Introduction to Marxist Dialectics

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To develop Marx's ideas about dialectics, we will say that a relation between two or more entities is an **organic relation** if that relation determines, at least partly, the nature of the things that are related. The relation between workers and capitalists is an important example of this kind of behavior. You can't be a capitalist without exploiting labor. You can't be a member of the working class unless some capitalist exploits you. The relationship between capital and labor is essential for the capitalist to be a capitalist, and for the worker to be a member of the working class. It is thus an organic relation, and we say that labor and capital are **organically related**.

The organic relation between the capitalist and working classes is fundamental to the whole capitalist system, but organic relations occur in all social and natural systems. Marx gives an example of an organic relation in the labor of making metal type for printing books. In his day, this process required three kinds of workers, "founders" who cast the type, "breakers" who broke it into individual pieces, and "rubbers" who polished it. For every four "founders," there had to be two "breakers," and one "rubber." This mathematical relation of four to two to one was "the expression of an organic relation"[1] among the jobs of founders, breakers and rubbers, like the relationship that exists among different jobs in any modern factory. Each job was the kind of job it is partly because of its relationship to the jobs other people were doing to produce the same product. Each job was opposite to the other two, since each job required the other, but excluded those others, too, since each job was different, and usually done by different workers.

Taken together, the different jobs necessary to produce a product form a system in which each part influences and limits other parts. In other words, the whole process of production–of printer's type, for example–helps determine what the particular parts of that process must be like. The organically related parts of the production process form a system in which the parts–for example, different types of jobs–are not independent of other parts, but are what they are *because* of their relationships to each other and to the system as a whole, is called an **organic system**, a **totality**, or sometimes an "**organism**."

The terms "organic" and "organism" suggests that we are talking about living things like animals or people. In fact, the interdependence of the different organs and systems of a living being is an important example of an organic system, and it explains why we use the term "organic." We will, however, be calling things organic systems that aren't much like living organisms. The group of workers making type is one example. Another example comes from physics: the electromagnetic field is an organic system. The electric part depends essentially on the magnetic part, and the magnetic part depends on the electric part. The organic relation between electric and magnetic fields is thus a relation of opposites. Each depends on the other, but also excludes it, since neither side is *both* electric and magnetic.

The usual term for the things, properties or processes that have an organic relation to one another is "**moments**." This term does not refer to moments of time. In dialectical thought, moments are the parts of some organic whole, and may be present at the same time as other

[1] *Capital*, Vol. I, *Marx Engels Collected Works, New York:* International Publishers, 1976- (abbreviated *CW)* vol. 35, p. 351, (abbreviated 35:351).

moments or at different times. The electric field and the magnetic field are moments of the electromagnetic field. A complex system like capitalism has many moments, not just two. In the simplest case, labor has three moments: activity directed toward a goal, the object worked on, and the means to work on it.[2] In addition to the word "moment," we will sometimes use the terms **"aspect**," "**phase**," or "**side**" for the moments of an organic system.

While we will mainly be interested in social or natural organic systems, it is also true that the categories in a theory can form organic relations. The category of "negative number" in mathematics is organically related to the category of "positive number," since "negative" requires the concept of "positive" in order to make sense. Similarly, the category of "truth" is organically related to the category of "falsity," etc.

Since categories and theories are invented to describe the world, the logical connections between our categories should have a structure that is similar to the organic systems that we find in the world. There are important differences between systems of categories and systems of real objects, however. The main difference is that categories don't *cause* other categories to change. Human activities–including human thought--are constantly making categories and concepts change, but categories don't change things, even other categories. This is a part of the materialist point of view. People use categories to help describe and understand the world. Guided by theories that contain categories, people change the world. Categories don't do the job by themselves.

Except where we specifically say otherwise, the rest of our discussion of organic systems will concern social or natural things and processes. When we need to distinguish these two kinds of system, we will call the natural and social systems **real** systems, as opposed to **theoretical** systems of categories and concepts. Real systems include the psychological process that take place in people as they think of theories, but the theories that are the product of some person's imagination are not real systems, in the sense that we are using the word "real" here.

Causation in an Organic System

Moments of real organic systems **interact** with one another. That means that each one acts as both a cause and as an effect of the other. This is one way that organic systems differ from mechanical ones. In a mechanical system, the properties of the whole system are assumed to be caused by the properties of the parts, but as we will soon see, wholes can affect the parts (that is, moments) in an organic system, as well as the moments affecting each other.

Causation is a two-way street among moments–that is a fundamental fact about organic systems. That does not mean, however, that all the moments are equally powerful or make an equal contribution to the behavior of an organic system. Some moments dominate others and encroach on their "territory," while others are subordinate. Such **dominant moments** have the greatest effect in determining the behavior of an organic system, but even subordinate moments make some difference. In the capitalist economy, for example, production is a dominant moment, while consumption of goods, and distribution of goods and money, are subordinate to it. Marx explains this very clearly in the following passage, which is worth quoting at some length:

> "Production and consumption ... appear ... as moments of a process in which production is the actual point of departure, and hence also the dominant moment, ... the act epitomizing the entire process... That exchange and consumption cannot be dominant moments is self-evident, and the same applies to

[2] *Capital*, Vol I, *CW* 35:188.

> distribution as the distribution of products. A definite [mode of] production thus determines a definite [mode of] consumption, distribution, and exchange and *definite relations of these different moments to one another*. Production *in its one-sided form* [that is, considered *only* as a moment], however, is in its turn also determined by other moments. For example, if the market, *i.e*., the sphere of exchange, expands, production grows in volume, and becomes more differentiated. Changes in distribution, e.g., concentration of capital, different distribution of the population in town and country, and the like, entail changes in production. Lastly, production is determined by the needs of consumption. There is an interaction between different moments. This is the case in any organic entity."[3]

One thing that we need to be clear about is what it means to say that some moment X "determines" another moment Y. This does not mean that X forces Y into just one possible pattern. Instead, it means that X *influences* what Y is, and if X is a *dominant* moment, then X influences what Y is to a large extent. Since the relation between X and Y is an organic one, Y must influence X, too, but generally less than X influences Y. The sphere of production, for example, substantially influences the market, the sphere of exchange. To a lesser extent, the market also influences the sphere of production. At some times, the influence of the market can become very large. In an economic crisis, production may shut down because few people can afford to buy the product. Consumption can also have a substantial effect on production. This pattern of mutual determination is typical for organic relationships. Moments interact, that is, they influence each other and cause each other to change. Interaction does not play a big role in mechanical viewpoints, which usually take causes to act only in one direction. Capitalist economists, for example, often try to prove that the main features of a capitalist system merely *result* from things like the preferences of consumers or the available technology. Theories like this pay no attention to the fact that consumer preferences are not merely causes, but are also *affected* by advertising and other economic activities. Similarly, these theorists ignore the fact that competition and other economic processes are not only affected by technology, but also cause it to change.

The organic relation of production, distribution, and consumption illustrates another important point, that in the capitalist economy, the system whose moments are production, distribution, and consumption is itself a moment of capitalist society as a whole. That moment is subordinate to the organic relation–that is, the opposition--between capital and labor.[4]

Organic systems can occur inside other organic systems.

An organic relationship requires a connection between moments, but it does not require that all connections be direct. If two moments are directly connected, we call their relationship **immediate**. Relationships which are not immediate are said to be **mediated**.

Exchange of products, for example, is a process that mediates between production and consumption. This exchange is itself mediated by money, which is the intermediate link between buyer and seller for most things you buy. The circulation of money is in turn mediated by the banking system.[5]

Mediation plays a dual role in organic systems. Mediation can connect things that wouldn't otherwise be connected, but it can also separate things that might otherwise be connected directly, without intermediate links. We will see later that the mediating role of

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[3] *Outline of the Critique of Political Economy, CW* 28:31, 36-7. Marx later made clearer the sense in which the dominance of profit over all aspects of the capitalist economy limits the domination of production over distribution: "Profit," he wrote, "a form of distribution, is here simultaneously a form of production... The form of distribution ... sets bounds to bourgeois distribution, enters into production itself, as a determining factor, which overlaps and dominates production." *Theories of Surplus Value*, *CW* 32:274.

[4] *Outlines of the Critique of Political Economy, CW* 29:86.

[5] *Outlines of the Critique of Political Economy, CW* 28:36, 95, 121.

money and credit in the capitalist economy creates the possibility of economic crisis by allowing buying and selling to be come separated.

Examples of Organic Systems from Marx and Engels

Marx describes the factory as an organism[6] because of its division of labor into different jobs that require each other to produce a product:

> "Take, for instance, the manufacture of glass bottles ... five detail workers are so many special organs of a single working organism that acts only as a whole, and therefore can operate only by the direct co-operation of the whole five. The whole body is paralyzed if but one of its members be wanting."[7]

A second example from Marx of an organic system is the capitalist system as a whole:

> "... in the fully developed bourgeois system each economic relationship presupposes the other in a bourgeois-economic form .... This organic system has it premises as a totality, and its development into a totality consists precisely in subordinating all elements to society itself, or in creating out of it the organs it still lacks. This is historically how it becomes a totality."[8]

Within this totality of economic relationships, many processes depend on other processes, and will break down if those other processes stop. Production cannot take place if workers do not consume food, clothes, and shelter. Food, shelter and clothes won't exist, however, without production. Production can't take place in most industries without investment in equipment, which can't be paid for without uninterrupted production and sales. Without money and credit, products can't be bought and sold at all. As we will see, these interdependencies mean that the system only works if the functioning of some its parts is coordinated with other functions. A fundamental weakness of the capitalist system is that this coordination not only cannot be assured, but is guaranteed to break down periodically.

A third example of an organic system is Marx's modification of the materialist view that people are products of their circumstances. Marx adopted this view and explained how the contradiction in it, that people have to be changed in order to change society, is resolved by revolutionary practice. In revolution, people change circumstances and circumstances change people as well. Since mechanical viewpoints are committed to the idea that external factors are the main cause of change, it cannot make sense of this solution.

A fourth organic example is Marx's reply to the mechanical conception of an unchangeable human essence built into each person, which social contract theory assumes:

> "The essence of man," he wrote, "is no abstraction inherent in each single individual. In its reality it is the ensemble of the social relations [of those individuals]."[9]

Marx and Engels attacked those who maintained that the conditions of life which people have in common are a "product of the 'essence of men', of [human] nature."[10] Instead, these common conditions of life, "just as much as consciousness of equality, are historical products."[11] Human nature isn't just something that is in each person's genes. Human nature

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[6] *Capita*l, Vol. I, *CW* 35:398.

[7] *Capital*, Vol. I, *CW* 35:351 - 2.

[8] *Outlines of the Critique of Political Economy*, *CW* 28:208.

[9] *Theses on Feuerbach*, *CW* 5:4.

[10] *German Ideology, CW* 5:479.

[11] *ibid.*

depends on social relations among people, and is therefore different in different classes, and changes over time. Human relations are organic, not mechanical. It is those relations that primarily determine the people who are related, rather than an "essence" in each individual that supposedly determines what the relations among people are, as mechanical viewpoints assume.

A fifth example concerns language. Marx said that language is practical consciousness that exists for me *because* it exists for other people as well. The understanding that each of us has of ourselves and of other people depends on our relationship with others, and in particular, on our common languages:

> "Consciousness," Marx and Engels wrote, "is, therefore, from the very beginning a social product, and remains so as long as men exist at all."[12]

Historical Development in Organic Systems

As some of our examples show, the "parts" of an organic system are not necessarily objects like an arm or a heart of a human being. The parts or moments of an organic system may be *processes, properties, or characteristics.* For example, the capitalist system is not just a collection of people, machinery, raw materials, etc., but a whole made up of various *processes*. Two of the most important types of processes that occur in organic systems are those involving **circulation** and **reproduction**. For an animal to live, blood and oxygen must circulate in it. Commodities produced for sale must circulate in a capitalist economy. Money circulates along with the circulation of commodities, in a way that is organically related to the circulation of commodities. For an animal or plant species to continue, it must reproduce, and cells which die out in it must be replaced. Capital can exist only if it is constantly reproduced by being turned into machinery, raw materials and wages, which workers convert into products that are sold to produce more capital than was originally invested. These processes of circulation and reproduction are processes that are organically related to other processes in their organic systems.

In political struggles, the development of political understanding in individual people and in collectives is a process that influences and is influenced by other processes, like the actions of allies or enemies, or changes in the economy or the start of a war. Like a living being, a political movement can continue to exist only if it reproduces itself by recruiting new members and training new leaders to replace those who become inactive. It can only grow if it recruits more new members than the old members that it loses. Processes in complex physical systems also have organic relations, like the relationships among the Gulf Stream in the Atlantic Ocean, the movement of the polar ice pack, and changes in the climate of Europe.

In organic systems, the moments develop over time. Entire moments are not always present at one instant, so cannot be fully understood if you look at them only at one time. The typical organic system can only be fully understood if its *historical development* is studied. Studying the historical development of an organic system reveals its underlying characteristics, its laws of development, its contradictions and instabilities that could not be detected at a single time. Thus, development of theories of organic system always requires historical study and evidence. This is true for organic systems of all types, from the capitalist system to systems of philosophy. To understand them fully, you must learn about their historical development. The structure of the universe, the geology of the earth, the capitalist system, the characteristics of individual people or groups, all have to be studied historically in order to be fully understood.

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[12] *German Ideology, CW* 5:44.

Not all periods of the development of an organic system are equally important or informative, however. The main features of a system may be much more developed at a later than an earlier time. Marx chose to study England more than any other capitalist country, for example, because that was the place where capitalism was most fully developed at that time, and therefore showed the features most typical of capitalism.

> "The country that is most developed industrially only shows, to the less developed, the image of its own future . . . [Germany], like all the rest of Continental Western Europe, suffers not only from the development of capitalist production, but also from the incompleteness of that development."[13]

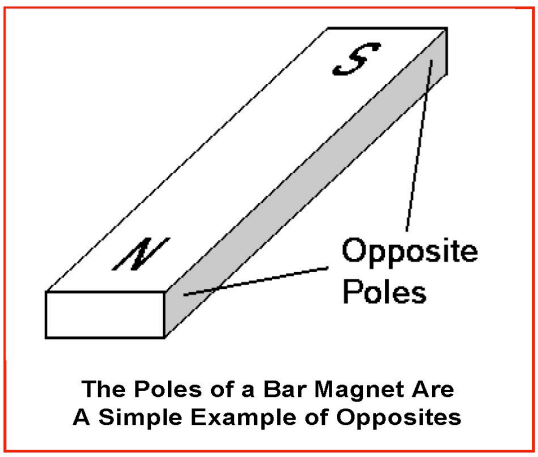
The general principle is that you should study the most developed stage of a system that you have access to. Thus to study labor, you should not concentrate on how third graders do their homework, although some information might be gained from that. You should concentrate instead on the labor of adults, and choose cases where that labor is the most demanding and effective.

Opposites in Organic Systems

One of the most important ways that different aspects of an organic system are related is by being opposites. **Opposites** are things, processes, or categories that are organically related, but which also **exclude** each other or are **negatively related** to one another. A clear physical example of the organic relation of opposites are the opposite poles of a magnet.

A magnet must have two poles, usually called *north* and *south* poles, in analogy with the north and south poles of the Earth. The north pole and the south pole of a magnet are opposites in the sense that neither pole can be both a north pole and a south pole of a single magnet. Being the north pole excludes being the south pole, and vice-versa. But this mutual exclusion is not the only aspect of the relation between the two poles.

The two poles have an organic relationship to one another, so that each pole can exist only if another pole of the opposite type exists at the other end of the magnet. The poles require each other in order to exist–that is what makes their relationship an organic one. This organic relationship of two moments, which both exclude one another and require one another, is called **polar opposition.** The relationship of parents and their children is a polar opposition. You cannot be a parent without at least one child, and you cannot be a child without parents (at least parents in the biological sense). If you have children, you are both a parent and a child, so you are involved in two different organic relationships, one to your children and the other to your parents. Each side of each of these relationships profoundly influences the other, and your relationship with your children or your parents is a big part of your being the particular person you are.



The Poles of a Bar Magnet Are A Simple Example of Opposites

The relationship of the working class to the capitalist class is another important example of polar opposition. This means that in the first place that "worker" and "capitalist" are opposite categories. Being a worker means being in a relationship with a capitalist who exploits

[13] *Capital*, vol. I, *CW* 35:9.

your labor. Being a capitalist means hiring workers and exploiting them. This worker-capitalist relation is not just a matter of the opposite meanings of the words "worker" and "capitalist," however. Workers and capitalist are in actual conflict with each other over the surplus value that the workers produce. The capitalists try to increase the surplus value by reducing the part of a worker's working time that goes into his own wages. Workers try to keep this stolen time to a minimum by fighting for higher wages or more time off, or by working more slowly, etc.

A certain number of people aren't either workers or capitalists, but "self-employed," so they aren't either in the capitalist class or the working class. There are also some people in the capitalist system who own small businesses and have to work long hours, but also hire workers and exploit labor. These "middle class" people have some of the characteristics of capitalists and some of workers–we could say that they were *partially* workers, and *partially* capitalists. This shows that opposites are not rigidly defined and separated, but often have intermediate or borderline cases.[14]

This relation of polar opposition also has another side, however. Capitalists need workers to maintain and increase capital. If necessary, capitalists will recruit people to the workforce so that they can expand production and steal more surplus value to turn into capital or luxury consumption. Within the social relations of the capitalist system, however, workers are also forced to keep the capitalist in business and make him richer. Hence:

> "Each side reproduces itself by reproducing its other, its negation... The capitalist produces the worker, and the worker, the capitalist. [15]

Polar opposition is also a key category for describing other relationships within the capitalist economy. A purchase and the corresponding sale are opposite sides of a single process.

> "... selling and buying are different aspects of a single process and each act of this process simultaneously includes its opposite."[16]

In an economy where goods were exchanged without money, where people would simply trade one thing for another, buying and selling would be inseparable. In the capitalist economy, however, money and credit separate buying and selling into events that can take place at different times and places- *i.e.*, money *mediates* buying and selling. The capitalist buying-selling relationship is an important example of polar opposition.

In the discussion of opposites that follows, we will usually drop the word "polar." Whenever we are talking about a pair of opposites that are organically related to each other, they will be polar opposites.

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[14] There are also a few people who are exploited by a capitalist, but also hire and exploit other workers. That is, they are workers in their relation to one capitalist, and capitalists in relation to some other workers.

[15] Marx, *Theories of Surplus Value*, *CW* 34:234.

[16] Marx, *Theories of Surplus Value, CW* 32:278.

What are Opposites?

A and B are opposite moments or categories of a specific organic relationship if they have the following two properties:

1. **A and B *require each other***: Within their specific relationship, the properties that A has depend on B, and the properties B has depend on A. For example being a parent requires that there be at least one person who is the child of that parent. Being a child requires that there be at least one person that is the parent of that child.

2. **A and B *exclude each other***. This means that in the context of that specific system, nothing can be both A and B, at least not fully or completely A and B. Although a person can be both a parent and a child, but he is the parent in context of one specific organic relationship and a child in a different relationship. Within each of these relationships, no one is both parent and child.

Opposites and Relative Independence

The basic idea of opposites is simple. Opposites *require* each other. This is typical of moments in an organic system. But opposites also *oppose* one another in the sense that each side has characteristics the other does not have.

When we consider real examples of opposites, like the relation between the working class and the capitalist class within the capitalist system, we can see, however, that their relationship has more to it than we have mentioned so far. It is still true that you can't be in the working class and also be in the capitalist class. There is no doubt that *working class* and *capitalist class* are mutually exclusive moments, just like the north and south poles. As moments in an organic relation, workers and capitalists each require the other exist in order to be what they are themselves. But this mutual dependence has important limits. The working class does not depend completely on the capitalist class. Being in the working class means having the results of your labor taken away by the capitalist. In that sense the capitalist is required for the existence of the working class. In another, very important sense, however, the capitalist class is *not* required. Workers already produce everything that society needs, and workers already have abilities, relationships, ideas, and goals that don't depend on the capitalists. Marx argued that the working class is something that is perfectly capable of developing itself *apart* from its relationship to the capitalist class, and is capable of becoming the whole human race. The feature that the working class has here, that it is not completely determined by its relationship to capitalists but is capable of doing its own thing, is called **relative (or partial) independence**.

The Concept of Contradiction

The main concept for explaining conflict and change through conflict in organic systems is the concept of **contradiction**. Organic theories of society and nature that incorporate the idea that it is contradictions within things that makes them change and develop, and that these contradictions are in fact present everywhere in nature and society, are called **dialectical theories**. Methods for discovering, constructing, and critically evaluating dialectical theories are called **dialectical methods**. Dialectical methods only work, however, because the natural and social systems that we need to know about are in fact driven to change by their internal contradictions. Correct methods are only correct *because* they correspond to the real structure of the world. The dialectical method that was developed by Marx and Engels, and further developed by later Marxists, is derived from earlier developments in philosophy, especially the theories of the German philosopher G. F. W. Hegel (1770-1831), and his predecessors.

To begin looking into the idea of contradictions, we consider a famous example from the ancient Greek philosopher, Zeno of Elea, born about 490 BC. Zeno tried to prove that motion is impossible, despite the fact that it appears to happen all the time. Zeno's strategy

for showing motion is impossible was to try to show that motion always involves contradiction. He claimed that:

> "What is moving is neither in the place in which it is nor in the place in which it is not."[17]

Since his reasoning is obscure and probably incorrect, we won't go into how Zeno tried to prove this contradictory claim. The point of his argument is that he assumes the premises that (a) motion involves contradiction, and (b) there cannot be contradictions in reality. If you assume that both these premises are true, then it would be correct to infer from them that motion can't really exist, even if it seems to.

The dialectical point of view denies Zeno's premise (b). It agrees with him that motion *is* connected to contradictions in reality, but says that this doesn't show that motion or other kinds of change do *not* happen, it just shows *why* they happen. *Contradictions cause change,* and contradictory things and processes *strive to change themselves* by "driving toward resolution"[18] of these contradictions.

We mentioned that the ancient philosopher Zeno denied that there are contradictions in reality. The dialectical view is just as old as Zeno's, however. The dialectical point of view that there is conflict in every system, and that the internal conflicts of that system are what make it develop and change was expressed by the Greek philosopher Heraclitus about 500 BC. Only a few fragments of what he wrote are still left. Here are a few of his statements that express important ideas about contradiction, and the unity of opposites:

1) "... all things come to be through strife, and are so ordained."

2) "... what opposes [also] unites, and the finest attunement stems from things bearing in opposite directions, and that all things come about by strife."

3) "Sea water is very pure and very foul water–for fish drinkable and life-sustaining, for people undrinkable and lethal."

4) "Disease makes health pleasant and good, hunger [makes] satiety, weariness [makes] rest."[19]

The first two of these statements are the most important, that everything that changes does so because of conflict. The third illustrates the idea that one thing–seawater–can have *opposite properties*, can be both life-giving and deadly. The other statements express the idea that opposite things are connected with each other, like being hungry and feeling satisfied after you have eaten. If you never got hungry, you could never feel satisfied from eating.

The examples of Zeno and Heraclitus make it clear that the philosophical battle over the existence of contradictions has been going on for a very long time, at least 2500 years.

What we have already said about contradictions in reality may seem puzzling, since the most common ways to use the word "contradiction" apply it only to statements or beliefs about reality, not to that reality itself. If you ask several different people who started a fight that they saw, it wouldn't be a surprise if someone said "Fred started it" and someone else said "Fred didn't start it, Derek did." These two statements contradict each other, and it is often thought to follow from the fact that they contradict each other that the two statements cannot both be true, but that one must be false. If you found out a little more about the fight,

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[17] Diogenes Laertius, *Lives of the Philosophers*, IX 72.

[18] Marx*, Economic and Philosophic Manuscripts of 1844, CW* 3:294.

[19] T. M. Robinson, *Heraclitus: Fragments*, Toronto: University of Toronto Press, 1987, pp. 15, 41, 49, 65.

however, you might find that both Fred and Derek had a hand in starting the fight, so the two contradictory statements are both at least partly true.

There are other cases, however, where two statements flatly contradict each other, for example, “Four is an even number,” and “Four is not an even number.” The first of these statements is true, and the second is completely false. Contradictions of this kind are different from the kind of contradiction that we will study in organic systems, although the two kinds of contradiction are related. To avoid confusion, we will call the contradiction between “Four is an even number” and “Four is not an even number” a **flat contradiction** or a **formal contradiction**. The kind of contradiction that causes development in an organic system will be called a **dialectical contradiction**.

The Ingredients of a Dialectical Contradiction

To explain dialectical contradiction more fully, let’s start with an example of a contradiction in one person’s thinking: You want a job that is interesting, secure, and pays well, and doesn’t require too long a commute. What you find are two jobs, job A that pays well, but is deathly dull and a long ride on the subway, and job B that is interesting and close by, but doesn’t pay well. B looks better because it doesn’t have the boredom and long commute of the only other alternative. Likewise, A looks better since it doesn’t have the lousy pay that B has. Faced with the choice of which job to take, you hesitate, pick up the phone to accept job A, put it down again, and decide to call the other one instead. Having accepted job B you regret your choice and try to get job A instead.

Let’s note the following features in this example:

1) Your thinking about these two job offers have a degree of *unity*, in part because they occur in the consciousness and desires of one person, and concern one particular choice, the choice of which job to take. Your attitude toward each job is partly determined by the fact that it provides something of what you want in a job. More than that, job A is attractive partly because it doesn’t have the disadvantages of job B, and vice versa. Thus there is an organic relation among the factors that would tend to make you choose A and those that would make you choose B.

2) Your two inclinations, to take job A and to take job B are *opposites*. There is no way to take both jobs, so taking A and taking B are *mutually exclusive*.

3) The advantages you see in job A tend to prevent you from choosing B, and vice-versa. Your desires *work against each other*, and the result is indecision, hesitation, changing your mind, and maybe changing it again.

4) Although you would have done something even if you had had only one job offer, what you actually did was strongly influenced by the conflict of two inclinations that worked against one another. The conflict changed your behavior, and might even have cost you *both* jobs.

This example shows the most essential features of a dialectical contradiction. First the inclinations toward each job are unified in a single person and influence each other. Second the two inclinations cannot both be realized, since you have to choose just one job.

This means that the two inclinations are *opposites*. Contradiction requires opposition, and as we saw before, opposites are moments of an organic system that do two things. First, opposites (partly) define, require, or produce one another, which just means that they have an organic relationship with each other. Second, opposites *exclude* each other, partly or fully. These are the features noted in 1) and 2) above.

Being in *opposition* does not automatically imply being in *contradiction*. The additional thing that a contradiction requires is that the two opposite sides *actively work against each other.* This is what 3) says: your desire to get the good features of each job prevents you from choosing the other one. The two desires actively interfere with each other.

There are several different terms that are used to describe this active mutual interference of contradictory opposites. One common and useful one is the *"struggle of opposites*." We will use this term, and also another term that is more common in the history of dialectical philosophy, the "*negativity*" of a contradiction. A **dialectical contradiction** is an organic relation of opposites in which the opposite sides actively interfere with one another, that is, are negatively related to each other.[20]

Elements of a Dialectical Contradiction

1. A dialectical contradiction must have a pair of *opposite properties, tendencies, forces or requirements*.

2. These opposites must each actively work against the other, partially or entirely. This is the **negativity** of the contradiction, the struggle of its opposite sides

3. The opposites must be *united* within a single thing, process, or system. This is the organic **unity** of the contradiction.

Together, these properties define a dialectical contradiction as a **unity of opposites**.

The case of the two jobs shows several other things about contradictions. First, *contradictions produce change*, in this case, the change of hesitation, delaying decision, and then changing your mind. Second, contradictions *limit what can be done,* by forcing some kinds of change and preventing other kinds. In this case, your internal contradiction is making you behave in a way that is contrary to your own goals, since if you don't stop changing your mind, you might end up missing both jobs. Third, contradictions *can be resolved* (or *dissolved*), that is, they can lose the unity or negativity of the opposite moments, typically by eliminating one of those moments entirely. You might resolve this contradiction by investigating each job some more, by getting some advice, or simply by thinking through what you are aiming at. In any case, this resolution involves an internal struggle, and that is a fourth point: *contradictions are resolved by becoming more intense*.

A different example of a dialectical contradiction is a basketball game. The polar opposites are the two teams. Each of the teams not only tries to score, but plays defense. They block shots, prevent passes, and steal the ball, etc., to interfere with the opponent's game. This interference is part of the negativity of the contradiction, the struggle of the opposite sides. If either side strengthens its offense or its defense, the contradiction becomes more intense. The change that this contradiction produces is opposite to the kind of change produced in the two jobs case. In a competitive game, each side strives to do more, to be more effective. Instead of being nearly paralyzed by contradictory influences, as in the case of the two jobs, the two teams are driven to perform on a higher level, and their contradiction becomes more intense.

Contradictions like the two jobs case don't just happen in individuals, where they can make them indecisive or downright stupid, because they are held back by their internal contradictions. Marx said that the contradictions among capitalists lead to crises and make the capitalist economy uncontrollable.

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[20] Marx gives a description of the contradictory relation between the two forms of the expression of the value of a product: they are "are mutually conditioning, inseparable moments, which are at the same time mutually excluding or opposed extremes, that is, poles of that value expression." K. Marx, *Das Kapital*, Erster Band, *Werke* 23:63. Cf. *CW* 35:58.This is an accurate definition of a dialectical contradiction.

Contradiction in Competition

Many of the contradictions of a capitalist economy look more like the basketball game example than the two jobs case. Instead of producing hesitation and indecision, these contradictions can produce striving for the fullest development in a single direction. In a competitive relation, whether it is a game, the commercial competition between capitalists, or the struggle of two sides in a war, each side is driven to develop its capacity to compete as fully as possible. Each side resists the attempts of the other to defeat it, and this forces it to put all its resources and efforts into whatever it takes to win. Athletes train harder and try harder, capitalists drive down prices or get the government to beat up on their competition, warring imperial rivals build bigger bombs and spend more lives in the struggle of opposites. These actions may be things the various sides would have wanted to do anyway, or they may do them very reluctantly. In either case, the contradictory relationship forces them to change.

Given the examples mentioned, it might seem logical that there are two kinds of contradictions, some that hold you back, and some that push you forward. This idea is only partly right, however, because, one kind can turn into the other. Competition drives capitalists to increase production, lower prices, and expand capacity. Periodically, the result of these processes is a crisis of overproduction, a recession or depression, when sales, production, and jobs are cut back. The contradictions of competition drive production forward, but the eventual result is that production is held back, until the cycle begins again.

Hegel on Contradiction

Much of the Marxist theory of organic systems is inspired by the German Philosopher G. F. W. Hegel (1770-1831), particularly his book *Science of Logic*:

1. "It is one of the fundamental prejudices of previous logic and of ordinary thinking that contradiction is not as essential and immediate a determination as identity. Indeed, if contradiction and identity had to be separated and ranked, then contradiction would have to be taken as the most essential.... contradiction is the root of all movement and liveliness; only in so far as something has a contradiction in itself does it move itself, have drive and activity.''

2. “Only when raised to the peak of contradiction do the variety [of opposites] become active and lively in relation to one another–they acquire ... the inherent pulsation of self-movement and vitality.”

3. “Opposites contain contradiction in so far as they are negatively related to one another in the same respect, or are both canceled out by each other and also indifferent to [*i.e.*, are not determined by] one another.”

4."The living body is always on the point of passing over into the chemical process. Oxygen, hydrogen, salt, etc., are always about to emerge, but they are perpetually being suppressed, and the chemical process can only prevail by means of death or sickness. Living being is perpetually exposed to danger, and always bears something alien within it. Unlike inorganic being, it can sustain this contradiction."

Sources: 1, 2, & 3: G. W. F. Hegel, *Wissenschaft der Logik*, edited by G. Lasson, Hamburg : Felix Meiner, Part II, pp. 58, 60, 61. Cf. Hegel, *Logic of Science*, A. V. Miller, translator, Atlantic Highlands, N. J., Humanities Press, pp. 439, 441,442; 4: G. W. F. Hegel, *Hegel's Philosophy of Nature*, M. J. Petry, translator, London : Allen and Unwin, 1970, Vol. III, p. 10, §337, Addition.

The Difference Between Contradiction and Opposition

A (dialectical) contradiction can be thought of as a kind of *intense* opposition, so intense that the opposite sides disrupt each other. When two jobs seem equally good to you, that does not mean that your contradictory inclinations cancel out and have no effect on your actions. Contradictory opposites continue to act, even when they are equally strong and directly opposite to each other. In the example of the two jobs, the fact that you try to put off a decision, that you hesitate and then change your mind are effects of the contradiction in your desires. Contradictory opposites don’t necessarily stop acting just because they may be

equal and opposite. They don't "cancel out." Similarly, competitors that are roughly equal in power can be driven to change rapidly by their intense conflict. Imperialist powers that are equally matched are still driven toward war.

Unlike contradiction, opposites do not necessarily interfere with each other. We will consider several kinds of opposites that *do not contradict each other,* or do so only to a small degree. Consider the organic relationship between theory and practice. Theory and practice are opposites since each requires the other, but they also exclude each other. Despite their opposite relationship, however, theory and practice do not always contradict each other.[21] This lack of contradiction is never permanent, and further practice is bound to show eventually that theory and practice have come into conflict. If theory is wrong, it misdirects and undermines practice, while new kinds of practice can undermine the evidence for the theory. In either way, a relation of negativity or struggle of opposites can come about. Now we have a contradiction between theory and practice, where before we just had opposition. This contradiction can be resolved by discovering a new theory or new auxiliary information, and testing it with further practice. As a result, there will no longer be a contradiction, at least for the time being.

The opposite relationship between money and commodities is another case that has some similar features. Money (and credit) generally make buying and selling commodities easier than directly swapping one thing for another. This is one reason capitalism develops money and credit extensively. In a recession or depression, however, businesses often have to sell products at low prices to raise enough money to pay their bills. That means that money has come to interfere with the capitalist's business, rather than making it easier. Marx wrote that:

> "In a crisis, the opposition between commodities and ... money is increased to an absolute contradiction."[22]

This statement speaks of contradiction as the result of *increasing* an opposition, making it *more intense*, that is, the opposite sides coming into a relation of negativity, of the active struggle opposites. It is the intensity of the mutual interference of the sides that makes the difference between a contradiction and a mere opposition.

These cases should also make clear that contradiction is more than imbalance. Mere imbalance between commodities and money, is not yet contradiction. It is only when the two sides interfere with each other, when they have a relation of negativity, that they are in contradiction with each other.

Solving and Resolving Contradictions

A contradiction is said to be **resolved** or **overcome** when it stops being a contradiction. Typically this happens by one or both sides of the contradiction being destroyed. Here we need to discuss a distinction between resolving or overcoming a contradiction, and the movement and change that take place as a result of the continued existence of a contradiction, the process of a contradiction's **solving itself**, or **working itself out**.

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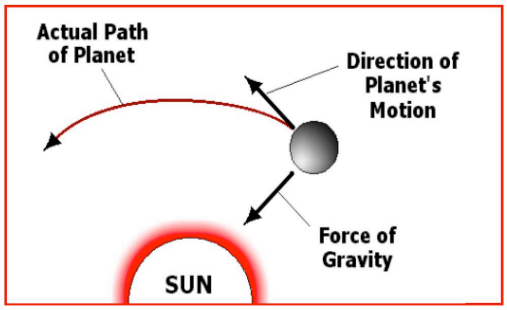
[21] Since practice is always more complicated than the theories we have to explain it, the correspondence between theory and practice is never perfect. There is an important difference, however, between a theory's asserting something that is actually false about practice, and the theory's merely failing to include the full truth. If a theory does not tell lies, but merely omits some of the truth, we can say that the organic relation between that theory and the corresponding practice is–temporarily–merely opposition, not contradiction.

[22] K. Marx, *Das Kapital*, Erster Band, *Karl Marx, Friedrich Engels Werke*, Berlin: Dietz Verlag, volume 23, pages 152. Cited as *Werke*, with volume and page number, *e.g.*, *Werke* 23:152. Cf. *CW* 35:149.

As opposed to overcoming or resolving a contradiction, "solving" means finding or creating a way for the contradiction to move, so that the clash of the opposite moments is minimized, if this is possible. For example, in the process of the exchange of products, contradictory conditions have to be met.[23] The development of commodity circulation in the capitalist system does *not* overcome these contradictions. Instead, the contradictions "create a form in which they can move themselves. This is the general method through which actual contradictions solve themselves."[24]

This process of solving or working out contradictions is not unique to social contradictions, but also takes place in the natural world. As an example of a how contradiction can direct motion into a particular path, Marx cited the *elliptical curve in space*, which is approximately the path a planet takes as it moves around the Sun:

> "... it is a contradiction for one body to constantly fall toward another, and also constantly fly away from it. The ellipse is a form of motion that allows this contradiction to be realized and solved at the same time."[25]



Like all bodies, a planet has a tendency to continue in a straight line. This tendency is sometimes called "inertia." The Sun's gravitational force, however, gives the planet a tendency to move directly toward the Sun. The *unity* of these two tendencies comes from a fundamental physical law which says that it is a single physical property, the mass of the planet, which gives rise both to its inertia and to its gravitation toward the Sun.[26] The *negativity* of this contradiction is that the two tendencies are tendencies for motion in *different* directions. These contradictory tendencies are resolved by moving in an elliptical path, which is neither a straight line nor directly toward the Sun. To say that the elliptical path *solves* the contradictory tendencies of flying toward and also away from the Sun are *both* realized along that path.

The contradiction in this case is not resolved, but is constantly being recreated as the planet moves to a new position, which requires motion in a slightly different direction. The point here is completely general. Contradictions solve themselves only in movement or change. As we have described it so far, however, the planet example does not yet show full dialectical development. The seed that develops into a plant has not merely moved, but fundamentally changed as a result of contradiction-driven processes. Real development also happens in the system that includes the planet, however, and we can see that development if we look into the history of the planet in detail. The planet will change mass by colliding with

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[23] There are a number of these conflicting conditions in the exchange of products. The use value of a commodity, the physical aspects of it that make it useful, conflict with the social characteristics it gets in the process of exchange. There are also contradictions among the various roles that money plays in the process of exchange, for example, the role of money as a means for buying products, and as a medium for saving, that is, for not buying.

[24] K. Marx, *Das Kapital*, Erster Band, *Werke* 23:118 - 9. Cf. *CW* 35:113.

[25] K. Marx, *Das Kapital*, Erster Band, *Werke* 23:118 - 9. Cf. *CW* 35:113.

[26] This principle is called the "identity of inertial mass and gravitational mass". It has been verified by experiment to a very high degree of accuracy.

meteors or losing atmospheric gases. It will change direction slightly due to the gravity of other planets, so that its path will not be a true ellipse. This real system will develop in a way that is irreversible, and is governed by additional laws of development.[27]

An Absolute Contradiction on the Shop Floor

We saw before that an opposition can be "increased to an absolute contradiction."[28] Now we will look into an important example of such an absolute contradiction, one that has a big effect on worker's lives. In the capitalist system, competition among capitalists forces each of them to produce as cheaply as possible or lose out to his competitors. To avoid having to pay to train workers, or paying more for those with skills, capitalists usually break down production into very small tasks, each assigned to a different group of workers. They do this even if the production technology is not very complicated. One worker sews the inseam on a pair of men's pants, and another sews on the pockets. When complex machinery is, involved–and capitalists are constantly forced to introduce this by competition--the worker's job often amounts to taking care of a machine. The result of this capitalist organization of labor is that workers get training and practical experience only in very narrow skills.

Lenin on Contradiction

"The splitting of a single whole and the cognition of its contradictory parts ... is the *essence* (one of the "essentials," one of the principal, if not the principal characteristics or features) of dialectics. That is precisely how Hegel, too, puts the matter... The correctness of this aspect of the content of dialectics must be tested by the history of science....

The identity of opposites (it would be more correct, perhaps, to say their "unity,"–although the difference between the terms identity and unity is not particularly important here. In a certain sense both are correct) is the recognition (discovery) of the contradictory, *mutually exclusive*, opposite tendencies in *all* phenomena and processes of nature (including mind and society). The condition for the knowledge of all processes of the world in their "*self-movement*" in their spontaneous development, in their real life, is the knowledge of them as a unity of opposites.... [This conception] *alone* furnishes the key to the "self-movement" of everything existing; it alone furnishes the key to the "leaps," to the "break in continuity," to the "transformation into the opposite," to the destruction of the old and the emergence of the new."

--V. I. Lenin, *Philosophical Notebooks*, *Collected Works*, vol. 38, Moscow: Foreign Languages Publishing House, 1961, pp. 359-60

At the same time as competition forces capitalist to split jobs up into individual tasks, it also forces capitalists to "continually revolutionize the instruments of production,"[29] that is, keep introducing new technology for producing things. Since the experience and skills that workers rely on for their livelihood are directly keyed to these "instruments of production," workers' skills are constantly becoming obsolete. For example, none of the three kinds of workers who made printers' type in Marx's day could make a living that way now, since books and newspapers are now typeset on computers, not in metal type. Since capitalists are forced to change their production methods rapidly, they need workers to be able to adapt quickly to different tasks requiring different skills. They need "the fully developed individual, fit for a variety of labors, ready to face any change in production."[30] The average wage for a certain kind of work is partly determined, however, by the amount of training and experience that are necessary to do that job. So "fully developed individuals" cost the capitalist more in wages.

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[27] Engels argues that all motion has this property of "continuous origination and simultaneous solution" of contradictions. See *Dialectics of Nature*, *CW* 25: 111.

[28] K. Marx, *Das Kapital*, Erster Band, *Werke* 23:152. Cf. *CW* 35:149.

[29] *Communist Manifesto*, *CW* 6 :487.

[30] *Capital*, Vol. I, *CW* 35:490.

Here we have a clear incompatibility between two requirements that capitalist competition imposes on employers. On the one hand, they must get their workers as cheaply as possible, and on the other they must get workers with a variety of skills and knowledge. Since knowledge and skill cost money, these two requirements cannot possibly be met in full. The effect of this contradiction on many workers is that they have limited opportunities to develop new skills, and when they do development them, those skills can quickly become obsolete, undermining whatever job security the skills used to provide:

> "... this absolute contradiction between the technical necessities of modern industry, and the social character inherent in its capitalistic form, dispels all fixity and security in the situation of the laborer, ... it constantly threatens ... to make him superfluous.... this antagonism vents its rage in [unemployment] ... and the most reckless squandering of labor power."[31]

Putting aside the consequences of this contradiction, however, let us see what were the elements that went into it. Each capitalist needs to hire a single workforce to work together to produce his product. This is the element of unity of what the capitalist requires in the workforce. He also needs the workforce to have the mutually excluding features of being both low-paid on the one hand and well trained and flexible on the other. This is the element of **negativity** or struggle of opposites, which work against each other in the capitalist's requirements for the workforce. Note that the need for a low-paid workforce would still exist, even if the capitalist did not need a well-trained one. The need for a well-trained workforce would still exist, even if he did not need one that wouldn't cost much. Thus, the opposite requirements for capitalist production are partially independent of each other, as we expect in real oppositions. The presence of unity and negativity means we have contradiction. The things that capitalists do to try to find a solution to this contradiction, which are mostly done at the workers' expense, can never overcome this contradiction.

One way for the capitalist to try to find a "best" solution to the contradiction is to hire a small group of more skilled, better-paid workers, and a large group of less skilled, lower-paid workers. This is a traditional pattern in manufacturing, where a few tool-and-die makers are paid better, and workers who work directly on production are paid less. In effect, this strategy tries to prevent the unity that is necessary for a contradiction: One group is more skilled and better paid, and a *different* group is less skilled and lower-paid. Disrupting the unity of the contradiction is not very successful in meeting the capitalists' need for flexibility in changing production methods, however, and it creates a source of new contradictions within the workforce. When workers are divided into different trades, especially when they fight to keep work rules that protect their jobs, capitalists can't easily adapt the workforce to new market situations.

A second strategy for trying to solve the contradiction is to move to regions or countries where wages are lower, but the level of skill is not lower. This strategy has the very important advantage for the capitalist that total wages are lower, but it does not resolve the contradiction. It still costs more to hire a well-trained, flexible workforce, even if the total bill is lower than before the move to the low wage area.

In the 1970s, a different capitalist strategy called TQM (Total Quality Management) became popular. The idea of this strategy is to increase unity among the workforce by winning over the workers to work harder and contribute their ideas on how to improve quality and efficiency "for everyone's benefit." Relying on sellout unions to help control the workers, the capitalists hoped to overcome the negativity of the contradiction by getting workers to work

[31] *ibid*.

harder at a variety of jobs *without getting paid more*. TQM was developed to go along with a so-called "lean" production strategy, which includes reducing defects, slashing inventories, outsourcing, and making constant small adjustments to raise productivity. TQM attempts to create tightly integrated production teams, which fit in with the "lean" emphasis on constant production improvements, reducing costs and speeding up workers.

The TQM strategy hasn't been particularly successful. It has created other new contradictions, and become less popular with management. "Lean" production has its disadvantages, too. Tightly integrated teams and finely tuned production schedules are fairly inflexible, hence don't adjust easily to changing demand. New strategies, including so-called "agile" manufacturing, try to solve the problems with "lean" production by keeping no inventory, and making products only after they are ordered, "just in time" for delivery. This strategy adjusts production quickly by forcing working to work overtime on short notice, or by hiring many part-time workers, who are laid off when there is no work.

These shifting strategies are attempts by capitalists' to meet their contradictory needs for low wages and high skill and flexibility, needs that can't both be satisfied. The contradiction that confronts them can never be fully resolved within the limits of capitalist social relations. The more a capitalist policy meets one of the two requirements, the less it meets the other. Because of the negativity of the contradiction, no long-term balance can be found between them. Instead, management goes from one fad to another, searching in vain for ways to have their cake and eat it, too. Each strategy they try for solving the contradiction changes the particular form the contradiction takes, but does not resolve it.

Although the contradiction is not resolved, there is a general direction of development that results from the contradiction. That direction is the movement toward "the fully developed individual ... to whom the different social functions he performs, are but some of many modes of giving free scope to his own natural and acquired powers."[32]

Underlying Contradictions

Contradictions do not have to be easy to see in order to have a powerful influence on what phenomena take place. They can be part of underlying reality that only becomes recognizable in certain circumstances. The contradiction between the working class and the capitalist class, is a permanent feature of the capitalist system. Although they are locked into the same system, the working class and the capitalist class always work against each other– *i.e.*, have negativity in their opposite relationship--whether or not phenomena of this struggle that are easy to see, like layoffs, strikes, welfare cuts, etc. are occurring at the moment. The contradiction between two capitalist powers is obvious when they go to war, but long before the shooting starts, the contradictions in their interests, which is what makes them enemies, have usually been becoming more intense for a long time. The struggle of the U. S. and its major oil companies to dominate the Persian Gulf area is over 50 years old, and U. S. contradictions with Iraq have existed for decades. The unity and negativity of the U. S. - Iraq relationship already existed, long before the shooting started, when the contradiction became obvious.

It is important to distinguish between *underlying contradictions* and merely *potential contradictions*. Underlying contradictions continue to operate and produce change, even when the contradiction and the change it produces are not obvious. Potential contradicts, however, are not yet contradictions, but can become contradictions. The relation between money and commodities is not always contradictory, although the *possibility* of contradiction

[32] *Capital*, vol. I, *CW* 35:490-1.

is a part of their relationship.[33] When they do come into an economy-wide contradiction, that contradiction is only resolved in a crisis.[34] The difference between actual contradiction and merely potential contradiction is very important. Actual contradictions are self-moving, they bring about forms of change that solve them and eventually lead to their being overcome. Potential contradictions do not–by themselves--cause change. They need something outside them to produce change and explain why it happens.[35]

The Importance of Negativity

Although we have identified two essential elements of a contradiction, and both are necessary, negativity–that is, the tendency of the opposites to act against each other--is the one that we need to focus on to understand contradictions and how they force changes to happen. Negativity can take various forms, and be present in different degrees. In the case of the planet, the negativity took the form of being subject to opposite tendencies of motion. The result of these tendencies is the planet's motion in a direction different from the direction of either tendency. In this case, both the opposite tendencies that make up negativity are present at the same time. It can also happen however, that one tendency is present one time and its opposite at another.[36]

A second way of describing the negativity of a contradiction is that the organic system that contains it is subject of opposite requirements in order to maintain or reproduce itself. Requirements mean nothing, however, unless there is an *active tendency* to meet those requirements, as there was in the wage-flexibility example. Negativity and contradiction will only be present if the opposite moments are *active* in their opposition to each other. In the process of accumulating capital, for example,

> "[The] two elements embraced by the process of accumulation, however, are not to be regarded as merely existing side by side in repose.... They contain a contradiction, which manifests itself in contradictory tendencies and phenomena. These conflicting agencies counteract each other simultaneously."[37]

In all these cases, negativity, the struggle of opposites in the sense of the active conflict of tendencies, is what drives development. It is true that without unity, this negativity would be ineffective, but *it is the recognition of negativity that is the heart of the Marxist understanding on organic systems*. This negativity is something beyond the mere *possibility* that moments can become partly independent is needed to form contradictions and explain change. That something is negativity, the *struggle* of partly independent opposites.[38]

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[33] "...contradictions [are] inherent in money as a means of payment....[but] These forms alone ... cannot explain why their crucial aspect becomes prominent and why the contradiction contained in them potentially becomes a contradiction," *Theories of Surplus Value, CW* 32:142. See also CW 35:123 - 4.

[34] "Crisis is the forcible establishment of unity between elements that have become independent and the enforced separation from one another of elements which are essentially one." Marx, *Theories of Surplus Value, CW* 32:144.

[35] "These [abstract] forms [of crisis] alone, therefore, do no explain why their crucial aspect becomes prominent and why the contradiction contained in them potentially becomes a real contradiction." Marx, *Theories of Surplus Value, CW* 32:142.

[36] "The contradictions involved ... appear as a process in which mutually contradictory conditions alternate in time." *Economic Manuscripts of 1861 - 63, CW* 34:19.

[37] *Capital*, Vol. III, *CW* 37:247, translation modified.

[38] "The necessary inner connection of moments belonging together and their mutually indifferent, independent existence are already a foundation of contradictions. However ... contradiction ... has to be grasped more intrinsically than merely as the mutually indifferent and apparently independent appearance of the individual mo-

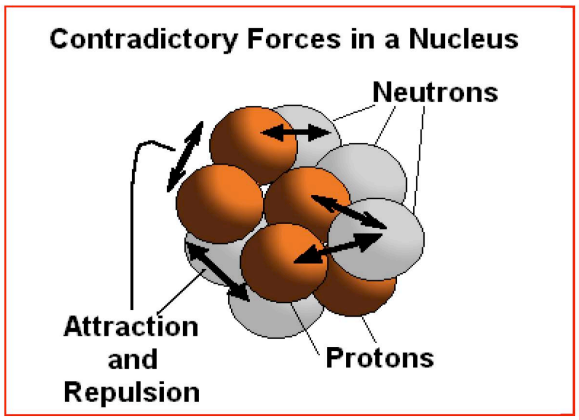
Change is the result of contradictions, and change happens everywhere, and at all times because contradictions are everywhere. In opposition to this view are (a) mechanical views, which see all change as coming from some external influences, and (b) the balance view of organic theory. The balance view says that change results from a supposed general tendency of things to move toward equilibrium, balance, or harmony in organic systems. Unlike the Marxist view, the balance view rejects or minimizes negativity and contradiction, which disrupt balance or make it impossible, while it emphasizes the unity that supposedly tends to lead the system into balance or equilibrium.

The view that balance is the typical situation in an organic system, and the attempt to explain what happens as striving toward equilibrium is a common and important feature of capitalist ideology. This ideology spills over into science, and tries to use results of natural science to support its case. In specific cases, a limited, specific tendency toward equilibrium can certainly be present and have important effects. What the balance view claims, however, is that the tendency toward equilibrium is a *general truth* about organic systems. Psychologist Jean Piaget presents a clear example of this kind of view for biological systems, claiming that:

> "... equilibrium is ... an intrinsic and constitutive property of organic and mental life.... the theory of [human] development necessarily appeals to the notion of equilibrium, since all conduct tends to secure an equilibrium between internal and external factors ..."[39]

When applied to social systems, this balance-oriented view of organic systems implies that social conflicts tend to die out, a position maintain by positivist theorists like H. Spencer and J. S. Mill.

Contradiction in an Atomic Nucleus



Contradictions and the interpenetration of opposites are not limited to economic or political subjects, but have important applications in physical science, too. A fundamental example of contradictions concerns the structure of atoms. Each atom of matter has a dense center called the *nucleus*, with *electrons* flying around it. The nucleus of each atom consists of two kinds of particles, *protons*, which have a positive electrical charge, and *neutrons* that have no charge. Our example concerns the forces that hold the nucleus together. There are several kinds of forces involved, but we will discuss only the two most important ones, the so-call *strong force* that holds the nucleus together, and electrical force between the protons that tends to drive them apart.

That is, we have two main forces which have opposite effects. Roughly speaking, the strong force pulls all the particles in the nucleus *together*, and the electrical force pushes the protons *apart*, but doesn't affect the neutrons, since they don't have an electrical charge. An

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ments of the process or, rather, of the totality of processes." Marx, *Outlines of the Critique of Political Economy*, *CW* 28:341-2.

[39] J. Piaget, "Le rôle de la notion d'équilibre dans l'explication en psychologie [The role of the concept of equilibrium in psychological explanation]," *Acta Psychologica* XV (1959), pp. 51 - 64. Over the years Piaget had different accounts of what psychological equilibrium is supposed to be. In this article Piaget defined it as a person's ability to compensate for disturbances that come from outside him by his own mental operations.

important complication, however, is that the strong force is so strong that it could overwhelm the electrical repulsion. It does not do this, however, since at very short distances, the strong force *changes from an attraction to a repulsion*!

The structure of an atomic nucleus is a very clear example of contradiction. The strong force provides the unity of the nucleus, the attraction that holds it together. The negativity of the nucleus, the forces that tend to drive it apart, are more complicated. In the nucleus of any atom other than hydrogen (which only has one proton), the positive charges on the protons repel each other. But the strong force also *repels* when the particles it has attracted come too close to each other.

Even if two particles are not attracted and repelled by the strong force *at the same time*, these two moments of the strong force are negatively related. Opposite moments that have a relation of negativity don't have to have it at every moment, as Marx noted. The attraction of the strong force opposes the repulsion of the electrical force and of the short-distance strong force itself. The upshot of this is that the laws of physics require that any nucleus with more than one particle–that is, all except the simplest form of hydrogen– has both attraction and repulsion, that is unity and negativity.

Understanding a nucleus as a unity of opposites is essential for comprehending a number of properties of nuclei, especially forms of instability like *radioactivity*. The **moment of attraction** of a nucleus consists of the all the attractive effects of strong force among its various neutrons and protons nucleus. The **moment of repulsion** of a nucleus consists of the various repulsive effects of the electrical force between the protons, and of the strong force at very short ranges. A nucleus will be able to stay in existence only if the moment of attraction is its **dominant moment**, that is, if it has greater effects than the moment of repulsion. If there are too many protons for a given number of neutrons, repulsion will dominate, and the nucleus will tend to come apart. Repulsion is also dominant if there are too many neutrons for a given number of protons. If the moment of attraction is dominant at one time, that does not mean it will stay that way, since, as in other organic systems, the dominant moment can shift. If repulsion becomes dominant, one or more of the particles in the nucleus will be lost or transformed into another kind of particle.

The process of throwing off a particle from the nucleus is called *radioactive decay,* and it results in changing the nucleus to another nucleus with a different number of protons or neutrons–that is, changing its nature. One kind of uranium, for example, can throw off a particle that contains two protons and two neutrons, thus changing into Thorium. The process of splitting into smaller nuclei of roughly equal size is called *nuclear fission*, and results in destroying the nucleus and giving off a lot of energy. It is fission that produces the heat of an atom bomb or of an atomic power plant.

The process of a nucleus decaying into another kind of nucleus by splitting in two or by throwing off a part of itself is very common. We can give a numerical measure the tendency of a certain kind of nucleus to do this by determining how long an average nucleus of that kind is likely to last before it decays. This length of time is called the *average lifetime*.[40] Physicists have been able to discover about 3600 different nuclei that can exist at least briefly. For about 3200 of them, the average lifetimes have been determined. These lifetimes range from a few billionths of a second to times so long they can't be measured accurately, but are at least many millions of years. Nuclei that have these extremely long lifetimes are called *stable*. There are about 275 of these stable nuclei, and the most stable is the nucleus of iron that has

[40] The old method of calculating how fast a nucleus decays was to give its "half life" *Average life time* equals *half life* times 1.443. All nuclear data used here are from the Isotopes Project, Lawrence Berkeley National Laboratories, Berkeley, CA, and Department of Physics, Lund University, Sweden, 1999.

26 protons and 30 neutrons. In addition to the stable nuclei, another 140 or so have lifetimes more than one year. The majority, however, have lifetimes of less than five minutes.

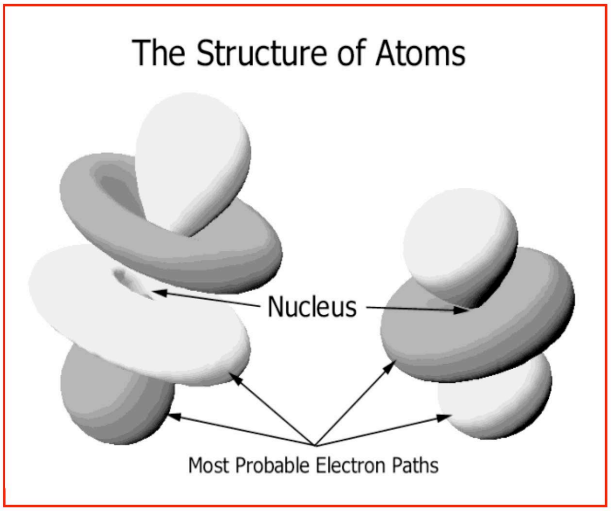
There is both unity and negativity in the opposite moments of attraction and repulsion in a nucleus. Thus the nucleus contains contradiction, and, since contradiction causes change, the nucleus must change. What sort of movement solves the contradictions of the nucleus? No general principle of organic theory can tell you the answer to that question. Instead you must know the specifics features of the contradiction and the system that contains it. Most types of nuclei are unstable to some degree, and they eventually decay into another kind of nucleus. What is the effect of the contradiction in the small number of nuclei that last a very long time?

Why Matter Doesn't Disappear

The typical nuclear structure is quite unstable–that is, has an average lifetime less than 5 minutes. This statement is obviously not true, however, of most physical objects. The reason that ordinary objects last a lot more than 5 minutes is that the most unstable nuclei either do not occur in ordinary objects at all, or they form only a very small fraction of their atomic nuclei. Just as in biological evolution, the most viable types tend to become the most common ones, and the nuclei with the longest lifetimes tend to be the most common. This means that the most common nuclei are the most stable ones, by a process of elimination.

The answer is that they undergo various other kinds of change *other than destruction*. Many nuclei are not spherical, but are shaped like a football or a pear. These nuclei *spin*, and some also flip back and forth between several shapes. Some nuclei vibrate in various ways. The protons can move around with respect to the neutrons, and the distribution of the spin on the neutrons and protons can change.

All these kinds of motion are the result of the internal contradictions in the nucleus, but other kinds of change can also be stimulated by external influences, like a nucleus being struck by another particle. This is what happens in the nuclear chain reaction in an atomic explosion or power plant. Neutrons given off by some nuclei smash into other nuclei and induce them to split. This splitting only happens, however, because the particle that smashes into the nucleus changes the relation of the opposite forces inside it, *changes the dominant moment of that nucleus*. That is, the main factor in the explanation of nuclear fission is the internal structure of the nucleus that is struck. This does not mean that fission would take place without any external effects. That kind of fission is rare. An external action is *necessary* for fission to take place, but the fission only *results* from the change in the internal relationships within the nucleus.



A few of the many shapes of the orbits of electrons around a nucleus

Let's look into the process in the nuclear "chain reaction" that takes place in an atomic bomb made with uranium. The kind of uranium that matters here has an average lifetime of just over one billion years.[41] The nuclei of this stuff are not very likely to split into roughly

[41] The comments about uranium in this paragraph apply to Uranium 235, which has 92 protons and 143 neutrons.

equal pieces without some external influence. In an atom bomb, the external cause is a neutron that smashes into a uranium nucleus. The neutron gives the nucleus a small amount of extra energy. This added energy is enough of a change to make the moment of repulsion dominant in the nucleus, which flies apart. Many other kinds of nuclei would *not* split in two if they were hit by a neutron with this modest amount of energy. Given the existing relation between the contradictory moments of attraction and repulsion in the uranium, however, the nucleus is changed enough by the added energy from the new neutron to make it split apart. As the nucleus splits up, it gives off tremendous energy, part of which is in the form of neutrons that hit other nuclei and keep the process going.

Primacy of Internal Contradictions

This process of a nucleus splitting in two illustrates several important points, so let's analyze it more closely. The collision of the neutron with the uranium nucleus is a kind of external relation, since the neutron and the nucleus have not previously interacted. This external relationship plays a role in the splitting of the nucleus, since that splitting is very unlikely to happen unless a neutron hits it. Never the less, the internal relationships within the nucleus, in which the moment of attraction was dominant--but just barely--is the *primary cause* of the nucleus splitting in two.

This case illustrates a very general law of dialectics: **internal contradiction is primary**. Even when external factors play a necessary role is causing something to happen, the main cause of change is the internal contradictions of the thing that changes. The primacy of internal contradictions can be seen in many kinds of dialectical development. If you keep a fertilized chick egg warm, it will turn into a baby chick. You can keep a rock warm forever, however, and it will never hatch into a chick. The processes in a chick embryo, driven by internal contradictions, require heat from outside in order to operate, but that heat is a necessary **condition**, not a **cause** of the embryo's development into a baby chick.

The truth of the principle that internal contradictions are primary is clear in the case of nuclei of atoms since the same not very fast neutron that induces uranium to split in two would not do this if it hit, say, an iron atom. The principle of organic theory that internal contradictions are primary is the opposite of the approach of the mechanical view, that the main causes of change are external.

Primacy of Internal Contradictions in Crises

There have been crises in the capitalist economy in 1825, 1836, 1847, 1857, 1866, 1873, 1882, 1891, 1900, 1907, 1913, 1921, 1929, 1937, 1949, 1953, 1958, 1961, 1970, 1975, 1981, 1990, 2001 and 2007, roughly every 8 years. Defenders of capitalism often try to explain its periodic crises by factors they regard as external to the economy, like political events or war. Some have even tried to explain the cycle of boom and bust in business by the cycle of spots on the Sun. The fact that during the 19th, 20th, and 21st centuries, there have been over 20 crises in the leading capitalist countries shows the absurdity of the idea that all crises have external causes. External conditions can only help start a crisis if the system is already susceptible to them. External conditions make a difference only because they modify existing internal contradictions. It is those internal contradictions that primarily produce the crises.

The principle that internal contradictions are primary (ICP) is fundamental for applying the dialectical ideas to explain real development and change. It is important that to formulate it carefully, however, and to realize what it does and does not say:

ICP Principle (Internal Contradictions are Primary): *What something does, how it changes, or what it is capable of doing is determined primarily by its internal relationships, and particularly by the contradictions in these relationships*.

Let's note several points about what this principle does *not* mean: We have already noted that ICP does not mean than external factors and circumstances are not necessary for change, as in the case of the chicken eggs that need the right amount of heat to hatch. Internal contradictions determine what something can do or will actually do in appropriate circumstances. They do not determine what will happen when required circumstances are not there. A worker who is experienced, well trained, has good references and interview skills may still not be able to find a job, if capitalists don't need her at the moment. The reason she has no job is not internal to her, but it is internal to the social relations of capitalism, which needs unemployment, and always has some amount of it.

A second point is that "inner" does not mean "inside" in the sense of being contained in a physical object or part of space. "Inner" means "within an organic relation." The moments of attraction and repulsion in a nucleus are present in the same small space, but the relationship between workers and capitalists is also an organic, "inner" one, even though workers and the capitalists they work for can be far apart in space.

A third point is that what is not internal to one organic system can be internal to a larger, more inclusive one. Unemployment is caused by the internal contradictions of the capitalist system. That 10,000 autoworkers are unemployed in a particular city may result either from local or worldwide internal contradictions of a particular industry. That a particular autoworker is out of work is probably not explained by his or her internal contradictions, however. He or she just has the bad luck to be one of the unemployed.

Conclusion

There is much more to Marx's dialectical thought than has been presented here. In particular, few political applications of dialectics were discussed here. Please check http://marxistphilosophy.org for more material.

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