

David Oyler
Phoenix, AZ
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Wholes and Hierarchies

In a whole that is not fully systematic, everything is not related to everything else, but everything is related to something that is related to something else, so that all the parts do not need to be interrelated. This permits an aggregate of elements and occurrences that in turn constitutes the potency of the whole to perform in relation to itself and to the other and to develop. Remotely it makes evolution possible. In such a whole it is possible to have structure and systematic processes without the whole being fully systematic. This permits organisms to live in situations which are not fully systematic. It also provides evolutionary gradients towards greater complexity, greater variability and greater flexibility.

This type of whole is not a system nor is it a set of fixed processes. Neither is it a structure where changes in one area necessarily have implications that radiate throughout the whole, though this can occur. This is because not all parts of the whole need to be engaged at any one time for it to function. Understanding such a whole takes us beyond determinism, systems theory and structuralism. Our contention is that organisms are such wholes. Organisms need to be understood holistically, as spontaneously integrating their parts in their behavior or performance, but these integrations are transient and not necessarily related to one another systematically. Neither are parts necessarily related to particular processes. Hierarchy theory, a variant of systems theory, with its notion of levels of organization can introduce unwarranted difficulties into understanding organisms. After providing an overview of the non-systematic whole, we will see how Lonergan's understanding of things and conjugates can be understood in a way that avoids these pitfalls. Though he evokes an understanding of hierarchical structure in his notions of conjugates organizing conjugates and of higher systems and integrations, understanding the part-whole relationship as an inadequate distinction avoids ontological difficulties immanent in reductionism and in understanding causation as below upward and above downward.ⁱ There are key points in his thinking where the notion of emergent probability applied to developing organisms and developing intelligence and knowing requires an understanding of the whole as not fully systematic, though it is not explicitly acknowledged.ⁱⁱ His terminology remains that of systems theory, though the situations discussed are neither systematic nor fully integrated.

With more complex organisms mutually self-mediating systems have evolved to support more flexible and complex behavior.

The respiratory system supplies fresh oxygen not merely to the lungs, but to the whole body. The digestive system supplies nutrition not merely to the digestive tract but to the whole body. The nervous system supplies control not merely to the nervous system but to the whole body. And the muscles supply locomotion not merely to the muscles but to the whole body. The result is something that has fresh oxygen and is nourished, is under control and is moving, because you have a

number of immediate centers ...and the centers make the whole, giving the whole all the properties of each of the centers of immediacy. ⁱⁱⁱ

The notion of mutual self-mediation is holistic. Since the systems yield different states at different times in different situations they are understood statistically as well as in terms of their core sets of possible interrelations.

Loneragan distinguishes primary and secondary determinations. Loosely put, primary determinations are basic relationships. Secondary determinations regard the way the relationships occur. The concrete occurrences have variations for which the primary relationships as abstract do not account. So we can have a scientific model of how satellites orbit a body in space which provides the primary relationships, but the actual orbits of distinct bodies vary from the model. ^{iv} These variances provide the secondary relationships. There is no model which accounts systematically for the variances. The existence of the satellites and the events of their orbits are understood statistically.

If we consider an organism the situation is more complex. With mutually self-mediating systems not only do we have the case of the secondary determinations of the systems, but we need to address the interrelationships of the systems to one another. The divergence of the systems from the systematic can yield various states within a range that constitutes species specific behavior. So we can have flexible sets of schemes of recurrence that define the behavioral range of ducks and coyotes, for example.

In the higher organisms behavior cycles, not only do we have the different motivational cycles such as those associated with mating, eating and play, but we have the diurnal cycles of sleeping and waking. Within sleep we have other cycles such as deep sleep and REM sleep which are not fully understood. As persons we typically assume that our freedom is the primary operator in determining what we do, at least in the immediate situation. However, if we acknowledge that we perform within a context, the context can be invoked either via our free operations or other sources. (The person may think that the context is set by the "objective situation" but we are assuming a fully intellectually converted "universal" viewpoint as the context for our discussion). The other sources can be either conscious or non-conscious.

If we consider the fight or flight response, the source is conscious. There is a perceived threat. All major systems are transformed via a stereotypical response which enables both fight or flight. Which is invoked depends on the animal's decision. The fact that either is possible, points to the openness of the organism's state and indicates that self actualization, this time through decision, is what completes the process. This is a basic tenet of Kurt Goldstein's holism. The organism is structured for self actualization. It spontaneously organizes itself as a whole engaged in performances that constitute what it is. Polanyi terms these comprehensive acts. For Lonergan these would include the conjugate forms of behavior that distinguish one species from another.

In the fight or flight situation, both the key operator of performance and the operator that invokes the context for performance are conscious. This is not always the case. For example, events in the immune system can influence mood via peptides which are utilized throughout the body. Their somatic release can activate neural activity via the pituitary pathway which bypasses the blood-brain barrier so that emotions can have visceral as well as neural origins. So when we are ill or injured our mood may become depressed and we become more inactive.

Falling asleep is another type of case for here our fundamental state changes from full consciousness to the states of the sleep cycle. One theory of sleep is that it permits “restorative” functions to occur by permitting neural networks to process independently of the wider context and correlative integrations required for conscious performance. The organism is still a whole, but not fully integrated as it proceeds through the different cyclic stages of sleep. The operations that lead to us falling asleep and waking up are not conscious. The fact that consciousness does not initiate itself leads to the understanding that consciousness per se is not free, rather freedom is conscious.

In mammals, what we have are non-systematic wholes where at one time one mode of behavior is predominant and at another time, another mode, and they do not need to be interrelated other than that they are activities of the same thing. Likewise, there can be different types of states while awake where self-actualization is possible and while asleep where it is not. In these cases different systems become dominant to set the context for performance or non-performance.

In this holistic view the major systems are complementary with sometimes one taking more of a leading role and sometimes another. For example, though the neural system provides a different means of integration of operations than biochemically based systems, it utilizes the biochemical for neural transmission and can itself be subject to biochemical regulation that influences the organisms behavior. In short, there are complex interactions across the mutually self mediating systems that are literally parts of the comprehensive processes or sets of conjugates that constitute behavior.

The notion of “part” in the distinction of wholes and parts is suggestive, for a part, as a part of a process, is functional. It does something, and the something that it does can be distinct from the nature of the part itself. If we turn to understanding parts, we can see that there can be an independence of function from how it is realized. The same thing can be done in different ways. Likewise, the same thing or part can be used in different ways. The first is expressed in the system notion of equifinality and the latter in the notion of equipotentiality. Thus, it is possible that both grey parrots and chimpanzees have insights, yet they are not animals of the same class. Thus, we have a convergence of a type of form from divergent sources. This is an instance of equifinality. On the other hand, nails, like atoms or neurons, can be used within a variety of structures. This is an illustration of equipotentiality. The potential for manifolds to be organized into different organizations yielding different kinds of things rests on equipotentiality. We see equipotentiality within the organism in the variety of coordinated actions of populations on other populations that yield disparate behaviors.

In his notion of the thing and in his metaphysics, Lonergan lays out a view of the organism that incorporates aspects of hierarchy theory.

In a hierarchical organization lower levels of organization are themselves organized into higher levels where the higher levels, as organizations of the lower, are more complex. A common example is letters are organized into words, words into sentences, sentences into paragraphs and so on. With science we have physical entities or organizations found in chemicals, biochemicals providing an organization of chemical entities which can themselves be organized within cells. Cells are organized by organs, organs by the body and so on.

What relations obtain among the levels? This is where the key philosophical discussion and difference occur. If the higher organizes the lower, then the relation is of

organizer to organized. Higher level principles of organization are postulated which can cause changes on lower levels of organization. We can conceive of “above downward” causality for example. Conversely there is “below upwards” causality. There are at least three instances. The first is the most straightforward where the higher organization is what it is because of the parts that make it up. The higher can be explained reductively in terms of the lower. Levels of computer languages in their instantiation in a machine can be understood this way. (Use of computer languages cannot be. But that is a more complex discussion for another day.) Higher level languages organize lower level commands in general tasks which can be fully articulated in both languages. It is just that the lower language is more cumbersome. Likewise, the notion of theoretic reduction trades on the same relationships. It is granted that chemistry and biology are necessary today to understand organisms, but that is only because physics is underdeveloped. Once physics is mature, it will be able to explain everything. This type of reductionism is materialistic.

The model of levels of organization is also used as a context for the mind-body, matter-spirit, and brain-consciousness discussions. Is the mind the brain? The answer is “No” if they are different levels of organization and the mind is a higher level. The mind may not be distinct from the brain but it is something more. The answer is “Yes” if they are not different levels. Identity theory, interactionism, psycho-physical parallelism and other mind-brain theories all can be cast in terms of hierarchy theory.

The discussion of levels can be ontological. If levels of organization exist, they are ontological in the sense that at some point we get to the ultimate levels of organization in terms of which everything else is organized. We find a parallel structure in the order of knowledge, where Lonergan, perhaps, has the best formulation. If we understand physics, the things understood by physics alone are a coincidental manifold to chemistry. As such they provide a potency for organizations that cannot be explained by physics alone. This possibility is recurrent as one moves from chemistry to biology to psychology to ethnology and to the human sciences.

For Lonergan this pattern is not recurrent within things, since a thing is a unity, identity whole where all aspects of the thing pertain to the thing. Thus, there cannot be things within things which means that things are not organizations of other things. One cannot, then, explain an animal in terms of physics alone because an animal is not a thing specific to physics. It is not an atom or an electron. On the other hand, there are sciences such as biophysics which understand the animal in terms of the physics of an animal. This is a complementary, partial understanding of the animal which fills out the anticipated full explanation that would draw on multiple sciences.

Lonergan does approach a hierarchical understanding of levels when understanding the conjugate forms of an organism. Higher conjugates can be integrations of lower conjugates since the lower conjugates, as coincidental, leave open the possibility of being organized in ways that do not transform them, but that actualize their possibilities of being related to other conjugates.^v

In general, conjugates of conjugates are in the relation of organization to organized. Further, conjugate acts are temporal wholes where there is a unity of process over time. The process has parts. The parts and the whole are a single organization.^{vi} Though they can be distinguished, that distinction is inadequate. When considered in isolation, one can err and consider the part as fully distinct from the whole, which is what

the reductionist does, at least tacitly. On the other hand, if we consider how the lower conjugates survive or endure, they either survive as part of a process or as sometimes independent of any process so they can be organized into a process. If they survive as part of a process, then there is not a higher and lower level of organization but simply an organization of parts where the parts are inadequately distinct from the organization. Notionally we can distinguish them, but concretely they are a whole. If they exist for a time independently of any process then we have an instance of the non-systematic nature of the whole where there is potency for further integration.

The discussion of higher and lower is carried over to higher and lower systems, specifically the organic, the neural, the psychic and the conscious. The key here is to acknowledge that these exhibit mutual self mediation insofar as processes are distinct and are inadequately distinct insofar as there are organizations of organizations. Failure to do so results in issues in the relation of mind and body which can never be resolved if they are considered adequately distinct. Likewise, the reductionist can never reassemble the organism from its disaggregated parts without implicitly reintroducing the organization he or she denies. So the content as seen integrates wavelengths of light, neural transmitters, neural dynamics and consciousness at a minimum. An understanding of all the types of systematic processes is required to understand it.

Also, consciousness, though the highest of these integrations, is not always the highest operative integration. We noted that different systems play different roles at different times where, as in sleep, the organic and the neural may take precedence over consciousness. However, if one considers the comprehensive acts and performances of an organism, it is the higher integration that comprises the conjugate forms that differentiate species from one another.

Our contention is that the organism is a non-systematic whole, not a hierarchical system. There are multiple systematic integrations within the whole. While these may be understood in terms of organic, psychic and conscious functioning, these are inadequately distinct and are not fully systematic. In the lower organisms, including the less complex mammals, we find fairly regular motivational cycles and behaviors that actualize them. The non-systematic in these cases approaches the minimal flexibility immanent in the secondary determinations of primary relations where the primary relations are understood as comprising a fairly invariant development and fairly stable developmental stages and life cycles. In humans, though, we find a major flexibility immanent in the fact that different systems may not themselves be fully related systematically. We find this type of flexibility in Lonergan's notion of the aggregate as operator in development, and most poignantly in his view of man as "...the being in whom the highest level of integration is, not a static system, nor some dynamic system, but a variable manifold of dynamic systems." ^{vii} In this instance, "integration" seems more like a state with situational aspects where the systematic is found in the different parts of the manifold and the non-systematic in their coincidence. If so, we find human consciousness as a non-systematic whole open to further integrations that enable each of us to be a species unto ourselves.

ⁱ We will focus on the former. "Upward causation" is understood via a theory of emergence. The issues arise if one imagines separate levels and then tries to combine them. In emergence there is the prior situation and the emergent situation. The prior situation has the conditions for emergence. The post

situation includes the existence of the emergent. Emergence is the coming to be of the emergent. The emergent is a more complex organization of elements in the prior situation. As such it is self-organizing and is one of the causes of emergence, the other being the prior conditions. In emergence there is a coming to be of an organizer/organized where each is inadequately distinct from the other. There are three types of downward causation. The first occurs where organized processes create elements which later become organized in other processes. These processes can be more or less complex than the originating process. The second is the general relation of organizer/organized. The third is when a process ends, but some of its components continue to function. They become transformed and then change their role to some extent the next time the process occurs. Formation of memories after an experience where these memories inform the next experience of a similar type is an example. The intent of this discussion is to eliminate the need for the metaphor of levels by transforming these notions of upward and downward causation into explanatory terms compatible with science. This would seem to be compatible with a mature metaphysics which does not rely on images and is fully explanatory.

ⁱⁱ The first is in his discussion of development in *Insight* (p. 490) where the manifold is an operator. The second is after the quote below from “The Mediation of Christ in Prayer” where he acknowledges that other things are going on besides mutual self-mediation including the creation of currently non-systematized elements that will be integrated in future developments. He notes that “...there are anticipatory developments that have no great utility at any particular given stage but are extremely useful later on... In other words, there is something more to the organism than mutual mediation.” (p. 167) The third is the reference at the end of this paper where there is a clear conflict in the use of the notion of integration and the notion of manifold to describe the same thing. The resolution is to consider the ‘integration’ as a state that is more or less integrated, like a state of affairs or a situation. Applied to consciousness we can understand it as an operational situation.

ⁱⁱⁱ Bernard Lonergan, “The Mediation of Christ in Prayer” in *Philosophical and Theological Papers 1958-1964*, (Toronto: University of Toronto Press, 1996), p. 165.

^{iv} A model is a set of terms and relations that can be applied to explain the concrete and particular or numerous. What is explained is particular (though it may be a particular group). Models can be understood analogically when they are transposed from one area of inquiry to another, for example Piaget’s use of the mathematical notion of groups. Other types of models can have imaginative components - i.e. a model of a building and these may have heuristic value. However, our focus is explanatory models.

^v If we consider the ontology of organisms in terms of parts and wholes the relation of the sciences to one another becomes just another instance of parts being open to organization. It is analogous to the ontology of the organism, but not the same. The ontology of the organism evolved. It did not evolve from “below upwards”, but holistically via “internal” evolutionary differentiation. Evolution occurred within wholes, as does development, though they differ in other respects of course. The ontology of organisms then, becomes one of the types of parts that evolved and survived and their manner of organization. With major moves, such as the evolution of the neuron and the associated emergence of consciousness, new potencies arose. The shift from expression to sign with the concomitant biological and psychological changes is another instance. The ontology of parts makes bioengineering easier to assimilate. An ontology based on a “natural hierarchy” would require a full theory of artifacts and then an interrelation of that with the basic scientific principles immanent in the organism.

^{vi} This single organization is extremely complex. The introduction of hierarchy theory is one means of handling the complexity by distinguishing levels. While there can be organizations of organizations ... of organizations, concretely there is only one organization with the sub-organizations inadequately distinguished. Imagination is not up to the task and we must resort to concepts and virtual images. The notion of nested contexts is one helpful notion as is the symbolization of a mathematical equation with expressions within expressions. But in a complex neurodynamic process these would be inadequate given the reciprocal relations and transformations occurring across neuronal groups. The bottom line is that nothing suffices except the understanding itself. However, in most cases it has not been achieved and we are left hanging – or we fill it in with a metaphor or something else that is simpler which is where we make our mistake.

^{vii} Bernard Lonergan, *Insight* (Toronto: University of Toronto Press, 1992), p. 532.