Holism is a view about the internal organization of certain systems. The claim can be summed up in this way: Holistic systems are such that their constituent parts have some of the properties that are characteristic of these things only if they are organized in such a way that they constitute a whole of the kind in question. Holism is widely accepted in epistemology. Systems of beliefs of persons, scientific theories and finally our system of knowledge as a whole are considered to be holistic systems. It is claimed that experience cannot confirm or refute single beliefs or statements. Experience always confirms or refutes a whole system of beliefs or statements. What is more, the meaning and the justification of a belief or a statement consists in inferential relations to other beliefs or statements within a whole system of beliefs or statements. If these inferential relations are taken to be determined by social practices, social holism ensues. Methodological holism is the view that systems have to be studied by considering the things that are their parts in the context of the whole. Holism as methodology applies to holistic systems in the first place; but it may also be an appropriate heuristic approach to study other systems. Methodological holism is widespread in the human sciences. In ontology, holism is in the last resort the claim that the whole world is one holistic system in the described sense.

1. Introduction

This article considers holism insofar as it is a philosophical position, defended by rational argument. It first goes into examples of holism in specific areas of today’s philosophy, namely in epistemology and semantics (section 2), in methodology (section 3), and in ontology (section 4). It then sums up these examples in a philosophical characterization of holism (section 5). In the field of transdisciplinary knowledge ontological holism is the most prominent form of holism, but epistemological and methodological holism are also discussed (see, Unity of Knowledge and Transdisciplinarity: Contexts of Definition, Theory and the New Discourse of Problem Solving).

The examples of holism in the sciences are considered in detail in a separate article (see, Holism in the Sciences).
2. Holism in epistemology and semantics

2.1 Confirmation holism

Holism is a position that is widely accepted in today's epistemology. The best way to introduce holism in epistemology is to consider the confirmation of statements or beliefs by experience. The claim of holism in that respect is that a statement cannot be confirmed or refuted by experience in isolation. What is confirmed or refuted by experience always is a whole system of statements, that is, a whole theory, and finally the system of our knowledge as a whole. This position is known as epistemological holism, or, more precisely, confirmation holism.

The contemporary discussion on confirmation holism goes back to the French scientist and philosopher of science Pierre Duhem (1861-1916). In his work on the object and the structure of the physical theory, Duhem maintains that it is not possible to put a hypothesis of physics to the test in isolation. Every experiment involves assumptions about the way in which the measuring instruments function, and these assumptions, in turn, imply physical laws. Therefore, Duhem claims that an ensemble of hypotheses or theories is put to the test in any experiment. If the experimental results do not agree with our predictions, we only know that at least one of the hypotheses in question is false. But we do not know which hypothesis or which hypotheses are false. We have a number of options for changing our theory in such a way that it accords with the experimental results. Duhem proposes bon sens as a criterion for deciding which option should be endorsed.

Consequently, even the first principles of physics are subject to empirical control in the same way as all the other statements that are contained in a physical theory. If a conflict with experimental evidence occurs, it is not logically determined which statements are to be rejected. It may be reasonable to change even fundamental hypotheses of physics subsequent to the results of experiments. Duhem concludes that the entire physics is one theory that is confronted as a whole with the whole of the experimental facts. Experience does hence not determine a unique system of physics. There may be several logically possible systems of physics that all agree with the whole of the experimental data that are at our disposal.

Duhem refers only to physics. He excludes common sense knowledge as well as sciences such as physiology on the one hand and logic and mathematics on the other hand from his thesis about confirmation. The American philosopher Willard V. O. Quine (1908-2000) generalizes Duhem's thesis in such a way that it applies to all sorts of knowledge, including common sense statements as well as logical laws. However, Duhem's holism is not Quine's background. In his famous paper "Two Dogmas of Empiricism" (1951), Quine sets out confirmation holism in opposition to the logical empiricism of the twenties and the thirties. Quine maintains that there is no separation between analytic statements of logic and mathematics, which are true or false independently of the way the world is, and synthetic, empirical statements about the way the world is. It is not possible to reduce empirical statements to logical constructs upon statements that describe sense experience and that can be directly confirmed or refuted by sense experience. What is confirmed or refuted by experience be it scientific experience, be it common sense experience is a whole system of statements. Consequently, no statement is immune against revision as a result of experience. Even statements that are regarded as logical laws can be abrogated in order to accommodate new experience. The demarcation between what counts as logic and what counts as empirical science can hence be subject to change. One famous example of this demarcation being variable is the debate about abrogating logical laws such as the law of the excluded middle consequent upon new experience in the domain of quantum physics.

Quine suggests regarding our system of knowledge as a seamless web. This web touches experience at its edges. Statements such as "There are brick houses on Elm Street" are on the periphery of this
Statements of logic are located in its center. This web is not determined by experience: If a conflict with experience occurs, we have several options for adjusting the web to experience. Quine proposes a pragmatic attitude: It is rational to opt for those changes which imply the slightest perturbation within our system of knowledge as a whole in order to accommodate this system to new experience. Hence, this position implies not only that experience cannot confirm or refute any statement taken in isolation, but also that there is no separation between science and philosophy in the sense of metaphysics. Paying tribute to both Duhem and Quine, confirmation holism is often referred to as the Duhem-Quine thesis.

To put the matter in a nutshell, confirmation holism is the claim that experience be it common sense experience, be it scientific experience cannot confirm or refute statements in isolation. What is confirmed or refuted by experience is a whole system of statements and in the last resort the system of our knowledge as a whole. Consequently, (a) there is no separation between empirical statements about the way the world is and statements of logic, which are taken to be true come what may. Furthermore, (b) experience does not determine a unique system of knowledge. There are always rival logical possibilities to account for the same experience.

Although confirmation holism is widely accepted in today's philosophy, a precise conceptualization of this position faces a number of problems. The most important problems are the following two ones:

- What is the methodology of science to which confirmation holism leads? The point of confirmation holism is not a psychological theory about the way in which persons change their beliefs in reaction to experience. The issue is the normative one how we shall change knowledge that is shared in our culture consequent upon new scientific experience. It is granted that there always are several logical possibilities for adapting shared knowledge to new experience. The point at issue is whether there are rational criteria that distinguish particular ways as being the plausible ones, or, ideally, one particular way as the true one. Relativists deny that there are such criteria. Scientific realists, by contrast, are committed to the view that there are such rational criteria, although we may ignore them at present.

- What is experience so that experience can be the way in which a system of knowledge responds to the world? Again, the point of confirmation holism is not a story about how experience causally induces changes to the systems of beliefs of persons. The point is how experience can be a reason for changes to a system of knowledge that is shared by a community. The point thus is how there can be a rational relation between experience and knowledge. Confirmation holism faces the following dilemma: If experience is conceived as a mere sensual happening, it is not intelligible how it can be a reason for changes to a system of knowledge. If, however, experience is conceived as being conceptual itself and thus as consisting in observation statements, it is itself part of the system of knowledge. How can it then exercise a check on a system of knowledge?

2.2 Holism about justification

Holism about justification can be seen as one answer to the last question. The claim is that (a) only other statements or beliefs can justify a statement or a belief and that (b) a statement or a belief is justified if and only if it coheres with other statements or beliefs. Holism of justification therefore is a coherence theory of justification. According to this position, insofar as experience is relevant to knowledge, it is itself conceptual and consists in observation statements. These statements are acquired without making any inferences. But they are not immune to revision, because they are part and parcel of our system of knowledge. They exercise a check on knowledge in the sense of general statements from within the system. The view thus is that our knowledge as a whole is one coherent system that relates to the world by including observation statements.
There are two ways of conceptualizing holism about justification: One can say that coherence is in the first place a property of a system of knowledge as a whole. If the justification of a statement that is called into question consists in showing that this statement is integrated into a coherent system of statements, then one can maintain that justification is, like coherence, a property which is, strictly speaking, a property only of a whole system of statements. Nonetheless, the property of justification of the whole indicates the way in which its parts that is, single statements are related with each other as regards justification. This property of the whole indicates in how far its parts cohere with one another, although the property of justification does not apply to single statements. Such an account of justification thus moves from the coherence of the overall system to the justification of that system and from there to the justification of particular statements by virtue of their membership in the system.

However, one can also conceptualize holism about justification in such a way that coherence is not a property of a whole system in the first place, but the way in which single statements fit together with other statements in a system of statements. In this case, justification is a property of single statements in the first place, albeit a relational one, consisting in relations to other statements within a system of statements. The system as a whole is justified, because its parts have the property of being justified by cohering with one another.

### 2.3 Semantic holism

Semantic holism is the view that statements or beliefs do not have meaning in isolation, but only in the context of a whole system of beliefs or statements and finally the context of our system of knowledge as a whole. Quine proposes both confirmation holism and semantic holism in "Two Dogmas of Empiricism". He bases the link between confirmation holism and semantic holism on a verification theory of meaning that he adopts from logical empiricism: the meaning of a statement consists in the method of its confirmation. Consequently, if a statement cannot be confirmed in isolation, it does not have meaning in isolation either. If one takes a verification theory of meaning for granted and if one maintains that confirmation applies only to a whole system of statements, then one is committed to the conclusion that only a whole system of statements has meaning. According to Quine, the unit of empirical significance is in the last resort the whole of science.

Quine conceives both confirmation holism and semantic holism in such a way that confirmation and meaning are in the first place properties of a whole system of statements and in the last analysis properties of our system of knowledge as a whole. Smaller units of statements down to single statements have the properties of meaning and confirmation only derivatively from the whole. That is to say: meaning and confirmation as properties of the whole indicate an internal differentiation within the whole. They indicate how its parts (smaller units down to single statements) are related with one another with respect to meaning and confirmation, although it is not the case that these parts have a meaning and a degree of confirmation each.

Confirmation holism and semantic holism do not imply semantic holism. One can endorse holism with respect to the confirmation of beliefs or statements, but maintain that beliefs or statements have a meaning each independently of one another. In fact, most philosophers today approve of confirmation holism, but many have reservations about semantic holism. Moreover, Quines way of proceeding from confirmation holism to semantic holism is no longer accepted today, because it is based on a verification theory of meaning. In the course of the downfall of logical empiricism, verificationism about meaning has lost much of its original appeal. The most important argument today for semantic holism is inferential role semantics. The idea in inferential role semantics is this one: the meaning of a belief or a statement is its inferential role in a whole system of beliefs or statements. This role consists in the beliefs or statements that a belief or a statement of a given type implies, supports or excludes.
Inferential role semantics leads to a different conceptualization of semantic holism than the one that Quine proposes. This semantics does not deny that it is single beliefs or statements that have meaning in the first place. Indeed, a whole system of beliefs or statements does not have the property of meaning, because it does not have an inferential role as a whole. The point of inferential role semantics is that the meaning of a belief or a statement is a relational property: it consists in inferential relations to other beliefs or statements within a whole system of beliefs or statements.

However, inferential role semantics is not automatically a semantic holism. It is a version of semantic holism if and only if one subscribes to the following claim; this claim is usually based on Quines criticism of a separation between analytic and synthetic statements in "Two Dogmas of Empiricism": The inferential context that is the meaning of a belief of the type \( p \) is not closed by means of those beliefs which \( p \) entails analytically (or by another means). If there were such a closure, a system of beliefs or statements would not be a holistic system with respect to meaning, because there would be parts of such a system that are self-sufficient as far as meaning is concerned. Hence, inferential role semantics is a semantic holism if and only if the inferential context of a belief of the type \( p \), which is its meaning, is conceived as being open-ended, comprising in an indirect way in the last resort all the other beliefs in the system.

Inferential role semantics faces a number of difficulties. The most important problems are the following two ones:

- There is no detailed elaboration of an inferential role semantics to date. The objection therefore is that "inferential role" is a vague notion that cannot account for meaning.

- What is the system of beliefs or statements to which inferential role semantics is meant to apply? If it is the system of beliefs of each person, then the problem is how two or more persons can communicate by sharing some of their beliefs without having to share all their beliefs. Since no two persons have the same system of beliefs, the inferential role of a belief of the type "Electrons have negative charge" in the system of beliefs of John is different from the inferential role of a belief of the type "Electrons have negative charge" in the system of beliefs of Carol. Consequently, if meaning is inferential role, a belief of the type "Electrons have negative charge" does not have the same meaning for John and Carol. Moreover, the acquisition of a new belief such as the belief that it is raining here and now changes the inferential role of all the other beliefs in the system of beliefs of a person, however slightly.

One strategy to alleviate these objections is to introduce a distinction between two sorts of content of our beliefs: a narrow content to which semantic holism applies, and a wide content that is exempt from holism, because it includes the reference to things in the world. People communicate by sharing the same wide content (reference), while meaning in the sense of narrow content depends on the belief system of each person.

Another strategy to meet these objections that has become a focus of discussion recently consists in conceiving inferential role as a social role. That is to say: the inferential relations of a belief or a statement of a given type are determined by social practices. A social pragmatics is to make the notion of inferential role more precise. Furthermore, if inferential role is not a matter of the systems of beliefs of single persons, but a social affair, the problem how two or more persons can share some of their beliefs does not arise. This strategy links up semantic holism with social holism.

2.4 Rule-following and social holism

Social holism is the claim that in order to have beliefs with a determinate conceptual content, a person has to be a member of a social, linguistic community (see, Holism in the Sciences, section 3). The
main argument for this claim stems from the rule-following considerations that go back to the Philosophical Investigations of Ludwig Wittgenstein (1889-1951). Consider a concept \( F \). Let \( F \) be a one place concept and a basic concept in the sense that it is not regarded as a function of other concepts. For instance, the concept "blond" is conceived as being derived from the concepts "hair" and "yellow", whereas these latter concepts are not conceived as being derived from other concepts. If a person masters a concept \( F \), she has the capacity to apply this concept to an indeterminate number of new situations by forming beliefs and uttering statements of the type "This is \( F \)". In other words, if a person masters a concept, she follows a rule that determines what is correct and what is incorrect in employing the concept in question. Thus, the rule determines which concept the person masters and, consequently, what the beliefs in which the concept in question is employed mean.

However, any finite thinking being applies any rule only finitely many times. Furthermore, any mental representation of a rule (such as a mental idea or the mental act of grasping an abstract object) or any implementation of the rule in dispositions to behavior is finite, too. Wittgenstein argues that any such finite entity cannot determine which one is the rule that the person follows. Each mental or physical candidate for a meaning-fact therefore fails to account for the rule-following capacity of a person: any alleged mental or physical fact of meaning satisfies an infinite number of meaning-rules. The problem of rule-following hence is this one: How can a finite thinking being follow a particular rule and thus form beliefs with a determinate meaning? Two aspects of this problem have to be distinguished:

- the \textit{infinity problem}: How can a finite sequence of whatever items instantiate only one rule rather than infinitely many rules? The challenge is: There are infinitely many possible ways of continuing any finite sequence in any new situation. Each of these ways is in accordance with the rule that the sequence instantiates under some interpretation of what the rule is.

- the \textit{normativity problem}: What determines which is the correct manner to continue a finite sequence in such a way that a person can follow a rule (so that she has a distinction between following the rule correctly and following it incorrectly at her disposition)? The challenge is: For any finite sequence and for any new situation of continuing the sequence in question, the correct way to go on is not determined.

The conclusion that Wittgenstein draws from the problem of rule-following is that we cannot conceive the meaning of our beliefs as some sort of a predetermined fact because it is a physical fact, be it a mental one. There is meaning only to the extent that there are persons who have beliefs with a determinate meaning. The main argument for social holism is that by focusing on social practices, normatively described, we can avoid the indeterminacies that the problem of rule-following reveals. Social practices are necessary and sufficient in order to (a) determine a meaning for the beliefs of a person given the infinitely many logically possible meanings of any finite sequence and (b) enable a person to have a distinction between correct and incorrect rule-following at her disposal. The idea hence is that by conceiving inferential relations among beliefs as being socially determined, we can show how our beliefs have a determinate meaning. Social holism has gained support in the last two decades, because it is perceived as a means to overcome the challenges to the determinacy of meaning.

There are three types of views about the social practices that determine meaning in the literature:

- At the one end of the spectrum are views that maintain the following: Not only can these practices be described only in normative vocabulary, but also it is not possible to give any further explanation of the norms that are embodied in these social practices.

- At the other end of the spectrum are views according to which it is possible to naturalize these social practices despite the problem of rule-following; that is, a reduction of the normative description of these practices to a description in the vocabulary of the natural sciences is in principle possible.
A middle position is the view that although no reduction is possible, one can reconstruct these normative practices on the basis of our biological nature.

To give a more precise idea of these social practices, let us briefly consider one possible way that such a reconstruction may take. Let us assume the following: Although any finite sequence can be continued in infinitely many different ways, for any finite thinking being there usually is one specific way in which this being is disposed to continue a given finite sequence. All the indeterminacies that the problem of rule-following brings out apply to the description of any such disposition. Nevertheless, the notion of certain biological dispositions is necessary to get a social theory of meaning off the ground. Let the dispositions of persons who have the same biological equipment and who share a physical environment include a disposition to coordinate one's behavior with the behavior of one's fellows. On this basis, one can say the following: Owing to this latter disposition, persons react to each others actions by applying sanctions in the sense of reinforcements or discouragements. Sanctions make available for a person a distinction between what a person takes to be correct or incorrect and what is correct or incorrect in the light of others. Over and above that, sanctions are a means to come to conditions under which persons agree in their ways of continuing a given sequence of examples, that is, normal conditions. In the case of agreement, sanctions reinforce the dispositions of persons in the way in which they react to their environment. In the case of disagreement, sanctions in the form of discouragements trigger a process of finding out in practice the obstacles in the persons or in the environment that prevent agreement. Sanctions thus induce a process of mutual adjustment that leads to convergence. Once conditions under which persons agree are filtered out, the rule is the point of convergence of the persons in question in their ways of continuing a given finite sequence of examples. These social practices do not determine single rules and thus a meaning for single types of beliefs in isolation. They determine a meaning for a belief of one type together with determining a meaning for beliefs of other types that constitute an inferential context for a belief of the type in question.

The argument for social holism from the determinacy of meaning makes a case for a social holism that focuses on social relations among individuals. This argument does not deny that it is in the first place individual persons who have beliefs. If a whole community is said to think and act as well, this is a metaphorical use of the notions of thought and action. This conception is based on Ithou relations among individuals correcting each others actions. It does not accord a special ontological status to the community: The communal "we" can in principle be reduced to descriptions in terms of "Ithous". For the purpose of a systematic reconstruction of social practices, one can start with considering a few individuals going through the process sketched in the preceding paragraph and then imagine ever more individuals joining in so that this process is open-ended. The point of the social holism that this argument establishes is that interactions with other individuals that thereby constitute a community are necessary for a person to have beliefs with a determinate meaning. The extension of the community can be conceived as open-ended. It does not have to be limited to those people who speak the same language; for there can be social practices of translation between different languages. In the last resort, one can envisage social practices which constitute one community that encompasses all human beings.

Social holism implies that a person considered in isolation cannot have beliefs with a determinate meaning. The stress in this claim is on "considered in isolation". This cautious formulation is to make sure that a physically isolated person may follow rules. Although physically isolated, the person can continue to be a member of a social community. The argument for social holism under consideration does not imply that if a person chooses to live as a hermit or if she is kept in solitary confinement, she no longer has beliefs with a determinate meaning. The condition "considered in isolation" refers to the absence of any social community of which the person in question can be considered a member.

The main challenge to the sketched argument for social holism is that the interactions of a community of thinking beings are finite too. It therefore seems that the problem of rule-following can be repeated...
on the level of the community. The reply that supporters of social holism can give to this objection consists in specifying the sense in which social practices can solve the problem of rule-following. Recall the normativity aspect of that problem:

1) For any finite sequence and for any new situation of continuing the sequence in question, it is not determined what is the correct way to go on.

The argument for social holism sets out to block the move to this conclusion. For this argument is to show that for any situation with which the people in a community deal in their ordinary practices it is determined what is the correct way to go on. Determining in the assessments of each others actions on the basis of each ones dispositions a norm (rule) that is binding on each of the persons in question fixes what is correct to do for an indefinite number of situations. However, going beyond the ordinary practices with which the people in a given community deal, there is for any finite sequence of actions a margin conceivable beyond which the correct way to go on is indeterminate. For any one concept, it cannot be excluded that a community will confront such a margin.

In such an extraordinary situation, a further determination of the norm has to be carried out by means of the mentioned process.

Hence, the argument for social holism rejects the indeterminacy conclusion (1) in the following way:

2) For any finite sequence, there are indefinitely many new situations of continuing the sequence in question for which the correct way to go on is determined.

However, this argument has to concede the following point:

3) For any finite sequence, there is a new conceivable situation of continuing the sequence in question for which the correct way to go on is not determined.

No reconstruction of meaning in terms of the practices of finite thinking beings can achieve a determination of rules beyond the scope of these practices. Consequently, the argument for social holism solves the normativity problem by offering a reconstruction of how persons can have beliefs with a determinate meaning. But it does not solve the infinity problem, that is, the problem whether and how a finite sequence as such can determine infinitely many cases. It only shows how a finite sequence can determine meaning for a community of persons within the scope of their ordinary practices.

The main point of debate among those who accept the sketched argument for social holism is the issue whether social holism is tied to social relativism or whether this position is compatible with realism. What are the implications of a social theory of meaning when it comes to an account of reference and truth? On the one hand, one can maintain that by determining meaning, social practices also determine what kinds of things there are. Consequently, reference and truth is relative to social practices. On the other hand, one can say that a social theory of meaning is only about the way in which we gain access to the world in our beliefs. There may thus be a world that is independent of our beliefs and that determines which of our beliefs are true and which ones are false.

3. Holism in methodology

If a system is holistic, then the methodology of research that is appropriate to study this system has in general to be holistic, too. Thus, since holism is widespread with respect to the meaning, confirmation, and justification of beliefs and intentional attitudes in general, a holistic methodology is
widely considered to be the appropriate means of research in the human sciences. That is to say: beliefs, utterances, attitudes and actions of persons can only be understood in the context of the other beliefs and attitudes of the person in question as well as her social and cultural environment. If this context changes, the significance of an utterance or an action of the same type changes as well. There is some dispute as to how much emphasis shall be put on the social and the cultural environment and how much stress shall be laid on the systems of intentional attitudes of single persons as a whole.

Holism as a methodology for the human sciences is an area in which the Anglo-American tradition of analytic philosophy and the continental tradition of hermeneutics can meet. Hermeneutics as it is known today has been developed in continental Europe science the nineteenth century. The most important work in this tradition is *Truth and Method* by the German philosopher Hans-Georg Gadamer (*1900). In the Anglo-American tradition of analytic philosophy, notably Donald Davidson (*1917) has set out a theory of interpretation that correlates the beliefs of a speaker with an interpreter and an environment that is shared by both.

As regards the natural sciences, the impetus that philosophy gave to modern science is opposed to a holistic methodology. The following quotation from the preface of Thomas Hobbess book *Of the Citizen (De Cive)* (1640) brings this opposition to the point: " for every thing is best understood by its constitutive causes; for as in a watch, or some such small engine, the matter, figure, and motion of the wheeles, cannot well be known, except it be taken in sunder, and viewed in parts (quoted from *The Clarendon Edition of the Philosophical Works of Thomas Hobbes. Vol. 3: De Cive, English version. Edited by Howard Warrender*, Oxford: Oxford University Press 1983, p. 32).

This claim of Hobbes does not only refer to machines. It is characteristic of the view of the object of science that is taken for granted in modern science in general.

The view in question is this one: Apart from atoms in the literal sense (if such things exist), systems of whatever kind and whatever complexity are composed of parts. These parts are characterized by properties that belong to these things independently of one another. In philosophy, such properties are known as intrinsic properties. Hence, in order to understand a system, it is sufficient (a) to know the intrinsic properties of those things that are its parts and (b) to be aware of the spatial arrangement of those things. To the extent that a system is determined at all, it is determined by the intrinsic properties of its parts and their spatial arrangement. As far as our theories about things are concerned, it may be right that these theories have a meaning only in relation to each other, that is, only in virtue of being part of our web of knowledge; and it may be right that these theories can in the last resort be confirmed by experience only taken together. Nonetheless, as far as the objects of our theories of the natural world are concerned, the characteristic properties of those objects are intrinsic, that is, such that they belong to each of these things independently of whether or not there are other things.

Although this view is still predominant, there are areas within the domain of the natural sciences in which this view is challenged. In the environmental sciences in particular, transdisciplinary research methods are called for. Transdisciplinarity implies, among other things, a methodological holism: studies in each field cannot be carried out independently of one another, but have to be conducted in such a way that the connections with other fields are taken into account in each particular study.

### 4. Holism in ontology

Holism in ontology is the claim that some systems in the world over and above intentional and social systems are holistic. Most prominently, it is the claim that the whole world is one holistic system. That is to say: In the last analysis, there is only one independent thing. Everything that exists is a way of being of the one thing. All properties are realized as relational properties or relations within this
one thing. Ontological holism is opposed to atomism. This is the view that the world is composed of an indefinite number of things that are characterized exclusively by intrinsic properties each. Consequently, relations are of minor importance.

Both atomism and ontological holism can be traced back to Greek philosophy. Atomism was mainly developed by Democrit (about 460 to 380 BC) in response to Parmenides (about 500 BC). However, it is doubtful whether Parmenides can be regarded as proposing ontological holism. For the one being that he admits seems to be deprived of any internal structure. Holism, by contrast, is a claim about the internal structure of certain systems. Aristotle (384 to 322 BC) can be taken to defend a moderate ontological holism that is limited to specific systems, notably biological systems. For he maintains that these things do not consist of independent parts. Instead, they are characterized by a principle of internal organization, namely a form.

The most prominent philosophers who propose a comprehensive ontological holism in modern times are Spinoza, Hegel and Bradley. According to Baruch de Spinoza (16321677), there is only one substance. Everything that exists is a mode, a way of being, of that substance. Physical phenomena and mental phenomena are both specific ways of being of the one substance. Georg W. F. Hegel (17701831), by contrast, defends an ontological holism as an objective idealism: There is only one universal mind. All forms of being including physical phenomena are ways in which that one mind develops itself. Francis H. Bradley (18461924) stresses relations. He maintains that all properties are in fact relational. Thus, everything that exists refers in an indirect way to every other thing. Consequently, the realm of being is one holistic system. Whereas ontological holism has been defended throughout the history of philosophy on the basis of a priori arguments from metaphysics and logic alone, in todays philosophy, there are arguments for a sort of ontological holism based on the physics of general relativity and quantum physics (see, *Holism in the Sciences, section 3*).

5. A philosophical characterization of holism

5.1 Holism in contrast to monism and atomism

The task of philosophy is not only to examine the forms of holism in various areas of knowledge, but also to enquire whether these forms can be brought under a general and substantial characterization of holism. This section therefore is to sketch out a philosophical characterization of holism. According to a popular saying, a whole in the sense of a holistic system of whatever sort is more than the sum of its parts. This popular saying states (a) that a whole in the sense of a holistic system has parts and that (b) what turns a whole into a holistic system is that it is more than the sum of its parts. We thus have to distinguish holism from both monism and atomism. Monism is the view that there are certain systems that do not have parts. In the last resort, it is the claim that the world as a whole or the whole realm of being is such a system. The most prominent monism in the philosophical tradition is the above-mentioned position of Parmenides. He maintains that all particular things are mere appearances. The real being is a thing that has neither parts nor any other internal distinctions. Holism differs from monism by admitting parts.

What does it mean to say that a whole in the sense of a holistic system is more than the sum of its parts? Even a heap of sand is more than the sum of its parts, that is, the grain of sands. If one lays out one thousand grains of sands in a row on the floor, one has not created a heap of sand. Grains of sand make up a heap of sand if and only if they are arranged in a specific way, i.e. tied together by certain spatial and causal relations. However, a heap of sand is not a holistic system. Instead, a heap of sand is a common example of an atomistic system. Thus, an atomistic system does not have to be merely a sum of its parts either. A specific spatial and causal arrangement of parts is not sufficient to turn a system into a holistic system.
Whether a system that has parts is an atomistic system or a holistic system (or, perhaps, neither) does not depend on the way in which the parts are arranged, but on their nature. A heap of sand is a paradigmatic example of an atomistic system, because its parts are grains of sand independently of whether or not they are arranged in such a way that they constitute a heap of sand. Being arranged in such a manner that they constitute a heap does not touch upon the nature of the grains of sand. Imagine a possible world in which there is only one thing. That thing can be a grain of sand. Thus, something can be a grain of sand independently of whether or not it is accompanied by other things. Consequently, as regards a holistic system, the "more than the sum of its parts" does not mean a specific spatial or causal arrangement of the parts, but that being part of the system touches upon the nature of the thing in question. The following sub-section will offer an explanation of what this might mean.

5.2 Properties that make something a part of a holistic system

Let us first examine the following question: What is a part of a system, which is a candidate for a holistic system? The "more than the sum of its parts" in the popular characterization of a holistic system cannot refer to any odd parts of a system that is a candidate for a holistic system, given that the notion "being a part of" is transitive according to standard logic. Imagine that a social community is a holistic system. Carol, a human, is a part of such a community. Legs, arms, bones and the like, in turn, are parts of Carol. But we do not want that such things are parts of a social community, too. Carol is a part of a social community, because she has the capacities to think and to act. Bones and the like are not parts of a social community, because they do not have these capacities. In order not to clash with the logical notion of a part, which is transitive, let us speak of constituent parts of a system or constituents, for short. Whenever the term "parts" is used in the following, constituent parts are intended. Human beings, in distinction to their parts, are constituents of a social community, because they have properties such as thinking and acting. These are the properties that make something a constituent part of a social community, presupposing that there is a suitable arrangement of humans living together.

Let us generalize this point: Consider a system of the kind S. For every S, there is a family of properties that make something an S. These are qualitative or pure properties, because they make something a thing of a certain kind. Qualitative or pure properties are such that their instantiation does not depend on the existence of any particular individual. Properties such as being that individual or having a certain proper name hence do not count as properties of this family. Furthermore, these properties are not disjunctive. That is to say, properties such as "being round or square" are excluded. Last but not least, the family of these properties can include both non-relational and relational properties. The boundaries of such a family of properties may be vague. Nonetheless, if and only if something has all or nearly all these properties, it is a thing of the kind in question. For instance, if something is a grain of sand, a certain molecular structure as well as a shape, size, and mass within a certain margin count among the family of properties that make something a grain of sand.

Let us apply this notion of a family of properties to the parts of an S. If a system of the kind S has parts, then there is at least one family of properties that make something a part of a system of the kind S. Having such a family of properties is a necessary condition for something to be a constituent part of a system of the kind in question. In order to capture the intuition that the distinction between an atomistic and a holistic system is not about the arrangement of the constituent parts, but touches upon their nature, we have to narrow down the properties that belong to the family of properties that make something a constituent part of an S. We have to exclude those relational properties in which the arrangement with other things consists. We then get to the following notion: There is a family of qualitative, non-disjunctive properties that make something a constituent part of an S in case the thing is arranged with other things in a suitable way. Having all or nearly all the properties that belong to such a family is a necessary condition for something to be a part of an S; it is a sufficient condition in conjunction with the condition of a suitable arrangement with other things.
The condition of a suitable arrangement has to be imposed in order to exclude those properties for which it is trivial that something can have them only by being part of a complex system. For instance, a human being can exercise a social role such as being a judge, or being a salesman only by being part of a social system. Social roles are arrangement properties. Pointing out social roles is not sufficient to make a case for a social community being a holistic system. The question is whether properties that are the prerequisite for exercising a social role such as the properties of thinking and acting require social relations. By excluding from the mentioned family of properties those relational properties in which the arrangement with other things consists, we pick out the properties that underlie the arrangement. There is a holistic system if and only if these properties are relational as well in the sense that one thing can have these properties only if there are other things together with which this thing is arranged in such a way that there is an S. By way of consequence there is a substantial case of atomism if and only if something can have these properties independently of whether or not there are other things with which this thing is arranged in such a way that there is an S.

The family of properties that make something a constituent of an S in case there is a suitable arrangement does not have to be the same for each constituent of an S. For instance, if S is an organism, there are various families of such properties. The family of properties that make something a heart differs from the family of properties that make something a kidney, etc. If an organism is a holistic system, then we have an example of a holistic system whose constituents instantiate properties of different families.

Turning to another candidate for a holistic system, let S be the system of beliefs of a person. Take a constituent of such a system, that is, a belief such as, for instance, "Most ravens are black". This belief has properties like meaning, a truth-value, a degree of confirmation, a degree of justification, etc. These are the properties that make something a belief and a constituent of a system of beliefs in case there is a suitable arrangement with other beliefs. The holist and her opponent can agree on this family of properties. The point of their disagreement is whether these properties are relational in the following sense: can anything have these properties independently of whether or not it is arranged with other beliefs so that there is a system of beliefs?

Let us elaborate on what it means that something can have the properties that make something a constituent of an S, given a suitable arrangement, only if there are other things. What kind of dependency is expressed by "can" here? Causal relations are not sufficient to characterize the sort of dependence that is at issue among the parts of a holistic system. Causal relations can provide for an arrangement of things so that these things constitute a holistic system. But the adjective specifying the kind of dependence among the constituent parts of a holistic system should have another meaning than the adjective "causal". Consider again the view that a social community is a holistic system: No one denies that the development of thought and rationality in a human being causally depends on her social environment. But that commonplace does not amount to social holism on pain of trivializing holism and turning social atomism into an absurd position.

In distinction to causal dependence, philosophers speak of ontological dependence. The notion that is needed here is generic ontological dependence. The idea is that there can be no individual of a certain kind unless there is some other individual of a certain kind. Thus, any individual that is F is, with respect to its being F, ontologically dependent on there being some other individual that is G. Employing the notion of possible worlds, generic ontological dependence says that there is no possible world in which there is something that is F without there being some other thing that is G. It is allowed that F and G stand for the same property. We then get to properties of which it is not possible that there is only one instantiation in a world. For instance, if a system of beliefs is a holistic system, it is not possible that there is only one item that has meaning, but there have to be several items that have meaning and that constitute a system of beliefs.

A holistic system can now be characterized as follows: Consider a system of the kind S and its
constituent parts. For every constituent part of an \( S \), there is a family of qualitative, non-disjunctive properties that make something a constituent part of an \( S \) provided that there is a suitable arrangement. An \( S \) is a holistic system if and only if the following condition is satisfied by all the things that are its constituent parts: With respect to some of the properties that belong to such a family of properties, a thing is ontologically dependent in a generic way on there being other things together with which it is arranged in such a way that there is an \( S \).

This is a fine-grained conceptualization of a holistic system: If there are some properties that satisfy this condition, the system is holistic with respect to these properties. With respect to all those properties within the mentioned family of properties that do not satisfy this condition, the system is atomistic. Thus, one and the same system can be holistic with respect to some of the mentioned properties, but atomistic with respect to others of them. For example, one can maintain that a system of beliefs is a holistic system only with respect to confirmation or justification, but not with respect to meaning. That is to say: A belief is ontologically dependent on there being other beliefs with which it is arranged in a system of beliefs insofar as it has a degree of confirmation or justification. But confirmation holism and justification holism do not imply semantic holism, that is, the thesis that a belief is ontologically dependent on there being other beliefs insofar as it has meaning. If and only if one maintains that, conversely, semantic holism implies confirmation holism or holism about justification, one can say that these different forms of holism in the same field amount to different degrees of holism in that field: in this case, semantic holism is a stronger form of holism than confirmation holism or holism about justification.

This characterization of holism hence includes also the notion of holistic properties. Holistic properties are relational properties. A relational property is holistic if and only if it satisfies the following two conditions: (1) Instead of being an arrangement property, it belongs to the family of properties that make something a constituent part of an \( S \) provided that there is a suitable arrangement. (2) Nothing can instantiate this property unless there are other things with which this thing is arranged in such a way that there is an \( S \). For example, meaning is a holistic property if semantic holism is right and a system of beliefs is a holistic system.

5.3 Bottom-up and top-down conceptualizations of holism

Given the described general characterization of a holistic system, two types of conceptualizations of holism can be distinguished. A bottom-up conceptualization of holism begins with the constituents of the holistic system in question and the family of properties that make something a constituent of such a system, given a suitable arrangement. The point then is that something can have some of these properties only if there are other things with which it is arranged in such a way that there is a whole of the kind in question. This conceptualization focuses on the constituent parts and their properties. As such it does not say anything about the properties of the whole. The whole may have some of the properties that belong to the family of properties that make something a constituent, too. But if the whole has some of these properties, it has them, because its constituent parts have them.

A case in which a bottom-up conceptualization of holism is appropriate is the view that a social community is a holistic system: The constituent parts of such a system, individual persons, have the properties of thinking and acting. It is only in a metaphorical sense that one can say of a community as a whole that it thinks and acts. Furthermore, inferential role semantics is a bottom-up conceptualization of semantic holism: Meaning consists in the inferential relations among the parts of a system of belief. The system as a whole does not have a meaning, because it does not have an inferential role as a whole.

By contrast, a top-down conceptualization of holism begins with the whole and properties that are characteristic of the whole. Holism then is distinguished from monism in this way: Some of the
properties of the whole specify a differentiation within the whole by introducing properties that make something a constituent of the whole and thus introducing relations among the constituents. Quines way of treating confirmation holism and semantic holism is an example of a top-down conceptualization of holism.

These two conceptualizations of holism are not disjunctive. The mentioned general conception of holism covers both of them, since it focuses on the internal structure of a whole that is a holistic system. The main difference between these two conceptualizations of holism is the way in which they conceptualize the properties that make something a constituent of the holistic system in question.

To conclude, let us come back to the popular saying that a whole in the sense of a holistic system is more than the sum of its parts. The philosophical characterization of holism is able to suggest a precise holistic meaning for this saying. If we interpret this saying in line with the philosophical view set out above, we have to maintain the following: Each of the constituent parts of a holistic system of the kind S is, insofar as it instantiates some of the properties that make it a constituent of an S, given a suitable arrangement, ontologically dependent on there actually being other things with which it is arranged in such a way that there is an S. These properties cannot be taken into account by a description of the properties which the things that are the constituents of an S can have in isolation. What is more, these properties cannot be taken into account by just adding a description of a suitable causal and spatial arrangement to that description either. Therefore, the holistic sense which a philosophical characterization of holism can provide for the saying "The whole is more than the sum of its parts" is not just that the "more than the sum" amounts to the parts being causally arranged in a certain way. This characterization can suggest a significant holistic sense for that saying: the "more than the sum" of the organization of the system consists in the parts having themselves holistic properties.

Related Chapters

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Glossary

**Atomism**: a system is atomistic if and only if its constituent parts have the properties that are characteristic of these things independently of one another.

**Confirmation holism**: experience confirms or refutes not single statements, but always a whole system of knowledge.

**Holism**: a system is holistic (and thus a case of holism) if and only if its constituent parts have some of the properties that are characteristic of these things only within the whole.

**Holism of justification**: beliefs or statements are justified if and only if they cohere with other beliefs or statements in a whole system of knowledge.

**Inferential role semantics**: the meaning of a belief or a statement p consists in the inferences to other beliefs or statements that p supports within a whole system of beliefs or statements.

**Meaning**: the meaning of a belief or a statement is its content, that is, what the belief or statement says.

**Methodological holism**: systems of certain kinds (e.g. systems of beliefs of persons) cannot be understood by considering their parts independently of one another.

**Monism**: there is only one being that does not have parts or any other internal differentiation.

**Ontological holism**: the whole world is one thing in the sense of one holistic system. Everything is a way of being of this one thing. All properties are realized as relations within this one thing.

**Ontological dependence**: Fs are ontologically dependent on Gs if and only if it is not possible that
there is something that is \( F \) without there being some other thing that is \( G \).

**Rule-following:** if a person masters a concept, she follows a rule that determines what is correct and what is incorrect in applying the concept.

**Semantic holism:** the meaning of a belief or a statement consists in inferential relations to other beliefs or statements in a whole system of beliefs or statements.

**Social holism:** a human being is a person in the full sense of the term (that is, a being that has beliefs with a determinate content) only in virtue of being part of a community of thinking beings.

**Bibliography**


**Biographical Sketch**