CHAPTER EIGHT

METAPHORS AS THE EXPRESSION OF MODELS

1. THE INTERACTIVE CONCEPTION OF METAPHOR

For those concerned with the use of metaphor in scientific theory two questions immediately present themselves: How do metaphors work? and Why are metaphors necessary? The first of these is one that may never be fully answered, not at least without a theory of meaning and a theory of mind at present far beyond us. The second may be answered simply—We need to use metaphor to say what we mean—since in the course both of literary composition and scientific theorising we can conceive more than we can currently say. Discomfort at having in the first case only a partial answer, and in the second a vague one is relieved by seeing the ways in which these two questions may illuminate one another.

Despite the difficulty of giving a fully adequate theory of the way in which metaphors work (and who, in any case, would be qualified to give it - philosophers, linguists, neurophysiologists?) we can note strengths and weaknesses in the various theories generally presented, and this itself points in the direction of a more adequate account. Transfer is implied, perhaps unfortunately, by the etymology of the term metaphor, and it is as a study of transfer or comparison that traditional studies of metaphor have developed. What are often referred to as the 'theories of metaphor' are for the most part theories as to the nature of the transfer or the comparison which a metaphor effects. They are theories of the way in which metaphor gives us, in Dr. Johnson's words 'two ideas for one' (cited by I. A. Richards 1965, p. 11).

These theories comprise two main groups: substitution and Gestalt theories. Basic to the former is the idea that metaphor is another way of saying what could be said literally, 'a sort of happy extra trick with words, . . . grace or ornament, or *added* power of language, not its constitutive form' (Richards 1965, p. 90).

The shortcomings of the substitution theory are legion. Taken at face value it reduces metaphor to the status of a riddle or word game, and the appreciation of metaphor to the unravelling of that riddle. To assume the ready availability or even the necessary existence of a literal substitute renders metaphor, on this interpretation and especially for the purposes of philosophical or scientific reasoning of any sort, almost useless.

A slightly more plausible variant of the substitution theory is the idea that metaphor is a kind of comparison, a condensed simile. Metaphor is treated as the merely ornamental comparison of similars. The comparison theory, though implying a more active mode of cognition than the simple substitution theory, fails to identify the most interesting sort of metaphors. These involve a use of terms, not merely to compare two antecedently similar entities of whose attributes the author must already be appraised, but enable one to see similarities in what have previously been regarded as dissimilars.

Furthermore, as we shall show, if metaphor is just comparison, then the content of scientific assertions involving metaphor will be confined to material concerning the realms of actual and possible experience, since comparisons are essentially rooted in experience. But most sciences are, for reasons we shall develop, inclined to include assertions about those features of the world that are beyond all possible experience.

All versions of the substitution theory share the conviction that metaphor is a way of saying what could he said literally. It is with this that Gestalt theorists disagree. It is basic to their

position that what is expressed by metaphor can be expressed in no other way. The combination effected by the metaphor results in a new and unique agent of meaning. A majority of modern commentators would accept some such position, derived ultimately from I. A. Richards' analysis, in which the modifying term ('vehicle') gives to the primary subject ('tenor') an extended meaning (Richards 1965, p. 90).

Max Black has been the main philosophical exponent of Richards' ideas, proposing in an early article, 'Metaphor', what he has called the 'interactive' view of metaphor (Black 1962). Black's contention is that each metaphor has two distinct subjects, principle and subsidiary, and that the principle subject acquires new meaning through its involvement with the subsidiary one. The subsidiary subject 'organises' one's thought about the principle subject in a new way and this operation makes metaphor irreducible to any one literal formulation. Metaphor is neither a kind of substitution nor a function of simple comparison, which is the province, Black suggests, of simile.

In Black's original interactive theory both primary and secondary subjects bring with them their own 'systems of associated commonplaces', though he offers no account of those systems, in particular of their structure. So the metaphor 'man is a wolf' depends upon certain shared knowledge and assumption about the nature of man and of wolves — wild, ruthless, relentless, and so on. In the metaphor, the *two* systems of implication interact (hence 'interactive metaphor'), and produce a new, informative and irreplaceable vehicle of meaning. Both primary and secondary subjects are illuminated by this interaction. It is the cognitively irreplaceable status of such metaphors which Black wishes to stress, and which makes them radically different from mere comparisons.

Black uses various metaphors to develop his theory of metaphor, one of which is 'filtering'. In organising one's view of man, the wolf metaphor 'filters' one's understanding, suppressing some details and emphasising others. Black compares this with looking at the night sky 'through a piece of heavily smoked glass on which certain lines have been left clear'. However, the implications of filtering are in fact inconsistent with Black's suggestion as to the twofold character of interaction. It is difficult to see how the smoked glass is affected by interaction with the night sky. The notion of filtering has been criticised in other ways: How does this filtering take place? and what controls are exercised on it? Why are some commonplaces accepted, and not others? Indeed, while the early interactive view has met with general acceptance and has come to be regarded in English language philosophy as a basic text, Black's terminology has met with criticism, In particular, 'interaction', 'filtering' and 'screening' are objected to as being neither fully explanatory nor fully explained.

By way of reply Black has written 'More about Metaphor' (Black 1977). The major change is his recognition of a closer bond than he has previously allowed between models and metaphor, and between metaphor and analogy, and this constitutes his reply to the difficulties of filtering. He says that between primary and secondary subjects, or more precisely between their two implication complexes, there exists an isomorphism of structure. 'Hence every metaphor may be said to mediate an analogy or structural correspondence.' This provides an answer to the question of how filtering may be controlled, but sounds surprisingly close to the comparison theory which he earlier rejected. Although Black insists that his position is not to be confused with those in which metaphor is identical to comparison, his talk of isomorphism, analogy and structural correspondence belies his claim.

Black's interaction view is further undercut by his new contention that it is only the secondary subject (for example, the wolf) which is to be regarded as bringing with it an implicative complex. Interaction is now a less appropriate term for what is going on, and Black's efforts to meet criticism have resulted in retraction of most of what made the original interactive theory interesting.

Contradictions are inevitable given Black's continued insistence that the first principle of his interactive view should be that each metaphor has two distinct subjects. This, and his continued reliance on examples such as 'man is a wolf' and 'Nixon is an image surrounded by a vacuum', make his theory applicable primarily to those metaphors which involve two nouns, and inevitably suggests comparison. Furthermore, the whole of Black's interaction theory rests upon the idea that it is the two *subjects* of a metaphor, or their systems of implicature, which interact, a notion which, if discredited, discredits his theory, despite the evident correctness of his idea of the role of the 'system of associated commonplaces'. We shall show, in our own theory, how, by generalising some ideas of Saussure, we can retain this idea without any commitment to a comparison of two subjects.

It has been mentioned that a great deal of the modern discussion of metaphor is indebted to the study of metaphor found in one small book, I. A. Richards' *The Philosophy of Rhetoric,* and it is Richards who may be credited not only with originating the interaction view but with putting it in its most consistent and illuminating form. Richards says: When we use a metaphor we have two thoughts of different things active together and supported by a *single word or phrase,* whose meaning is the resultant of their interaction (our italics). Max Black dismissed this notion of 'two thoughts working together' as psychological language and as an 'inconvenient fiction', perhaps because Richards' phrase suggests the ideational theory of meaning which he put forward with C. K. Ogden *in The Meaning of Meaning* (1923/1972), but if one allows, by a principle of historical charity, that the thoughts that one is dealing with here will be primarily couched in language there is no reason why Richards' suggestion is any less convenient than Black's 'two present subjects'.

Richards wants to emphasise that metaphor is an intercourse of thoughts, as opposed to a mere shifting of words or crude substitution, as suggested by the ornamentalist view of traditional rhetoric. It is not substitution of terms, but, in his phrase, the 'interanimation of words'. The notion that two thoughts interact is at the root of his distinction between 'tenor' and 'vehicle'; the tenor is the underlying subject of the metaphor and the vehicle is the terms which present it, so in this quotation used by Richards:

> A stubborn and unconquerable flame
> Creeps in his veins and drinks the streams of life.

The tenor is the fever from which the man is suffering, and the vehicle is the flame which drinks his life. Here it is important to note that what Black would call the primary subject, 'fever', is not explicitly mentioned in the passage. We talk about fever by using the word 'flame', and its associations determine what we mean by so doing. Since 'flame' occupies the centre of a different semantic field from that occupied by 'fever', the use of the term 'flame' enables us to say things about fever different from those we could say by using the word 'fever'. This supports Richards' contention that it is thoughts (associated commonplaces) and not words which interact. In section 2 we shall show how this can be worked out in more detail by the use of Saussure's conception of *valeur.*

Part of Max Black's dissatisfaction with 'ideas interacting' arises because he has not grasped Richards' distinction between tenor and vehicle. When Black gives account of these terms he uses examples such as 'man is a wolf', in which 'man' would be tenor and 'wolf' vehicle. Not only does this miss Richards' more subtle insight that tenor and vehicle may be co-present in one word or phrase ('That wolf is here again') but it prompts Black to state that in the interaction metaphor 'two distinct subjects are present'. This contention is perhaps related to a residuum of extensional or referential theories of meaning. In the above example, 'flame' is being used to refer to fever, not to flame. So it cannot be the referential meaning of 'flame' that is in point. But

it is mistaken, both if one means by present 'there in the utterance', as can be seen from the above description of the fever, and mistaken if one means by 'present', 'there in the mind'. While the primary subject 'fever' may be absent from the text but present in the mind in a metaphor such as the one cited above, it is by no means true that two distinct subjects are present, even to the mind, in a metaphor such as 'the giddy brink' or 'eddying time'. Black's account cannot, in fact, deal with such metaphors. Richards is not so limited for he can say, for example, that the tenor is the 'brink' and the vehicle 'giddy', and the metaphor works through the associations one has with giddiness.

This misunderstanding of Richards' distinction between tenor and vehicle is responsible for many of the inconsistencies of Black's interactive theory. The stipulation that each metaphor have two distinct subjects was responsible for the confusing notion that in the metaphor both subjects were illuminated, a notion which had to be abandoned in the later article. Stripped of this form of interaction, yet hampered still with two subjects, Black's analysis in 'More about Metaphor' drifts inevitably towards the comparison views which he had been at pain to denounce.

It is only by recognising that the tenor and the vehicle may be co-present in the one word or phrase, since tenor corresponds to reference and vehicle to 'sense', and that a metaphor has one true subject and a vehicle which is used to illuminate it, that a full interaction theory is possible. The insight of an interaction is not that two subjects and their commonplaces interact but that, in Richards' words,

> The vehicle is not normally a mere embellishment of a tenor which is otherwise unchanged by it but that vehicle and that tenor in co-operation give a meaning of more varied powers than can he ascribed to either.

This is 'interanimation of words' and not comparison of two subjects, because the referent of the old word 'fever' has been enriched by being described with a word having the sense of 'flame'. Hence we have a richer conception of fever and soon, perhaps, a richer semantic field for 'fever'.

The illumination of one subject through the interaction of tenor and vehicle can be seen in this metaphorical description taken from Virginia Woolf's, *To the Lighthouse:*

> Never did anybody look so sad. Bitter and black, halt-way down, in the darkness, in the shaft which ran from the sunlight to the depths, perhaps a tear formed; a tear fell; the waters swayed this way and that, received it, and were at rest. Never did anybody look so sad (Woolf 1977, p. 31).

What is being spoken of here is not both a grief and a shaft of some kind, but simply some private, sickening grief which is uniquely illuminated by being spoken of in terms appropriate to a shaft. The excellence of the metaphor is not that this is a new description of a previously describable human condition, but that this subject, this particular mental state, and these particular connotations are revealed as such only through this metaphor. This 'interanimation' of terms has uniquely identified the state so that the metaphor is not an adornment to what one already knows, but a vehicle for a new insight made available by this interaction of terms, leading to an increment to the psychological description. And here, through discussing how metaphor works, we arrive at an answer as to why metaphor is needed—we need metaphor because in some cases it is the only way to say what we mean since the existing semantic fields of the current terminology referentially related to the subject *in* question are inadequate to our own thought.

2. SAUSSURE'S *VALEUR* THEORY

The theories we have discussed in section 1 are all adequate to some instances of metaphor (there are, for example, sonic metaphors which do function as little more than ornamental substitutes for what could otherwise be literally stated): however, all involve a premature fusion of what metaphor is with how it is that some metaphors work. The most satisfactory theory, we have suggested, is an interactive one developed along the lines suggested by Richards, and for a working definition of metaphor it is best to choose a formulation which retains the insights and possibilities of Richards' 'interaction of thoughts', yet avoids suggestion of an ideational theory of meaning, or indeed suggestion of any mechanism or process at work in metaphor. The following is suggested: metaphor is a figure of speech in which one entity or state of affairs is spoken of in terms which are seen as being appropriate to another.

The motivation for wishing a well-designed theory of metaphor to accompany realist philosophies of science should now be more clear. The theoretical sciences experience crises of vocabulary. If the progress of science is seen to require the attempt to describe real things, some of which are beyond all possible observation, then one must concede the need to give an account of the terms which are used to describe these beings, their properties and relations not available to experience. Boyd has made the important point that these terms are essentially incomplete and improveable a *posteriori*[1]. One must ask under what conditions such terms can be introduced into a language *so that they may be intelligible.* We have some notion of the point of reference of our terms but since these entities are beyond experience the experiential terminology is semantically unsuitable, taken in literal application, that is, relative to its original source of meaning.

Clearly, a term that can be used in accordance with these demands must be:

(i) Meaningful to a user of the language *without recourse to further experience.*
(ii) And yet, somehow imbued with novel meaning.

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[1] From Boyd, R. 1979, pp. 371- 372:

These programmatic features of theory-constitutive metaphors—the tact that they introduce the terminology for future theory construction, refer to as yet only partially understood natural phenomena, and are capable of further refinement and disambiguation as a consequence of new discoveries—explain the fact that repeated employment and articulation of these metaphors may result in an increase in their cognitive utility rather than in a decline to the level of cliché,

What is significant is that these programmatic features of theory-constitutive metaphorical expressions are, in which, typical of theoretical terms in science . . . normally, we introduce terminology to refer to presumed kinds of natural phenomena long before our study of them has progressed to the point where we can specify for them the sort of defining conditions that the positivist's account of language would require. the introduction of theoretical terms does require, however, some tentative or preliminary indication of the properties of the presumed kinds in question.

[Metaphors] provide an especially apt illustration of ubiquitous but important features of scientific language generally ... there exist theory-constitutive metaphors in abundance, and. . .a non-definitional account of reference of the sort advanced by Kripke and Putnam can be employed to defend the view that the metaphorical terms occurring in theory-constitutive metaphors actually refer to natural kinds of properties, magnitudes and so on . . . which constitute the non-literal scientific subject matter of such metaphors . . The use of theory-constitutive metaphors represents a nondefinitional reference-fixing strategy especially apt for avoiding certain sorts of ambiguity.

The former condition implies that somehow the new term is drawn from the common stock, and that whatever is novel about it is created by a process internal to the language. The latter condition requires that the term be controlled by novel rules of use, and involve intentional content which is distinct from any other term, or that term in any other usage.

These conditions can be met by only one kind of linguistic phenomenon. While neologicism could meet condition (ii), they could not, in general, meet condition (i). But metaphor (and perhaps some other figures of speech) could meet both conditions. A neologism fails since mere location of a lexical sign in a new network of laws of nature, for example, implying a unique set of rules of use, is inadequate to fix new meaning, since such a condition *can* guarantee no new intentional content—there could be tenor (that is, a novel referent), but no vehicle (that is, no sense).

It seems clear that any account of meaning which correlates meaning with sensory experience in acts of observation by ostensive reference is bound to be incapable of explaining the meaning-creating power of a process internal to a language, such as metaphor. Worse, taken seriously, it would lead to the reduction of all sense-extending figures of speech such as metaphor to comparison. In a comparison, the term through which the similitude is drawn is unaffected in meaning by standing in that relation, since it is precisely its literal meaning which is partitioned into likenesses and differences. Indeed, comparisons could work only if the predicated term remains unaffected in meaning. And these meanings are, in general, given in terms of existing dimensions of experience of the actual world.

Thus, meaning theories which are essentially ostensive *in* character are excluded from a role in giving an account of that kind of metaphor in which new meaning is created. At most they could explain how old meaning is reshuffled. Since ostension theories entail that there are no real metaphors, only comparisons, the demonstration of the existence of irreducible metaphor would be a *reductio ad absurdum* of such theories. In order to understand metaphor we shall have to turn to a different way of conceiving meaning from 'whatever' a term refers to. The most powerful theory that provides a thoroughgoing alternative is that of Saussure. With our development of Saussure's *valeur* theory we shall show how Richards' theory of 'interaction of thoughts' can be given a quite concrete interpretation.

If metaphorical description is a process internal to language, then we ought to find an account of it in terms of Saussure's theory of *valeur,* that aspect of meaning by virtue of relations that a term bears to all other terms of a language, that is, the internal relations of the language as a system. I remind the reader, *valeur* can be represented graphically as follows: a horizontal axis represents all the structured forms into which a term may enter. It could be a list of the well-formed sentences of a language in which a term 't' appears. This is the syntagmatic axis, and it could be thought of as generated by a set of rules, the grammatical rules of the language. At every point at which the term 't' occurs one could imagine a set of vertical axes, each representing a category of possible meaning-preserving substituents for the term 't' at that point. Distance from the horizontal axis would represent the likelihood of the substitution.

The permissible set of alternatives at any occurrence could be thought of as generated by sub-categorical rules, representing the metaphysical and even the empirical status of the term 't' relative to the other terms in the sentence. For instance, the sentence 'My cat likes to lap cream' contains an instance of the term 'cream'. Paradigmatic axes at that occurrence might include close to the horizontal axis such terms as 'milk', 'water', 'mouse' and 'blood', but not such terms as 'the circuit at Brands Hatch'. In short, 'lap', in that sense, specifies categories and classes of terms which are admissible substitutes at that occurrence of 'cream'. Let us call the rules that specify the *set* of possible objects of the verb 'to lap' *in that sense* the sub-categorical rules, relative to the sub-categorical rules for 'cream', that is, that it is a liquid, comestible dairy product.

We define a metaphorical use of a term as a use which violates the sub-categorical rules of the lexical items in a sentence. To insert 'the circuit at Brands Hatch' in the sentence above would be a violation of the sub-categorical rules associated with 'cat' and 'lap'. Contemplation of 'lap' would relate our sense of what 'lap' means in this context to the sub-categorical rules governing the set of verbs of which 'cat' could be the subject, in that sense of 'cat'. Graphically these rules could be represented by the sets of items on paradigmatic axes erected at the point in the syntagmatic axis where the term 'lap' occurs.

But the term which is used metaphorically, that is, functioning as the vehicle of the metaphor, has with it its own Saussurean grid, with its own syntagmatic and paradigmatic axes. If the metaphorical use is accepted as intelligible, it must involve a reshuffling of the items on the paradigmatic axis of the term so used, relative to its *valeur*. In short, a metaphorical use of a term involves an interaction between the set of Saussurean grids representing the *valeur* of all the terms involved in the sentence in which the metaphorical use occurs. The mathematical representation of such an interaction would require matrix algebra. Fortunately, since the axes of the Saussurean grids can be generated by the repeated application of sets of rules, grammatical for the syntagmatic axis amid categorical amid sub-categorical for the paradigmatic axes, we can express the matter succinctly as the principle that whenever a genuine metaphorical use has occurred there has been a violation of a sub-categorical rule of the set of rules for substitution in the relevant grammatical categories relative to the other terms. Metaphor is *interactive* because in *valeur* terms, the effect of a metaphorical use will be to alter the order of the set of items that lie on the paradigmatic axes at that point. But to reshuffle those items will necessarily be to alter the sub-categorical rules associated with them, in their appearances in syntagmata. To construe a usage as metaphorical is then for a native speaker to employ tentatively modified sub—categorical rules, so that the usage is not rejected as a category mistake. In so doing, the native speaker allows himself, as it were, a richer intension than the referent of the term in the metaphorical employment currently sustains.

Thus if the term 'wave' is used metaphorically for the causes of luminiferous phenomena, in its new use it must he associated with some differences in the items on the paradigmatic axes representing the literal use. So 'creamy white horses' is not a proper meaning-preserving substituent for 'waves' in the sentence, 'Light is propagated by transverse waves'. But if 'waves' is being used in its metaphorical sense, there must be a reshuffling of the items paradigmatic to 'light' so that, for example, 'flame' is no longer an admissible substiuent for it.

Why do we call the use of 'wave' metaphorical and not the use of 'light'? To speak of 'light' in this sense must also involve changes in the previous sets of sub-categorical rules governing this term, though these reorderings may not always engender metaphor. Sometimes the effect correlative to a metaphorical predication is an alteration in the extensional scope of the subject term, that is, the domain of its application becomes wider. Compare 'I see the cat' with 'I see what you mean'. Neither use of 'see' could properly be called metaphorical, nor do these uses depend upon a covert model.

3. THE DEMAND FOR METAPHOR IN THE SCIENCES

For the purposes of discussing metaphor in scientific theory we have noticed that it is necessary to distinguish metaphors from models. A metaphor, we have said, is a figure of speech; a model is a non-linguistic analogue. An object or state of affairs is said to be a model when it is viewed in terms of its relationship to some other object or state of affairs. The relationship of model and metaphor is this: if we use the image of a fluid to explicate the supposed action of the electrical energy, we say that the fluid is functioning as a model for our

conception of the nature of electricity. If, however, we then go on to speak of the 'rate of flow' of an 'electrical current', we are using metaphorical language based on the fluid model. Strictly speaking 'rate of flow' has not the same sense when used in the context of electrical phenomena as it does when speaking of liquids, say. The model 'spins off', as it were, a number of metaphorical terms (flow, quantity of electricity, condenser, resistance, and so on) which we apply in formulating electrical theory, but clearly without the intention of a point-by-point comparison between liquids and their behaviour, and electrical energy. So models and metaphors may be closely linked; we can have the latter when we speak on the basis of the former.

Simile, on the other hand, resembles metaphor in being a figure of speech. It is customary to identify simile syntactically by the presence of 'like' or 'as'. The analysis of simile identified in this way has led a number of theorists, including Black, to reject the idea that metaphor is simply simile without the 'like'. Objection to this equation is usually made on two grounds: first, that simile lacks the rhetorical impact of metaphor; and secondly, and more importantly, that simile as simple 'same-saying' cannot rival the richer and more complex interactive meaning of metaphor. Both these arguments stand only if one takes as examples uninspiring similes such as 'these biscuits are like cement', or 'the sun is like a golden ball' where the range for comparison is narrow. But if one takes a striking simile, such as this one from Flaubert, 'Human language is like a cracked kettledrum on which we beat out tunes for bears to dance to, when all the time we are longing to move the stars to pity' (Flaubert, *Madame Bovary*, cited in Platts 1979) the comparison is by no means obvious or flat, nor would it be improved by deleting the 'like' to make it a metaphor. Not all simile is same-saying of a trivial sort. Simile, like metaphor, may be the *modus vivendi*, or comparisons of two kinds, the comparison of seeming dissimilars. For this reason we are justified in saying that metaphor and simile are overlapping categories, but differ in grammatical form. This does not denigrate the novelty of metaphor, but recognises the full capacities of simile, nor does it deny the stigma that some similes are mere comparisons.

There is, however, one role which metaphor performs and which simile, precisely by virtue of its grammatical form, cannot. This is to supply a term where one is lacking in our vocabulary, the process of catachresis. Catachresis, so defined, took place when the lower 'slopes of the mountain were called its foot, or when the support of a wine glass was called its stem, because no satisfactory straightforward term was available *in* the lexicon for this purpose. In the language of the linguists, catachresis is the activity of filling lexical gaps. Simile cannot, for reasons of syntactic form, be easily used in catachresis. One may say of the voluble guide 'He's just like Cicero used to be', but the catachretical form will be 'He's a cicerone'.

It is the role of catachresis which is, in an indirect way, the reason why metaphor is so very useful in scientific theory-making, for, as suggested earlier, it is not the model in itself as heuristic device that makes models indispensable in creative theory-making, but the fact that the model gives rise to, 'spins off' a matrix of terminology which can then be used by the theorist as a probative tool. Speaking metaphorically on the basis of a model, a scientist is enabled not only to posit but to refer to theoretical entities by the use of terms which transcend experience in that their semantic context is not fully determined *a priori* by the empirical conditions for their application. Meaning is not exhausted by the conditions of assertability.

The demand for a defence of metaphor in science is not unconnected with the view one might have as to the representational quality of scientific theories, as to whether they could be taken to be possible descriptions of the states and processes in the real world, the world that exists independently of men. The strong realist position, transcendental realism, requires that there be referential terms and descriptive predicates that refer to and serve to describe states of the world which could be forever beyond the bounds of possible experience. Furthermore, defenders of that position would also claim that it would be quite naïve to expect the denizens of such realms to be like those with which common experience makes its acquainted, even as these

are themselves much influenced in their manner of manifestation by the conceptual system with which we perceive and understand them.

The argument for transcendental realism runs as follows:

I. The stratification condition: the natural sciences explain regularities of behaviour and coexistence of properties at any one level of the natural order by reference to beings, their properties and relations at some other level of order. Levels can be defined epistemically by reference to our ways of knowing them, and correspondingly, metaphysically, through the use of various hierarchy creating concepts such as whole-part and collective-individual. People are the individuals in social collectives, and electrons the parts of atoms. The simplest cases are where explanations of regularities manifested in the behaviour of materials in common experience are achieved by reference to microstructures, as in chemistry. Sometimes explanation is achieved by reference to the macrostructures in which the entities in whose properties we are interested are embedded. The regularity of day and night, the seasons and so on, as observed on the earth, are related to structural and dynamic properties of the system of planets within which the earth is a component.

2. There is no *a priori* reason why the entities, properties, processes and relations of levels of the natural order remote from that revealed, however concept relatively, in experience, should be capable of description in the same vocabulary, having the same sense as that in use for common experience.

Taken together, these two conditions imply that a naturalistic exegesis of the import of scientific practice requires a theory of meaning which would allow the creation of new meaning independent of actual experience. Or so it would seem in order to argue that point successfully, it will be necessary to deal with another way of describing the unobservable.

3. A third feature of the natural and socio-psychological sciences alike is routinely to substitute dispositional attributions for occurrent. Thus the predicate 'hard' is treated not as the term for an occurrent property, 'hardness', but is to he read dispositionally as meaning 'capable of resisting penetration, etc.'. So the phenomenological attribute 'hardness' is replaced by the dispositional attribute 'capable of resistance', with the important consequence that in common with any dispositional attribute it may be said to be a property of a material being when it is not actually being displayed.

Combining this feature with the stratification aspect characteristic of theorising in natural and social science, we find that occurrent properties at one level are replaced by dispositional properties, at that level, which are themselves replaced by structured complexes of more fundamental dispositions at the level immediately above or below the level of actual human experience. Thus for example, actual lay-offs, bankruptcies and unemployment are explained by reference to the dispositions of an ordered and structured social system of firms and other institutions. Or the actual combinations of substances in chemical interaction are explained by the dispositions of the component atoms, clusters of which are molecules, to attract or repel each other, and so on.

Properties can be attributed to the unobservable on this model. Thus we may wish to attribute a disposition to some unobservable entity which is such that its antecedent and consequent are both descriptions of observable states of the world, but the disposition is ascribed to an unobservable. So one may wish to ascribe the curvature of a flight path observed in a trail of condensation produced from an observable hot filament and an observable cloud chamber by reference to a disposition, or structured field of dispositions, of an unobservable electric field, and the dispositional properties of an unobservable charged particle.

It is to meeting the objections to this treatment of scientific discourse that the theory of metaphor can contribute. Consider a repetition of the above explanatory move. The dispositions of substances are explained in terms of the dispositions of constituent atoms and the structures

they form. Atomic dispositions are explained in terms of dispositions of their constituent protons, neutrons and electrons and the structures they take tip. The dispositions of sub-atomic particles are to be explained in terms of the dispositions of their constituent quarks, and the structure of their interaction and so on. Either this regress is infinite or it terminates. There is no reason to suppose that the universe is infinitely complex. So the former alternative is radically indeterminate. To focus any argument we must turn to the second alternative. Consider the possibility of the termination of a regress such as that above. It must terminate either in a simple disposition or in a structure of simple dispositions. But the principle governing the use of dispositional terms was that every disposition must be grounded in a deeper level. It was that principle that led us to formulate a theoretical explanation for the observable dispositions in the first place, and so to initiate the regress. Hence the regress cannot terminate without abandoning the very principle of its construction.

The one possible solution, if one does not wish to contemplate an infinitely complex world, and does wish to treat science realistically, is to introduce some other form of predicate. But it must be of such a kind that it is intelligible, and its intensional content is richer than any predicate whose content is exhausted experientially. The argument of the preceding sections suggests that of all catachretical possibilities, metaphor meets these requirements particularly well. The metaphorical employment of a term brings about a reordering of its semantic field, as well as those of the term with which it is used, so generating new intensional contents, most of which are yet to be explored. So, returning to the main line of the argument, it seems that a realist construal of science requires predicates, of which those created by metaphorical usages of existing empirical predicates are the very exemplar.

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Gateway to the Unknown

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