

# Engels's Confusion of Logical Contradiction with Dialectical Contradiction

## Study Notes on Anti-Dühring Chapter 12: Dialectics of Quantity and Quality

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I have no problem with the basic theme of the dialectical relationship between quantity and quality that Engels is talking about in this chapter. And the latter part of the chapter, in which Engels defends Marx's *Capital* from Dühring's ridiculous charges about quantity/quality is quite good.

However, I do have some disagreements with some of the things that Engels says or implies in the first part of this chapter (and also references in other chapters). At one point Engels quite justly remarks that Dühring has "committed the blunder of identifying Marxian dialectics with the Hegelian". [MECW 25:114] But, reluctantly, I have to say that I think that in this chapter at least, Engels himself has not fully broken with Hegelian dialectics either. So that's what I'll be talking about here.

Engels begins the chapter by quoting Dühring: "Contradiction is a category which can only appertain to a combination of thoughts, but not to reality. There are no contradictions in things, or, to put it another way, contradiction accepted as reality is itself the apex of absurdity." Engels responds by pointing out that Dühring incorrectly *identifies* contradiction with *absurdity*, and therefore says that contradiction cannot occur in the real world. This of course is not the view of Marx & Engels, nor is it the way that any Marxist understands the term 'contradiction'. We all see a vast number of contradictions in the natural world and in human society, as well as in human thought. And we don't see these contradictions as a *logical absurdity ... or do some of us?!*

What is the *nature* of these contradictions which we see in nature and society? It is not one of *logical contradiction*, but rather of *dialectical contradiction*. (Actually, even in human thought there are *both* examples of frequent dialectical contradiction as well as occasional logical contradictions.) And this is my central beef with this chapter: Engels does not here draw an explicit distinction between logical contradiction and dialectical contradiction. Like Hegel himself, in this chapter at least, Engels seems to blend the two very different notions of contradiction into one.

In human society we have the contradictions between social classes, such as the primary contradiction in capitalist society between the bourgeoisie and the proletariat. Is this a "logical" contradiction? No. It is more like a struggle of opposing forces. In nature we have the contradiction between the movement of tectonic plates which often raise up mountains, and the forces of erosion from rain, ice, wind and gravity which serve to wear down and destroy mountains. Again, this is a matter of opposing forces within an overall physical process, and not a matter of logical contradiction. It is not "illogical" that mountain raising and erosion are in (dialectical) contradiction to each other, nor is it in any way "illogical" that there is a class struggle between the bourgeoisie and the proletariat.

In that first paragraph from Dühring that Engels quotes, Dühring goes on to say: "The antagonism of forces measured against each other and moving in opposite directions is in fact the basic form of all actions in the life of the world and its creatures. But this opposition of the directions taken by the forces of elements and individuals does not in the slightest degree coincide with the idea of absurd contradictions." So what Dühring is apparently trying to do here is to draw a distinction between logical contradictions and the more general concept

of opposing forces—which he does not want to call “contradictions” at all. In other words, it seems to largely come down to a difference between Engels and Dühring on how the word ‘contradiction’ should be used.

Why do we Marxists refer to opposing forces as “contradictions” anyway? It is mostly for historical reasons. This is the terminology used in ancient Greek philosophy (not only by the preeminent Greek dialectician [Heraclitus](#), but also by many others including Plato and Aristotle). And it is the terminology consequently used by many more modern philosophers, most notably Hegel. Although Hegel was in fact a [philosophical idealist](#) he was also the leading champion in the era leading up to Marxism of the conception that the world can be best analyzed in terms opposing forces. In other words, Marx and Engels learned this dialectical perspective from Hegel, and therefore quite naturally used the Hegelian term ‘contradiction’ to talk about it. For both Hegel himself, and for most of his followers, the term ‘contradiction’ has the dual and somewhat confused blended meaning of both what we would now distinguish as logical contradiction (inconsistencies) and dialectical contradiction (internal opposing forces).

It would indeed probably have been better if English speakers had chosen to refer to dialectical contradictions as “oppositions” rather than “contradictions”. But the latter has long been the accepted terminology in discussions of dialectics, and we just have to get used to this fact. Dialectical contradiction is a matter of *oppositions* (or conflict, or struggle) within things and processes, while logical contradiction is simply a matter of simultaneously affirming a statement and denying it. Yes, it is unfortunate that the same term, ‘contradiction’, is used for these two very different things, but we are stuck with this situation for historical reasons. An educated person must come to understand that the term ‘contradiction’ (like virtually all words and phrases) means something different in different contexts. In speaking of contradictions *in nature* and *society* we are of course talking about dialectical contradictions, and not logical inconsistencies.

What did Marx and Engels mean when they said that their materialist dialectics was the opposite of Hegel’s idealist dialectics? Here are two specific quotes from Marx about that:

“By the way, half intentionally and half from lack of insight, he [Dühring] practices deception [in his review of volume I of Marx’s *Capital*]. He knows very well that my method of presentation is *not* Hegelian, since I am a materialist and Hegel is an idealist. Hegel’s dialectics is the basic form of all dialectics, but only *after* it has been stripped of its mystical form, and it is precisely this which distinguishes *my* method.” —Marx, Letter to Ludwig Kugelmann, March 6, 1868, in *Marx-Engels Selected Correspondence* (Moscow: 1975), p. 187; in a slightly different translation in MECW 42:544.

And:

“My dialectic method is not only different from the Hegelian, but is its direct opposite. To Hegel, the life-process of the human brain, *i.e.*, the process of thinking, which, under the name of ‘the Idea,’ he even transforms into an independent subject, is the [demiurgos](#) of the real world, and the real world is only the external, phenomenal form of ‘the Idea.’ With me, on the contrary, the ideal is nothing else than the material world reflected by the human mind, and translated into forms of thought.

“The mystifying side of Hegelian dialectic I criticized nearly thirty years ago, at a time when it was still the fashion. But just as I was working at the first volume of ‘Das Kapital,’ it was the good pleasure of the peevish, arrogant, mediocre, epigones [inferior imitators] who now talk large in cultured Germany, to treat Hegel ... as a ‘dead dog.’ I therefore openly avowed myself the pupil of that mighty thinker, and even here and there, in the chapter on the theory of value, coquetted with the modes of expression peculiar to him. The mystification which dialectic suffers in Hegel’s hands, by no means prevents him from being the first to present its general form of working in a comprehensive and conscious manner. With him it is standing on its head. It must be turned right side up again, if you would discover the

rational kernel within the mystical shell.

“In its mystified form, dialectic became the fashion in Germany, because it seemed to transfigure and to glorify the existing state of things. In its rational form it is a scandal and abomination to bourgeoisdom and its doctrinaire professors, because it includes in its comprehension and affirmation recognition of the existing state of things, at the same time also, the recognition of the negation of that state, of its inevitable breaking up; because it regards every historically developed social form as in fluid movement, and therefore takes into account its transient nature not less than its momentary existence; because it lets nothing impose upon it, and is in its essence critical and revolutionary.

“The contradictions inherent in the movement of capitalist society impress themselves upon the practical bourgeois most strikingly in the changes of the periodic cycle, through which modern industry runs, and whose crowning point is the universal crisis. That crisis is once again approaching, although as yet but in its preliminary stage; and by the universality of its theatre and the intensity of its action it will drum dialectics even into the heads of the mushroom-upstarts of the new, holy Prusso-German empire.” —Marx, *Capital*, Vol. I, Afterward to the Second German Edition (Jan. 24, 1873), (International ed., pp. 19-20; Penguin ed., p. 102-3).

Thus for Marx and Engels, and even for Hegel (at least sometimes, and in his upside-down sort of way), dialectics is the philosophy of change and development. But Marx and Engels have still not addressed in these passages the secondary confusion in Hegelian dialectics between logical contradiction and dialectical contradiction. We could put it this way: They have inverted Hegelian dialectics and gotten rid of *most* of the idealist philosophy in Hegel’s dialectics, but they have not yet cleared up the continuing confusion in Hegel between formal logic and dialectical logic.

However, for the most part this secondary weakness in the dialectics which we Marxists have inherited and further developed from Hegel has been greatly clarified since then by both Lenin and Mao. Here is the essence of what they have said about contradiction in dialectics:

“In brief, dialectics can be defined as the doctrine of the unity of opposites. This embodies the essence of dialectics, but it requires explanations and development.” —Lenin, “Conspectus of Hegel’s Book *The Science of Logic*” (1914), LCW 38:223.

“The law of contradiction in things, that is, the law of the unity of opposites, is the basic law of materialist dialectics.” —Mao, opening sentence in his famous essay, “On Contradiction” (Aug. 1937), SW 1:311.

Mao more explicitly talked about the distinction between formal logic and dialectics in this passage:

“It has been said that the relationship of formal logic to dialectics is like the relationship between elementary mathematics and higher mathematics. This is a formulation which should be studied further. Formal logic is concerned with the form of thought, and is concerned to ensure that there is no contradiction between successive stages in an argument. It is a specialized science. Any kind of writing must make use of formal logic.

“Formal logic does not concern itself with major premises: it is incapable of so doing. The Kuomintang call us ‘bandits’. ‘Communists are bandits’, ‘Chang San is a communist’, therefore ‘Chang San is a bandit’. We say ‘The Kuomintang are bandits’, ‘Chiang Kai-shek is Kuomintang’, therefore we say ‘Chiang Kai-shek is a bandit’. Both of these syllogisms are in accordance with formal logic.

“One cannot acquire much fresh knowledge through formal logic. Naturally one can draw

inferences, but the conclusion is still enshrined in the major premise. At present some people confuse formal logic and dialectics. This is incorrect.” —Mao, “Speech at Hangchow” (Dec. 21, 1965), in Stuart Schram, ed., *Chairman Mao Talks to the People* (1974), pp. 240-241. Also in Mao, SW 9:229.

So now, when we Marxists talk about dialectical contradiction we are primarily talking about the “unity of opposites” in a thing or process, or—in other words—we are talking about *oppositions* and *not* about formal logical inconsistencies. (In academia, however, especially in “left” pseudo-Marxist academia strongly influenced by Continental idealist philosophy, confusion about this point is still rampant.)

However, returning to Chapter 12 of Engels’s great work *Anti-Dühring*, we do see signs that Engels at that point has not clearly drawn the distinction between logical contradiction and dialectical contradiction. This, it seems, is only something that became fully clarified later on, especially by Lenin and Mao.

One of the important reasons for the continuing confusion in this regard in the thinking of both Engels and Marx is that the foundations of mathematical analysis (“the Calculus”) were still in a confused and rather incoherent state when Engels was writing. Well, to be honest, it had by the 1880s mostly been straightened out in the work of great mathematicians like Cauchy and Bolzano, though this much more logical reformulation of the calculus in terms of [limits](#) had not yet entered the realm of public education even for sophisticated non-mathematicians like Engels despite his serious study of the sciences in general. The remaining difficulties with mathematical continuity and the “continuum” were then resolved by mathematicians such as Weierstrass and Georg Cantor not long after Engels wrote *Anti-Dühring*. (A good summary of the rigorous reformulation of calculus during the 1800s can be found in Carl B. Boyer, *The History of the Calculus and Its Conceptual Development* (Dover: 1949), esp. chapter VII.)

Engels responds to his two large initial quotations from Dühring as follows:

“The thought-content of the two passages cited can be summed up in the statement that contradiction = absurdity, and therefore cannot occur in the real world. People who in other respects show a fair degree of common sense may regard this statement as having the same self-evident validity as the statement that a straight line cannot be a curve and a curve cannot be straight. But, regardless of all protests made by common sense, the differential calculus under certain circumstances nevertheless equates straight lines and curves, and thus obtains results which common sense, insisting on the absurdity of straight lines being identical with curves, can never obtain.” [MECW 25:110-1]

So it appears that Engels is saying, contrary to Dühring, that absurdity *can indeed occur* in the real world, or at least in valid mathematical theories which we can use to describe the world!

But what is Engels even talking about here? Although he doesn’t elaborate, it seems quite likely that he is merely referring to the [derivative](#) of a function at point P on the curve, where it constitutes the straight-line tangent to the curve. While at the time this was commonly, but very incorrectly, expressed by saying that the infinitesimal portion of the curve was “actually a straight line”, this is not at all how we would describe it today. Today we would say something such as that the *limit* of the series of straight line segments connecting pairs of points on either side of point P as those other points get closer and closer to P define a straight tangent line to the curve at point P. And *not* that the curve is “actually a straight line” at that point. In other words, we have *straightened out* (!) our concepts and our language so that there is no absurdity whatsoever associated with the concept of a derivative or of a tangent to a curve at some specific point. There is in fact today no logical absurdity in this mathematical conception, even though in Engels’s day it was still (incorrectly) thought that there was.

Similarly, in Chapter 13, Engels talks about the calculus this way:

“Elementary mathematics, the mathematics of constant quantities, moves within the confines of formal logic, at any rate on the whole; the mathematics of variables, whose most important part is the infinitesimal calculus, is in essence nothing other than the application of dialectics to mathematical relations. In it, the simple question of proof is definitely pushed into the background, as compared with the manifold application of the method to new spheres of research. But almost all the proofs of higher mathematics, from the first proofs of the differential calculus on, are from the standpoint of elementary mathematics, strictly speaking wrong. And this is necessarily so, when, as happens in this case, an attempt is made to prove by formal logic results obtained in the field of dialectics.” [MECW 25:125]

Engels certainly seems to be saying or strongly implying here that the [differential calculus](#) cannot be developed and proven by formal logical proofs; that the proofs for it are “wrong” (presumably meaning wrong from the point of view of the formal logic used to establish elementary mathematics, or in other words that they are really *illogical*); that “the mathematics of variables” therefore does not move “within the confines of formal logic”; that “this is necessarily so”; and that therefore only dialectics *which recognizes and then ignores that bad formal logic* can establish the validity of the differential calculus. This is all completely mistaken.

A couple pages later Engels writes:

“The negation of the negation is even more strikingly obvious in higher analysis, in those ‘summations of indefinitely small magnitudes’ which Herr Dühring himself declares are the highest operations of mathematics, and in ordinary language are known as the differential and integral calculus. How are these forms of calculus used? In a given problem, for example, I have two variables,  $x$  and  $y$ , neither of which can vary without the other also varying in a ratio determined by the facts of the case. I differentiate  $x$  and  $y$ , i.e., I take  $x$  and  $y$  as so infinitely small that in comparison with any real quantity, however small, they disappear, that nothing is left of  $x$  and  $y$  but their reciprocal relation without any, so to speak material basis, a quantitative ratio in which there is no quantity. Therefore  $dy/dx$ , the ratio between the differentials of  $x$  and  $y$ , is equal to  $0/0$  but  $0/0$  taken as the expression of  $y/x$ . I only mention in passing that this ratio between two quantities which have disappeared, caught at the moment of their disappearance, is a contradiction; however, it cannot disturb us any more than it has disturbed the whole of mathematics for almost two hundred years. And now, what have I done but negate  $x$  and  $y$ , though not in such a way that I need not bother about them any more, not in the way that metaphysics negates, but in the way that corresponds with the facts of the case....” [MECW 25:127-8]

The issue here is not about the [negation of the negation](#) which I have no problem with (despite Mao’s one-time criticism of the notion). The issue is with Engels’s apparently nonchalant acceptance of the illogical nature of differentiation as it was conceptualized in his day. We should not blithely accept illogicalities such as “infinitely small but non-zero quantities” and ghost-like “disappeared” quantities that still have a ratio! Nor should we say, well OK, formal logic fails us and results in nonsense so we must shift to dialectics where logical inconsistency is supposedly no problem! Ignoring illogic does not make it go away.

It is true that in Engels’s day the proper and valid proofs for the theorems of the calculus were still being worked on, primarily by the introduction of the essential concept of limits, which Engels was not yet aware of. It is also true that the calculus was demonstrated to “work in practice” long before its proper logical foundation was understood. But it was never true that no set of logical definitions and proofs could establish and prove the theorems of calculus. They just hadn’t been discovered yet. And therefore Engels was quite wrong to believe that calculus can only be established by a dialectical method that tolerates (though it ignores) logical contradictions.

In addition to these and a few other *mathematical examples* at various places in *Anti-Dühring* (such as about the supposed inherent contradictions in the concept of *infinity* and the supposed contradiction involved in fractional exponents) which have since all been reformulated in more rational and logical ways, Engels also talks

about *motion* in a way that can at least be construed as referring to a conceptual (logical) contradiction, though it really is not. He says:

“Motion itself is a contradiction: even simple mechanical change of position can only come about through a body being at one and the same moment of time both in one place and in another place, being in one and the same place and also not in it. And the continuous origination and simultaneous solution of this contradiction is precisely what motion is.” [MECW 25:111]

This Hegelian description or conception is simply not correct. It confuses logical contradiction with dialectical contradiction.

Motion is the change of position over time. At any one precise instant or “moment of time” the object is in fact at only one place. But if the object is moving, then at a later “moment” it is at a different place. Of course at the one precise moment when the object is at point P it is still *moving* only in the sense that at a later moment it will be in a different location. In this sense, yes, at the moment it is at point P it is not “motionless”. Nevertheless, it is at that moment at one and only one place. It is not correct to say that it is both at that one place and “not at that one place”.

Part of the confusion here is from that fact that an “instant” or “moment of time” can itself be an ambiguous or confusing idea. The words ‘instant’ or ‘moment’ can refer either to a *point in time* during which no time elapses, or—*more loosely*—these words can refer to very small lengths of time: “I’ll see you in a moment.”

Let’s pick one specific point in time which has a name, Noon. How long does “noon” last? It doesn’t last for *any length of time whatsoever!* But suppose I ask you what time it is and you say “Noon”. It takes time to even say that one word (though only a fraction of a second). And maybe it is actually only 10 seconds to noon, or 3 minutes afterwards. In the context of that question these things usually do not matter! But still, there is the basic concept of noon as one single point in time. It is not a minute long, not a second long, not even a nanosecond long! It is the name of a point in the progression of time and *not* a time segment, not any length of time no matter how short. You could in this sense call it a mathematical abstraction, though it is also part of the conceptual equipment of very modern human being.

So when Engels says that “Motion itself is a contradiction: even simple mechanical change of position can only come about through a body being at one and the same moment of time both in one place and in another place, being in one and the same place and also not in it.” we simply cannot accept what he says on the grounds that by “moment” he might mean a very tiny period of time. The whole point of the analysis here is to talk about the situation *not* during any period of time (no matter how short), but rather at one moment or one instant of time during which nothing can possibly happen! (Everything that happens in the world takes some amount of time, if only a picosecond. There is no true instantaneous change. Change is a matter of some *difference* in the situation at one time with respect to the situation at *another time*.)

Thus to say that an object is both at one single point at a moment in time and also *not* at it (or at a different point) is *to affirm a logical contradiction*. And why is Engels doing that? It can only be because his conception of dialectical contradiction is either identical with logical contradiction (in this case anyway), or at least compatible with it. And this is what I am objecting to.

As with motion and position, also with rates of motion (speeds) and changes in rates of motion (accelerations). In physics we also require the concepts of not just points in space (positions) and points in time (instants), but also “[instantaneous velocities](#)”, and instantaneous accelerations, etc.

People have sometimes argued that, well if nothing is happening (moving, changing) at some precise moment M, how can everything ever “start up again” after that moment? This amounts to conceptually halting the real movement of things in the world and then wondering how the movement can “resume” in the “next

moment". Of course this is silly because conceptually halting the movement of the world is not the same as really halting it! (This is a reason for viewing this sort of puzzlement as due to idealistic philosophical confusion.) Although we have the concept of Noon the world does not pay attention to that concept of ours and keeps changing despite us. The world keeps on spinning without any pause at noon!

If motion is not a logical contradiction, could it still perhaps be some sort of dialectical contradiction? Possibly, though it is hard to frame it in intelligible dialectical terms in the abstract. (See if you can do it! But Newtonian mechanics and Einsteinian relativistic motion have already been exhaustively discussed. So you have to go beyond those commonplaces.) One possibility is to try to dig deeper into what [motion](#) actually amounts to in physics terms. What is space (or space-time) really? What is matter really? There are some extremely wild speculative theories in contemporary physics that space itself might be discrete (quantized) at the super-tiny scale of the Planck Length, and if that is actually true perhaps motion might involve a series of discrete jumps from one allowable position in space to another. In this situation there might be opposing forces at work which could be discussed as dialectical contradictions. Another wild theory in contemporary physics is that matter is just compressed or knotted space-time. So maybe on that theory motion is a matter of constantly tying new knots and unraveling old ones. (I'll leave it to the reader to take it from here!)

In any case, dialectical contradictions are not the same as logical contradictions!

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Of course, since Engels is one of my great heroes, I do feel a little uncomfortable in criticizing him on this general point of confusion over the essential nature of dialectical contradiction. I feel even more uncomfortable to the small degree this means I have to partially agree on one point with the generally outrageous and pretentious fool Eugen Dühring! But something tells me that Engels himself would understand. His commitment to science and the advance of human understanding over time would probably only lead him to smile at me. Either in belated agreement, or else at my own continuing naivety!