

Is Compositionality compatible with Holism?

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Is the principle of semantic compositionality compatible with the principle of semantic holism? The question is of interest, since both principles have a lot that speaks for them, and since they do seem to be in conflict. The view that natural languages have compositional structure is almost unavoidable, since linguistic communication by means of new combinations of words would be virtually incomprehensible otherwise. And holism too seems generally plausible, since the meaning of an expression is directly connected with the way that expression interacts with other's to determine the meaning of more complex expressions. So, if these principles are in conflict, we have a problem.

In this paper I consider three cases for incompatibility. I argue that each has an acceptable solution. The first is a problem about the order and mode of determination of the meaning of complex expressions. It is familiar, and so are the proposed solutions. The second is a problem about the individuation of meanings. This problem is also well known, thanks to the writings of Fodor and LePore. The solution proposed here is not as well known, although in essence it has been suggested before. The third problem concerns the explanatory role of compositionality. To my knowledge, it has not been considered so far, but it is related to a problem raised by Michael Dummett, concerning learnability.

Preliminaries

On the face of it, the principle of semantic compositionality flatly contradicts the principle of semantic holism. The former implies that the meaning of a complex expression depends only on the meanings of its parts, while the latter implies that it also depends on the meanings of other expressions in the language. Is there a genuine inconsistency here, or just a tension or resolvable conflict, or perhaps not even that? In order to assess the situation you must of course be careful about what you mean by "compositionality" and by "holism". Both these terms can be defined

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in detail in many ways. In this paper I shall keep a fairly intuitive understanding of them, and add more precision only insofar as the discussion requires.

Before proceeding with these concepts I shall clear one point. When I talk about compatibility between compositionality and holism I mean compatibility as regards the same *meanings*, or the same *aspects* of meaning. Of course you can be a holist about e.g. some version of *conceptual role* and a compositionalist about *truth conditions*, given that these are taken to be distinct aspects of meaning.¹ There will then be no problem whatsoever about compatibility, but maybe a question whether there is any interesting relation between these aspects.²

Compositionality. By “the principle of semantic compositionality” (Compositionality, for short) I shall, to begin with, understand just what is expressed in the standard formulation:

(C) The meaning of a complex expression is determined by the meanings of its parts together with its mode of composition.

(C) can be interpreted in several ways. When I say that Compositionality is compatible with (semantic) holism my claim is that this holds for at least one *reasonable* interpretation of (C).

Holism. As is more than well known, many different theories can be understood under the heading of “semantic holism”. I shall not here intend this term as Fodor and LePore do.³ Rather I shall try to hold on to a more traditional and intuitive sense. As I understand it, the principle of

1. Hartry Field, 1977, was perhaps the first to suggest this combination. Of course, compositionality is not one of the main concerns of that paper. A similar line is taken by Ned Block, who combines holistic narrow content and truth conditions, but Block does not really claim that these are different parts or aspects of (the same) meaning. See Block 1986, 1993.

2. This question is pressed in Fodor and LePore, 1992, pp. 170-72.

3. Fodor and LePore, 1992, defines “holistic property” to be a property such that, if one entity has it, then a lot of entities have it (p 2). Semantic holism (meaning holism, content holism), as they understand it, is then the doctrine that generic semantic properties, like the property of having meaning, are holistic (p 5).

I do not follow their usage, since I am interested in the principles of determination of meaning, or content, of expressions of natural, or mentalese, languages (and they, the expressions, are a lot to begin with). I am not here concerned with the possibility e.g. of having just a single, or just a few, beliefs.

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semantic holism is a principle of *determination* of meaning. It is a principle concerning the general *pattern* of determination. In order to conform to the format of (C) we can state the principle of semantic holism (Holism, for short) as

(H) The meanings of expressions in a language L are determined *together*, by a *totality* of relations between expressions in L

I intend (H) to be understood along the following lines. Let us think of a theory of meaning for a language L as a theory that accomplishes two things. First, it specifies non-semantic properties of, and non-semantic relations between, expressions of L, and second, it specifies the principles according to which the meanings of expressions of L are determined by, or supervene on, those non-semantic properties and relations. Then, such a theory is *Holistic* if, and only if, two conditions are met.

First, if some particular non-semantic property *A*, or relation *R*, is relevant for determination of meaning, then the theory must specify the *whole* extension (as far as L is concerned), of *A*, or *R*. The whole extension, and not just some selected subset, is relevant for meaning determination.

Second, the the meanings get determined *together*. They get determined together because assignments of meanings to different expressions are *interdependent*. What meaning expression can have depends on what meaning expressions and can have, and *vice versa*. Many combinations of meaning assignments are excluded. In the extreme case no two expressions of a language can have their meanings determined independently of each other. And *at least* Holism requires that there will be widespread interdependence between expressions that do not share any constituent parts, e.g. between syntactically simple expressions. This will ensure that no single non-semantic fact about some expression by itself can determine any meaning, and that no single expression can get its meaning determined irrespective of the rest of the language.

Of course, this is still an extremely rough characterization of Holism. It will become a bit

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better, for in section 2 I shall provide an example of a kind of Holistic theory.

As before, my claim is that there is a *reasonable* interpretation of (H), as elaborated above, which is compatible with Compositionality. I do not deny that there are versions of compositionality and of holism which are genuinely incompatible. But I think that the versions of that I argue to be compatible are plausible for independent reasons.

Expressions. By “expression” and related terms (“sentence” etc.) I intend here not just syntactic objects of public languages. The discussion is concerned not only with holism about public languages but also with holism about the contents of attitudes (or other inner states that might be relevant). Thus if some type of inner state, like the occurrence a mentalese sentence, does have content, and if it also holds that this state can be identified irrespective of content (e.g. as a neurophysiological state), then there can be a holistic theory about the determination of content of that type of state, and then I intend the present discussion to be relevant. That is, I would include that inner state in the extension of, what I here understand by, “expression”.

1. First problem: locality and order of determination

The first problem, which is well-known, is that there seems to be a conflict between Compositionality and Holism over the *mode and order of determination* of meaning.

Compositionality seems to imply that the meaning of a complex expression is determined *locally*, by nothing else than what is internal to it, i.e. the meaning of its parts and its mode of composition. So the parts must have a meaning *prior* to the complex expression itself.

But this is apparently inconsistent with Holism. Holism claims that the meanings of expressions, including complex expressions, are determined by relations to other expressions in the rest of the language, not only by what is internal to it. And Holism claims that expressions get their meanings determined together, by common factors, and so the parts of a complex expression apparently cannot have their meanings determined first.

Holism and Compositionality *can* be understood as incompatible on this count. But there are

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at least two ways of resolving the conflict, the first one depending on how we understand Compositionality, the second on how we understand Holism as well as Compositionality. The first one is of a formal nature, and I do not favour it, since we need more than formal compatibility for a plausible combination of compositionality and holism.

Anyway, the first way of resolving the conflict depends on how we understand “determined by” in (C), our statement of Compositionality. The interpretation which generates a conflict is a metaphysical interpretation. Understood metaphysically, Compositionality involves a claim about *order* of determination, and about the factors which metaphysically generate the meaning of complex expressions. So understood, the parts of a complex expression must have meaning prior to the determination of meaning of the complex expressions, because it is the meaning of those parts, together with mode of composition, which actually *produces* the meaning of the complex expression.

But Compositionality *need* not be understood as a metaphysical principle of meaning determination. Holism, as I have presented it, is such a principle, but Compositionality can be taken as a purely mathematical principle. We can interpret “determined by” in (C) as expressing only a *functional relation*. On this interpretation we understand Compositionality as the requirement that there be a *function* which takes the meanings of the parts, and mode of composition, as arguments and yields the meaning of the whole as value. The function is just a mathematical entity, neutral as regards the metaphysics or the epistemology of meaning determination. The function need be nothing more than a set theoretic many-one relation. It is compatible with any order and pattern of meaning determination.

One way of taking the formal condition of Compositionality is to understand it as requiring the existence of a *homomorphism* from a syntactic algebra to a semantic algebra (See Montague, 1974, pp. 227-28). This homomorphism is a function h assigning semantic values to syntactic items. The requirement is that for each syntactic function f from expressions to (more complex) expressions, there shall be a corresponding semantic function g from semantic values

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to semantic values such that

$$h(f(s_1, \dots, s_n)) = g(h(s_1), \dots, h(s_n))$$

No metaphysics or epistemology of priority of meaning is implied. This way of resolving the apparent conflict with Holism is quite well known (e.g. Dummett, 1991, p. 225; Block, 1993, p. 6). It works just as well for resolving the conflict between Compositionality and various *molecular* theories of meaning, i.e. theories which take sentences to be the primary bearers of meaning. According to molecularity, individual words and other subsentential expressions get their meaning determined derivatively, according to the role they play in sentences. Again we have a possible conflict over the mode and order of determination of meaning, between Compositionality and Molecularity. That conflict, too, is resolved by way of understanding Compositionality as above, i.e. as a purely mathematical principle.

But this is not an attractive solution. As I see it, our best reason for believing in Compositionality as concerning natural languages is that it gives us an explanation of the success of actual linguistic communication. But such an explanation needs more than just a *formal* fulfilment of the requirement of Compositionality. There are various ways of fulfilling such a formal requirement which are quite useless when it comes to giving an account of communication (See e.g. Janssen, 1984, chapter 2, theorem 6.10). Therefore we need a different resolution of the conflict, one which works well with the idea that speakers do understand new sentences through compositional structure.

The other reason why Compositionality need not conflict with Holism, as regards mode and order of determination, is that Compositionality says nothing about how the meanings of the *simple parts* are determined. It is consistent with Compositionality that the meaning of simple expressions are determined in a holistic manner. It *may* be the case, as far as Compositionality goes, that the meaning of any simple expression depends on the meaning of every other simple expression. It does *not*, of course, square with Compositionality, as a principle of meaning

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determination, that the meaning of simple expressions in general depend on the meaning of complex expressions of which they are constituent parts. In this case the dependency relation must be non-symmetric, but as between simple expressions it may be symmetric.

The second question, about this way of resolving conflict, is whether it is compatible with Holism. Our statement (H) requires that expressions in a language get their meanings determined “together”, and this does not appear to square well with assigning priority to simple expressions. And indeed, there are reasonable versions of Holism which are inconsistent with letting the meaning of any expression be independent of the meaning of any other. But there are also reasonable versions for which this does not hold. As I see it, it is the very heart of holism, as a principle of meaning determination, that the meaning of expressions do depend on the meaning of other expressions with which they share no grammatically significant parts, and that this dependency is mutual and widespread in the language. And we can well have holism in this sense if there is mutual dependency only between simple expressions.

It will still hold that the expressions of the language do get their meanings determined together. For suppose that s and s' are two sentences that have no common parts, and that the meaning of s is determined. Since it is determined by the meanings of its parts and its mode of composition, the meaning its parts, and ultimately of its simple parts, must be determined as well. By assumption the meaning of simple expressions are totally interdependent, and so the meaning of the simple parts of s depend on the meaning of the simple parts of s' . Hence these are determined. But, again by Compositionality, the mode of composition of s' , together with the meaning of its simple parts, determine the meaning of s' . So, for any two sentences there are common factors in the determination of their respective meaning. This is a holistic feature, by any standard.

From the point of view of Holism, then, compositional structure is seen as *part of the general pattern* of meaning determination. Meaning does supervene on non-semantic properties and relations, and it is a feature of the supervenience relation, i.e. the relation between supervenient

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semantic facts and subvenient non-semantic facts, that compositional relations hold.

Compositional structure can make simple expressions interdependent in different ways. For instance, it may be that all, or nearly all, members in some particular set of sentences must come out true, whatever they mean. Then, since truth conditions of a sentence is, or depends on, meaning, and since the meaning of a sentence depends on its structure and on the meanings of its parts, the meanings of the parts must *fit together* so as to yield truth conditions which are met. The supervenience relation determines meanings that do fit together. Then the simple parts do not get their meanings determined independently of their contributions to determining the meanings of complex expressions. It does hold, as Holism requires, that the expressions in the language get their meanings determined *together*, by the subvenient non-semantic properties and relations, and, as Compositionality requires, that the meanings of complex expressions are determined through their structure and the meanings of their parts.

In this way compositionality and holism can be seen as reconciled in Donald Davidson's theory of meaning.⁴ First, the meaning, and the structure, of an expression in language L is the meaning assigned to it by the best T-theory (or T-theories, but we can presently ignore indeterminacy) for L. Second, T-theories are *required* to exhibit compositional structure (hence, the language must have compositional structure). And third, T-theories can be tested only as *whole theories* against the *totality* of evidence.⁵ No part of a T-theory, concerning only a fragment of the language, can be verified or falsified in isolation. This confirmation holism of the T-theory corresponds to semantic holism of its subject matter.

The basic evidence, in Davidson's case, is a speaker's set of *holding true* attitudes. Some sentences are held true absolutely, some in particular types of situation, some, perhaps, on condition that others are also held true. The property of being held true by a speaker, or being held true in a certain range of situations, is a non-semantic property of a sentence. That a sentence is

4. I base this on early papers, such as Davidson, 1984a and 1984b.

5. These conditions correspond, in reversed order, to my two conditions on Holistic theories stated in the preliminary remarks.

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held true by a speaker is a *consequence* of semantic properties of the sentence, and of what the speaker believes, as Davidson has pointed out in many places, but it is itself a non-semantic fact. Therefore facts of this kind can serve as facts which semantic facts supervene on.⁶

So I do think that in Davidson's philosophy of language we have an example of a combination of Compositionality and Holism which resolves the potential conflict. It is more of an open question whether Davidson would prefer the first or the second way of resolving it. His arguments against the conventionality of language (e.g. in Davidson 1984c) is a reason, I believe, for attributing to him a preference for the first way.

Another theory which combines holistic and compositional ingredients is due to Gilbert Harman (Harman, 1973). Harman writes both that the representational character of a sentence in the inner language "depends on its potential role [...] in the functional system" and also that it "depends on its truth conditional structure" (Harman, 1973, pp. 60 and 82), but I am not clear about how Harman thought that the potential conflict between these two ingredients was avoided.

2. Second problem: the individuation of meanings

In section 1 I presented two ways of solving the first problem of incompatibility between Compositionality and Holism. Both ways can be characterized by saying that Compositionality is made to serve the interests of Holism. Compositional structure becomes part of the Holistic pattern of meaning determination. But this solution may itself lead to a new problem, concerning the individuation of meanings. The second problem is whether the combination of Compositionality and Holism is compatible with reasonable, and plausible, assignments of meanings to expressions. I shall argue that it is.

This second problem is well brought out by Fodor and LePore in their discussion of Concep-

6. It is, of course, odd to say that some non-semantic F fact is a consequence of a semantic fact F' which supervenes on F. The simplest way of removing the oddity is to think of the consequence relation involved as a purely formal relation, something which again is part of the pattern of meaning determination.

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tual Role Semantics (Fodor and LePore, 1992 and 1994). Fodor and LePore consider what they call “Inferential Role Semantics” (IR), a version of Conceptual Role Semantics. According to IR, the meaning of an expression consists in its *inferential role*. The inferential role can be identified with the set of accepted inferences crucially involving the expression. For instance, the inference

$$p \ \& \ q \quad p$$

is clearly an inference crucially involving ‘&’. However, if Holism is added to IR, we get the result that *every* accepted inference belongs to meaning. Then, suppose that a speaker accepts the inference schema

$$(1) \quad \text{brown cow } x \quad \text{dangerous } x$$

(Fodor and LePore’s example; the variable will be omitted henceforth), since he thinks that brown cows are dangerous. According to holistic IR, this means that it is part of the *meaning* of ‘brown cow’ that this inference is valid.

But the requirement of Compositionality now means that the meaning of ‘brown cow’ shall be a function from the meaning of ‘brown’ and the meaning of ‘cow’, according to the semantic significance of the modifier-head construction. But this seems absurd. The speaker need not accept either of

$$(2) \quad \text{brown} \quad \text{dangerous}$$

$$(3) \quad \text{cow} \quad \text{dangerous}$$

and so there is no *natural* assignment of meanings to the constituent parts of ‘brown cow’ which yields the desired meaning of the complex expression. What we have here is apparently a *reductio ad absurdum* of Holistic IR.

And Holistic IR is just one example. The general problem is that if Compositionality shall be

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made to fit the requirements of some Holistic theory, then the result will be that we must assign either strange meanings to components of complex expressions, or strange semantic significance to syntactic constructions, or both. The result *seems* to be that Holism and Compositionality, although formally compatible, can't be combined in any reasonable way.

But so far the example suffers from a somewhat sketchy presentation. Further, Fodor and LePore has assumed that meaning is to be *identified* with inferential role. Holistic inferential role would require only that meaning shall be *determined* by, or supervene on, inferential role. I shall therefore recast the example in terms of the present conception of Holism. This will provide us with an example, even if a crude example, of a kind of Holistic theory.

Holistic inferential role. We are interested in the meaning of expressions in a language L (as) used by a speaker S . L in itself is just syntax. L is, or contains, an infinite number of sentences and other complex expressions. The complex expressions have syntactic structure: they have other expressions as constituent parts.

Now we have a (subvenient) relation I . This is a relation holding between expressions (or, more generally, between sets of expressions and expressions). The expressions are either sentences, or else predicates (property expressions). I holds between α and β just in case S accepts the inference from α to β . Thus in the extension of I we find 'snow is white and grass is green', 'snow is white' as well as 'brown cow', 'dangerous'.

Secondly, we have a (subvenient) relation C which holds between two expressions just in case the first is a constituent part of the second. Thus 'brown', 'brown cow' belongs to the extension of C .

Then we define the relations L and R (for "Left" and "Right") as follows:

$$L(\alpha, \beta) \text{ iff } C(\alpha, \beta) \text{ and } I(\alpha, \beta)$$

$$R(\alpha, \beta) \text{ iff } C(\beta, \alpha) \text{ and } I(\alpha, \beta)$$

So L holds between α and β in case α is part of β and there is an inference, accepted by S ,

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from α to β . Similarly for R . Let us add the following: with ‘*’ as an expression parameter, we have as special case $R(\alpha, *, \beta)$ in case S holds true (a sentence held true is inferred from any sentence), and $L(\alpha, *, \beta)$ in case S holds false (analogously). This is extremely crude, since it ignores *how* an expression occurs as constituent of another, but it serves the purpose of illustration.

Now we can define what we can call the *Global Role*, $G(\alpha)$, for a *simple* expression α :

$$G(\alpha) = \{ \langle \beta, \gamma \rangle : L(\alpha, \beta, \gamma) \}, \{ \langle \beta, \gamma \rangle : R(\alpha, \beta, \gamma) \}$$

For complex expressions Holistic IR is also very crude: it assigns to a complex expression α the global role that is the tuple of the global roles of its immediate constituent parts, in the order they occur. Thus if α has $\alpha_1, \dots, \alpha_n$, in that order, as immediate constituent parts, then

$$G(\alpha) = \langle G(\alpha_1), \dots, G(\alpha_n) \rangle$$

Now we can easily see that if S begins to accept a new inference $\alpha \rightarrow \beta$, which S up to this point was agnostic about, or rejected, then for every expression γ which occurs in α or in β it holds that the Global Role of γ , as well as the Global Role of every sentence in which γ occurs, changes.

The example could be elaborated upon to the effect that if an expression α occurs in a sentence s such that the global role of s changes (at some point), then the global role of α changes as well. This would provide an intuitively more holistic theory.

We have now provided the subvenient properties and relations. The next step is to outline how meaning supervenes on these. Formally, meaning supervenes on the relevant non-semantic facts by being a function of Global Role. The meaning of an expression is directly determined by its Global Role. Nothing is lost by this expedient. Global Role is itself a kind of Holistic property: Global Roles are determined by the totality of subvenient facts, and Global Roles of expressions, including simple expressions, are largely interdependent. For instance, ‘brown

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‘cow’, ‘dangerous’ cannot be an element of the left part of the Global Role of ‘brown’ unless it is also an element of the left part of the Global Role of ‘cow’, and also an element of the right part of the Global Role of ‘dangerous’.

So what we need for the second step is a function from Global Roles to meanings. That is, we need a function which has as its domain the set of possible Global Roles of expressions in L, and as its range a the total set of meanings which are possible for those expressions. Let h be such a function.⁷ Presently, h is supposed to be *one-one*, meaning that h does not assign the same meaning to any two distinct Global Roles. This is *the* crucial assumption, and I shall return to it shortly. For the time being we are to see the consequences of that assumption.

Further, for each syntactic function g , mapping expressions $\alpha_1, \dots, \alpha_n$ on some complex expression β , there is a function f from meanings to meanings, such that the homomorphism requirement on h is fulfilled:

$$h(G(\beta)) = h(G(\alpha_1), \dots, G(\alpha_n)) = f(h(G(\alpha_1)), \dots, h(G(\alpha_n)))$$

This ensures that Holistic IR is a compositional theory for L (as spoken by S).

Finally, we add to Holistic IR the stipulation:

INF If $L(\alpha, \beta)$ or $R(\alpha, \beta)$, then β is a valid inference.

INF should be regarded, if accepted as valid, not as an extra stipulation, but as a restriction on admissible functions from Global Roles to meanings.

Now it is time to see whether what Fodor and LePore say about holism and compositionality is true of Holistic IR. They say that for holistic Inferential Role Semantics it is part of the mean-

7. Of course, we can skip Global Role and define directly a function which takes a set of subvenient facts, and an expression, as arguments, and yields a meaning as value. What makes such a function Holistic? Beside involving the relevant totality of non-semantic facts, its Holistic character consists precisely in the interdependence of its outputs. For instance, given the acceptance of (1), some possible meanings of ‘brown’ do not combine with some possible meanings of ‘cow’.

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ing of 'brown cow' that the inference

(1) brown cow dangerous

is valid. This can be confirmed. In the same breath we can confirm more: Fodor and LePore also say that because of Compositionality the validity of the inference must be determined by the meaning of 'brown', the meaning of 'cow' and the modifier-head construction. This can also be confirmed. In fact, according to Holistic IR, it is part of the meaning of 'brown', and part of the meaning of 'cow', and also part of the meaning of 'dangerous', that (1) is valid. Why? The answer is that since h is *one-one* it has an inverse h^{-1} . Since h is *one-one* 'brown' would not have the meaning it does unless it had the global role that it does. And the value of h^{-1} for the meaning of 'brown', as argument, contains 'brown cow', 'dangerous' in its left part, which immediately implies that $L('brown', 'brown cow', 'dangerous')$. According to INF this means that (1) is valid.

This may indeed seem counterintuitive. And not only this. We can go on to confirm more of what Fodor and LePore say about holism. They say

For, consider the property T^* which a belief has iff it expresses a proposition that is the content of a belief of mine. According to the present assumptions, if T^* is *atomic*, then it is *holistic*. And if T^* is *holistic*, then (assuming that thoughts are individuated by their propositional contents) it might turn out that nobody has thoughts that are tokens of the same type as my thought about Auntie's pen unless he also has thoughts that are tokens of the same type as, as it might be, my thought that the cat is on the mat, my thought that black holes are odd kinds of objects, my thought that Salome will never sell in Omaha. This too might be considered an interesting, even counter-intuitive, result in the philosophy of mind (Fodor and LePore, 1992, pp. 13-14).

Is this a consequence of Holistic IR? Well, not quite. We could have made it a consequence, had we elaborated a bit on our notion of Global Role. But things are bad enough as they are. Let's

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assume that thought content is determined in accordance with Holistic IR. Then, again because the assignment h of meaning to Global Role is *one-one*, we have the result that if S changes her mind about the validity of some inference, say (1), this will bring about a change in the meaning of 'brown', the meaning of 'cow', and the meaning of 'dangerous'. It will also bring with it a change in the meaning of *every* complex expression, every sentence, that contains any of these three expressions.

Thus suppose that you and I speak L and are exactly alike as regards acceptance of inferences. Both of us accept (1). But suddenly I change my mind. I now reject the inference from 'brown cow' to 'dangerous'. Because of this the content which I express with

(4) mad dogs are dangerous

is now different from the content that you express by the same sentence. This is because my meaning of 'dangerous' is now different from yours. We used to agree that mad dogs are dangerous, but now we don't, for we don't think the same thought.

According to Holistic IR we can still agree e.g. that

(5) black holes are odd kinds of objects

provided we are exactly alike as concerns our uses of 'black', 'hole' etc. Chances are, however, that we are not. So our intuitive picture of intersubjective understanding will not fare well if we accept something like Holistic IR as our preferred theory of meaning.

But now it is time to object. Holistic IR is Holistic in virtue of two features: that the *totality* of accepted inferences (jointly) determine meaning, and that possible meanings are *interdependent*. This was captured by way of Global Role: the meaning of an expression is a function of its Global Role, and Global Roles themselves satisfy the Holistic principles: they depend on the totality of subvenient, non-semantic facts, and they are interdependent. It is not part of the Holistic character of Holistic IR that the function from Global Roles to meanings be *one-one*. It

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can be *many-one*. And it is precisely because h was assumed to be *one-one* that Holistic IR has such absurd consequences.

Thus suppose we drop this part of Holistic IR. Our revised theory, HIR*, has the same Global Roles but a different function, h^* , from Global Roles to meanings, and h^* is assumed to be *many-one*. Then h^* does not have an inverse. More than one Global Role for 'brown' yield the same meaning. Suppose 'brown' is assigned a meaning M ('brown'). It does *not* follow from this that L ('brown', 'brown cow', 'dangerous') is true. That is, it does not follow unless 'brown cow', 'dangerous' is an element in *all* Global Roles which h^* maps on M ('brown'), and that is clearly no necessary feature of Holism.

Given this property of HIR*, the property that different, perhaps many different, Global Roles can yield the same meaning, we also have the result that the Global Role of an expression may *change* without bringing with it a change in meaning. In the example above you and I were exactly alike up to the point where I gave up my adherence to (1). This changed some of my Global Roles, and made them different from yours, but if difference in Global Role need not imply difference in meaning, then there *need* not be a difference in meaning between, say, 'brown cow' in your mouth and 'brown cow' in mine. So it is not an intrinsic feature of Holism, considered as a principle of meaning determination, that communication, or change of mind, turns out as impossible.

Why has it seemed otherwise? The immediate reason is that the distinction has not been clear between holism as a principle of meaning *determination*, and holism as a principle of meaning *individuation*. The general idea of holistic individuation is often expressed by saying that something is individuated, or identified, by its position in a "space", "system", or "network". This passage from Davidson is characteristic:

There are good reasons for not insisting on any particular list of beliefs that are needed if a creature is to wonder whether a gun is loaded. Nevertheless, it is necessary that there be endless interlocked beliefs. The system of such beliefs identifies a thought by locating it

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in a logical and epistemic space (Davidson, 1984d, p. 157).

This intuitive idea of an holistically individuated property is exemplified by Global Role. Think of a network simply as a set of objects together with a set of properties and relations over these objects. This can be represented as a netlike diagram. In our case we have expressions of the language L as objects, and as relations we have the constituency relation, and the relation between premise and conclusion of accepted inferences (above partly fused into the three place relations L and R). The *position* of an object is then primarily determined by what properties it has and what other objects it is related to, secondly by what properties these *other* objects have and what yet further objects *they* are related to, and so on as far as is relevant. A holistic, or holistically individuated, kind of property, is then a kind of property such that changes always occur when changes in position occur. It is maximally holistic if *everything* in the network is relevant, i.e. if any change in the position of any object brings with it a change in the position of every other object. Global Role is a holistic kind of property in this sense (indeed identical with position), but not, as it was defined, a maximally holistic one.

Meanings would be holistically individuated as well if any change in position (Global Role) of an expression forced a change in its meaning. But, again, this is not part of Holism as a principle of meaning determination. It is one thing that an expression must *have* such a position in a network⁸, and that its meaning *depends* on its position, and another that its meaning be individuated along with that position. It is perfectly consistent to claim that meanings consist in referential relations and that what meaning an expression has is determined in a Holistic fashion. Holism will remain as long as assignments of meaning to an expression is sensitive to assignments of meaning to other expressions (beside its own parts).⁹

The point I have made here is essentially anticipated by Brian McLaughlin (McLaughlin,

8. This is the feature underlying Fodor and LePore's definition of holism.

9. As far as I can see, this model is fully compatible with Donald Davidson's semantic holism. It even strikes me as the more natural alternative. Thus, Davidson's semantic holism does not seem to suffer from the drawbacks noted by Fodor and LePore.

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1993, p. 653-660)¹⁰, although in a different conceptual framework, without making the general determination/individuation distinction.

I shall also remark just briefly on the question of the analyticity of, for instance, (1). Above, by appeal to the principle INF of Holistic IR, we concluded that (1) is valid, given e.g. the meaning of 'brown'. By an ordinary understanding of analyticity, this makes (1) analytically valid, since it is valid in virtue of meaning¹¹. Similarly we can say that

(6) brown cows are dangerous

is analytically true. This conclusion depends on two features of Holistic IR. First it depends on the fact that the function *h*, from Global Roles to meanings, was assumed to be *one-one*. If *h* were not *one-one*, then 'brown' might have had the same meaning, *M*('brown'), and yet another Global Role, one that did not include 'brown cow', 'dangerous' in its left part, and then (1) would not be valid.

Secondly, the analyticity of (1), in Holistic IR, also depends on the principle INF, the principle, roughly, that if the *acceptance* of an inference, like (1), takes part in determining the meanings of the expressions involved, then that inference shall come out as valid. This principle is not part of Holism as I have presented it. We can drop INF, and still have Holism, but without

10. At least so I have interpreted McLaughlin. On p 656 McLaughlin writes: "Moreover, the conceptual role semantics in question allows that there can be *multiple distinct* conceptual roles that are partly constitutive of the same meaning". Which is to say, a many-one relation. Judging from their reply in the same issue, Fodor and LePore have taken McLaughlin to make a different point.

To some extent I am also anticipated by Ned Block, who thinks there can be "a many-one relation between thought contents and meanings, and a many-one relation between meanings and truth conditions" (Block, 1993, p. 16), but I am not completely clear about how Block's views fit in with the present ones.

The related general observation, that a supervenient kind need not inherit all the properties of its supervenience base, has been made against Fodor and LePore by Ted Warfield in Warfield, 1993 (I thank Ernie LePore for the reference).

The present remarks were developed independently, and presented at the SILFS conference on holism in Rome, in December 1994.

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analyticity, at least without this kind of analytical inferences.

Something like INF can indeed *motivate* a Holistic theory, as Davidson's holism has been motivated by the principle that we should seek the interpretation which makes the interpretee as right as possible (maximizes truth; one version of the principle of charity). But it is a mistake to think that it is a part of Holism as such. It *is* part of Holism that assignments of meanings to different expressions are largely *interdependent*, but that interdependence can be created in different ways. Taking INF as a valid, meaning constitutive principle is just one way.¹²

3. Third problem: the explanation of productivity

The first problem was a problem about direct inconsistency between Compositionality and Holism. The second problem was one about incoherence in a somewhat looser sense. It seemed that combining Compositionality and Holism was inconsistent with plausible views about meanings of expressions in the language. The third problem exhibits an incoherence in a yet wider sense. It seems that, if Holism is true we will have to give up some *explanations* which make appeal to Compositionality.

Perhaps most often, Compositionality has been invoked for explaining our ability to understand *new sentences*. I may read in my morning paper something like

(7) The inflation rate in Finland has dropped twice as much as that in Denmark

No one has explained to me the meaning of this sentence. I have never spoken, written, thought, heard or read it before. Yet I immediately understand it.¹³ How is this possible? The answer is that I know the meanings of the components of (7), and the semantic significance of its mode of

11. Of course, given the classic conception of analyticity, we should add "irrespective of the way the world is". Presently I shall ignore that, and hence ignore the fundamental issue of the analytic/synthetic distinction.

12. Both Ned Block, in Block, 1993, p. 20, and Paul Boghossian, in Boghossian, 1993, pp. 35-36, argue against the need for Inferential Role Semantics to accept inferences as analytic. In my terminology, they argue against the need of accepting INF.

13. This is in fact a controversial statement, but the present paper is not the right place to discuss it.

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composition, and this is sufficient for me to understand it. The meaning of (7) is determined in accordance with Compositionality, and because of this my prior knowledge of English enables me to understand it.

I don't know how old this explanation is, but it has been part of analytic philosophy since early on, and it is good. It gives us a reason for believing that Compositionality is true. And if we had to give up this explanation, most of us would probably give up Compositionality with it. For short I shall call it *Novelty*. So Novelty is the thesis that Compositionality is the correct explanation of our ability to understand new sentences. If there is a direct conflict between Holism and Novelty, then there is an indirect conflict between Holism and Compositionality, since Novelty is one of our main reasons for believing in Compositionality.

Is there a conflict between Holism and Novelty? No doubt, some versions of Holism do conflict directly with Novelty. If I am to understand a new sentence in the compositional way, then the meaning of its familiar parts must have been preserved over time, and so must the principles of semantic composition. If we have a version of Holism according to which the subvenient semantic facts change erratically, beyond my cognitive control, then clearly past semantic knowledge will be of no help for present understanding, whether of old or of new sentences. I would reject any such version of Holism.

A particularly interesting question is whether theories like our Holistic Inferential Role, for which the subvenient facts are speakers' acceptance of sentences and inferences, conflict with Novelty. It is interesting partly because of their prominence in recent analytic philosophy, but also because understanding of new sentences, according to such theories, is closely connected with changes in the subvenient facts, to the effect that we have reason to suspect a clash with Novelty.

Consider the following tenet:

(+) Assent to [dissent from] a new sentence does not change its meaning

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Clearly, (+) is hard to disagree with. But not only does a denial of (+) strike you as absurd in itself, it would also undercut the explanatory value of Compositionality. For what is the point of understanding a new sentence if it acquires a *different* meaning once you have decided to count it as true, or as false? But this is the situation we seem to end up in with Holistic Inferential Role and similar Holistic theories.

Assume the following. HIR* is true, where HIR* is a theory which is like Holistic IR except that its function h^* from Global Roles to meanings is *many-one*. Then there is a set S_i of all sentences and inferences that I accept at time t_i . Included in this set is

(4) mad dogs are dangerous

(8) black holes are dense

Further, the function h^* from Global Roles to meanings is such that given S_i it assigns the truth function of conjunction to '&' as I have used it, and the truth function of negation to '¬'. Then, at time t_j , for the first time, I consider the sentence

(9) mad dogs are dangerous & black holes are dense.

This sentence strikes me as implausible, not because I have forgotten or changed my attitudes to (4) and (8), or because I don't recognize them as occurring in (9), but just because this new sentence, composed as it is, strikes me as false. I reject it. I assent rather to

(10) ¬ (mad dogs are dangerous & black holes are dense).

This produces a new set S_j of all sentences and inferences that I accept at time t_j . A great number of Global Roles will have changed. That happens every time I assent to, or dissent from, a new sentence. If *one-one* Holistic IR were true, with Holistic individuation of meanings, then there would be a great number of changes in meaning each time I took a stand on a new sentence (and each time I revised my attitude to an old one).

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But when I take the step of adding (10) to my totality of accepted sentences, alongside with (4) and (8), something will have to change even on the *many-one* HIR* model. In HIR* the INF principle is still assumed true. Remember that INF required the inferences (and hence sentences) a speaker *accepts* to come out valid (true) in his language. So, once I have accepted (4), (8) and (10), all of these must be true. But then it cannot be the case that, at time t_j , '&' still means conjunction and '¬' still means negation. For then at least one out of (4), (8) and (10) is false. So the meaning of at least one of the constants must have changed.

Given our intuitive understanding of things, this sounds bad in itself. But take Compositionality into account, and it becomes worse. For before I decided to reject (9) and accept (10), '&' still meant conjunction and '¬' still meant negation. And if I understood (9) before my new decision I did understand it as a conjunction of two sentences that I accepted. And if I understood (10), I understood it as the negation of (9). But *after* my decision it was something else. And the principles of composition that determined the meaning of (10) before the decision was made, do not tell you what meaning (10) (along with every other sentence containing '¬', or '&') has *after* the decision has been made. Holistic Inferential Role says what the meaning of expressions are, at each time, depending on what inferences (including sentences) you accept at that time, *regardless* of what meaning the expressions had *before*. There is simply no requirement of continuity, of conservation of meaning across time, built into HIR*.

Our immediate problem with conjunction and negation in the example can be dispelled by rejecting INF: if it is not necessary that something *held* true by a speaker must be assigned meaning so that it also *comes out* true, then we can still say that (10) is false in my language, despite my acceptance of it, since that fits in with the best *overall* assignment of meanings to expressions in my language. It is possible to filter out as unhappy my decision to treat (10) as true.

But this solution is only temporary. If I were to go on to make precisely the same kind of apparently inconsistent decisions in a number of other cases, then it would no longer be plausi-

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ble that the best overall interpretation of me would be to filter out those decisions as unhappy. And if that is the case, there will always be *some* deviant decision which tips the balance in favour of assigning new meanings to my expressions rather than preserving the old ones.

And so it seems that the explanatory task of Compositionality cannot be achieved. Compositionality was meant to explain not just how we can simply *understand* new sentences, but also how we can acquire *new knowledge* by verbal information. There is hardly any value in understanding new sentences if you cannot assimilate what you understand as new knowledge, or at least new belief. And this is what we want Compositionality to explain.

To sum up. Given that Holistic Inferential Role and related theories determine the meaning of an expression regardless of its earlier meaning, and given that a decision concerning a new sentence can change the meaning of that sentence (and many others with it), can Compositionality really *explain* how we can get new beliefs through our understanding of new sentences? This is the question. And the answer is: For all that is said so far, yes!

Clearly, Compositionality could *not* fulfil the intended explanatory role if meanings often *did* change because of new decisions, as in the example. But is there any reason to believe that, if Holism is true, they also *do* clash, in ways similar to the example? After all, people don't do such things as asserting (10) while being fully aware of assenting to (4) and (8) (given the normal meaning of '&' and '¬'). And speakers rarely say things that are so strange as to invite their interpreters to change their interpretational habits (like claiming to have a hippo in the refrigerator).

This normal course of affairs is theoretically significant if two conditions can be met. First, it should be compatible with Holism in general, and with HIR* in particular, that *when* people make normal decisions about new sentences, i.e. decisions that we would not *intuitively* count as conceptually deviant, then meaning *is preserved*. That is, it should be compatible with Holism that the meanings assigned to my expressions at time t_1 , based on the set S_1 of sentences and inferences that I accept then, are the *same* as the meanings assigned to my expressions at

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time t_k , based on the new set S_k of sentences and inferences I accept at t_k , *provided* my decisions between t_i and t_k are normal. And clearly this condition is fulfilled. It is consistent with the very idea of HIR*, and *a fortiori* with Holism, that the meanings of my expressions *will be* preserved as long as I do not make extremely non-standard decisions regarding sentences and inferences, new and old.

The second condition is that the normality of the normal course of affairs can be *explained* by Compositionality. Our question was whether the intended explanatory role of Compositionality was compatible with Holism. In order that they be compatible, it is not enough that the Holistic principles *in fact* preserve meaning across time, but it must also be possible to invoke Compositionality for explaining *why* meaning is preserved across time. And as far as I can see, this condition is also met. To return to our example: given that I am aware of assenting to (4) and (8), and know the customary meanings of ‘&’ and ‘¬’, only temporary insanity can make me reject (9) and accept (10). I am so guided and constrained by my understanding of these sentences that, unless because of some accident, my decision *will be* to accept (9) and reject (10). And this understanding *is* explained by Compositionality. I will decide to accept or reject a sentence on the basis of my understanding of it and of my already settled beliefs, and my understanding of it can usually be predicted according to compositional principles.

I *could* decide differently, and if I were to decide differently, often meaning *would* change. Compositionality explains why it does not.

This problem about preservation of meaning across time is related to a question that has been pressed against semantic holism by Michael Dummett: If holism is true, how can you *learn* an entire language? Dummett says that

[...] on a holistic view, it is impossible fully to understand any sentence without knowing the entire language [...]

[...] there can be nothing between not knowing the language at all and knowing it completely (Dummett, 1976, p. 79)

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So, if Dummett's appreciation of semantic holism is correct, holism makes it impossible to learn a language incrementally, piece by piece, and thus virtually impossible to learn it at all.

Dummett's perspective on language is different from that of our previous examples. As Dummett sees it, a natural language is the common property of a speech community. Individual speakers have a cognitive relation to it: they know it, better or worse. What an expression means is determined by facts about the speech community as a whole, and for its members it is a question of knowing those meanings.

From this perspective it appears that Holism makes it impossible to know *a proper fragment* of a language, to know part of the language but not all. Suppose that the meaning determining facts about expressions are their respective *uses* in the speech community, and suppose that *use* is a Holistic kind of property in the sense of section 2. Then we have the following situation. An expression α belongs to a fragment L' of L . If we consider L' in isolation, the Holistic principles assign a meaning to α , based on the use of α in L' . α has a wider use in the whole of L , and the Holistic principles assign a meaning to α , based on the use of α in L . These two meanings need not coincide. And so, to know what meaning α has in L , you must know the use of α in L . It is not sufficient to know the use of α in L' . If you belong to a community of L -speakers and you have only mastered L' yourself, you do not really understand what they are saying, since you do not really know what their words mean.

This problem about learnability is related to the problem about new sentences. In both cases you have a situation where an addition to previous meaning determining facts may fail to preserve the old meanings. In our first case, where the speaker made a new decision about a sentence, there may be a genuine change of meaning. In our second case there is an epistemic problem: if I do not know the *further* meaning determining facts which are already at hand in the speech community, then I may get the meanings of familiar expressions wrong.

I think there are basically two replies you can make on behalf of Holism against Dummett's criticism. The first one has been delivered by Akeel Bilgrami (Bilgrami, 1986). According to

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this view Dummett's description is partly right. Before you know the whole language you do not have a complete knowledge of the meaning of any single expression. What you have is a *partial* knowledge of those meanings. As you learn new parts of the language your knowledge of the meanings of already familiar expressions increases, until finally you understand them fully. Dummett is wrong in arguing that because you cannot know just part of a language, there is nothing between knowing a language completely and not knowing it at all. There are stages in between, since there is such a thing as partial knowledge of the meaning of an expression.

I think that this reply is adequate as regards some expressions. Some expressions are such that you can master their use in some types of contexts, and still fail to master their use in some other types of context, even though there is no ambiguity. To take an extravagant example, you may well master the use of "at the same time", or "simultaneously" in everyday situations, but fail to do so in the context of relativity theory. So in this case you clearly know only part of the meaning. What you don't know may not matter very much to your understanding of the expression in the everyday contexts you where use it.

So far Bilgrami's reply is all right, but I think it is quite inadequate for most ordinary expressions. For instance, it would be quite counterintuitive to claim that speakers may fail in their understanding of "very", "chair", "but", "if-then", "walk" and so on for lack of knowledge in physics, history, geography, anatomy or other disciplines. If Holism requires us to say so, then surely there is a case against it.

But Holism doesn't require this. Remember that on the *many-one* model of Holistic meaning determination it is quite possible that meanings are preserved when new meaning determining facts, such as uses, are introduced. The addition of relativity theory or ancient history to everyday English surely does not change the meaning of "if-then", or "walk", and this is perfectly compatible with e.g. the HIR* kind of Holism.

So, assuming that the meaning of "if-then" which is determined in the language fragment of some ten year old speaker, is *the same* as that determined in the language fragment of a fully

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competent speaker, what shall we say about the understanding of the ten-year old? You *can* say that he does not really understand “if–then”, the reason being that he does not know all the meaning determining facts of the English language. But this is implausible, or at least it does not yield the most relevant sense of “understand”. I think that we should say that he *does* understand the expression, because he does associate the *right* meaning with it (the meaning it has in English), and because he does so *on good grounds*. We should not say that he understands only in virtue of associating the right meaning with the expression, since that would turn any successful guesswork into understanding. We need also to say that understanding takes place only if the association is made on good grounds.

But why *should* we say that our ten year old speaker does have good grounds for, tacitly, taking “if–then” to have the same meaning in the entire language as it has in the fragment he knows (or rather, as it would have if that fragment were the whole language)? I think that, although those meanings might differ, the *default option* is that they will not. If this is the default option, then the ten year old speaker does have good grounds. Acting as if the meanings are the same will usually lead him right.

Again, the *explanation* of this, i.e. the explanation of why sameness of meaning is the default option in such a case, is Compositionality. That the meaning of a sentence is determined by the meanings of its parts and its mode of composition is, *inter alia*, the best explanation of how we easily can enlarge our linguistic knowledge by way of learning how to relate new expressions, in definitions and in use, to already familiar expressions. This explanation implies that normally, the familiar expressions retain their already familiar *meanings* in the new contexts. And that, in turn, is the reason for taking preservation of meaning to be the default option. Because Compositionality in general does provide part of a good explanation of language learning, in this context Compositionality can also explain why Holism, on the *many-one* model, is not incompatible with the traditional picture of language learning.¹⁴

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Dear Sir/Madam,

would you please consider my enclosed paper "Is compositionality compatible with holism" for publication in Mind and Language.

yours sincerely

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