Metaphor and Argumentation

edited by

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The Role of Metaphor in Mary Hesse's Language Theory

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1. Metaphor, first of all

Looking at the historical and philosophical context in which Mary Hesse's thought took shape, the "revolution" she brought about in the contemporary epistemological debate is immediately striking.

Since the 1960s, Hesse has been developing a theory that moves away from the positions of logical empiricism and from the necessity, peculiar to this current of thought, to turn language into a calculation, in order to use it as a reasoning instrument. This concept of an "ideal language", perfectly able to mirror the world, as Mary Hesse claims, "has a philosophical pedigree going back at least to Aristotle" (Arbib & Hesse 1986: 149). Indeed, for him, scientific knowledge provides an image or a representation of the ontological structure of reality, symbolically expressed in apophantic speech, appropriate to scientific discourse, where the determinations of true and false take place.

Aristotle conceives of nature as a hierarchy in which entities are divided into genera. Such a hierarchy is held to reveal the ontological structure of nature. In accordance with this view, knowledge would be acquired through the identification of the inner essences of entities (which is defined by giv-

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ing its genus and specific differences). The ideal language view, maintained by the logical empiricists, perfectly suits this kind of ontology.

> Every ideal language contains a finite number of general terms and an ideal language contains enough of it to "mirror" the fixed number of natural genera that have to become isomorphic to them in the ideal science. The correlations between natural genera are expressed in natural laws, which, therefore, agree with the semantic rules of the ideal language and are guaranteed as universally applicable ones (Arbib & Hesse 1986: 230-231).

From this point of view, with the logical frame of knowledge in the foreground, the historical dynamics of scientific undertaking have been considered of minor importance. The emphasis on the context of justification has led to the idea that epistemology simply should analyze the logical form of propositions, the syntactic structure of theories and the abstract patterns of explanation, rather than studying their transformations in the historical context. In this sense, the neopositivist philosophers' work "was with the construction of adequate formal representation of scientific expression in general, rather than with the details of particular scientific work (and much less with past scientific work)" (Shapere 1966: 59). The hypothesis that the whole dynamics of knowledge acquisition and scientific inquiry could be rendered through a formal system, relies on the assumption that the logical structure of theories is inert and does not interact with the contents it represents, as well as on the belief (critically emphasized by Kuhn in his *Structure of the scientific revolutions*, 1962) that there is a theoretically neutral observation language in which the formal structure of theories could find their expression. Now, as Kuhn further claims, since at least the Seventeenth century, the availability of such language has been postulated by many philosophers, who took for granted the neutrality of the sensation reports and tried to identify a *characteristica universalis* that could express the whole set of languages as if they were just one. "Ideally the primitive vocabulary of such a language would consist of pure sense-datum terms plus syntactic connectives" (Kuhn 1970: 266).

The neopositivist perspective went into crisis in the 1960s, along with an increase of awareness of the importance of taking into account the historical dynamics of scientific enterprise.

If we consider the development of scientific theories, it becomes quite clear that there is no neutral observation language, and that the phenomenon of theory change cannot be explained by simply appealing to different interpretation of a set of shared evidences. Instead, as Thomas Kuhn has claimed, different theories can be built on separated and, sometimes, con-

flicting sets of empirical observations. To give an example, Dalton's atomic theory "implied a new view of chemical combination with the result that the line separating the referents of the terms 'mixture' and 'compound' shifted" (Kuhn 1970: 269). The transfer of metals from compounds to elements was due to the introduction of a new theory shedding light on combustion, acidity and the difference between physical and chemical combination (Kuhn 1970: 269-275). In similar cases, the name of the sets remains the same, but the new classification affects the entire network of interrelations among sets. And the last claim has critical effects in scientists' vocabulary.

> In the transition from one theory to the next, words change their meaning or conditions of applicability in subtle ways. Though most of the same signs are used before and after a revolution – e.g. force, mass, element, compound, cell – the ways in which some of them attach to nature has somehow changed. Successive theories are, thus, we say, immeasurable (Kuhn 1970: 266-267).

As a result of a critical approach to the history of science, the thesis that different theoretical accounts of phenomena are incommensurable – which claims the impossibility of finding a common measure serving as criterion of choice between different competing theories –, has been opposed to the acritical reliance on a theoretically neutral observation language. In fact scientific practice mostly depends on our capacity to group objects and situations in classes of primitive similarity, that is in groups that are settled without having to answer to the question "similar to what?" The change of explicative models and language occurring in the historical development of science involves a reclassification and a reorganization of the objects in classes of different similarities, and the lack of a common observative language implies that the criteria of such redistribution cannot be made fully explicit.

When such a redistribution of the objects into different classes of similarities takes place, the shared reference that used to ensure successful communication among the scientists disappears. "Just because neither can say, 'I use the word element (or mixture, or planet, or unconstrained motion) in ways governed by such and such criteria', the source of the breakdown in their communication may be extraordinarily difficult to isolate and by-pass" (Kuhn 1970: 276). Thus, the non-neutrality of observation language would imply both the incommensurability of the theories and the interruption of communication, and hence the impossibility of coming to a rational assessment of different theoretical solutions.

Hesse was fully aware of the problems the history of science brought up to the neo-empiricist view. Nevertheless, she was neither inclined to adopt

the relativist perspective implicit in the idea of an interruption of communication among scientists who have assumed different theoretical points of view, nor to regard the impossibility of rational assessment of different theoretical options as necessarily ensuing from the non-neutrality of observation language.

In order to cope with these issues, a theory of language should allow for categorization based on the recognition of family resemblances and account for the possibility, given in practice, of effectively communicate and rationally discuss about experimental results and theoretical hypotheses. Trying to meet these requirements, Hesse elaborates a conception of language in which metaphor plays a fundamental role, and scientific language is characterized as a dynamic system that grows through metaphorical extension. In doing so, Hesse brings to prominence some issues that have been addressed in depth by scholars such as Eleanor Rosch (1978), George Lakoff and Mark Johnson (1980).

In the light of Hesse's proposal, getting the meaning of a term is not just a matter of recognizing its referent, but it also and foremost involves concern for the "family resemblances" that are commonly associated with it, as well as requiring that the meaning is kept open beyond literal immediacy. In this way, meaning becomes a function of the connections developed within a dynamic semantic network, and of further connections between this network and the world.

2. Shaping concepts

In developing her theory of language, Hesse starts from Wittgenstein's notion of "family resemblance".

> Instead of showing what is common to whatever we call a language, I say that these phenomena have nothing in common, on which basis we use the same word for all of them, but they are connected each other in many different ways. And thanks to this connection, or connections, we call "languages" all of them. (Wittgenstein 1953: § 65)

In this passage, Wittgenstein suggests an alternative to the conception of meaning as an entity underlying all the occurrences of a word. Following Wittgenstein's analysis, the table below (Fig.1) approximately represents the process of concept shaping as based on family resemblance.

Object	**P_1**	**P_2**	**P_3**	**P_4**	**P_5**
Properties	**ACD**	**ABDE**	**BCD**	**BCE**	**BD**

Fig. 1

Let us see how certain properties A, B, C, D and E are attributed to some objects P1, P2, P3, P4 e P5. Taking into account the similarities and the differences between these objects, we can recognize them as being part of the same class P, although they do not share exactly the same set of properties (indeed classification always involves a loss of information due to neglecting individual features). Summing up Wittgenstein's thought, Hesse states

> We assume that in a family resemblance class (for example "game"), the members of enough pairs of objects in the class resemble each in some respects relevant to P, and are appropriately and sufficiently different from objects put in the class not-P, without assuming that there is any universal "P-ness" realized by the object (Hesse 1993: 60).

Family resemblance-classes (hereafter referred as FR-classes) rest upon similarity between objects. Similarity is stated with regard to a bunch of properties that are recognized as relevant and important for the sake of classification. This implies that their selection is conditioned by the conceptual framework one adopts, because "relevance and importance will be functions of the theoretical system accepted up to date" (Hesse 1993: 68). For instance, though color is an important property of flowers, it is of little use for scientific classification of plants. On the other hand, the number of stamens, which are hardly visible to the naked eye, provides the botanist with a better criterion for an economical and comprehensive taxonomy.

3. The resemblance connections

As Hesse points out, one essential property of the resemblance connections is *non transitivity*. Following the schema represented in figure 1, if we recognize a certain degree of similarity between, say, the objects P1 and P2 with respect to an FR-class, and, at the same time, some similarity between P2 and P3, we cannot conclude that the same kind of similarity holds

between P1 and P3. As an example of FR-class, let us consider chairs. The most paradigmatic members of this class are objects consisting of a back-rest, a seat, four legs, and (optionally) two armrests. But the class includes also other types of chair, such as beanbag chairs, hanging chairs, and swivel chairs, contour chairs, barber chairs, etc., that possess different features as compared to the most paradigmatic members. Now, we use to regard all these types of chair as belonging to the same FR-class "not because they share some fixed set of defining properties" with the central one, "but rather because they bear sufficient family resemblances" to it (cf. Lakoff and Johnson 1980: 122-123). Referring to the above represented schema, we can say for instance that the position of P2 within the FR-class is more central than the position of P1, while P5 is quite peripheral. This also implies that "The resemblances can form a chainlike structure through a given class in such a way that there are relatively clear cases of objects falling within it, and relatively clear cases of those that do not" (Hesse 1993: 61).

Recognizing similarities between objects allows us to rank them among the members of a FR-class, and so to include them in the same FR-concept. Still, an FR-class is constitutively open, since it owes its structure to an intricate interweaving of similarities and differences. As a matter of fact, it is not possible to specify all the constitutive similarities of a class, because the relation of similarity objects that are classified together, but also among whatever single property involved in the classification (Hesse 1974: 49). This is the reason why categorization always implies some loss of information. In any case, the attempt to define an FR-concept by enumerating all the resemblances between the objects included in its extension would lead to infinite regress, as the concepts introduced for clarification should in turn be characterized by calling into play further resemblances. According to the above table (Fig. 1), an attempt to enumerate all the properties of an object included in P, would require first mentioning A, B, C, D, E etc., but then each of these properties should be characterized by mentioning further properties, such as F, G, H etc. So, if P1 and P2 resemble each other, for example with respect to D, we might still wonder in virtue of what D is predicated of both. To avoid falling into a variation of the third man argument, we can only accept a relative degree of characterization (Hesse 1974: 49). "This potential regress must be stopped by some predicates whose application involves loss of information which is present to recognition but not verbalizable" (Hesse 1970: 40).

Although Hesse acknowledges that observation is theory-laden, and claims that similarities are recognized through our "theoretical glasses", she

also points out that in pre-theoretic contexts our ability to detect certain similarities rather than others is biased by other factors as well.

> If we have little or no information about any theoretical system […] similarities may be determined just physiologically. […] We may even regard such recognition of similarity as incipient theory, where the "theory" is a physiologically innate determination of perception (Hesse 1974: 68-69).

In such cases, it is "the physics and physiology of situations" (Ibid. p. 39) that provides us with some criteria for appraising whether two situations are similar in more obvious respects than others, and deciding the salience of one respect for establishing similarity or diversity between different situations. This simply means that our cognition is anchored in "the physics and physiology of situations", at least in some respects, and that the basic open-endness of concepts does not imply their arbitrariness. The apparent lack of motivation of the observative language and its reliance on theoretical background depend on the loss of information we inevitably experience while building our conceptual system upon sensory impressions. Therefore, while arguing that the relevance of the shared properties depends on the accepted theoretical framework, Hesse recognizes that, due to this loss of information, the dependence is only partial.

The analogical character of cognition, and the fluctuation of meaning it entails, suggest that we cannot define a final set of instructions about the use of words and the shaping of similarity classes. We must accept the impossibility of using the elements of language in a stable and strict form, fixed once and for all. This idea is a major tenet of Hesse's *Network theory of meaning*, as we shall see in the next section.

4. The network theory of meaning

The semantic flexibility, Hesse claims, demands that

> one does not ask "What is *the meaning* of a linguistic term?" but rather "How does this term relate to others in the language and to its empirical reference, in such a way that communication becomes possible?" The answer has to be in terms of a complex network of *meaning relations* (Hesse 1988: 324).

In other words, in order to understand and clarify the meaning of a term, we must consider the grammatical rules allowing its public use. This is made by linking the term to the other terms of the language. From this point of view, the language records the connections between the terms used in different

linguistic communities. The semantics of a word covers a set of uses that range from the logical-formal definition to the recognition of similarities.

Following this train of thought, meaning is to be conceived as a function of the connections in a dynamic semantic context linking each word with other words, and the whole language with the world. Then the meaning of a term is not only defined by its correspondence to the world, it also depends on the whole network of connections. However, language learning and communication depend also on the fact that the language network is connected to the extralinguistic world (Hesse 1988: 324).

Words are not subject to the same degree of regulation. We could draw a contrast between cases in which words have clear meanings that regulate their functioning in every particular case of attribution and cases in which words have only vague meanings, which functioning is connected to peculiar associations in different empirical situations (Wittgenstein 1958: 40).

> Words get the meaning we have given to them. And we give them meanings through clarifications. I may have defined a word and used that word consistently with its definition, or those who taught me that word may have explained it to me in that way. Or, by the clarification of a word, we may mean the clarification that, on demand, we are ready to give to it. If we *are* ready to give a clarification, in most cases we are not. Many words, in this sense, have no strict meaning then. But this is not a flaw. Considering it a flaw would mean that the light of my lamp is not a real light because it does not have a clear limit (Wittgenstein 1958: 40).

In sum, we cannot expect to list a set of rules for each use of a word and we must accept that words do not always have strict meaning and never have a fixed meaning. This is a crucial point concerning the way predicates work in language. It is this way they become signifiers. "The network theory of meaning" "contemplates controlled indefiniteness of the boundary of "what we want to mention"" (Hesse 1986: 47).

As a further specification of this view, it should be noted that according to Hesse FR-classes are not purely extensional, as they are not defined simply by reference to the objects they include. "They involve also what I shall call *intensional reference*, that is, they depend on recognitions of similarities and differences in producing the initial classification in a given language" (Hesse 1974: 62).

The concept of intensional reference plays a central role in Hesse's theory of language. It should be distinguished from the notions of extension and intension used in formal semantics. It is rather related to the issue of "meaning variation" discussed in philosophy of science. According to her, the peculiarity of FR-classes is that they "are not adequately described as

extensional, for they are not defined merely by the objects contained in them" (Hesse 1974: 62). To say that any FR-class involves an intensional reference means that it is related to the recognition of similarities and differences the original classification in a language is based on. In Hesse's words, "intensional reference is the relation which subsists between a descriptive predicate in a given language and a property of an object when the statement ascribing that predicate to that object is true" (Hesse 1974: 62). Any statement is held to be true against the background of the best theory available at the time and based on coherence conditions. When theories change, the intensional reference of terms accordingly changes. However, this does not necessarily modify the extension of classes. For instance, we might improve or modify the criteria allowing the recognition of Vermeer's paintings, without modifying the comprehensive catalogue of his artworks.

> Thus, same extension does not entail same intensional reference, but same intensional reference does entail same extension, since that any object has an intensional property is a sufficient condition for placing that object in the extensional class corresponding to that property (Hesse 1974: 62).

Basically, the intensional reference linking any predicate P to a property of an object establishes the conditions for the attribution of P to the object itself, which is thereby included in the extensional class of P.

According to this analysis, the relevant change of meaning takes place when the conditions causing the attribution of a predicate are modified. "The 'meaning of P' changes when all or some empirical situations to which we have conventionally learned by recognition of similarities and difference to assign the predicate P, are deliberately ascribed the predicate -P, according to some rule derived from the coherence conditions" (Hesse 1974: 63). In other words, if the similarity defining the class of Vermeer's pictures changed, or if some works first included in that class had eventually been excluded from it (for instance, because critics have come to distinguish the master's paintings from his best pupil's ones), the meaning of "Vermeer" would change as well. Therefore, we have no authority, though facing different theories, to ascribe a meaning change to P. "If the physical conditions under which recognition of a property as P is correct are unchanged, the meaning of P is unchanged, no matter what changes of theory may be dictated by all the evidence and the coherence conditions" (Hesse 1974: 64). For instance, the use of the telescope changed both the physical conditions to ascribe the predicate "planet" to celestial bodies and the empirical situations under which that term could be learned by scientists. Thanks to the new instrument, Galileo was able to see the similarities between the Earth

and Jupiter and, more in general, between heavens and sublunary world. The physical conditions for the ascription of astronomical predicates changed so much that the entire framework of Aristotelian cosmology broke down shortly after.

No change of meaning takes place unless the physical conditions allowing the attribution of P have changed. According to the network theory of language "similarity and difference are irreducible primary relation, prior even to application of the simplest predicate: they are *shown* not *said*" (Hesse 1984: 33). Now, as the recognition of similarities and differences is the basis of metaphor, the whole language turns out to be metaphorical.

> The shifts of meaning undergone by predicates applied in FR classes are also like metaphoric shifts of meaning, for they depend on similarities and differences in some respect and in given context between the objects to which a given FR predicate is applied (Hesse 1984: 2).

Starting from Wittgenstein's analysis of concepts genesis through the notion of family resemblances, Hesse comes to take account of Max Black's "interactive view of metaphor" which, she claims, "fits our network model of meaning like a glove" (Hesse 1984: 6).

In the tradition of logical empiricism, metaphors are held to be inappropriate to express an original cognitive content and deemed to represent a deviant use of language. Such a position rests on the assumption that, as far as metaphors are meaningful, their meaning can be rendered by an equivalent literal paraphrase. From this perspective, only literal formulations can express a cognitive content properly. As an alternative to this account, Black proposed his "interactive view of the metaphor", where he rejects the substitution view and recognizes the cognitive value of metaphor.

Black draws a distinction between two subjects in a metaphor: the primary and the secondary subject. In a metaphoric sentence such as "man is a wolf", "man" instances the primary subject, and "wolf" the secondary subject, which functions as metaphor frame. The crucial point here is the idea (firstly suggested by Richards 1936) that the juxtaposition of the subjects metaphor brings together generates some meaning effects that cannot be inferred from the single words taken separately. In other words, new meaning arises from the interaction that metaphor triggers between two domains. This, Black claims, results in reshaping of the concepts related to both domains. The interaction suggests the selection of a subset of properties commonly associated to the secondary subject. Such a "system of associated commonplaces" acts as a focus on the properties of the primary subject, whereby a set of implications is sorted out from it. In this way, the primary

subject is "seen through" the secondary subject. Indeed, according to Black, metaphor works as a filter that allows us to recognize and organize the features of the primary subject by emphasizing some of them and ignoring others (cf. Black 1954: 286). Furthermore, this process, while promoting a change in our primary subject representation, is supposed creates mutual parallel changes in the secondary subject representation. Then, from a semantic point of view, the interaction process results in "shifts in meaning of words belonging to the same family or system in the metaphorical expressions" (Black 1954: 292).

As we have seen, perception of similarities and differences plays an essential role in defining linguistic reference. Now, Hesse's idea that FR-classes have metaphorical genesis finds also support in Black's claim that metaphor is "an instrument for drawing implications grounded in perceived analogies of structure between two subjects belonging to different domains" (Black 1979: 31).

As a matter of fact, analogies develop through a complex system of implications within a range of linguistic uses shared by the speakers' community, and create the holistic network of language. It is important to underline that the predicates of a natural language do not have a clearly determined extension, which strongly depends on the analogy recognized in the specific cases. As a consequence, the FR-classes cannot be considered as purely extensional, since they imply an intensional reference as well. In other words, meaning is constituted by a network and metaphor forces us to look at the intersection and interaction of different parts of the network (Arbib and Hesse 1986: 156). In Newton's theory, for example,

> both "force" and "mass" were used metaphorically, that is, not in accordance with contemporary custom, but the extensions and corrections of meaning involved were implicitly *shown* within the structure of theory itself - the theory was a recommendation to reclassify, to reject the necessary connection of force with push-pull, and to recognize all material bodies in the universe as "masses" within the meaning of theory (Hesse 1993: 64).

This shift of meaning was produced by Newton through experiments and theoretical hypotheses. In this way he managed to indicate new physical conditions for the use of those terms and changing their reference as well as some inherited related ideas (Arbib and Hesse 1986: 154). By the way, the metaphors often are not immediately understood and accepted so that they require negotiation between speakers to draw out their possible meanings (Hesse 1993: 64-65).

This general conception of language is effectively resumed in Hesse's words:

> Understanding the meaning of a descriptive expression therefore does not mean just being able to recognize its referent (in a given context, in a given reading) and not even just using words correctly in the expression, but also calling back to mind the ideas, both linguistical and empirical, included in the mental frames and commonly considered associated to the referent in that given linguistic community […]. As far as an intersubjective understanding is concerned, most of the connected ideas must be assumed as common to all speakers of that language (Arbib and Hesse 1986: 154).

On these grounds, the Network Theory of meaning highlights the basic metaphoricity of language. All this has been properly summarized in what Hesse has called "Thesis M": "metaphor is a fundamental form of language, and prior (historically and logically) to the literal" (Hesse 1993: 54).

Hesse's conclusions about the intensional character of categories and metaphorical functioning of language have crucial epistemological implications. In fact, the epistemological concern proves to be as central as the aim at clarifying the nature of language, rather, the two aspects are inherently interwoven. "Suggesting […] that metaphor has, after all, a cognitive status means debating the basis of most of the applied logic and of the semantics" (Arbib and Hesse 1986: 144). However, even if logical consistency turns out not to be the essential element of language, this does not imply abandoning logic and deduction in science. While relying on some secondary known analogies and hinting at new unsuspected ones, scientific metaphors , may allow us to deal with logical difficulties or real formal contradictions arising from models. In any case, the question about the truth conditions of scientific metaphors is not the most appropriate and fruitful. Metaphors should not so much be appraised for their truth or falsity, as for their aptness or inefficacy, for being illuminating or misleading, useful or useless. Their import should be assessed compared to the context of application and "their coherence with evaluative judgments made about particular situations" (Arbib and Hesse 1986: 156). Scientific activity involves also pragmatic aspects, where prediction and control are as essential as abstract theorizing, where theories must stand experimentation and testing, and the experimental results can affect theory retroactively (Arbib and Hesse 1986: 10).

> On philosophical grounds, scientific models are a prototype of fantasy creations or frames based on natural language and on experience; however, thanks to the metaphorical extension, they go beyond this attempt to build symbolic worlds that can represent certain aspects of the empirical world, either properly or not. All these metaphorical worlds share the function of describing and redescribing

> the world through scientific models; and for any of them it is not appropriate to ask for a literal truth as a direct correspondence to the world (Arbib and Hesse 1986: 161).

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