, A297 B354f; A339 B397.

[46] Kant, 1950, A426 B454ff.

[47] This seems to be the consensus concerning the general theory of relativity. Alternatively one can argue that something *can* come into existence from nothing (space-time itself being an example of this) and trace the mistaken belief that this is impossible back to the Reference thesis. (See Routley, 1980, Ch. 2).

[48] Kant, 1950, A498 B526ff.

[49] A similar strategy, perhaps at a more sophisticated level, is deployed in the Buddhism of Nāgārjuna: see the previous chapter, part 2.

[50] Copleston, 1963, p. 55ff.

[51] Copleston, 1963, p. 58.

[52] Copleston, 1963, p. 65.

[53] Fichtė, 1970, p. 106. Quotation rearranged.

[54] Fichte, 1970, p. 106.

[55] Fichte, 1970, p. 107.

[56] Fichte, 1970, p. 107.

[57] Fichte, 1970, p. 108.

[58] Fichte, 1970, p. 108.

[59] Fichte, 1970, p. 113.

[60] A full account can be found in, e.g., Taylor, 1973.

[61] See Taylor, 1973, p. 80.

[62] We could say, to see the contradiction is not a contradiction.

[63] Taylor, 1973, p. 228.

[64] Taylor, 1973, p. 339.

[65] Taylor, 1973, p. 131.

[66] Taylor, 1973, pp. 153–157.

[67] Hegel would seem to be open to an *ad hominem* argument here. If contradictory situations are realizable (which they certainly are since Thought is both identical to itself and not identical to itself) why can't you have a person who is both bound and free? The answer, of course, is that though Hegel is committed to the view that *some* contradictions are realizable, he is not committed to the bizarre view that all are. Which can be, and which cannot be, is an important question, but this is another matter.

However Hegel's discussion of the master-slave relationship does give grounds for saying that not only is the master bound (in some respects, at any rate) as well as free, but that the slave is free, as well as bound, for the slave turns out to be free in a way, since it is the slave who mediates between the master and the world and thus has a degree of control over the master. (This point is due to J. Norman.)

[68] Details can be found in any book on Hegel. For example, Taylor, 1973.

[69] "There is no proposition of Heraclitus which I have not adopted in my Logic". Hegel, 1955, Vol. 1, p. 299.

[70] Hegel interprets Zeno as holding his own position. Hegel, 1955, pp. 266–7.

[71] Hegel is well aware of this. See the last section of Hall, 1967.

[72] Taylor, 1973, pp. 230f, 342.

[73] Which he often does. See for example his 1929, Vol. II, pp. 66–7.

[74] See, for example, the section "Dialectical Method" in Acton, 1967.

[75] Popper, 1963. Given his earlier logical work, Popper should have known better. He shows, p. 321, that he is aware of the possibility of formal paraconsistent logic, but naively supposes that only one, extraordinarily weak, such logic is possible.

[76] Giles 1967.

[77] Acton, 1967a.

[78] Marx, 1959, Vol. III, p. 314.
[79] Marx, 1976, Ch. 15 §3.
[80] Marx, 1976, p. 531. It is worth noting that a number of writers also see a dialectic analogous to Hegel's logical dialectic in *Capital*, for example in the way that economic categories are deduced from the contradictions in the notion of a commodity. See Ilyenkov, 1982, chapter 5.
[81] Marx, 1977, p. 215.
[82] Marx, 1959, Ch. XXVIII, p. 440.
[83] Engels, 1975, p. 140f. Some of which however are *very* dubious.
[84] Engels, 1975, p. 326.
[85] Engels, 1975, p. 140.
[86] Engels, 1975, p. 156ff.
[87] V. I. Lenin, 1972.
[88] See for example, the section on Hegel's Philosophy of Nature in Acton, 1967.
[89] See, for example, Mao Tse-tung, 1968, p. 32. For other examples, and further discussion of negation and contradiction, see Routley and Plumwood, 1986.
[90] On this, see for example Acton, 1967b, p. 392.
[91] Engels, 1941, p. 44. Engel's "reduction" would make the Newtonian laws of motion, for example, dialectical laws along with such principles as the unity and opposites.
[92] Lenin, 1978, Part I. It is only fair to add however that much of Lenin's writing was polemical and not tightly theoretical. In such a context dilution of the notion of dialectic is (if not thereby exonerated) understandable, and of course sometimes advantageous.
[93] Quoted in Cornforth, 1965, p. 292. However, note that in contrast to Popper, 1963, and others, we are not denying that dialectic, and its laws duly amended, can play a significant role in accounting for scientific method and dialectic, see Priest, 1980.
[94] It follows that the few attempted formalizations that have appeared which use classical logic are doomed to failure. Some of these can be found in Marconi, 1977.
[95] See, for example, Routley and Meyer, 1975; da Costa and Wolf, 1980; Priest, 1982; and Peña, 1980.

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III
Aspects of the Historical Development of Paraconsistent Logic

Ayda I. Arruda

1. Introduction

In this paper we look at some aspects of the historical development of paraconsistent logic since 1910 up to the present day.

As is usual in science, we cannot define precisely what paraconsistent logic is; we only say that a necessary condition for a logic L to be paraconsistent is that it can be used as a basis for inconsistent and non-trivial theories, that is to say, in a theory T based on L we may derive a contradiction without proving that all formulas of T are also theorems of T.

Consequently, paraconsistent logic is closely related to other kinds of non-classical logics, especially to dialectical logic and relevant logic. Although closely related, it is difficult to establish a general criterion of comparison between paraconsistent logic and dialectical logic or relevant logic. The reason is that the concepts of deduction and of theorem in these logics are not always similarly defined.

In spite of the fact that apparently Hegel's dialectics cannot be formalized, many present day authors use the term 'dialectical logic' to designate those logics that are intentionally constructed to formalize aspects of the dialectical discourse of Hegel, Marx and their followers; it is in this sense that the term 'dialectical logic' is used in this paper. We will not try to define 'dialectical logic'; we only mention some points of view about the subject, which perhaps can elucidate the meaning we attribute to this expression. Routley and Meyer [70] give a necessary condition for a propositional logic to be dialectical: in their opinion it must be closed under *modus ponens*, simply inconsistent (i.e., to include A and $\neg$A, for some A, as theses), and non-trivial (i.e., not every formula is a theorem). Marconi [53] says that '*... probably any future attempt to think in logical terms about the Hegelian discourse will have an obligatory passage on the theory of inconsistent formal systems*'. Wolf and da Costa [38] argue that the fields of dialectical logic and paraconsistent logic intersect but are different, and we think they are right.

Relevant logic originated with the work of Ackermann [2] and was especially investigated by A. R. Anderson and N. D. Belnap, since the late fifties. The basic idea of Ackermann is to obtain an implication which is