CHAPTER 4

Epistemological holism without linguistic holism

*Epistemological* holism is usually associated with *linguistic* holism, and sometimes the latter is inferred from the former. In this chapter I shall show how the view that the sense of a sentence be its immediate argumental role, though it conforms to the requirement of compositionality and hence involves a denial of linguistic holism, is perfectly compatible with epistemological holism. Thus, by accepting the view centred upon immediate argumental role, we can have epistemological holism without linguistic holism.

1. Global argumental role of a sentence.

Does the immediate argumental role of a sentence constitute the whole use of that sentence in arguments? In order to answer this question we have to deepen our analysis of the notion of ‘argument’. An argument is given within a language \(<L,A,\geq>\). Hence its correctness is first considered with respect to the language and its argumentation rules in \(A\). Of course, the speakers do not explicitly compare the given argument with the argumentation rules of the language, because they usually know these rules only implicitly. Moreover, if arguments were fully articulated, they would be exceedingly long. In practice they mostly contain many non-immediate argumentation steps which are not simple applications of single argumentation rules. In addition, arguments often involve observation and manipulation of diagrams, pictures and other iconic aids. Thus, even if they purport to be conclusive arguments (e.g. mathematical proofs) they are often sketchy and tentative and in general fallible. That's why Lakatos described even mathematical proofs as "thought-experiments".\(^1\) However, just because arguments are fallible, they are subject to criticism. Under the pressure of criticism arguments are further elaborated and articulated. Argumentation steps which seem to be simple are elaborated to compound arguments by inserting one or more intermediate argumentation steps between premises and conclusion. Such an articulation leads (or would lead, if pursued far enough) to immediate argumentation steps, which the speaker does not consider susceptible of any further elaboration because their acceptability is part of an understanding of the involved words or, some might say, "is part of the concept". Immediate argumentation steps are applications of argumentation rules (they are accepted

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\(^1\) Cf. Lakatos (1976) p.9.
only in virtue of their structure, which is the characteristic structure of an argumentation rule).

One might rightly object that in the natural sciences, in mathematics, and also in everyday life, criticism does not always stop at immediate argumentation steps. It can continue. Also immediate argumentation steps which are applications of previously accepted argumentation rules (i.e. of rules in the set A) can be criticized. This kind of criticism is an implicit criticism of the argumentation rules and thus of the meanings (or "concepts") which are constituted by those rules. Lakatos has called "concept-stretching" such a criticism and the modifications and improvements of the language that can arise from it. In particular cases it can be difficult to distinguish the latter more creative kind of criticism from the criticism which only demands a justification on the basis of the already accepted argumentation rules which implicitly constitute the common meanings of the words, because both aspects are present in our concrete practice of criticizing arguments. But the distinction is in principle clear and very important. By exploiting Wittgenstein's metaphor in Über Gewissheit we might say that both the waters (assertions and arguments within the language) and the river-bed (the language with its argumentation rules) may move (may be improved by criticism). In particular cases, it can be difficult to make the distinction between the movement of the waters and the shift of the river-bed, but the difficulty does not eliminate the distinction: the waters couldn't move if there were no relatively firm and solid river-bed functioning as a channel for their flux. Without metaphor: arguments cannot be elaborated offhand in an epistemic void, otherwise no agreement about their acceptability would be possible. Therefore arguments must be constructed on the basis of a relatively stable background of commonly accepted argumentation rules, although such rules too may be changed.

A criticism which is directed against the meanings of words (against "the concepts") involves a notion of ‘correctness of the language’ which is very different from the notion of ‘correctness’ as ‘agreement with the argumentation rules of the language’. The latter correctness is relative to a language \(<L,A,\geq>\) i.e. it is based on an acceptance of (the argumentation rules of) \(<L,A,\geq>\), whereas the notion of ‘correctness of the language’ involves completely different criteria on the basis of which \(<L,A,\geq>\) and its argumentation rules are subjected to a judgement, instead of being simply treated as the precondition for assessing a
reasoning. I shall deal with the criteria for the correctness of a language in the next chapter. Here it is enough to point out the distinction.

The present chapter will consider the language in a fixed stage of its development and thus my analysis will now be focused on the notion of correctness relative to \(<L,A,\geq>\). I shall address myself to the question: does the immediate argumental role of a sentence in \(<L,A,\geq>\) constitute the whole use of that sentence in arguments which are correct with respect to \(<L,A,\geq>\)?

A first notion of ‘correct argument relatively to \(<L,A,\geq>\)’ is the notion of ‘fully articulated argument relatively to \(<L,A,\geq>\)’, which can be defined as follows

An argument \(D\) for a conclusion \(C\) from assumptions \(H^1,\ldots, H^n\) and from non-linguistic evidence \(NL^5\) is correct and fully articulated relatively to \(<L,A,\geq>\) if, and only if, every non-discharged assumption in \(D\) is among \(H^1,\ldots, H^n\), all the employed non-linguistic evidence is in \(NL\), every argumentation step in \(D\) is an application of an argumentation rule belonging to \(A\) and the conclusion of the last argumentation step in \(D\) is \(C\).

(Observe that an argument which is correct and fully articulated relatively to \(<L,A,\geq>\) is not a derivation in a formal system, because argumentation rules are not formal inference rules, as we have seen in chapter 3, section 5).

Arguments allowed by a language \(<L,A,\geq>\) are fully articulated, when they consist entirely of immediate argumentation steps conforming to the argumentation rules in the set \(A\). In practice, as it was said above, we seldom give fully articulated arguments, because they are exceedingly long. We usually give shorter arguments in which most argumentation steps are non-immediate. However, we accept a non-immediate argumentation step because we implicitly believe that it could be transformed into an argument consisting of many different more elementary argumentation steps which are immediate and conform to accepted argumentation rules. If such a belief is shaken by successful criticism, then we have to choose between two possible rational responses to such criticism: we can either agree with our opponent and reject the argumentation step, or we can modify the language and adopt a new argumentation rule of which the problematic argumentation step is an instance. In the latter case the argumentation step becomes an immediate argumentation step in a new enriched language. But, as I said above, I reserve a treatment of the possibility of modifying the language for the next chapter, now I put this topic aside. If we

\[5\] Here and in the other definitions in this section "non-linguistic evidence \(NL\)" is an abbreviation of "the set \(NL\) of pieces of non-linguistic evidence".
keep the language $<L,A,\geq>$ fixed, a non-immediate argumentation step is acceptable relatively to the given language $<L,A,\geq>$ if, and only if, it can be articulated by inserting intermediate argumentation steps between its premises and its conclusion so as to obtain a fully articulated argument which is correct relatively to $<L,A,\geq>$. Hence, in general, an argument which is correct relatively to $<L,A,\geq>$ can be defined as follows.

xxviii An argument $D$ for a conclusion $C$ from assumptions $H_1, \ldots, H_n$ and from non-linguistic evidence $NL$ is correct relatively to $<L,A,\geq>$ if, and only if, by an appropriate articulation of the non-immediate argumentation steps in $D$, it is possible to obtain an argument $D^*$ for the same conclusion $C$, from the same assumptions $H_1, \ldots, H_n$ and from the same non-linguistic evidence $NL$ such that $D^*$ is correct and fully articulated relatively to $<L,A,\geq>$.

So, there is a first sense in which the immediate argumental role of a sentence $S$ in $<L,A,\geq>$ does not constitute the whole use of $S$ in arguments which are correct relatively to $<L,A,\geq>$. As we have seen in chapter 3, only the argumentation rules in $A$ which concern $S$ are involved in its immediate argumental role, and, strictly speaking, only immediate argumentation steps are applications of argumentation rules. When $S$ is used in a correct non-immediate argumentation step - which is part of a correct argument that is not fully articulated - the speaker is not simply applying argumentation rules belonging to the immediate argumental role of $S$.

However, this is not a very deep sense in which the whole use of $S$ in arguments might be said to transcend its immediate argumental role. If a non-immediate argumentation step in which $S$ is involved can be transformed into an argument consisting only of applications of argumentation rules which all concern $S$ and thus belong to the language fragment presupposed by the immediate argumental role of $S$, then such a non-immediate argumentation step is after all justifiable on the basis of the immediate argumental role of $S$. If the linguistic community regarded as correct an argumentation step in which $S$ and only sentences belonging to the language fragment presupposed by $S$ are involved only if such an argumentation step is either immediate and an application of an argumentation rule concerning $S$ or a non-immediate argumentation step which can be justified on the basis of the immediate argumental role of $S$ in the way described above (by a chain of applications of rules concerning $S$), then one could rightly say, in a second more interesting sense, that the immediate argumental role of $S$ does constitute the whole use of $S$ in arguments.
Therefore, the interesting question is whether this is always the case, that is: whether in all languages $<L,A,\geq>$ all argumentation steps which are correct relatively to $<L,A,\geq>$ and involve a sentence $S$ (and sentences in the fragment presupposed by $S$) can be justified by arguments that contain only applications of argumentation rules concerning $S$, that is by arguments in the language fragment $<LS,AS,\geq S>$ presupposed by $S$.

Before answering this question, I shall introduce some useful notions in terms of which it can be reformulated. The whole use of a sentence in arguments in a language $<L,A,\geq>$ can be taken to correspond to what I shall call its global argumental role in $<L,A,\geq>$. A sentence may be used in argumentation in two ways. It may be asserted (possibly on the basis of some assumptions and provided some non-linguistic evidence is available) and it may be used (possibly together with other sentences and with some non-linguistic evidence) as grounds for inferring a certain conclusion. The argumentation rules of a language $<L,A,\geq>$ allow immediate and non-immediate argumentation steps of both kinds. Thus, the argumentation rules in $A$ fix assertability conditions and inferrability conditions for any sentence in $<L,A,\geq>$. The global argumental role of a sentence $S$ in $<L,A,\geq>$ is constituted by all the assertability and all the inferrability conditions of $S$ in $<L,A,\geq>$.

The assertability and inferrability conditions of a sentence in $<L,A,\geq>$ can be considered in a "subjective" sense - i.e. with respect to a speaker in a given circumstance of utterance - or, in a more "objective" way, only with respect to the language $<L,A,\geq>$. Here we are interested in the latter more objective notion.\(^6\)

\(\text{xxix}\) A sentence $S$ is assertable in $<L,A,\geq>$ on the basis of non-linguistic evidence $NL$ and of assumptions $H^1,\ldots,H^n$ (in symbols: $NL,H^1,\ldots,H^n \Rightarrow^A S$) if, and only if, it is in principle possible to construct an argument $D$ for $S$ from assumptions $H^1,\ldots,H^n$ and from the non-linguistic evidence $NL$, which is correct and fully articulated relatively to $<L,A,\geq>$.

A speaker in a certain circumstance asserts correctly in $<L,A,\geq>$ a sentence $S$, on non-linguistic evidence $NL$ and on assumptions $H^1,\ldots,H^n$, if, and only if, he/she in that circumstance gives an argument for $S$ from that non-linguistic evidence and from those assumptions, which is correct relatively to $<L,A,\geq>$. But

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\(^{6}\) The notion of ‘assertability conditions’ here introduced is clearly different from the notion of ‘assertability conditions’ which is considered by Dummett and Prawitz in their verificationist theory of meaning. Cf. for example Prawitz (1987) where assertability conditions are not relative to a fixed set of argumentation rules and, on the other hand, are related to a particular circumstance of utterance (hence are assertability conditions in the above-mentioned "subjective" sense).
S can be assertable in \(<L,A,\geq>\) even if no speaker asserts S correctly. In order that S be assertable in \(<L,A,\geq>\) on the basis of the non-linguistic evidence NL and of the assumptions H₁,..., Hⁿ, it is necessary and sufficient that a correct argument for S from NL and H₁,..., Hⁿ can be constructed. The corresponding notion of inferability with respect to \(<L,A,\geq>\) is defined in terms of the notion of assertability in an obvious way.

A sentence E is inferable in \(<L,A,\geq>\) from S together with H₁,...,Hⁿ and with the non-linguistic evidence NL if, and only if,

\[ \text{NL, H₁,..., Hⁿ, S} \overset{A}{\Rightarrow} E \]

Hence, one can define the notions of global assertability and inferability conditions in \(<L,A,\geq>\).

A global assertability condition of a sentence S in \(<L,A,\geq>\) is a pair \(<\text{NL, }\{H₁,..., Hⁿ\}>\) such that \(\text{NL, H₁,..., Hⁿ} \overset{A}{\Rightarrow} S\).

A global inferability condition of S in \(<L,A,\geq>\) is a triple \(<\text{NL, }\{H₁,..., Hⁿ\}, E>\) such that \(\text{NL, H₁,..., Hⁿ, S} \overset{A}{\Rightarrow} E\).

A consequence of definition xxxi is that among the global assertability conditions of S can be also the "empty pair" \(<∅, ∅>\) which contains the empty set in both the first and the second position. The empty pair is a global assertability condition of S, if, and only if, S can be asserted categorically, i.e. if S is an axiom or can be proved independently of assumptions and of non-linguistic evidence. In such a case we may say that S is apriori relatively to \(<L,A,\geq>\) (I shall deal with this notion in chapter 7). On the other hand, according to xxxii, if the empty pair is a global assertability condition of a sentence E, then the triple \(<\text{NL, K, E}>\) is a global inferability condition of every sentence S for any set NL of pieces of non-linguistic evidence and for any set K of assumptions: in short, if E can be asserted categorically, then E can always be correctly inferred from whatever sentence.

Finally, the global argumental role of a sentence S in \(<L,A,\geq>\) is defined as follows.

The global argumental role of a sentence S in \(<L,A,\geq>\) is the pair \(<AC(S)^A, IC(S)^A>\) where AC(S)^A is the set of all global assertability conditions of S in \(<L,A,\geq>\) and IC(S)^A is the set of all global inferability conditions of S in \(<L,A,\geq>\).
Our question is: can the global argumental role of S go beyond its immediate argumental role? The answer is: yes. To see why, we have to compare the global argumental role of S in \(<L,A,\geq>\) with the global argumental role of S in the sublanguage \(<L^S,A^S,\geq^S>\) presupposed by S.

2. The global argumental role of a sentence can transcend its immediate argumental role.

A language \(<L,A,\geq>\) which contains a sentence S and the language fragment \(<L^S,A^S,\geq^S>\) presupposed by S are identical only in very exceptional cases.\(^7\) If we set aside such exceptional cases, the global argumental role of S in \(<L,A,\geq>\) always differs from the global argumental role of the same S in the language fragment \(<L^S,A^S,\geq^S>\) which S presupposes: the global assertability conditions of S in \(<L,A,\geq>\) and the global inferrability conditions of S in \(<L,A,\geq>\) respectively differ from the global assertability conditions of S in \(<L^S,A^S,\geq^S>\) and from the global inferrability conditions of S in \(<L^S,A^S,\geq^S>\). The obvious reason is that L contains words which are not contained in L\(^S\) and thus some sentences that can be built in L cannot be built in L\(^S\). Hence \(AC(S)^A\), the set of the global assertability conditions of S in \(<L,A,\geq>\), contains some pairs \(<NL,\{H^1,\ldots,H^n\}>\) in which some of the assumptions H\(^1,\ldots,H^n\) are not sentences of L\(^S\). Such pairs \(<NL,\{H^1,\ldots,H^n\}>\) do not belong to the set \(AC(S)^A^S\) of the global assertability conditions of S in the language fragment \(<L^S,A^S,\geq^S>\) presupposed by S. Similarly, the set \(IC(S)^A\) of the global inferrability conditions of S in \(<L,A,\geq>\) contains triples \(<NL,\{H^1,\ldots,H^n\},E>\) which do not belong to the set \(IC(S)^A^S\) of global inferrability conditions of S in the fragment \(<L^S,A^S,\geq^S>\), because some sentence among H\(^1,\ldots,H^n\), E is not a sentence of L\(^S\). Nevertheless, these obvious differences between the global argumental roles \(AC(S)^A,IC(S)^A\) and \(AC(S)^A^S,IC(S)^A^S\) depend only on the fact that L contains more words than L\(^S\). Since L contains more words than L\(^S\), A contains argumentation rules which are not contained in A\(^S\). There must be additional argumentation rules concerning the additional words. But if the additional rules have no consequence upon the possible argumentation steps which involve only sentences of the narrower sublanguage \(<L^S,A^S,\geq^S>\), then \(<L,A,\geq>\) is a conservative extension of \(<L^S,A^S,\geq^S>\) and the sole reason why the global argumental role of S in \(<L,A,\geq>\) outruns the global argumental role of S in the fragment \(<L^S,A^S,\geq^S>\) presupposed by S is the fact that L contains more words than L\(^S\). In such a case the gap between the immediate argumental role of S in \(<L,A,\geq>\) (which is determined by

\(^7\) Cf. Chapter 3, section 21 and chapter 1, section 4.
and the global argumental role of S in \(<L,A,\geq>\) (which is determined by the whole language \(<L,A,\geq>\)), is not very significant.

But there is a much stronger sense in which the global argumental role of S in \(<L,A,\geq>\) can outrun the immediate argumental role of S. Such a wider gap between the immediate argumental role of S in \(<L,A,\geq>\) and its global argumental role in the same language can occur if some argumentation rules in A which do not concern S and thus don't belong to \(A^S\) allow new possible argumentation steps which involve only sentences of the fragment \(<L^S,A^S,\geq>\); in other words the wider gap takes place if \(<L,A,\geq>\) is not a conservative extension of \(<L^S,A^S,\geq>\).

If in a language \(<L,A,\geq>\) the argumentation rules in A which don't concern a sentence S (i.e. are not in \(A^S\)) determine global assertability or inferrability conditions of S which involve only sentences in the language \(L^S\) presupposed by S, but these assertability or inferrability conditions would not hold if only the rules in \(A^S\) were available, we can say that \(<L,A,\geq>\) is not a conservative extension of \(<L^S,A^S,\geq>\) and the global argumental role of S in \(<L,A,\geq>\) transcends the immediate argumental role of S. More precisely:

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\text{xxxiv The global argumental role of S in } <L,A,\geq> \text{ transcends the immediate argumental role of S in } <L,A,\geq> \text{ if, and only if, there is a (possibly empty) sequence } H^1,...,H^n,E (n \geq 0) \text{ of sentences belonging to } L^S \text{ and (possibly) a non-linguistic evidence } NL \text{ such that either:}
\]

1) NL,H^1,...,H^n \not\subseteq A^S and not NL,H^1,...,H^n \not\subseteq A^E,
2) NL,H^1,...,H^n \not\subseteq A^E and not NL,H^1,...,H^n \not\subseteq A^E.

It is very easy to describe a language in which the global argumental role of a sentence transcends its immediate argumental role, as it is shown by the next example.

EXAMPLE: Let L be a language for propositional calculus with implication "\(\rightarrow\)" and negation "\(\neg\)" as logical constants. Let the rules in A be the following:

\((\neg E)\): from "\(\neg \neg B\)" we may infer B;
\((\neg I)\): from an argument \(D_1\) for "\(\neg B\)" depending on an assumption H and an argument \(D_2\) for B depending on the same assumption H, we may infer "\(\neg H\)" and discharge the assumption H;
\((\rightarrow E)\): from A and "\(A \rightarrow B\)" we may infer B;
\((\rightarrow I)\): from an argument \(D\) for B depending on an assumption A, we may infer "\(A \rightarrow B\)" and discharge the assumption A.
Since no argumentation rule immediately-touches more than one word, presupposition holds only reflexively for "→" and "¬", that is: "→"≥"→" and "¬"≥"¬", but "¬" does not presuppose "→", nor does "→" presuppose "¬".\footnote{Cf. Chaper 3, section 10, principle xi.} The sentence "((p→q)→p)→p", called Peirce's law (abbreviated: P), is categorically provable in <L,A,≥>, which is a system for classical propositional logic. Therefore the empty pair <∅,∅> is a global assertability condition of P in <L,A,≥>. But P is not categorically provable in the fragment of language <L^P,A^P,≥^P> presupposed by its immediate argumental role, which is the implicational fragment of <L,A≥>, containing only the rules (→I) and (→E). To see why, observe that Peirce's law is classically but not intuitionistically valid. If Peirce's law were provable in <L^P,A^P,≥^P>, then it would be intuitionistically valid; but we know that it isn't. Thus, the empty pair <∅,∅> is not a global assertability condition of Peirce's law in <L^P,A^P,≥^P>: we have proved in the metalanguage that "∅AP" holds but "∅AP" does not hold. Hence the global argumental role of Peirce's law in <L,A,≥> transcends its immediate argumental role.

By the latter example we have established that there can be languages (even very simple languages) in which the global argumental role of a sentence transcends its immediate argumental role.

That the global argumental role of S in <L,A,≥> can transcend the immediate argumental role of S means that the piece of knowledge which constitutes an understanding of S does not necessarily determine all the ways in which S can be correctly asserted in <L,A,≥> nor does it determine all the ways in which S may be used for drawing consequences: there can be new ways to assert S correctly in <L,A,≥> and to draw consequences from S, new ways which we did not even potentially grasp when we began to master the fragment of language presupposed by S. Therefore, if we enrich the language <L,A,≥> with new words and new argumentation rules, new ways to assert our old S and to draw consequences from it can come to light.

The latter observations show that, despite its compositionality, a theory of meaning centred on immediate argumental role tends to epistemological holism.

3. Epistemological holism.

As we saw in chapter 1 (section 4), linguistic holism is the thesis that sentences cannot be understood unless the whole language is understood and thus an understanding of a single sentence depends on the understanding of the whole.
language. *Epistemological holism* is the doctrine that the epistemic criteria for a sentence (criteria of verification, confirmation, falsification, infirmation, etc.) depend on a whole set of accepted theories, or, more radically, on the whole science, or, even more radically, on all our beliefs.

Today very few philosophers would deny epistemological holism for scientific sentences. After Duhem's *La Théorie Physique* (1906) it has now become a common view that a scientific hypothesis cannot be tested in isolation, because in order to draw an observational consequence one needs other hypotheses belonging to the same theory, and sometimes also to other theories, or simply to "common sense", and because in order to perform and to interpret an experiment one needs other theories concerning the experimental apparatus. Duhem wrote:

> The prediction of the phenomenon, whose nonproduction is to cut off debate, does not derive from the proposition challenged if taken by itself, but from the proposition at issue joined to that whole group of theories; if the predicted phenomenon is not produced, not only is the proposition questioned at fault, but so is the whole theoretical scaffolding used by the physicist. The only thing the experiment teaches us is that among the propositions used to predict the phenomenon and to establish whether it would be produced, there is at least one error; but where this error lies is just what it does not tell us.

Duhem's conception of a scientific theory has been developed by Quine into a general conception of language. In "Two Dogmas of Empiricism" (1951) Quine defended epistemological holism in criticizing "the dogma of reductionism". Reductionism maintains that to each (synthetic) statement taken in isolation from other statements, there are associated "a unique range of possible sensory events such that the occurrence of them would add to the likelihood of truth of the statement" and another "unique range of possible sensory events whose occurrence would detract from that likelihood". Quine's counterclaim, in full agreement with Duhem, is that: "our statements about the external world face the tribunal of sense experience not individually but only as a corporate body".10

Two remarks are important in this context. In the quoted passages Duhem and Quine are concerned with the relation between evidence and sentences which can be supported or undermined by that evidence. The first remark is that, of the many different kinds of evidence, Duhem and Quine consider only *sensory experience* (Quine says "impacts at our nerve endings"11). They both highlight the

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9 Quine writes in footnote 17 that "this doctrine was well argued by Duhem" Quine (1953) p.41.
10 Quine (1953) p.41.
11 Quine (1960) p.2; similar formulations occur also in Quine's most recent works, cf. Quine (1990) p.1.
fact that in order to test a single theoretical sentence by deriving from it empirical consequences which can be confronted with sense experience we need to employ a whole system of other sentences (even if, when we are testing that single sentence, we usually choose to treat the rest of the system, for the time being, as firm).

The second remark is that, though we cannot set fixed and precise limits to the system of auxiliary sentences which we in particular circumstances may have to employ in order to test a sentence, such a system of sentences is in practice never the complete totality of science. Quine clarifies this point in "Five Milestones of Empiricism" (1981):

[...]

In the same paper Quine calls "moderate holism" the doctrine proposed in this passage, according to which, usually, in our testing a sentence is involved not the totality of science, but "more modest chunks".

As to the first remark, it seems to me that to take only sensory evidence into account is somewhat in conflict with the model of language which Quine himself first outlined in "Two Dogmas of Empiricism". In that famous essay Quine gave a picture of language which makes clear that not only sense experience can be counted as favourable or unfavourable evidence for a sentence. Quine describes language as an articulated structure, "a man-made fabric which impinges on experience only along the edges" or "a field of force whose boundary conditions are experience". Only the sentences lying at the periphery of this structure are directly connected with sense experience. (We may say that their immediate argumental role involves argumentation rules according to which sense experience is non-linguistic evidence for those sentences). Other sentences lie at

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12 "Five Milestones of Empiricism" now in Quine (1981b) p.71. It was part of a wider paper entitled "The pragmatist's place in empiricism" presented at a Symposium at the University of South Carolina in 1975.

13 Cf. Dummett (1976) p.111: "The great contribution of that essay was that it offered an essentially verificationist account of language without committing the logical positivist error of supposing that the verification of every sentence could be represented as the mere occurrence of a sequence of sense experiences".

14 Quine (1953) p.42.
different levels within the interior of the structure and are not directly connected with sense experience. They are directly linked only with other sentences by deductive or non-deductive inferential links. (From the point of view of the conception centred on immediate argumental role, we may say that the links connecting the sentences in the interior with other sentences which are their neighbours in the structure are argumentation rules constituting the immediate argumental role of the sentences in the interior and that the other sentences with which the former are linked are the linguistic evidence or the conclusions admitted by such argumentation rules).

According to Quine's model of language, through the links which connect sentences in the structure the impact of sense experience is transmitted from the periphery inwards into the interior: "a conflict with experience at the periphery occasions readjustments in the interior of the field". But the connection of a non-peripheral sentence with sense experience is indirect because it depends on many other sentences. Peripheral (i.e. observational) sentences, on the contrary, are directly connected with sense experience. So, if we consider only sense experience as relevant evidence, we are clearly led to the conclusion that observational sentences are the only sentences which are directly connected with some evidence independently of other sentences. Thus Quine, taking only sensory evidence into account, seems to maintain that a sentence in isolation from the whole system of other sentences accepted as true cannot be directly connected with any evidence or counterevidence.

But if also linguistic evidence is considered, then it is clear that also non-peripheral sentences are directly connected with some evidence, though this evidence is not sense experience. A competent speaker does not know all the possible (sometimes very long and complicated) chains of inferences that can remotely connect a sentence S with other sentences which can count as evidence for S or as consequences of S. However, it is clear that the competent speaker must know at least those immediate inferential links which connect S with its neighbours in the structure (otherwise the impact of experience could never be transmitted inwards). Therefore there must be some linguistic evidence which is directly connected with individual non-peripheral sentences. Duhem and Quine neglect this fact because they neglect linguistic evidence.

By this resort to a wider conception of evidence, which takes also linguistic evidence into account, I do not intend to argue against epistemological holism.

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15 Ibidem.
16 Cf Quine (1953) p.41: "The dogma of reductionism survives in the supposition that each statement, taken in isolation from its fellows, can admit of confirmation or infirmation at all: My countersuggestion [...] is that our statements about the external world face the tribunal of sense experience not individually but only as a corporate body".
Indeed, even if there is always a direct connection with some non-linguistic or linguistic evidence a grasp of which is part of a competent speaker's understanding of both peripheral and non-peripheral sentences, the crucial holistic point is that the linguistic evidence which is directly connected with non-peripheral sentences and the non-linguistic evidence which is directly connected with peripheral sentences, in both cases, are not all the relevant evidence. In both cases the favourable or unfavourable evidence which is directly connected with those sentences is not all that can be counted as evidence or counterevidence for them. There is other relevant evidence or counterevidence which counts as such not only in virtue of the speaker's understanding of the sentence, but also because of his/her acceptance of a wider system of other sentences and thus on the basis of his/her knowledge of other parts of the language. To take one of Quine's examples, evidence for the observational sentence "That is green" is not only our seeing that something is green, but it can also be our accepting the sentence "That is copper oxide" together with the chemical theory from which the sentence "Copper oxide is green" can be derived. Obviously, a knowledge of such a theory goes far beyond our understanding of the sentence "That is green".

Epistemological holism is thus best formulated as the thesis that for both observational and non-observational sentences there can be also relevant (linguistic and non-linguistic) evidence or counterevidence which is recognized as such only indirectly, i.e. only through an acceptance of systems of other sentences to the comprehensiveness of which no limit can be set in advance. As Putnam wrote:

A model of the fixation of belief -of inductive inference, or of abductive inference (theory construction)- is “holistic” if it allows that beliefs on any topic may become relevant to the fixation of beliefs on any other topic.

Putnam's formulation of holism with respect to belief fixation is more enlightening than Duhem's and Quine's above mentioned passages, because Putnam does not limit himself to sensory or perceptive evidence, but brings into focus that any belief may become evidentially relevant to any other belief.

From the point of view of the conception of language centred on immediate argumen tal role, we may look at epistemological holism in the following way. Since our notion of ‘evidence’ includes both linguistic and non-linguistic evidence, it is always wrong to say that an individual sentence admits of no direct connection with any evidence. The immediate argumental role of a sentence connects the sentence with some favourable evidence, and with some

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conclusions. Thus a competent speaker, by knowing the immediate argumental role of a sentence $S$, knows that something can count as evidence for $S$.\footnote{Correspondingly, by understanding, the negation of $S$, the competent speaker knows that something counts as counterevidence for $S$.} An understanding of $S$, which involves a knowledge of the language fragment presupposed by $S$, is \textit{sufficient} to know that \textit{some} evidence is relevant for $S$ and that \textit{some} consequences can be drawn from $S$, but, as the preceding sections of this chapter indicate, the immediate argumental role of $S$ determines neither \textit{all} that can count as evidence for $S$ (the global assertability conditions of $S$) nor \textit{all} that can be derived from $S$ as a consequence (the global inferrability conditions of $S$). The global assertability conditions of $S$ and the global inferrability conditions of $S$ (which together constitute the global argumental role of $S$) do not depend only on $S$, on its component words and on the fragment of language which they presuppose, but also on other parts of the language and on other sentences accepted as true. \textit{Epistemological holism amounts to the fact that, in general, the global argumental role of a sentence $S$ transcends the immediate argumental role of $S$.}  

A consequence of epistemological holism is that if a language is enriched with new words and new argumentation rules concerning those words one can acquire new ways for verifying sentences belonging to the old language (sometimes unverifiable in the old language) and for drawing consequences from them (which sometimes it was impossible to draw in the old language). The many impressive examples of the holistic character of knowledge seem to show that we cannot set any limit \textit{in advance} to what in future can be used to verify a given sentence or to infer other sentences from it. "Who would have said, a few years ago, that we could ever know of what substances stars are made whose light may have been longer in reaching us than the human race has existed?" wrote Peirce in 1878.\footnote{Peirce (1931-35), 5.409.} He was referring to the new method discovered in his times of determining whether a substance is present in a star by means of an analysis of the spectrum of the star. To day we could add very many other surprising examples.

One of the lessons which Gödel's first incompleteness theorem has taught us is that a similar phenomenon occurs also in mathematics.\footnote{Cf. Cellucci (1987).} Gödel has shown that by adding new concepts and new argumentation principles to any formal system expressing at least an elementary fragment of first order arithmetic one can prove sentences belonging to the language of first order arithmetic that are not provable in the system in question. An interesting example of this kind belonging to mathematical practice is Goodstein theorem. Goodstein theorem is an
arithmetical sentence that, as Kirby and Paris have shown in 1981, is provable only by means of non-arithmetical principles.  

The holistic character of verification is not limited to scientific or mathematical language, but applies also to the language of daily life. If you have learnt what the word "rockabilly" means, you will be able to infer that a youth most likely wears a certain kind of shoes from the fact that his hair are cut in a certain fashion. But if you haven't acquired the notion of rockabilly, you will not know that rockabillies are young people with a very peculiar haircut, wearing typical jackets and typical shoes, and therefore you will not perform the inference.

In "Two Dogmas of Empiricism" Quine used epistemological holism to refute the logical empiricists' verificationist theory of meaning. According to such a theory the meaning of an individual sentence is given by the conditions for the verification and the falsification of the sentence and both verification and falsification consist merely in the occurrence of certain sensations. Therefore this kind of verificationist theory of meaning involves the tenet that every individual sentence has its own range of verifying and falsifying (or confirming and infirming) experiences, which amounts to the dogma of reductionism attacked in Quine's essay.

Dummett's and Prawitz's neoverificationist conception (which was shortly described in chapter 2, section 2) is very different. Dummett and Prawitz accept Quine's model of language as an articulated structure which impinges on experience only along the edges. According to the neoverificationist view, a direct verification consists in the occurrence of certain sense experiences only for a restricted class of sentences which are extreme cases (Quine's peripheral sentences), whereas for other sentences a verification must involve some (conclusive or non-conclusive) inferential procedure. In general, verification is a mixture of sense experiences and of inferences from other sentences. Observational sentences which are verified by mere sense experience are one extreme case. The other opposite extreme case are mathematical and logical sentences, the verification of which is a purely inferential procedure, i.e. a proof. For such sentences, then, meaning is given by proof-conditions, as the intuitionists maintained.

Despite this crucial difference between the neoverificationist conception of meaning advocated by Dummett and Prawitz and the verificationism of logical empiricists, epistemological holism is a problem also for neoverificationism. As

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22 Kirby and Paris (1982).
24 Cf. Heyting (1934) and (1956).
we have seen in chapter 2, the neoverificationist conception conforms to Dummett's requirements on theories of meaning. Hence the neoverificationist rejects linguistic holism and denies that in order to understand a sentence it be necessary to understand the whole language. The neoverificationist is convinced that in order to give a real explanation of how it is possible to understand a language, a theory of meaning must be compositional, i.e. it must explain what it is to know the sense of a sentence in terms of what it is to understand its components and a fragment of language of lower, sometimes of equal (in order to allow that the senses of some expressions can be understood simultaneously), but never of higher complexity.

But if the theory of meaning equates the sense of a sentence with its verification conditions there is a danger that epistemological holism can lead to linguistic holism (this is a danger because if epistemological holism is right, a compositional theory and, thus, a real explanation of linguistic understanding are impossible). The verificationist theory of meaning must dispel this danger. Dummett and Prawitz try to avoid the danger by distinguishing between direct and indirect verifications. According to this distinction the viability of a verificationist theory of meaning depends on the fulfilment of two requirements: 

a) it must be possible to state, for each kind of sentence of the language, conditions of direct verification which are compositional, i.e. specified in terms of the verification of sentences of lower or equal complexity; 

b) every sound indirect verification (that is: not direct, not compositionally describable) must be in principle reducible to a direct one. Even if the conditions in virtue of which something can be a direct verification of a sentence must be statable only in terms of a fragment of language of lower or equal complexity, the possibility remains that a particular direct verification which satisfies those general conditions can employ also parts of the language of higher complexity. Nevertheless the two requirements on which the viability of a verificationist theory of meaning depends, especially the requirement of reducibility of indirect verifications to direct ones, set a limit on what can count as a verification of a sentence and thus are somehow in conflict with epistemological holism.

A simple logical example of this conflict regards the verificationist critique of classical logic: if S is not in principle decidable, an indirect argument for the law of excluded middle "(S\lor\neg S)" in classical logic cannot be reduced to a direct proof terminating with an application of the introduction rule for disjunction, and therefore cannot count as a real proof. Therefore the verificationist maintains that classical logic ought to be abandoned.

But the problem is much more general. Many new methods of verification for old sentences result from new scientific and technological developments: new diagnostic procedures, new tests for recognizing chemical substances, new media
of communication. By television, I can come to know that now Helmut Kohl in Berlin and John Major in London are wearing the same kind of striped tie. In order to verify this directly, it would be necessary to see at the same time Kohl in Bonn and Major in London. Is there a guarantee that this is in principle possible?

Another (unpleasant) example: we can imagine that on the basis of a neurologic theory one can establish that a serious neurologic disease, which causes a complete paralysis, causes also pain in the back of a person, Phil, affected by that disease (by means of a special test one can also establish that the corresponding nerves are in the condition characteristic of pain according to the theory). In such a case, in order to verify directly the sentence "Phil feels pain in the back", one would have to observe Phil's (verbal or non-verbal) pain-behaviour, but Phil is paralyzed (and thus incapable of communicating) and pain and paralysis are interdependent. Would a direct verification be in principle possible? Historical sentences are also a problem: a sentence about the Sumerian civilization, "The king of Erech Lugalbanda conquered the city of Aratta in Iran", can be verified by means of an interpretation of written records which involves many theories not only about the Sumerian language (and alphabet), but also about other languages (e.g. Assyrian), other civilizations, and thus, perhaps, also theories about geographical and climatic circumstances at that time, and so on. The only way to verify the sentence directly would be to travel back in time. Is it in principle possible?

Hence, it seems that the idea of a verificationist theory of meaning advocated by Dummett and Prawitz is not fully compatible with epistemological holism, as far as epistemological holism implies that we cannot in advance set any limit to what can count as a verification of a given sentence. On the contrary, a theory of meaning centred on immediate argumental role is a compositional theory (as we have seen in chapter 3 section 21) which is fully compatible with epistemological holism, because it does not require that the global argumental role of a sentence should be reducible to its immediate argumental role and to the language fragment which the immediate argumental role presupposes (as we have seen in the present chapter section 2). The conception of understanding which I am here presenting is compatible with epistemological holism because it does not place any a priori restriction on the argumentation rules that can constitute a speaker's understanding of the words concerned and that can belong to A in a language <L,A>. The theory of understanding centred on immediate argumental role is tolerant: no bounds are set in advance on the ways in which one can verify a sentence or draw consequences from it.