

## WHOLES AND PARTS OF THINGS

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The problem of understanding how the wholes and parts of things are related (which incorporates the problem of the one and the many) has troubled mankind for millenia. It continues to plague contemporary philosophers and scientists, and political, economic and other practical appliers of philosophy and science. Continuing controversies regarding particles versus fields in physics, cybernetics versus structuralism in systems theory, and individualism versus socialism in political theory, for example, remain unsettled at least partly because no satisfactory understanding of how wholes and parts are related has been achieved. The purpose of this paper is to explore the problem and to propose an hypothesis, or a complex of hypotheses, aimed at helping to improve understanding of the problem.

1. THINGS. Each existing thing is a whole of parts. "Thing" means "anything", including "events" and "processes".

2. INTERRELATIONS. The whole and parts of a thing are interrelated in several ways:

2.1. Opposed. The whole and parts of a thing oppose each other. Each is not the other.

2.1.1. The whole of a thing as not its parts is opposed to its parts.

2.1.2. The parts of a thing as not its whole are opposed to its whole.

2.1.3. Wholes and parts are opposites. Each opposes the other. Each is opposed by the other. [The whole and parts of a thing are apposite opposites because, and to the extent that, they share in common the thing of which they are the whole and parts].

2.2. Complementary. The whole and parts of a thing are complementary.

2.2.1. The whole of a thing is incomplete without its parts. The parts of the whole supply what is needed for the whole to exist as a whole of parts.

2.2.2. The parts of a thing are incomplete without its whole. The whole of the parts supplies what is needed for the parts to exist as parts of a whole.

2.2.3. The whole and parts of a thing are complementary because and to the extent that each supplies some-

thing needed by the other in completing their cooperative constituting the thing.

2.3. Interdependent. The whole and parts of a thing interdepend.

2.3.1. A whole is always a whole of parts. No parts, no whole. A whole depends for its existence and nature upon the existence and nature of its parts.

2.3.2. A part is always a part of a whole. No whole, no parts. The parts of a whole depend for their existence and nature upon the existence and nature of the whole.

2.3.3. Since each depends upon the other, they interdepend.

3. WHOLES. What is a "whole"? What is the nature of "wholeness"?

3.1. A whole is or has "unity".

3.1.1. A whole is "a unit". A whole is "one", "an", or "a".

3.1.2. A whole is undivided. A whole is "a quantum".

3.1.3. A whole is "simple". Although a "whole of parts" is complex, the "wholeness" of a whole of parts as different from its parts is simple. It, merely as a whole, has no parts.

3.1.4. A whole is "an integer" and has "integrity".

3.2. A whole "unites" or "unifies" its parts. A thing functioning as a whole functions as a uniter, as an agent uniting or unifying its parts.

3.2.1. The whole of a thing is the same whole for all of its parts. It gives them identity (identifies them) as its parts. It functions as a universal in being something common to all of its parts.

3.2.2. The whole of a thing includes (is inclusive of) all of its parts.

3.2.3. The whole of a thing comprehends (is comprehensive of) all of the parts composing it.

3.2.4. The whole of a thing totalizes (is a totality of) all of its parts.

3.3 The whole of a thing is "immanent" in its parts. To the extent that a part depends for its existence and nature as a part upon the whole of which it is a part, the wholeness of that whole is inherent in its being as a part of that whole.

3.4. The whole of a thing "transcends" its parts. To the extent that a whole is not its parts, it transcends them.

4. PARTS. What is "a part", "partness" or "partiality"?

4.1 A part has "partiality" as one of many parts of a whole.

4.1.1. A part is "other than", "different from", or "externally related to" every other part of a whole.

4.1.2. A part, as one of many parts, is "quantitative" or is "a quantity". It is "one part" among many.

4.1.3. A part is like every other part of a whole in being a part of that whole. Likeness is an internal relation. A part is internally related to every other of their whole in whatever way it is like them.

4.1.4. A part is complex in having many relations (and likenesses and differences) to all other parts of the whole.

4.2. A part "participates in" the whole.

4.2.1. A part is "constitutive" of the whole. It is a constituent of the whole. A thing functions as a whole of parts through the functioning of each part as a constituting agency composing it.

4.2.2. A part is included in, is contained in, is incorporated in, the whole of which it is a part. It is inside, and thus internally related to, the whole.

4.3. A part is immanent in the whole in whatever way it is internal to and constitutive of the whole.

4.4. A part transcends the whole to the extent that it is not the whole.

4.5. A part has two kinds of participation: It participates as one part among many parts of a whole. It participates in the whole as a constituent of the whole.

4.6. A part has two kinds of "autonomy", "independence", or "entitiveness": It exists as something different from every other part. It exists as something different from the whole.

4.7. A part has two kinds of interdependence: It interdepends with the whole of which it is a part. It interdepends with all of the other parts for their part in constituting the whole of which it is a part.

5. ORGANIC WHOLES. What is "an organic whole" or "organic wholeness"?

5.1. A thing is "an organic whole" when and because its whole and parts cooperate in constituting it.

5.1.1. A thing functions as an organic whole when and because its functioning includes the cooperative and integrative functioning of its whole (as in 3., above) which is not its parts and of its parts (as in 4., above) which are not its whole and of their interrelations (including opposition, complementation, interdependence, as in 2., above) with each other in an organized way.

5.1.2. The whole and parts of a thing and their interrelations participate in constituting a thing as an organic whole.

5.2. The organic wholeness of a thing is what constitutes it as a thing, as an entity, as an existence.

5.3. All existing things exist and function as organic wholes.

6. HOLONS. What is "a holon"? What is "holoness" or "holonicity"?

6.1. When a thing as an organic whole functions as part of a larger whole, it is called "a holon". ["hol-" = whole, "-on" = part].

6.2. Every thing is both an organic whole and a holon.

6.3. The wholeness (i. e., organic wholeness, 5., above) and partness of a holon are interrelated in several ways:

6.3.1. Opposed. the wholeness and partness of a holon are opposed to each other. Each is not the other.

6.3.1.1. The organic wholeness of a thing functioning as a whole is not, and is thus opposed to, the whole functioning as part of a larger whole.

6.3.1.2. A thing functioning as a part of larger whole is not, and is thus opposed to, its functioning as an organic whole of its own whole and parts and their interrelations.

6.3.1.3. The organic wholeness of a thing functioning as a whole and the functioning of a thing as part of a larger whole are not each other. Each opposes the other.

6.3.2. Complementary. the wholeness and partness of a holon are complementary.

6.3.2.1. A holon is incomplete without the thing as an organic whole functioning as part of a larger whole. Functioning as a part of a larger whole supplies

something needed by a thing as an organic whole to exist and function as a holon.

6.3.2.2. A holon is incomplete without the thing functioning as part of a larger whole also functioning as an organic whole of its own whole and parts and their interrelations. Functioning as an organic whole supplies something needed for a thing to function as a holon.

6.3.2.3. The functioning of a thing as an organic whole and the functioning of a thing as part of a larger whole are complementary because and to the extent that each supplies something needed by the other in their cooperatively constituting the holon.

6.3.3. Interdependent. The wholeness and partness of a holon are interdependent.

6.3.3.1. A holon is always a thing as an organic whole functioning as a part of a larger whole. No thing as an organic whole, no holon. A holon depends for its existence and nature upon the existence and nature of the thing as an organic whole.

6.3.3.2. A holon is always a thing as an organic whole functioning as a part of a larger whole. No larger whole, no holon. A holon depends for its existence and nature upon the existence and nature of the larger whole of which it is a part.

6.3.3.3. A holon as a thing as an organic whole functioning as part of a larger whole depends upon its functioning both as an organic whole and as a part of a larger whole and upon each depending upon the other for participating in constituting it.

6.4. A thing, in functioning as a holon, i. e., as a part of a thing as a larger whole, is participating in that thing as an organic whole (5., above). That thing as an organic whole is an entity (5.2.).

6.5. A thing, which is an organic whole, by functioning as a holon, i. e., as a part of a larger organic whole, is participating in two different organic wholes.

6.5.1. By participating in two different organic things, a thing as a holon contributes something to both. By participating in two different organic wholes, in one as the whole and in one as a part, a holon unites them and integrates them, both in their existence and natures, in its own existence and nature.

6.5.2. By participating in two different organic unities and by having two different organic entities participate in it, a holon exists as part of two entities and has two entities participating existentially in it. The two entities interexist partially in it.

6.6. Some (all?) things are parts of many (more

than one) larger wholes. Each thing is not only a holon but also "many holons", one for each larger whole of which it is a part.

6.6.1. When a thing as an organic whole functions as a part of many larger wholes, it exists and functions also as a whole or uniter of the many holonic functions. Each of these many holonic functions participates in it as a multiholonic whole. It is "a multiholon".

6.6.2. A thing, which is an organic whole of its own whole and parts and their interrelations, functioning as a multiholon thereby functions also as an organic whole in which each of its many functionings as a holon is a part. A thing as a multiholon is also a whole (multiholon) of parts (holons).

6.6.2.1. The wholeness and partness of a multiholon are interrelated:

6.6.2.1.1. Opposed, etc.

6.6.2.1.2. Complementary, etc.

6.6.2.1.3. Interdependent, etc.

6.6.2.2. A thing as a multiholon is an organic unity of its wholeness (as a multiholon) and of its parts (all of its holons).

6.6.2.2.1. Its wholeness is or has unity (as in 3.1.-3.4. above).

6.6.2.2.2. Its parts have partiality (as in 4.1.-4.7. above).

6.6.2.2.3. The wholeness and partness of a multiholon and their interrelations participate in constituting it (the thing as a multiholon) as an organic unity.

6.7 Each thing, in functioning as a multiholon, unites and incorporates both of two organic unities within its existence and nature. These two organic unities do not constitute it as two things, or as two different entities, but increase the complexity of its organicness and of its entitiveness. It is an organic unity of organic unities.

6.7.1. Not only does a thing functioning as a holon embody the interexistence of its own entitiveness (as an organic whole) and of part of the entitiveness of the whole of which it is a part, but also a thing functioning as a multiholon embodies not only its interexistence with the entitiveness of each of the holons in which it participates but also with the entitiveness of itself as a multiholon and as an organic unity of its holons. It is a complex organic unity of organic unities. It embodies multiinterexistence.

6.7.2. Although one may think of an organic unity of a thing as a whole of its own whole and parts and their interrelations as internal to it and may think of the organic unity of a thing as a multiholon as

a whole of all its holons and their interrelations as external to it, both are internal to it as an entity, as a complex organic unity of organic unities. Although one may think of the organic unity of a thing as a multiholon as more external because the wholes of which it is a part are partly, even mostly, more than, and thus external to, it, all of its functionings as a holon are parts of it, and its functioning as a multiholon is a part of it, and so are internal to it as an organic unity and as an entity. [As we shall see below, the parts of a whole function also as wholes of parts which have their own entitiveness and thus partial externality to consider in understanding a thing as an organic whole even without considering its holonic functionings].

7. PARTHOLS. What is "a parthol"? What is "partholness" or "partholicity"?

7.1. When a part of a thing as a whole, i. e., as an organic whole, functions as a whole with its own parts, it is called "a parthol". ["part-" = part, "-hol" = whole].

7.2. Every thing is both an organic whole and has parthols as its parts. I. e., every part of every thing is a whole of smaller parts of its own.

7.3. The partness of a part as a whole and the wholeness of that part as a whole of its own parts are interrelated in several ways:

7.3.1. Opposed. The partness and wholeness of a parthol are opposed to each other.

7.3.1.1. The partness of a part of a whole is not the wholeness of a part as a whole.

7.3.1.2. The wholeness of a part as a whole is not the partness of a part of a whole.

7.3.1.3. Since the partness of a part of a whole is not the wholeness of a part as a whole and the wholeness of a part as a whole is not the partness of a part of a whole, each is not the other and each opposes the other.

7.3.2. Complementary. The partness and wholeness of a parthol are complementary.

7.3.2.1. A parthol is incomplete without the part functioning as a part of a whole.

7.3.2.2. A parthol is incomplete without the part functioning as a whole of its own part.

7.3.2.3. The functioning of a parthol as a part of a whole and the functioning of a parthol as a whole of parts are complementary because and to the extent that each supplies something needed by the other in

their cooperatively constituting it as a parthol.

7.3.3. Interdependent. The partness and wholeness of a parthol are interdependent.

7.3.3.1. A parthol is always a part of a whole functioning as a whole of its own parts. No part, no parthol. A parthol depends for its existence and nature upon the existence and nature of the whole of which it is a part.

7.3.3.2. A parthol is always a part functioning as a whole of its own parts. No part functioning as a whole of parts, no parthol. A parthol depends for its existence and nature upon the existence and nature of the parts of which it is a whole.

7.3.3.3. A parthol as a part of a whole functioning as a whole of its own parts depends upon its function both as a part of a whole and as a whole of parts, and upon each of these functionings depending on the other for participating in constituting it.

7.4 A parthol, in functioning as a whole with its own parts, is both a whole as opposed to its parts and a whole inclusive of its whole as opposed to its parts, its parts as opposed to its whole, and their interrelations. In this way it functions as an entity (as in 5.2., above).

7.5. By functioning as an organic whole of its own whole, parts and their interrelations (7.4.) and by participating in an organic whole of which it is a part (7.1.), a parthol participates in two different organic wholes.

7.5.1. By participating in two different organic wholes, it contributes something to both. By participating in two different organic wholes, in one as a part and in one as a whole, it unites and integrates them, both in their existence and nature, in its own existence and nature.

7.5.2. By participating in two different organic unities and by having the two different organic unities participate in it, a parthol exists as part of two entities and has two entities participating existentially in it. The two entities interexist partially in it.

8. LEVELS. What is "a level"? What are "levels"?

8.1. Things as wholes of parts involve levels.

8.2. Levels within things. Each thing as an organic whole incorporates two levels, the parts existing as a lower level and the whole existing as a higher level.

8.3. Levels of things. When a thing as an organic



whole functions as a part of a larger organic whole, it exists as a lower level and the larger organic whole exists as a higher level. When a thing as an organic whole has parts which function as organic wholes, it exists as a higher level and the parts as organic wholes exist as a lower level.

8.4. Things as trileveled. Each thing existing as an organic whole including parts as organic wholes and participating as part of a larger organic whole incorporates three levels of existence within itself. Three levels of existence interexist within it.

8.5. Things as multileveled. Each thing is part of a larger whole which is part of a larger whole which is part of a larger whole, etc., and each thing has parts which are wholes of parts which are wholes of parts which are wholes of parts, etc.

9. ARCHIES. Although the word "hierarchy" is sometimes used to refer to "levels" without further connotation, more strictly it means "control" or "causal influence" of something lower by something higher. Since the wholes of things are causally influenced by, and in this sense "controlled by", their parts, a correlative term, "lowerarchy", is needed to indicate this kind of influence. Causal influence or control at the same level may be called "coarchy". Hierarchies, lowerarchies and coarchies, etc., may all be called "archies".

Each thing as a whole of parts not only exists with its whole and parts as constituents, but as caused by them in whatever way their existence and nature are essential to its existence and nature. We sometimes use the word "cause" to indicate what brings a thing (or whole or part) into existence. But we also use it to indicate what helps to maintain a thing (or whole or part) in existence and also use it to indicate what helps to bring it to its termination. In this broad sense, all of the conditions necessary to, and all of the causal factors actually contributing to, the existence and nature of a thing are regarded as "its causes".

9.1. Things as wholes of parts involve "archies".

9.2. Archies within things. Each thing as a whole of parts involves at least three kinds of archies. Any control by the whole over the parts is hierarchical. Any control by the parts of the whole is lowerarchical. Any control of parts by parts, or of interrelations of the whole and parts by other interrelations of whole

and parts, is coarchical.

9.3. Archies of things. When a thing as an organic whole functions causally as a part of a larger organic whole, its influence is lowerarchical. When a thing as an organic whole has parts which function as organic wholes, its causal contribution to them is hierarchical.

9.4. Archies as multileveled. When a thing is causally influenced by a larger whole of which it is a part, which larger whole is causally influenced by a still larger whole of which it is a part, etc., any causal influence from any and every higher-level whole upon it is hierarchical control. When a thing is causally influenced by its parts which are wholes of parts which are wholes of parts, etc., any causal influence from any and every lower part upon it is lowerarchical.

Further discussion of levels and archies will be postponed until after considering changes and times.

10. CHANGES AND PERMANENCES. To change is to become different. To become different is to change. To be permanent is to remain the same. To remain the same is to be permanent.

10.1. Things as wholes of parts change and remain the same.

10.1.1. Things as parts may change and remain the same.

10.1.1.1. A thing may change its parts by (1) gaining a part, (2) losing a part, (3) exchanging a part (losing one and gaining one), (4) gaining many parts, (5) losing many parts, (6) exchanging parts (e.g., [a] many parts for many other parts, [b] gaining one and losing many, [c] losing one and gaining many, [d] etc.). When a thing changes its parts, it becomes a different thing, i.e., a thing with different parts.

10.1.1.2. A thing may remain the same by (1) not changing any parts, (2) remaining the same (both as a whole and as all of its other parts) while gaining a part, (3)... while losing a part, (4)... while exchanging a part, (5)... gaining many parts, (6)... losing many parts, (7)... exchanging many parts (e.g., [a] many parts for many other parts, [b] gaining one and losing many, [c] losing one and gaining many, [d] etc.). When a thing remains the same while its parts change, it is permanent, i.e., it remains the same thing with different parts.

10.1.2. Things as wholes may change and remain the same.

10.1.2.1. A thing as a whole may change by (1)

gaining a part (it changes from being a whole without that part to being a whole that includes that part), (2) losing a part..., (3) exchanging a part..., etc. When a thing as a whole changes, it becomes a changed thing, i.e., a thing with a (partly) different whole.

10.1.2.2. A thing as a whole may remain the same whole while it (1) gains a part (although changed and different because acquiring a part, it also remains the same, both in having all of the other parts remaining the same and in being the whole of all of those other parts), (2) loses a part..., etc. When a thing as a whole remains the same while its parts change, it is a permanent thing, i.e., is the same thing with (some) different parts.

10.1.3. Things having interrelations between their wholes and parts may change and remain the same.

10.1.3.1. When a thing as a whole of parts changes, either by changing (some of) its parts or by changing its whole (somewhat), and by changing the interrelations of the whole and its parts (somewhat), it remains the same, or permanent, to the extent that it remains the same whole, retains all other parts as the same parts, and has interrelations between its same whole and same parts that remain the same.

10.1.4. Things as organic wholes may change and remain the same.

10.1.4.1. A thing as an organic whole changes (somewhat) when its whole changes and when its parts change, and it remains the same (or permanent) whole (somewhat) when its whole remains the same and when its parts remain the same and when the interrelations of whole and parts remain the same (somewhat).

10.1.4.2. The existence and nature of a thing as an organic unity of its parts (which may change and be permanent, 10.1.1., above) and of its whole (which may change and be permanent, 10.1.2.) and of the interrelations between its parts and whole (which may change and be permanent, 10.1.3) constitutes it as an entity that is both changing (somewhat) and permanent (somewhat).

10.1.5. etc. things as holons, parthols, levels, archies, etc., may change and remain the same.

10.2. Wholes and parts of change and permanence.

10.2.1. When a thing changes, each change is "a change", is "one" change, is "a unit" of change, is one "continuous" change, is "a whole" change.

10.2.2. When a thing remains the same through change, each such permanence is "a permanence", is "one" permanence, is "a unit" of permanence, is one "continuous" permanence, is a "whole" of permanence.

Since change and permanence involve time and since time involves change and permanence, further consideration of wholes and parts of change and permanence will be delayed until temporal wholes and parts are explored in the next section.

11. TIMES. Each existing thing is a whole of parts. To exist is to be temporal. Each existing thing is a temporal whole of temporal parts. What is "time"? Time involves two interdependent aspects: "events" and "duration".

11.1 What is "an event"? Each change is an event. To change is to become different. Each becoming different is an event. Each event is the becoming of a difference. There are as many kinds of events as there are ways of becoming different. How long does an event last? As long as it takes for a difference to become. Since some differences take longer to become than others, some events last longer, much longer, than others.

11.2. What is "a duration"? Each event is the same event as long as it lasts. It is the same event from its beginning to its end. Any remaining the same from beginning to the end of an event is a "duration". Since some events last longer than others, the durations of some events last longer than others.

11.3 Each event as "an event" or as "one event" is a (an undivided) whole. Each duration as "a duration" or as "one duration" is a (an undivided) whole. Each event and its duration are two aspects of "a something" that needs a name: "evenduration" or "durevent". "Durevent" is chosen here to name what is constituted by its two aspects: event and duration. What is "a durevent"? It exists as a whole, as both a whole event and its whole duration. Each existing thing is a temporal whole of temporal parts. Each existing thing as a temporal whole is a durevent. Each thing has temporal parts, each of which is also a durevent.

11.4. Levels of time. Observe, for example, your heart beating. A heartbeat, including auricular and ventricular pulsations, is one event (durevent) having at least two events (durevents), an auricular and a ventricular pulsation, as parts. Each heartbeat as a whole is one durevent among all of the heartbeats in your life as a whole. Each life as a whole is one event (durevent) lasting as in some sense the same temporal whole from its beginning (in fertilization of ovum) until its end. One life is one durevent in

the life of mankind, which is one durevent in the duration of the earth, which is one durevent in the solar system, which is one durevent in our galaxy, etc. Each cell involved in each heartbeat is one durevent, composed of molecules each of which is a durevent, etc. Levels of things as temporal wholes of temporal parts exist as levels of time.

11.5. Organic wholes are temporal. Each existing thing is a temporal whole of temporal parts. The organicness of a thing as an organic whole includes its temporal wholeness (dureventness) and its temporal parts (durevents) and their temporal interrelations (opposition, complementarity, and interdependence, etc.).

A thing as an organic whole is an entity incorporating not only the organic wholeness of its whole and parts and their interrelations (5.1.2.) but also, what has been unstated until now, the temporal wholeness of its dureventness as a whole and the dureventness of its parts as temporal and the temporal interrelations between them. A thing as an organic whole is an entity incorporating not only its functioning as a multiholon and each of its functionings as a holon and the interrelations between them (6.6.-6.7.), but also, what has been unstated until now, the temporal wholeness (dureventness) of its functioning as a multiholon and the dureventness of each of its functionings as a holon and the interrelations between them.

The organic wholeness of a thing as an entity (or "eventivity" or "dureventivity") is thus a very complicated kind of organic unity.

11.6. Temporal hierarchies. In addition to temporal levels within things (8.2.) and temporal levels (8.3., 11.4.) and things as temporally multileveled (8.5.), any causal influences within and between organic wholes as temporal wholes of temporal parts and their interrelations, etc. (11.5.) involve such organic wholes in archies, i.e., in hierarchy, lowerarchy, and coarchy (9.-9.4.). Discussion is deferred until multileveled causation (12.2.4., 12.4.).

## 12. CAUSES. What is "causation"?

By "cause" we mean "cause of an effect" and by "effect" we mean "effect of a cause". The meanings of "cause" and "effect" involve each other. By "cause" we do not mean "effect" and by "effect" we do not mean "cause". The meanings of "cause" and "effect" are interrelated: they are opposed (are apposite opposites), are complementary (each is needed to complete the meaning of the other), and are interdependent (each depends

upon the other for part of its meaning.

By "cause" we mean to include here what is sometimes called a "condition" of the existence and nature of a thing. By "cause" we mean not only a cause of change (the becoming of a difference) but also a cause of permanence (or of any continuance or remaining the same), and a cause of termination (including maturation and cessation). By "cause" we mean causes and conditions internal to a thing as well as causes external to a thing and both immediate or direct causes and distant or indirect causes.

12.1 Things as wholes of parts involve at least causation of parts by parts, of the whole by parts, and of parts by the whole.

12.1.1. The parts of a thing influence each other causally, if not actively in the sense of causing changes, then at least passively in the sense of existing as conditions contributing to the existence of the other parts as parts of the whole. Parts may influence each other directly or indirectly, i.e., by one part influencing a second part by causing a third part to influence the second, etc.

12.1.2. The whole of a thing is causally influenced by its parts. They cause it to exist as the whole of them as its parts. Its nature is caused to exist by the parts because it is by nature a whole of the parts which compose it. A change in any part, whether loss of a part, gain of a part, exchange of a part, or a change in the nature of a part (which may be caused by another part or parts), causes the whole to become a whole with a changed part.

12.1.3. The parts of a thing are causally influenced by its whole. The whole is a causal condition of the parts being of this whole. Any change in the whole causes all of the parts to be parts of a changed whole.

12.1.4. When a change in parts causes change in the whole, then the changed whole causes the parts to be parts of a changed whole. Such causation is mutual causation, i.e., the whole and parts causing each other. The whole and parts of a thing are interrelated (i.e., opposed, complementary, interdependent) and mutually caused. One may think of such mutual causation as an additional kind of interrelation or as exemplifying and as participating in opposition, complementation, and interdependence as interrelations.

12.1.5. When a part (or parts) has causally influenced the whole which in turn causally influences the part which in turn influences the whole which in turn influences the part, etc., such repetition of mutual influencing not only embodies effects of each

within the other, but each then is influenced in turn by the effects of its own influence upon the other being returned through being incorporated into the other's existence and nature as a recurrent cause. This process is called "dialectic". Thus the existence and nature of a thing as a whole of parts is inherently dialectical.

12.1.6. A thing as an organic whole continues to exist as a whole of parts interrelated by means of perpetual mutual dialectical intercausation. Such dialectical intercausation is present when a thing as an organic whole is "static", i.e., remains the same by each, whole and parts, causally conditioning stable interrelatedness by remaining mutually unchanging in their causal contributions.

12.2. Things as organic wholes are also involved in causing and being caused by other things as organic wholes.

12.2.1. Things as organic wholes cause and are causally influenced by other things as organic wholes of "the same level". Such mutual causation is also dialectical.

12.2.2. Things as organic wholes functioning as holons cause and are caused by the larger wholes in which they are parts. Such causation is also dialectical. Things as organic wholes functioning as multiholons cause and are caused by each of the larger wholes in which they are parts. A thing as an organic whole functioning as a multiholon has a multiholonic organic unity or wholeness that is dialectically related with each of its functionings as a particular holon.

12.2.3. Things as organic wholes having parts functioning as parthols causally influence and are causally influenced by the parts of the parthols, even if indirectly. Such causation is also dialectical.

12.2.4. Things as organic wholes are also multi-leveled. In addition to having coarchical dialectic with other things as organic wholes of the same level, and to having dialectical interrelations by having lowerarchical influence as a holon participating causally in a larger whole and by being hierarchically influenced as a whole by the larger whole of which it is a part, and to having dialectical interrelations by having hierarchical influence as a whole of parts functioning as parthols upon the parts of its parthols and by being lowerarchically influenced by the parts of its parthols, a thing as an organic whole has dialectical intercausal relations with things as organic wholes of still higher and lower levels.

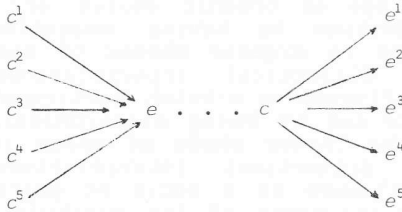
12.3. Things as organic wholes involve temporal causation. Causation is of two interdependent kinds: causation of change and causation of permanence. Causation of change, i.e., of the becoming of a difference (sometimes called "efficient causation"), includes all production of effects as different. Causation of permanence, or of anything remaining the same, includes all of the conditions of its existence and nature and its continuing to endure through changes. Both kinds are involved in all actual causation.

12.3.1. Causation of change, or of the becoming of a difference, involves succession. The thing existing before the change is followed by the thing existing after the change. Causation of change involves succession in which what exists before the becoming of the difference is followed by what exists after the becoming of the difference. The difference which is caused to become is called "an effect". The effect of change succeeds, follows, results from, and comes after its cause. Causation of change is directional, from cause to effect. Causation of change is temporal and has temporal direction: the effect comes after its cause.

12.3.1.1. Causation of change involves both the becoming of a difference and some remaining the same. Something from the cause is carried over into the effect. So, although cause and effect are different they are also partly the same.

12.3.1.2. Causation of change involves the becoming of new wholes. Causation of change in things as organic wholes is complex, involving many causes in the becoming of many effects from one (each thing as a) cause.

The usual symbolization of the relations of cause and effect by an equation (" $C = E$ ") is inadequate. Some minimum of symbols is required for conceiving the complexity involved in the most simple example of causation:



Symbolize all of the causes, simultaneous and successive, of a particular effect,  $e$ , by  $c^1, c^2, c^3, c^4$ , and  $c^5$ . If one thinks more causes are involved, he



may add  $c^6, c^7, c^8$ , etc., until he has enough for symbolic purposes. the effect,  $e$ , which is caused by all of its causes, is, in a sense, completely caused. Nothing exists in the effect which was not caused to be there by its causes, singly and collectively. But also something does exist in the effect which existed neither in any or all of them singly nor in all of them together collectively, for it is "an" effect and has unity or wholeness of its own which did not exist before.  $C^1$  is not the only cause of  $e$ , for  $c^2, c^3, c^4$ , and  $c^5$  are also its causes.  $C^2$  is not the only cause of  $e$ , because  $c^1, c^3, c^4$ , and  $c^5$  also cause it. Likewise for  $c^3, c^4$ , and  $c^5$ . The effect,  $e$ , is the joint effect of the five  $c$ 's, but there is something in it that existed neither in any one of the causes alone nor in all of them together, because their collectivity involves a manyness and an external relatedness of each from the others which does not exist in the one effect. This something is new, something newly created, in the effect as a new whole.

When the thing as effect then causes other effects and something from it passes over into its effects, its own novelty may participate in the effects it produces. When causes and effects are partly the same and partly different, some of what passes from a cause to its effects may pass on from the effect as cause to its effects, thus perpetuating sameness ("determinism"; or, e.g., "conservation of energy"). But to the extent that something new emerges in every cause-effect situation that enters causally into following effects, creativity also occurs constantly.

12.3.1.3. Causation of change in particular things involves not only several simultaneous immediately preceding causes but also many series of causation extending into distant pasts. Each of the many effects of the causation of change in particular things may have many additional series of effects into distant futures. Just as we have levels of existing wholes and parts and both hierachical and lowerarchical kinds of causal influence within and upon things as organic wholes, so we also have past wholes of causation being parts of earlier wholes of causation which were parts of still earlier wholes of causation, etc. Whether some law of ratios of whole-part causal contributions as the causes have occurred in a more distant past, and some law of ratios of whole-part causal contributions as the causes originate in more distant higher levels, I do not choose to speculate. But problems regarding the relative importance of more distant and closer causal relations will continue to plague efforts to understand the nature of organic wholes.

12.3.1.4. Causation of change involves future effects. Does it involve future causes? Can there be any causation of present effects, including present wholes and parts, by "future causes"? No and yes.

12.3.1.4.1. No. Causation of change is directional, from past to present or from present to future. There can be no causation of a present effect by a future cause at the same level, i.e., to the extent that the one thing or durevent as a whole causes another thing or durevent as a whole. In whatever way one existing thing follows another existing thing temporally, it cannot also precede it in the same sense at the same time.

12.3.1.4.2. Yes. When one thing as a temporal whole (durevent) causes another temporal whole (durevent) which, because existing as a whole, is the same whole from beginning to end, coexists with each of the two while each exists as its parts because each of the two coexist with it while each exists. When the two successive durevents participate interdependently in a larger whole, their occurrence is caused partly by that larger whole.

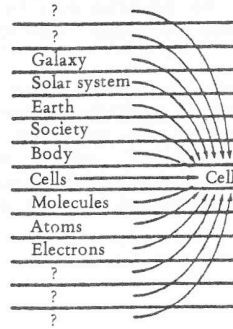
For example, a heart is designed to beat as a whole, and when an auricular pulse occurs and helps to cause a ventricular pulse, both the auricular and ventricular pulses contribute to the beat as a whole, and the beat as a whole contributes to both, i.e., each, and the heartbeat as a whole cannot make its full contribution temporally to the auricular pulse until the ventricular is completed also. Hence, the ventricular pulse, which is partly caused by and which comes partly after the auricular pulse, is necessary to the whole beat of which the auricular pulse is a part. When there is a whole-part causal contribution to a part which has ceased by a whole requiring causal contribution by a part that succeeds the ceased part, there is a sense in which the part that follows functions causally in the functioning of the part that precedes through their joint participation in the whole as a temporal whole.

12.3.2. Causation of permanence, or of a thing as an organic whole remaining the same through change, includes all of the conditions of its existence and nature and of the causes and conditions of its remaining unchanged. Some things are caused to be permanent by having perpetual recurrence of changed parts needed for their existence as wholes. Such things as wholes not only endure through changes but depend upon changes, and changing parts, for their endurance.

12.3.3. Things as organic wholes involve both causation of permanence inherent in their existence

and nature as temporal wholes of temporal parts.

12.4. Things as organic wholes are products of multilevel causation, and contribute causally to effects at many levels. Multilevel existence involves multilevel dialectical intercausal processes contributing causally to both permanence and change at each level. The wholeness of a thing as an organic whole retains some unity, simplicity, and entitiveness both as an effect of multileveled causation and as a cause of multileveled effects.



\* \* \* \*

Although the foregoing twelve hypotheses (or sets of hypotheses) about the nature of the wholes and parts of things are inadequate because lacking inclusion of additional essential characteristics of whole-part relations, such as kinds, variations, degrees, importance, and other categories of existence, they may be sufficient to initiate further discussion about the nature of things as organic wholes.

[Troubled by terminological deficiency, I am tempted to adopt the ugly word "org", connoting in general what is meant in common by "organ", "organism", and "organization", to replace the term "thing as an organic whole". The term "organic whole" mentions "whole" but it fails to mention "parts" which are equally essential to the nature of things as wholes of parts and as "organic". What do you think of this word for this purpose?].

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## RESUMEN

El propósito de este estudio es introducir un conjunto de hipótesis que haga posible un mejor entendimiento del problema -que sigue siendo acuciante en la actualidad- de la relación entre las partes y los todos de las cosas. Para ello se desarrollan doce hipótesis que elaboran los conceptos de cosa, interrelación, todo, parte, todo orgánico, holon, parthol, nivel, arquía, cambio y permanencia, tiempo y causa.

La exposición se articula conforme a la expansión interna de dichos conceptos: 1º) en torno a la terna oposición, complementariedad e interdependencia, y 2º) de acuerdo con la asunción progresiva, en cada terna correspondiente a cada concepto, de los conceptos anteriores así esbozados.

Aunque la presentación de estas doce -o doce conjuntos de- hipótesis es provisional en el sentido de que restan por tratar otras características esenciales de la relación parte-todo, tales como 'clases', 'variaciones', 'grados', etc., así como también otras categorías de existencia, puede bastar al menos para iniciar un debate más amplio acerca de la naturaleza de las cosas, consideradas como todos orgánicos.