Journal for Person-Oriented Research
2015, 1(3), 185-194
Published by the *Scandinavian Society for Person-Oriented Research*
Freely available at http://www.person-research.org
DOI: 10.17505/jpor.2015.19

Combining Holism and Interactionism Towards a Conceptual Clarification

Lars-Gunnar Lundh

Department of Psychology, Lund University, Lund, Sweden

Email address:
Lars-Gunnar.Lundh@psy.lu.se

To cite this article:
Lundh, L. G. (2015), Combining holism and interactionism. Towards a conceptual clarification. *Journal for Person-Oriented Research, 1*(3), 185-194. DOI: 10.17505/jpor.2015.19

Abstract: The terms "holism" and "interactionism" are central to the person-oriented approach, especially as formulated in Magnusson's (2001) holistic-interactionistic paradigm. However, Nilsson (2015) has recently argued that at least some forms of holism and interactionism need to be disentangled. This raises some general questions about what is meant by "holism" and "interactionism" and whether there are problems with combining them in one paradigm. The purpose of the present paper is to make a contribution to an increased conceptual clarity in this area. For this purpose a brief review is first made of how various writers have conceptualized holism and interactionism. On the basis of this review, a preliminary definition and differentiation of holism and interactionism is proposed, which suggests that holism and interactionism refer to different kinds of questions: Whereas holism involves assumptions about the relations between a whole and its parts (e.g., non-reducibility of the whole to its parts, and non-separability of the parts from the whole), interactionism refers to assumptions about causality. It is argued that both kinds of questions are relevant to all fields of study, and that questions about holism (e.g., whether a certain system is holistic or not) and interactionism (e.g., whether the interactions that occur are unidirectional or bidirectional) therefore need to be asked in any field of study. This reasoning is then illustrated by applying it to some questions concerning the nature of the organism-environment system. Finally, there is a brief discussion of the relevance of all this for a person-oriented approach to psychological science.

Keywords: holism, interactionism, person-oriented, organism-environment system, non-reducibility, non-separability, self-organization, person-environment system

The terms "holism" and "interactionism" are central to the person-oriented approach. For instance, in their influential presentation of the person-oriented approach Bergman and Magnusson (1997) develop its theoretical foundation with these two terms as important conceptual tools; and in his meta-theoretical writings, Magnusson (2001) combines these two terms in the form of a holistic-interactionistic paradigm. A theoretical analysis and discussion of these concepts is therefore important, both for the understanding of the person-oriented approach and for its further development. Such an analysis and discussion is the purpose of this article with one starting point being provided by Nilsson´s (2015) paper in this issue, where he argues that at least some forms of holism and interactionism need to be disentangled.

Nilsson's (2015) paper raises important issues concerning these topics, and points to the need for conceptual and theoretical clarifications in this area. Basically, to be able to use the concepts of holism and interactionism in a meaningful way, we have to define them clearly, and develop criteria for when a certain kind of system is to be seen as holistic or non-holistic, and how this relates to the nature of the interactions that are taking place. As part of such an undertaking we also need to understand if there are different forms of holism that need to be distinguished, and different forms of interactionism that should be differentiated. On the basis of such a clarification of these concepts, it may be asked what it means to combine holism and interactionism in psychological research in general, and in a person-oriented approach in particular. These are large and complex questions, and the purpose of the present paper is primarily to raise a number of questions that may stimulate

to further theoretical analysis and discussion of these topics.

The present paper contains three sections. The first section starts with a brief description of the concepts of holism and interactionism, and an overview of how they have been defined by various authors. Different examples of holism and interactionism are given, and the question is raised if there is something common to these that may serve as the basis for a general definition. This section concludes with a proposal for how these two concepts may be defined and differentiated. In the second section, these preliminary conceptualizations are illustrated and tested by being applied to some questions concerning organisms and their relation to the environment; one main conclusion is that holism and interactionism can be fruitfully combined in the analysis of the organism-environment system. The third and final section contains a short discussion of the relevance of all this for a person-oriented approach to psychological science.

Defining holism and interactionism

Although Magnusson (1999, 2001) seems to have been the first writer to combine holism and interactionism in one unified theoretical framework, the terms holism and interactionism have a long history in biology, philosophy, psychology and other sciences before that. Here it is important to note that the concepts of holism and interactionism have quite different historical and theoretical origins. Magnusson's way of combining them is therefore a creative move that deserves more attention than it has been given so far. Here it is interesting to note that when Magnusson first introduced his new paradigm he referred to it as *interactional* (Magnusson, 1985, 1990), and although the term "holism" does appear in his writings at least from the beginning of the 1990s (Magnusson, 1990; Magnusson & Törestad, 1993), it is first during the latter part of the 1990s that the paradigm is renamed as *holistic-interactionistic* (Bergman & Magnusson, 1997; Magnusson, 1999, 2001). This also reflects the fact that although there is an extensive discussion in psychology about interactionism, with various writers formulating a number of different perspectives on this topic, the concept of holism is much less explicitly treated in the psychological literature. Whereas interactionism is a rather familiar concept in psychology, holism is much less so. This suggests that holism might deserve a more extensive analysis than interactionism in the present context.

In this section, I will give a brief summary of how the terms "holism" and "interactionism" have been used in various contexts, and how they have been defined by various authors. Because the concept of holism is so little discussed in psychology, the discussion of this concept will include a review of how it has been defined in other disciplines like biology, physics and philosophy. The discussion of the concept of interactionism, on the other hand, will stay within psychology. Needless to say, this review does in no way pretend to give a complete picture of all the applications that are found of these concepts (such an undertaking would at least require an entire book). On the basis of this review, however, I will suggest general definitions of these terms that clearly differentiate holism and interactionism, and may form the basis of a discussion of if there are difficulties with combining them or not. These definitions, of course, should be treated as provisional, and open to critique and further modification.

The concept of holism

The concept of holism is sometimes rejected on the assumption that it means simply that "everything is connected with everything". One example is Turvey (2009) who advocates what he calls "systemism" rather than holism, and argues that systemism

> is best appreciated through its contrasts. It is not holism – the view that every thing is connected to every other thing – and it is not atomism – the view that every thing operates in isolation from every other thing. For systemism, every thing is connected with some other thing or things. (Turvey, 2009, p. 100)

Of course, the concept of holism becomes meaningless if it is defined in this rough way. It may be argued that Turvey's definition represents a caricature, and that holism *can* be defined in a way that it makes it quite meaningful. Further, as will be shown in this section, a close reading of the way holism is discussed by researchers in various disciplines actually illustrates the meaningfulness of the concept. Nevertheless, it may also be argued that we are in need of a more explicit definition of holism if the term is to be better integrated in further meta-theoretical work on the conceptual foundations of psychology. The purpose of the present section is to take some steps to a useful definition.

Holism in biology

The concept of holism was originally coined by Smuts (1926) in his book *Holism and evolution*, where he argued that evolution is characterized by "an operative factor" that leads to the development of "natural wholes which we call bodies or organisms" (Smuts, 1926, p. 87). He also argued that each such whole "is *more* than the sum of its parts" (Smuts, 1926, p. 103), and that it "is not a mere mechanical system" (Smuts, 1926, p. 103). One important implication of the latter statement is that holism applies to *some* systems (e.g., living organisms) but not to others (e,g., mechanical systems). This raises the important question which *criteria* may be used to decide whether a system is holistic or not.

In his writings on basic conceptual issues in biology, Nicholson (2013, 2014) similarly argues that organisms but not machines constitute holistic systems. His basic reasoning is that, although both organisms and machines are sys-

tems containing interacting parts, the nature of *the relation between these parts and the system as a whole* is very different. One such difference is that in a machine, the parts are *temporally antecedent* to the whole system, in the sense that they are constructed first and then put together in accordance with a certain design by the constructor of the machine. This also means that the parts "retain their own distinctive properties regardless of whether they are integrated in the machine or not" (Nicholson, 2013, p. 672). By contrast, the parts in an organism are *not* temporally antecedent to the whole system; they grow and develop in a more autonomous fashion, and "only acquire their respective identities qua parts as the whole progressively develops from an originally undifferentiated yet already integrated system" (Nicholson, 2013, p. 672). A corollary to this is that "an organism's physiological activities must already be taking place while growth is in progress, whereas a machine cannot perform its intended functions while it is still in the process of construction" (Nicholson, 2013, p. 672). As he also formulates it: "The parts of an organism do not even exist qua parts prior to the existence of the whole they constitute" (Nicholson, 2014, p. 9).

Another difference that Nicholson points to is that organisms unlike machines are characterized my *metabolism*, in the sense that the material parts of an organism are continually exchanged, and "yet the organization of the whole remains" (Nicholson, 2013, p. 672). A machine, on the other hand, "always consists of the same material components (unless an external agent interferes)" (Nicholson, 2013, p. 672). This means that:

> It makes no sense to identify an organism over time with the sum of its material parts, as these are constantly being replenished by the whole. The parts of an organism at any given moment are only the temporary manifestation of the self-producing organizational unity of the whole. The parts of a machine, however, remain distinct, stable, and identifiable over time. (Nicholson, 2013, p. 672).

Underlying all these differences in how the parts are related to the whole in machines and organisms, according to Nicholson (2013), are differences in their nature as systems. In contrast to machines, organisms are *self-organizing and self-regenerating systems.* A machine is extrinsically purposive "in the sense that it operates towards an end that is external to itself… A machine does not serve its own interests but those of its maker or user." (Nicholson, 2013, p. 671). An organism, on the other hand, is intrinsically purposive

> in the sense that it acts on its own behalf, towards its own ends… and it ultimately serves no purpose other than to maintain its own organization… That is, organisms, unlike machines, are not only organized but are also self-organizing and self-regenerating systems. (Nicholson, 2013, p. 671)

To summarize, this reasoning implies that holism in biology may include at least three basic assumptions: (1) A system is holistic if the properties of the whole cannot be reduced to properties of the parts ("the whole is more than the sum of the parts"); this may be called *non-reducibility*. (2) A system is holistic if its parts are dependent on the system as a whole, so that the parts *cannot exist* without the whole (in contrast to a mechanical system, where the components may be constructed first and then put together); this may be referred to as *non-separability*. (3) A system is holistic if it is intrinsically purposive and self-organizing; this may be referred to as *self-organization*.

Holism in physics

Although the concept of holism has its origin in biological thinking about living organisms as systems, this concept has also been carried over into a number of other research areas. In most of these cases, however, what is discussed is holism in a more restricted sense, which focuses either on non-reducibility or non-separability, but does not mention self-organization. This is the case, for example, with the discussions of holism in physics (e.g., Healey, 1991; Maudlin, 1998; Seevinck, 2004; Teller, 1986), where non-reducibility is discussed in terms like "entanglement" and lack of "supervenience", but where the authors despite different definitions of holism (e.g., defining holism in ontological or epistemological terms) seem to agree that classical physics is non-holistic and quantum mechanics is holistic. From an ontological definition it has been argued that composite quantum systems are holistic because they are "entangled" (i.e., non-reducible), in the sense that the state of the system cannot be derived from any combination of the subsystem states (e.g., Maudlin, 1998). From an epistemological definition, on the other hand, Seevinck (2004) has formulated another criterion (which also implies non-reducibility): "a physical theory is holistic if and only if it is impossible in principle to infer the global properties, as assigned in the theory, by local resources available to an agent" (Seevink, 2004, p. 693).

Holism in philosophy

Turning to analytic philosophy, the notion of holism is extensively discussed with regard to the nature of language ("semantic holism", or "meaning holism"), science (e.g., "confirmation holism" or "epistemological holism"), and the mind (e.g., "belief holism"). Early examples of this kind of holism were formulated by Hempel (1950) and Quine (1951), who argued that the meaning of a statement in language is dependent on the totality of its logical relationships to all other statements in this language. The nature of this kind of holism, and the question whether or how it applies to language, scientific theories and human intentionality is the subject of a lively discussion (for a review, see Pagin, 2006). Nilsson's (2015) "content holism" seems to fit in primarily in this tradition, and bears some similari-

ty to "belief holism", according to which an individual cannot have a particular belief without having many related beliefs. It should be noted that this form of holism emphasizes *non-separability*, rather than *non-reducibility* (which is focused in the discussions of holism in physics), and that it does not involve any discussion of self-organization.

Holism in the psychology of perception

To turn now to holism in psychological research, early examples are found in the psychology of perception. As pointed out by von Ehrenfels (1890), for example, when we perceive a melody, this melody cannot be reduced to a sequence of tones, because the melody is still recognized as the same when it is transposed to another key, although all the component tones are changed. What remains unchanged is a certain holistic temporal structure which von Ehrenfels referred to as a "gestalt quality". Here again we have an example of *non-reducibility*, in the sense that the melody cannot be reduced to a sequence of individual tones. This focus on holistic units in perception later became a dominant theme in the work of the Gestalt psychologists in the early 20th century (e.g., Koffka, 1935).

Holism in the psychology of personality and in developmental psychology

Of more interest for a person-oriented approach, however, is the conception of the person as a holistic system, as seen in the psychology of personality and developmental psychology. In Stern's (1938) view, for example, the person is "a living whole, individual, unique, striving toward goals, self-contained and yet open to the world around him" (p. 70), and Allport (1961) formulates a similar holistic conception of the person as a dynamic psychophysical system. Following in this tradition, a basic premise in Magnusson's holism is non-reducibility, as seen in formulations like "[t]he totality has properties beyond those belonging to the parts" (Magnusson, 1990, p. 197), and non-separability, as seen in the statement that each aspect of the individual's functioning "acquires meaning from its role in the integrated functioning of the total individual… from its role in the system of which it forms a part" (Magnusson, 2001, p. 155). In addition, Magnusson's holism also includes assumptions about self-organization, defined as "a characteristic of opens systems" that "refers to a process by which new structures and 'patterns' emerge from existing ones" (Magnusson, 1999, p. 229). In other words, here we find all three aspects of holism that were identified above in connection with the discussion of biological systems.

Holistic and non-holistic systems

To summarize, we have reviewed claims about holism from five different research areas: biology, physics, analytic philosophy, the psychology of perception, and the psychology of personality/developmental psychology. Of the three assumptions about holism that were identified above (non-reducibility, non-separability, and self-organization) *none* applies to all these examples of holism. Non-reducibility was found to apply to four of these (biology, physics, the psychology of perception, and personality/developmental psychology), non-separability to three (biology, analytic philosophy, and personality/developmental psychology), and self-organization to two (biology and personality/developmental psychology). This may be taken as an illustration of the notion that concepts tend to develop in several different directions, and therefore seldom share any common essential feature, leaving only certain "family resemblances" (Wittgenstein, 1953) between the various branchings of a concept.

Of the three aspects of holism that have been identified above, two refer to the nature of the relation between the whole and its parts, and are of most relevance to the continued discussion in this paper. On these grounds, I propose the following definition: *A system is holistic if it is an undivisible whole, in the sense that the relation between the whole and its parts is characterized by non-reducibility and/or non-separability.* Whereas non-reducibility focuses on the whole and implies that its properties cannot be reduced to the properties of its parts, non-separability focuses on the parts and implies that these cannot exist independently of the whole. Systems that are characterized by *neither* non-reducibility nor non-separability (e.g., various kinds of machines) can be described as non-holistic.[1] It should be noted, however, that the present definition is provisional, and might be modified on the basis of further analysis (for a slightly different definition, see Kitchener, 1982). Although self-organization has potentially interesting implications with regard to holistic systems in psychology (e.g., Ashby, 1962; Barton, 1994) it will not be treated in more detail in this paper.

The concept of interactionism

Like the concept of holism, the concept of interactionism is also sometimes rejected on the basis of a caricatured notion of what it means – in this case that it should mean that "everything interacts with everything". As formulated by

[1] As one reviewer pointed out, it may be asked if a machine is not in some sense a holistic system. A car engine, for example, consists of a number of parts that all together are necessary for the working of the whole system. These parts functioning together is what defines the machine – take away one part and the system does no longer work. Although this clearly exemplifies how a machine constitutes a *system*, it represents a *non-holistic* system to the extent that the functioning of the whole can be explained by the functioning of its parts (i.e., reducibility of the whole to its parts), and the parts are constructed first and then put together to form the machine (i.e., separability of the parts from the whole). One basic conclusion from the foregoing discussion is that *systems can be either holistic or non-holistic.*

Plomin: "If interactionism were to be believed, it would imply that 'main effects' cannot be found because everything interacts with everything else" (Plomin, 1986, p. 249). As pointed out by Magnusson, however, this represents a misunderstanding: "interaction is only one of the basic principles underlying the adaptive processes of individual functioning and development" (Magnusson, 1999, p. 228), and does *not* mean that everything interacts with everything else. The implications of interactionism are rather to look for the actual kinds of interactions that take place, and try to describe them in more detail.

In contrast to holism, interactionism is explicitly about causality. A first step to define interactionism is to separate it from non-interactional forms of causality. But are there non-interactional forms of causality? This amounts to asking if there are effects which depend on only one causal influence, completely independent of context. If so, that would be an example of non-interactional causality. Can we find such examples? What about genetic defects which cause severe mental dysfunctions?

Take the example of phenylketonuria (PKU), a rare inherited disorder that involves the unhealthy buildup of an amino acid called phenylalanine in the body when the person eats foods that are high in protein. PKU is caused by a genetic defect which prevents the body from producing the enzyme that is needed to break down phenylalanine. This might seem close to a case of non-interactional causality. But actually PKU is prevented in newborn babies with this genetic defect by screening them soon after birth, and by then setting them on a protein-low diet that limits phenylalanine. In other words: even here there is an interaction between genes and environmental factors, so that by adjusting the environment (in the form of food-intake) the genetic defect is prevented from causing mental retardation.

What is special about the PKU example is that *very few* interacting factors are involved. Typically, a psychological outcome is assumed to be *multi-determined*. That is, it is the complex result of the combination of a large number of factors that interact in various ways.

An important distinction here is between *unidirectional* forms of interaction and *bidirectional* or *reciprocal* interactions (Bandura, 1978). The PKU example clearly involves a unidirectional form of interaction: PKU develops as a result of an interaction between a genetic defect and the intake of foods that are high in protein. But the causal influencing here goes only in one direction, and the two causal factors are causally independent of each other. What typically characterizes causality in psychological functioning, however, according to Bandura (1978) is that it is bidirectional and reciprocal. Bandura refers to this as "reciprocal determinism", and argues that it involves bidirectional interactions between three categories of interlocking factors: internal personal factors, environmental influences, and behavior. For example, "behavior is influenced by the environment, but the environment is partly of a person's making. By their actions, people play a role in creating the social milieu and other circumstances that arise in their daily transactions." (Bandura, 1978, p. 345). Similarly, beliefs and behavior also interact in a bidirectional way, so that they "operate as reciprocal determinants of each other. For example, people's efficacy and outcome expectations influence how they behave, and the environmental effects created by their actions in turn alter their expectations." (Bandura, 1978, p. 346).

Magnusson describes interactionism in similar terms, stating that interaction "is a central principle of open systems at all levels" (Magnusson, 1990, p. 196), emphasizing that interactions are complex and bidirectional, which means that "it is not always meaningful to maintain the distinction between dependent and independent variables, since an element may be related to other elements in the process both as a cause and an effect" (Magnusson, 1990, p. 197).

To summarize, although holism and interactionism both represent assumptions about relations between different aspects of systems, they refer to *different* kinds of relations. Holism refers primarily to the relation between the whole system and its parts, and involves assumptions about non-reducibility of the properties of the whole system to properties of its parts, and non-separability of the parts from the system they are part of. Interactionism, on the other hand, refers to the relation between different factors that are involved in causal processes in and between different systems, and may involve either unidirectional or bidirectional and reciprocal influences between different systems, and between different components of a system.

Related to this, it may also be argued that holism primarily refers to *theoretical* questions about the nature of a system, whereas interactionism refers to *empirical* questions of how different factors interact to cause changes in a system. At the same time it may be argued that questions about holism are basic, because good research focused on causal interactions between different phenomena *requires conceptual clarity concerning the nature of the phenomena* that are to be studied (cf. Magnusson, 1992), and this conceptual clarity involves an understanding of the extent to which these phenomena take the form of holistic systems or not. Furthermore, if holistic systems are involved, we also need to become clear about the nature of these holistic systems – for example, how should the "whole" be defined? We now turn to an example of such a question: When we study living organisms, is it really the *organism* that is the "whole", or is it rather something that may be referred to as the *organism-environment system*?

Illustration: The organism-environment relation

The purpose of this section is to illustrate and test the preceding arguments by discussing some aspects of the organism-environment relation. How do we conceptualize the relation between the organism and its environment? Is holism relevant here? Is interactionism relevant? Are we

dealing here with two separate systems – an organism and an environment – or with one organism-environment system? And the main question: Can and should we *combine* holism and interactionism in our attempts to understand the nature of the relation between the organism and its environment?

First, is holism relevant here? According to some theorists, the organism and its environment constitute one inseparable system. Already among the Gestalt psychologists, organism and environment were regarded as one unitary system (e.g., Koffka, 1935), and similar formulations are basic to Gibson's (1979) ecological approach to perception. More elaborate theoretical conceptualizations of the organism-environment system have lately been developed by Järvilehto (Järvilehto, 1998a, 2009) and Turvey (2009). As Järvilehto formulates it, "in any functional sense organism and environment are inseparable and form only one unitary system. The organism cannot exist without the environment, and the environment has descriptive properties only if it is connected to the organism." (Järvilehto, 1998a, p. 321). According to his reasoning, many conceptual confusions in psychology are due to one mistaken basic assumption about the nature of our object of study, namely "the conception of the organism and the environment as two separate systems" (Järvilehto, 2000a, p. 35) – an assumption which he refers to as the "two systems theory". In a number of papers Järvilehto has elaborated his theory of the organism-environment system in relation to neurophysiology (Järvilehto, 1998b), the formation of knowledge (Järvilehto, 1999), mental activity and consciousness (Järvilehto, 2000a), emotion (Järvilehto, 2000b, 2001), and experimental psychology (Järvilehto, 2009).

A similar kind of holism is also seen in Magnusson's writings when he states that "an individual cannot be understood separately from the environment in which he or she lives" (Magnusson, 1999, p. 219). Because this formulation implies non-separability of the individual from its environment, it clearly implies holism. This holism is combined with bidirectional interactionism, as Magnusson also emphasizes the role of reciprocity between the individual and the environment by stating that "the individual both influences and is influenced by the environment at each stage of development" (Magnusson, 1999, p. 232).

The purpose of the present section is to discuss some concrete examples of the relation between the organism and its environment, first at the physiological level, and then at the psychological level, to see if we encounter any logical difficulties with combining holism and interactionism.

Holism and interactionism at the physiological level

Let us first consider some physiological aspects of this relation. One thing that is basic to human beings' and other animals' survival is breathing. To be living organisms we have to breathe air into our lungs and blood cells. As pointed out by Haldane (1929), if the respiratory system is to be conceived as a system we cannot set any border between "inner" and "outer" air. That is, in terms of breathing, an organism is *not* separate from its environment – it is by necessity part of a larger organism-environment system. This means that one criterion of a holistic system is at hand – the non-separability of the living individual from an environment that contains oxygen. Other similar arguments could be elaborated with regard to eating and drinking – although an individual can survive longer without eating and drinking than without breathing, this is only a matter of degree; here also, the living individual is non-separable from a larger organism-environment system. But, of course, this does not implicate some kind of indiscriminate holism ("everything is related to everything"); on the contrary, a further theoretical analysis along these lines may lead to a closer specification of the exact nature of this holistic organism-environment system.

Also, this does in no way deny the existence of *interactions* between the organism and its environment *within this holistic system*. For example, in terms of breathing, although the intake of oxygen is vitally important, there is also such a thing as oxygen toxicity (oxygen poisoning) – that is, too much oxygen can cause harmful effects. An excess of oxygen in body tissues is referred to as hyperoxia, and can result in symptoms like disorientation, breathing problems, and problems with vision. Hyperoxia could be seen as the result of a unidirectional interaction between the oxygen level and the individual's physiological systems. Further, people may learn to avoid such harmful effects by using protocols for the avoidance of hyperoxia in fields where there is a risk for it – as in underwater diving, neonatal care and human spaceflight. That is, here we have examples of bidirectional causal interactions within the holistic organism-environment system, in the sense that the individual's health is affected by changes in the oxygen level, and the individual in turn may causally regulate the risks connected with such changes.

The main point here is that, to understand the relation between the organism and its environment at a physiological level we have to take account *both* of holistic aspects of the organism-environment system *and* of causal interactions between organism and environment within this holistic system. Whereas holism states the boundary conditions for the living organism (e.g., living organisms do not exist without an environment that contains oxygen), interactionism focuses on interactions between changes in the oxygen level and the individual's health and behavior (e.g., how the health of living organisms is affected by the amount of oxygen that is inhaled, and how this effect varies as a function of the individual's physiology and behavior). The holistic aspects in this case can be identified by theoretical analysis of existent knowledge – for example, we do not need to carry out empirical studies to find out that an organism by necessity has to breathe to stay alive. To acquire knowledge

about the causal interactions between the individual's behavior and life processes and the amount of oxygen inhaled, however, empirical research is crucial.

A system is defined by Järvilehto (2000a) as "a whole consisting of elements, the interaction of which makes possible its existence or action" (p. 38). This definition, which combines holism and interactionism, implies that living systems (unlike mechanical systems) include parts of the environment. This applies already at the cell level:

> In order to exist as a living formation, the cell must continuously use its environment by identifying some substances, and transporting them through the cell membrane. Therefore, according to the definition of the system such environmental parts must be regarded as constitutive parts of the cell system… The membrane of the living cell is not a line of separation, but rather connects the inner parts of the cell with selected parts of the environment. The membrane is an organ of connection, not just a cover" (Järvilehto, 2000a, p. 38)

Turning to the psychological level, Järvilehto (1999b) argues that, although mental activity is made possible by the development of the nervous system, it cannot be reduced to what occurs in the nervous system but represents activity *in the whole organism-environment system*. This is consistent, for example, with Gibson's (1979) ecological theory of perception.

Holism and interactionism at the psychological level

To discuss holism and interactionism in understanding the relation between organism and environment at a psychological level, I will use Gibson's (1979) ecological theory of perception as an illustration. According to Gibson, what the individual perceives is primarily the *affordances* of the environment. Affordances are what the environment "offers the animal, what it provides or furnishes, either for good or ill" (Gibson, 1979, p. 127). For example, an open environment offers locomotion in any direction over the ground, objects of a certain shape and size affords sitting, different kinds of tools afford construction, manipulation, etc. Other examples are what the environment provides in terms of satisfaction of needs (food, security, love, etc.) and dangers (the danger of falling from a cliff, getting burnt by the fire, falling prey to a predator, etc.). Affordances may be physical or social.

Basically, the affordances of the environment include both what the individual can do in and with its environment, and what the environment can do to the individual. In short, "affordances may be defined as *possible interactions between organism and environment*" (Lundh, 1983, p. 33). This means that the primary function of perception is to inform the individual about possible interactions with the environment, *before* these interactions eventually take place. Animals differ from plants by being able to perceive such possibilities (opportunities as well as risks) before acting – it could even be said that the perception of affordances is what makes acting (as distinct from mere responding) possible.

Now let us focus on what this account implies with regard to the organism-environment relation, first from the perspective of holism, and then from the perspective of interactionism. First, we may note that affordances, as they are defined in Gibson's theory of perception, are located *in the environment*, and exist there whether the individual detects them or not (e.g., the risk of falling from a cliff is there to perceive whether the individual actually perceives the risk or not). At the same time, however, because these affordances represent possible interactions with the environment, they *exist only in relation to an organism's individual characteristics* (behavioral, physical and physiological characteristics). For example, what constitutes food for individuals of one species does not necessarily do so for individuals of another species. What constitutes a surface to walk and stand on also varies from ones species to another; water for certain insects, for example, is such a surface. What we generally refer to as "obstacles" can be defined as "an animal-sized object that affords collision and possible injury" (Gibson, 1979, p. 128), and this implies that what is an obstacle to one individual need not be an obstacle to another. The affordances may also differ between individuals within the same species: "Knee-high for a child is not the same as knee-high for an adult, so the affordance is relative to the size of the individual" (Gibson, 1979, p. 128).

This means that we do not perceive some "objective" physical space, but space as it is *relative to* our size and possibilities of moving around. The same thing can be said about processes in time: what we perceive is not some "objective time", but temporal events as they exist *relative to* the speed of our own life processes and ways of acting. All this together illustrates the *holistic unity* that connects an individual's environment with the individual characteristics of the organism – an individual's environment (defined in terms of affordances) *is not logically separable* from the organism-environment system.

At the same time, from an interactional perspective, we may ask how changes in the affordances of a certain environment (due to physical or social changes) may *interact* with a person's individual characteristics to affect that person's health or well-being. Further, in terms of bidirectional interactions between the individual and the environment, we may hypothesize, for example, that the development of new behavioral skills may cause changes in how the individual perceives the environment (i.e., new affordances are perceived) and that the perception of these affordances in turn will affect the individual's behavior and health in various ways. In other words: although the affordances of the environment and the individual characteristics of the organism are part of a holistic system, this seems to be quite

compatible with studying causal interactions between variations in the patterns of these affordances and the individual's behavior, health and well-being *within that holistic system*.

Again, it should be noted that the *kind* of relations relevant to holism and interactionism are quite different: Holism in this case involves the non-separability of phenomena (e.g., an environmental affordance exists only by virtue of there being an organism with such individual characteristics that it can make use of it). Interactionism, on the other hand, involves contingent empirical relations between changes in the pattern of affordances that characterize a certain environment and/or changes in the physical, physiological or psychological characteristics of the individual. Further, whereas the holistic aspects of the relation between environmental affordances and the organism-environment system can be identified by theoretical analyses, knowledge about actual causal interactions between affordances and characteristics of the individual organism requires empirical studies.

Finally, these analyses also suggest that the primary holistic system in the study of living organisms is the organism-environment system, rather than the organism as such. From a person-oriented perspective, each person can be said to have his or her "personal version of the world", defined in terms of how this person's meaning structures (Lundh, 1983) gives meaning to (and thereby includes) various aspects of the social and physical world. This, however, is a highly complex topic, which requires much more study and theoretical analysis before more precise conclusions are drawn.

Discussion

The terms "holism" and "interactionism" are central to the person-oriented approach, especially as formulated in Magnusson's (2001) holistic-interactionistic paradigm. At the same time the meaning and usefulness of these terms are sometimes questioned, often on the basis of a caricatured understanding of the meaning of these terms – for example, as if holism would mean that "everything is connected with everything", and interactionism that "everything interacts with everything". It is therefore important to define these terms more precisely, so that they can be used in a more refined way in theoretical analyses and discussions. The purpose of the present paper was to make a contribution to an increased conceptual clarity in this area.

On the basis of a brief review of how holism has been discussed in some fields of study (biology, physics, analytic philosophy, the psychology of perception, and the psychology of personality and developmental psychology) it was concluded that at least three different assumptions about holism can be identified. Two of these refer to the relation between a whole and its parts: non-reducibility (i.e., the properties of the whole cannot be reduced to the properties of its parts) and non-separability (i.e., the parts have no separate existence from the whole of which they are part). The third assumption refers to self-organization (i.e., the tendency of a whole to grow and develop on the basis of its intrinsic properties). Importantly, this means that we have a set of preliminary criteria whereby we may differentiate between holistic and non-holistic systems.

However, it is also important to note that holism seems to mean somewhat different things in different disciplines. Although all three assumptions of holism are found in discussions about holism in biology and in the psychology of personality and developmental psychology, discussions in other areas seem to use a more restricted concept of holism, which sometimes focuses on non-reducibility (e.g., in physics, and in the psychology of perception) and sometimes on non-separability (e.g., in analytic philosophy). This needs to be held in mind in order to avoid conceptual confusions in general discussions about holism.

The concept of interactionism seems to be somewhat less controversial. Here it may be important, however, to differentiate between unidirectional forms of interaction (where the results of an interaction do not exert a causal effect on the interacting factors that caused these results) and bidirectional forms of interaction (where two or more different factors act as both cause and effect in the interaction that is taking place).

Importantly, holism and interactionism involve questions about different kinds of relations that are relevant to the understanding of all kinds of systems. Whereas holism primarily involves theoretical questions about *the relation between a whole and its parts*, interactionism involves empirical questions about *causal relations*. This means that there should be no problem in combining holism and interactionism. It may even be argued that they need to be combined, at least in the sense that *questions* about holism and interactionism need to be asked in all fields of study, because any field of study is likely to contain both theoretical questions about the relations between whole systems and their parts and empirical questions about causality. One question that we need to ask is whether the system under study is holistic or not – for example, although it may be argued that organisms are holistic systems, machines generally are not. Also, in case we are dealing with holistic systems we need to analyze the nature of these systems - for example, how we should delimit the "whole" in each case.

In the present paper, this reasoning about holism and interactionism was illustrated and tested more concretely by applying it to questions about the relation between the organism and its environment. Examples were taken both from the physiological and the psychological levels, and clearly suggested that holism and interactionism are quite compatible in the attempts to reach more conceptual clarity concerning these questions. These considerations also suggest that the kind of "whole" we are dealing with in the study of living organisms should be identified as an "organism-environment system", rather than the organism

as such. However, such a conclusion needs considerable elaboration. Especially for a person-oriented approach, and a holistic-interactionistic paradigm, it may be argued that an improved understanding of the individual person as an organism-environment system is crucial. The notion of a holistic organism-environment system, as developed by Järvilahti (2009), Turvey (2009) and others may deserve more attention in this context.

Finally, Nilsson's (2015) article raises many further questions that deserve to be discussed, but which lie beyond the scope of the present paper. For example, what would happen if the present reasoning about holism and interactionism is applied to intentional systems? Intentional systems by definition involve intentional states, which can be defined in terms of thoughts, beliefs, desires and attitudes related to different aspects of the individual's world, including his/her environment. Such intentional states are commonly said to provide *reasons* for a person's action, but an analysis of these reasons is part of the *description* rather than the explanation of a person's actions.

As Nilsson points out, the understanding of the person's intentional states is a neglected topic in psychological research, and we may need to focus more on developing methods for a penetrating understanding of people's intentional states. At the same time, however, a focus on intentional states can at most produce a rather static picture of a person's worldview at a given moment in time. Although the intentional system vocabulary (with terms like "beliefs" and "desires") is a way of describing complex intentional states and their logical interrelatedness, this logical interrelatedness applies only to a frozen moment in time, T1, and there is no *logical* interrelatedness between intentional states at two succeeding moments T1 and T2. That is, the intentional systems view provides a *static* perspective, which may be highly important for the understanding of the person's psychological state at a given moment but does not involve any processes over time, whereas a full person-oriented approach to psychological science aims for a *dynamic* understanding of how intentional states *interact causally* with other psychological and environmental conditions over time. This raises the question of how an analysis of intentional states may best be integrated in a broader person-oriented approach.

From a holism perspective this also involves important theoretical questions about the intentional system's relation to the larger person-environment system. For example, does the intrinsic "aboutness" of an individual's intentional states (i.e., they are always about something beyond themselves, as for example objects and events in the world) mean that they exist only by being part of a larger organism-environment system, in the sense that they (as suggested by Järvilahti, 2009) essentially *include aspects of the environment* (instead of being reduced to just an "internal" system, as done in mind-brain identity theories)?

Conclusion

Magnusson (1999, 2001) made an important conceptual innovation when he combined the terms "holism" and "interactionism" into one overarching theoretical framework. The holistic-interactionistic paradigm that resulted from this work lies at the basis of Bergman and Magnusson's (1997) person-oriented approach, with its theoretical focus on dynamic interactions and whole system properties for the purpose of understanding individual development (see the five tenets described by Bergman & Magnusson, 1997), and its corresponding methodological focus on measurement procedures and statistical methods that are suitable for such an undertaking (Bergman & Andersson, 2010). Still, however, the concepts of "holism" and "interactionism" are sometimes rejected on the basis of a caricatured understanding of their meaning (e.g., Plomin, 1986; Turvey, 2009). This suggests that there is a need for conceptual clarification in this area, and in particular a clarification of the concept of holism – which seems to be surrounded by even more controversy than the concept of interactionism. In particular it may be argued that the development of the person-oriented approach may benefit from more precision in the delineation of the nature of the holistic systems that are involved – from the larger person-environment system down to various psychological subsystems and the interactions between and within these. The purpose of this paper has been to contribute to a conceptual clarification in this area, and thereby to stimulate to further analysis and discussion of these topics.

References

Allport, G. W. (1961). *Pattern and growth in personality*. New York: Holt, Rinehart & Winston.

Ashby, W. R. (1962). Principles of the self-organizing system. In H. Von Foerster and G. W. Zopf, Jr. (Eds.), *Principles of Self-Organization: Transactions of the University of Illinois Symposium* (pp. 255-278). London: Pergamon Press.

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33,* 344-358. doi: 10.1037/0003-066X.33.4.344

Barton, S. (1994). Chaos, self-organization, and psychology. *American Psychologist, 49,* 5–14. doi: 10.1037/0003-066X.49.1.5

Bergman, L. R. & Andersson, H. (2010). The person and the variable in developmental psychology. *Journal of Psychology, Vol. 218(3),* 155-165. doi: 10.1027/0044-3409/a000025

Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. *Development and Psychopathology, 9,* 291–319.

Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.

Haldane, J. S. (1929). *The sciences and philosophy*. London: Hodder and Stroughton.

Healey, R. A. (1991). Holism and nonseparability. *The Journal of*

Philosophy, 88, 393-421.

Hempel, C.G. (1950). Problems and changes in the empiricist criterion of meaning, *Revue Internationale de Philosophie, 41,* 41–63.

Järvilehto, T. (1998a). The theory of the organism-environment system; I. Description of the theory. *Integrative Physiological and Behavioral Science, 33,* 321-334. doi: 10.1007/BF02688700

Järvilehto, T. (1998b). The theory of the organism-environment system; II. Significance of nervous activity in the organism-environment system. *Integrative Physiological and Behavioral Science, 33,* 335-342. doi: 10.1007/BF02688701

Järvilehto, T. (1999). The theory of the organism-environment system; III. Role of efferent influences on receptors in the formation of knowledge. *Integrative Physiological and Behavioral Science, 34,* 90-100. doi: 10.1007/BF02688715

Järvilehto, T. (2000a). The theory of the organism-environment system; IV. The problem on mental activity and consciousness. *Integrative Physiological and Behavioral Science, 35,* 35-57. doi: 10.1007/BF02911165

Järvilehto, T. (2000b). Feeling as knowing — Part I: Emotion as reorganization of the organism-environment system. *Consciousness & Emotion, 1,* 53-65. doi: 10.1075/ce.1.2.04jar

Järvilehto, T. (2001). Feeling as knowing — Part 2: Emotion, consciousness, and brain activity. *Consciousness & Emotion, 2,* 75-102. doi: 10.1075/ce.2.1.04jar

Järvilehto, T. (2009). The theory of the organism-environment system as a basis of experimental work in psychology. *Ecological Psychology, 21,* 112-120. doi: 10.1080/10407410902877066

Kitchener R.F (1982). Holism and the organismic model in developmental psychology. *Human Development, 25,* 233–249. doi:10.1159/000272811)

Koffka, K. (1935). *Principles of Gestalt psychology*. London: Lund Humphries.

Lundh, L. G. (1983). *Mind and meaning. Towards a theory of the human mind considered as a system of meaning structures.* Acta Univ. Ups. Studia Psychologica Upsaliensia 10. Uppsala: Almqvist & Wicksell.

Magnusson, D. (1985). Implications of an interactional paradigm for research on human development. *International Journal of Behavioral Development, 8,* 115-137.

Magnusson, D. (1990). Personality development from an interactional perspective. In L. Pervin (Ed.), *Handbook of personality* (pp. 193-222). New York: Guilford

Magnusson, D. (1992). Back to the phenomena: Theory, methods and statistics in psychological research. *European Journal of Personality, 6,* 1-14. doi: 10.1002/per.2410060102

Magnusson, D. (1999). Holistic interactionism: A perspective for research on personality development. In L. Pervin & O. John (Eds.), *Handbook of personality* (pp. 219-247). New York: Guilford

Magnusson, D. (2001). The holistic-interactionistic paradigm: Some directions for empirical developmental research. *European Psychologist, 6,* 153– 162. doi: 10.1027//1016-9040.6.3.153

Magnusson, D., & Törestad, B. (1993). A holistic view of personality: A model revisited. *Annual Review of Psychology, 44,* 427–452. doi: 10.1146/annurev.ps.44.020193.002235

Maudlin, T. (1998). Part and whole in quantum mechanics. In E. Castellani (Ed.), *Interpreting bodies* (pp. 46-60). Princeton: Princeton university press.

Nicholson, D. J. (2013). Organisms ≠ machines. *Studies in History and Philosophy of Biological and Biomedical Sciences, 44,* 669-678. doi: 10.1016/j.shpsc.2013.05.014

Nicholson, D. J. (2014). The machine conception of the organism in development and evolution: A critical analysis. *Studies in History and Philosophy of Biological and Biomedical Sciences, 48,* 162-174. doi: 10.1016/j.shpsc.2014.08.003

Nilsson, A. (2015). Disentangling causal interactionism and content holism. *Journal for Person-Oriented Research, 1,* 3, 171-183. doi: 10.17505/jpor.2015.18

Pagin, P. (2006). Meaning holism. In E. Lepore and B.C. Smith (Eds.) *The Oxford Handbook of Philosophy of Language* (pp. 214–232). New York: Oxford University Press.

Plomin (1986). Behavioral genetic methods. *Journal of Personality, 54,* 226-261.

Quine, W.V. (1951). Two dogmas of empiricism. *Philosophical Review,* 60, 20–43.

Seevinck, M. (2004) Holism, physical theories and quantum mechanics. *Studies in History and Philosophy of Modern Physics* 35: 693-712. doi: 10.1016/j.shpsb.2004.08.001

Smuts, J. C. (1926). *Holism and evolution*. New York:Macmillan.

Stern, L. W. (1938). *General psychology: From the personalistic standpoint.* New York: MacMillan.

Teller, P. (1986). Relational holism and quantum mechanics. *The British Journal of Philosophy of Science, 37,* 71-81.

Turvey, M. T. (2009). On the notion and implications of organism-environment system. *Ecological Psychology, 21,* 97-111. doi: 10.1080/10407410902877041

von Ehrenfels, C. (1890). Űber Gestalqualitäten. *Viertel-jahsrschrift für Wissenschafliche Psychologie, 14,* 249-292.

Wittgenstein, L. (1953). *Philosophical investigations*. Oxford: Blackwell.