

Section 6 Artefacts

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6.1 Objects, Artefacts, Products

The core of product semantics lies in its concern with the concept of interface as the locus of the interaction between user and product, and in the recognition that this relationship is far richer than might be inferred from the technically oriented functional characterisations that they argue typify design theory. Nevertheless one could be forgiven for concluding that the descriptive, empirical and theoretical treatments of product interactions provided from product semantics are themselves partial and essentially incomplete. Product models and the constitution of the 'system image' are rarely addressed directly, but can generally only be inferred from the accounts given of 'user models' and 'design models', and the general contextual framework marked out by the domains of use, language, genesis and ecology. As a first stage in exploring the issues involved, and in locating the position of the product semantic account in this area of theory, we will address the question of the nature of designed objects generally, and outline the variety of available models that have been applied in the characterisation of products.

Product design is concerned with a certain class of objects, those objects or things in the world that form the class of 'products'. An object or thing might provisionally be characterised as something with sufficient compactness, coherence and persistence that it can sustain a sense of identity - 'a pattern that has enough coherence, or internal order, to evoke a consistent image or label'.¹ Among the totality of objects or things, we commonly distinguish between those that occur as natural objects and those that are man-made - between rocks and bricks, birds and aeroplanes. The most general term for such man-made objects is artefacts, a large proportion of which are sufficiently integrated into our socio-cultural transactions to be classed as products.²

Given the importance of the act of making, and the sheer ubiquity of artefacts, it is perhaps surprising that they have received so little direct attention in the philosophical and theoretical literature,³ although they have been instrumental in providing one of the most familiar models in classical philosophy. Aristotle distinguishes four kinds of causes involved in the coming into existence of things generally - the material cause (that in which a change is wrought), the efficient cause (that by which a change is produced), the formal cause, (that into which something is changed), and the final cause (that for the

¹ Csikszentmihalyi and Rochberg-Halton 1981, p14.

² It will be assumed at this stage that we are essentially dealing with physical particulars. The more abstract idea of products (eg 'insurance policy', 'software') and their implications are taken up as necessary.

³ With the general exception of Heidegger [Heidegger 1962; King 1964], materialist political philosophies [Marx 1974; Althusser 1969; Lukacs 1971] and more recent phenomenological approaches [Ihde 1979; Jonas 1974]. For a sustained consideration of the theme of the nature of products in the light of the above and particularly in relation to an interpretation of Hegel and the idea of 'objectification' [Miller 1987]; and in relation to the logic of acts of making [Harrison 1978].

sake of which a change is wrought). Thus for example, a block of marble (material cause) is worked on by the sculptor (efficient cause) and made into a bas-relief (formal cause) in order to decorate a facade (final cause).

Although a variety of interpretations would now be given in respect of the philosophical import of Aristotle's scheme,⁴ the family of 'causes' identifies the principal components involved in the notion of artifactuality, capturing the idea of material that is worked on by some process in order to achieve an identifiable outcome, in response to the intentions and goals of an agent. All objects have both matter and form and in Aristotelian terms matter is the individuating principle within the system, while form, the manner in which the matter is organised, characterises things as being of a certain kind. The organisation of matter into form is always accomplished by some process of form making, building or shaping, whether accomplished for example by the gradual erosion of running water, or the abrasion of a hand tool. The fourth of Aristotle's causes is more problematic as a general principle to be applied to all things (encompassing the natural as well as the artificial) in apparently implying the intention of an agent.⁵

What then constitutes the characteristics of artefacts in this broad sense? Objects consist in material which takes some form. But clearly if we are to look for a distinction between natural and man-made objects then we are unlikely to find it in these first two causes or principles, since they are shared by both natural and artificial things. Given an unknown object made of a certain material and with a certain form, we will not be in a position to know whether the object is natural or artificial, although from our experience of things we may have grounds for believing it more likely to be one than the other. This is also the case in respect of the third cause or principle, although less obviously so. Knowing that something has been shaped by the action of running water, or even knowing that it has been shaped by a river is insufficient to securely characterise the process and therefore the product as natural, since the material may have been placed in the river in order to shape it. In this case knowledge of the mechanics of the process may not be sufficient without knowing the circumstances surrounding the process. What is required in order to secure the distinction is an etiological or historical account, and one which clarifies the involvement of agents and intentions. But clearly not everything produced as a result of intentional activity is an artefact, since all processes have by-products. Artefacts in general are those objects that are produced as the goal of some intentional activity.⁶

⁴ This is both true of the status given to the 'causes' in Aristotle's philosophy, relative to his overall ontological, epistemological and metaphysical conceptual schemes, and to their equivalents in modern philosophy - particularly in relation to material/form/content relations. [See for example Harrison 1973] and in respect of teleology [Balme 1939,1965; Owens 1968].

⁵ Interpretations of Aristotelian teleology or 'final cause' in the natural world [Owens 1968].

⁶ The logic of intention in the act of making has been analysed by Harrison [Harrison 1978].

However this will not be sufficient in itself, since it is conceivable that intentions be realised accidentally. If I form the intention of making a flint blade from a particular nodule of material, and in exasperation in failing to flake the nodule cast it aside, and it cracks against a rock and sheds a flake, then unknowingly I have made a flint blade by accident, which fits my intentions. But unless there is some recognition of what I have made either by myself or an observer who has watched the process and recognised that my intentions have been fulfilled, then it does not seem correct to say that an artefact has been produced.

The elements required for artifactuality then are that I should intentionally engineer a material/form combination for some end, and that the end provides a specification for the particular material/form combination that is created. An artefact then is an object whose material and formal properties have been created in order to serve an end, an end which in turn has been used to define those material and formal properties.⁷ ⁸

Although this might appear to serve as a working definition of an artefact, it is not yet obvious whether it provides a clear distinction between the natural and the artificial, or that the definition itself constitutes necessary and sufficient conditions for artifactuality. In one sense it might be argued that necessary conditions have not been captured, in that it is possible to imagine cases where I can select an object, without creating its material and formal properties, but where an end is served and the end guides my selection. I could for instance as some of my remote ancestors will have done, select a hammerstone for knapping flints. I choose it on the basis that it is hard enough, heavy enough and fits my hand comfortably, and I keep and use it for flint knapping. Intuitively I might be quite happy to describe this hammerstone as a tool, although I might be less inclined to describe it as an artefact.

One approach to an answer to these questions has been provided by Dipert, who argues that there is a hierarchy of artifactuality which is related to the nature of the choices made in the intentionality of the agent involved. The underlying intentionality is captured by the idea of being 'intended for a purpose'. The distinctions that can then be made in the hierarchy of artefacts, relate to the nature and degree of the intervention by the human agent. On this basis he distinguishes between natural objects and useful objects, at the root of the hierarchy, subsequently differentiating between 'instruments', 'tools' and

⁷ The recursive definition of an artefact is unsurprisingly similar to the analysis of function developed in Section 3, 'Function' above.

⁸ The provisional definition does not exclude the symbolic use of artefacts. The purpose of an artefact may include its intentional symbolic use, and in order for it to be so used, I will have to muster an appropriate organisation of material and formal properties relevant to that proposed use. The problem of matching appropriate properties to symbolic purposes is not in principle any different or more difficult in this case than in the case of instrumental purposes.

'artefacts' in terms of degrees of intentionality and intervention.'

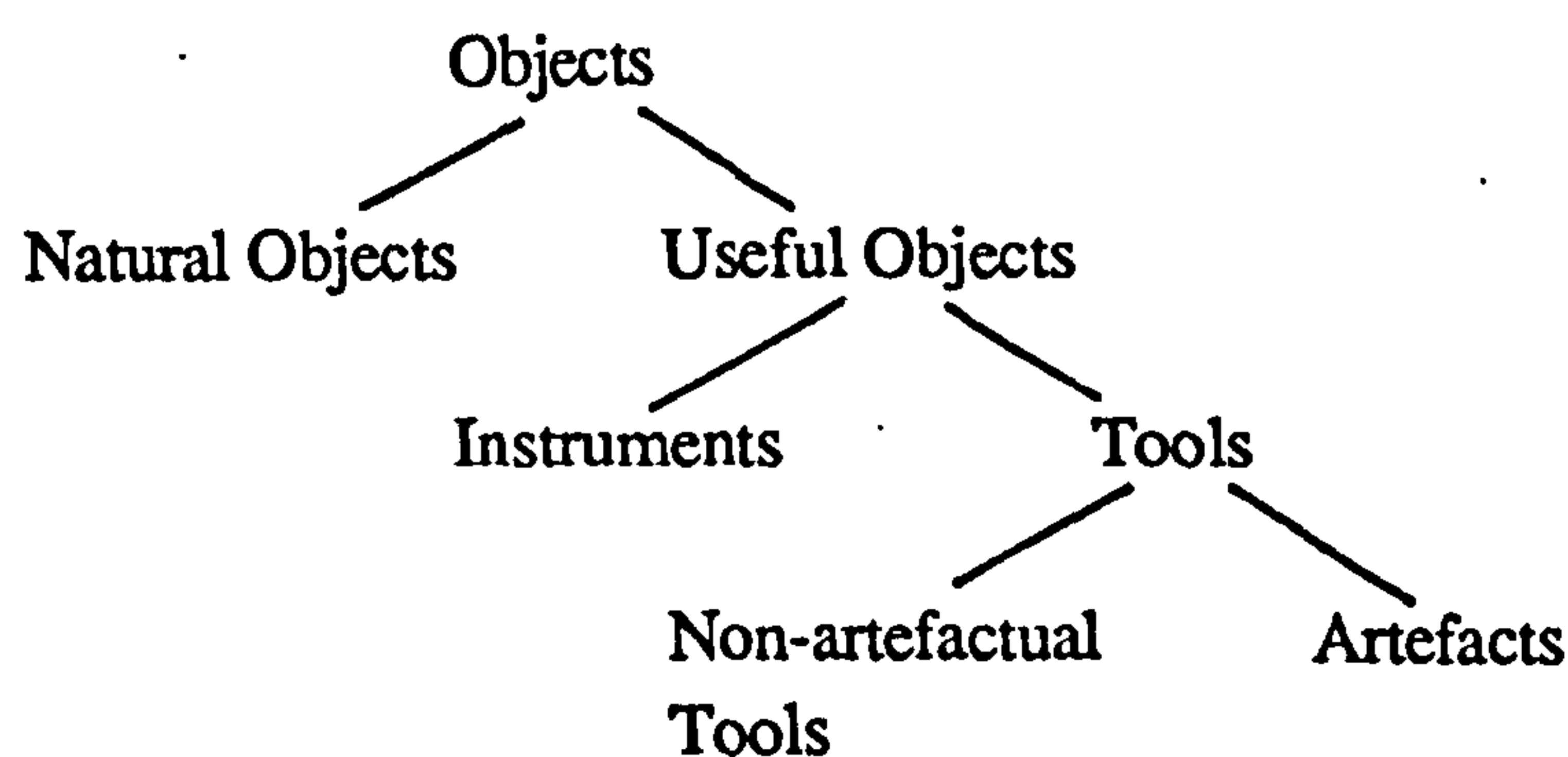
The class of 'useful objects' consists of those objects which have been conceived with respect to a particular use, and among these, 'instruments' are objects which have at least one property conceived by someone as a means to a particular end, and has been intentionally so employed. They are essentially unmodified by the agent, who simply recognises their potential and so uses them.¹⁰ 'Tools' are defined as instruments that have been intentionally modified to serve as a more effective means to an end. 'Artefacts', on the other hand are differentiated as intentionally modified tools

'...whose modified properties were intended by the agent to be recognised by an agent at a later time as having been altered for that, or some other, use.'¹¹

The quoted clause in the definition is intended to bring out the fact that artefacts are social in the sense that

'They require us as agents to think of other cognitive and acting agents, their attitudes and thought and emotional mechanisms, and the contents of their thoughts and attitudes. When they are weak in usefulness or recognizability, they are failed artefacts but still artefacts.'¹²

The core of Dipert's scheme can be expressed in the form of a hierarchy :-



⁹ The use of these terms in the analysis provided by Dipert do not match all their senses in natural language, but are intended to capture the intentional core of the terms. For example, the term 'instrument' is used to stand for a generalised notion of instrumentality, rather than instruments in the sense used in 'surgical instruments' or 'scientific instruments'. [Dipert 1993, chapter 2].

¹⁰ They may of course turn out to not have the property, or they may possess the property but the relationship between the property and the end is misconceived by the agent, so that the end cannot in fact be achieved. This does not affect the analysis, since the key factor in the definition is the intentionality and deliberation of the agent.

¹¹ Dipert 1993, p 29.

¹² Dipert 1993, p31. This contextual concept of an artefact and what is entailed in considering artefacts, makes the same central point as product semantics, but from a different formal perspective.

In a world consisting of objects, the fundamental typological distinction consists in the division between natural objects which are neither modified nor conceived in terms of use, and useful objects which are so conceived or modified. The distinction does not rest on the material content of the objects, which may in fact be identical, but rather on the ways in which they are conceived. An outcrop of rock may be viewed as a geological feature or as a vantage point, but in the latter case it is conceived or contemplated as a prospective means to some end - it is conceived instrumentally. The intentionality involved in its conception as a means to an end marks it out as participating (albeit at the lowest level) in the 'artefactual' world. In this case the object is not modified in any way, but simply conceived with respect to a use in terms of some property that it has. Objects conceived in this way are termed 'natural instruments'.

In many cases, rather than simply selecting something to hand with an appropriate property, we modify objects in order to make them better suited to some contemplated use. The idea of selection, choosing from among the things that are actually available on the basis of preference in a given property, gives way to the idea of selective modification based on choice amongst potential instantiations of a property. Where such intentional modification is involved the resulting objects are designated as 'tools'. Nevertheless the bulk of what we would recognise as useful objects fall into the category designated by Dipert as 'artefacts'. This is perhaps not surprising given that the distinction that marks off this category is that the intentional modification is made with the idea of recognition built into it - artefacts are tools intended to be recognised as tools. The intentional modification is normative.

It will be apparent that Dipert's analysis of artefacts in terms of intentionality is structurally congruent with the analysis of function developed above.¹³ Artefacts are instrumentally conceived and formally specifiable as particulars in terms of properties. Nevertheless there are no essential properties necessary to a given artefact. Their characterisation involves a reciprocal relation between intentionality and the perception of properties as prospective instantiations of intentionality in a given means-end relation.

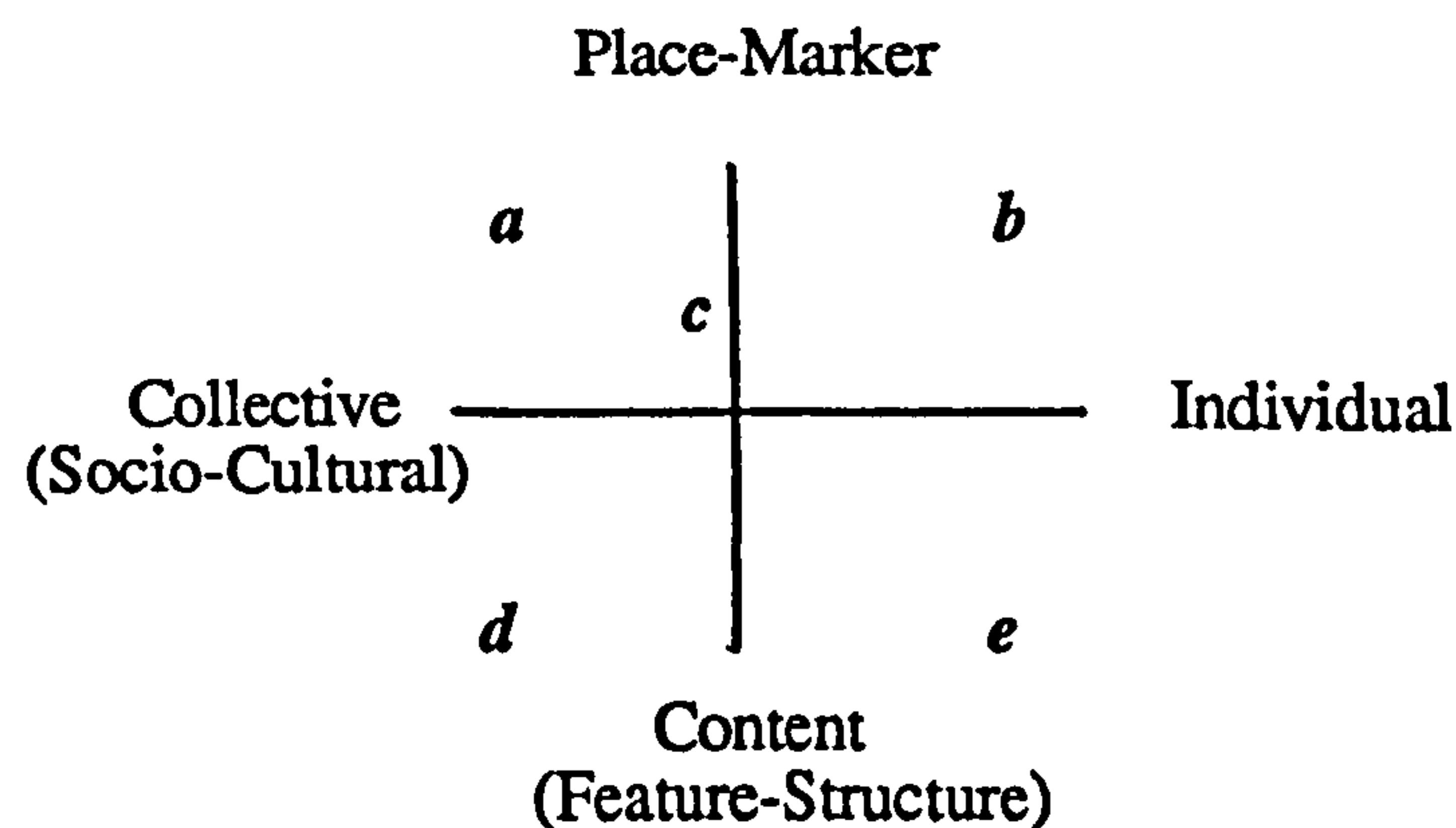
Although Dipert's analysis is unique in directly addressing the conditions for artefactuality in terms of intentionality, and therefore has a particular significance in the consideration of the concept of an artefact or product in product semantic terms, the more general run of 'product models' do not take this form. Consideration will therefore be given to the role and constitution of product models more generally, prior to analysis of the concept as it is articulated and used in product semantic accounts.

¹³ See above, Section 3.3 'Artefact Function - An Analysis'.

6.2 Product Models

In discussions of the role of significance and meaning in relation to artefacts, and more particularly to products, the literature reveals a number of distinct general models. These can generally be distinguished in terms of the degree to which the intrinsic identity or features of the product are an essential part of the analysis, and the degree to which the model is conceived in terms of individual or collective significance.

Many of the prevailing models, particularly those relating to the socio-cultural role and value of products, are indifferent with respect to their features or identity, treating them as unanalysed 'place-markers' in socio-cultural or intrapsychic transactions. At the other extreme there are models in which the internal feature structure or content of products is dominant, virtually to the exclusion of any reference to the contexts in which they are located. These polarities ('place-marker' vs 'feature structure (content)') provide one axis of a prospective classification of product models. A second axis of classification which distinguishes model types, can be constructed in terms of the extent to which the model is primarily articulated in relation to either individual or collective significance. The broad spectrum of product model types will be considered in relation to their location in respect of these axes :



(a) Place-Marker Models (Socio-Cultural or Collective Significance)

The characteristic of place marker models articulated in terms of collective rather than individual significance is that all products are treated in these models as equivalent. The inherent characteristics of products that such models draw on is that they are socially prefigured, manufactured and consumed. Their identity is assumed to be captured by the denotation of their functional role, which is given no particular status in signification,

other than an underlying assumption that a 'pure' product will meet a 'real' need. The elements of signification associated with a product are those which are acquired as it passes through various socio-cultural transactions.

In the Marxian version of this model the underlying conception is the transformation of nature by its appropriation through human labour - culture is understood via production. The process of individual and social self-realisation which is the essence of human nature, is founded on the idea of the physical act of making. The act of making has an inherent duality, in that on the one hand it represents a physical realisation as an externalisation which carries with it the possibility of objectivity and increasing differentiation of form, and on the other the danger of separation and estrangement. In Marx it is the separation that is given emphasis, so that the products of labour are severed from the act of production, creating a shift in the locus of signification and the sense of a controlling world that is given and not made.¹⁴

In Marx the act of making as the central 'human' act is conceived in terms of the use-value of products - their capacity to meet real human needs. We create our identity through socially useful work, and transform nature in the fulfillment of fundamental material needs.¹⁵ Separation of the products of this process from the process itself, leads both to the possibility of value systems which are divorced from 'real' need, and the alienation of the individual from the significance of the act of making. In socio-cultural contexts where this dual process of separation occurs, and where the abstraction of exchange value in the form of 'money' institutionalises both forms of separation, product signification takes on a new life in the articulation of individual and social identity and the exercise of power.¹⁶ In relation to products themselves, this process has been characterised, following Marx, as 'fetishisation'.¹⁷ The substitution of exchange-value for use-value promotes the product to an apparently autonomous world constituted in the relations between objects, obscuring the nature of value and relocating it away from human activity and embodying it in the object itself. Social distinctions, status and meaning are thus articulated through the elaboration and refinement of the consumption of products, in addition to their articulation through control of the process of production.¹⁸

¹⁴ Clearly this caricature of a part of the picture ignores a number of important issues, including the extent to which separation and alienation are inevitable and the extent to which they might be remedied given the right socio-political circumstances.

¹⁵ Miller points out that Marx's position is 'essentialist' in its identification of needs generally with biological needs. [Miller 1987 p 47].

¹⁶ Analyses of this kind are represented in the work of the Frankfurt School [Marcuse 1964; Habermas 1970]

¹⁷ The idea of the fetish in an anthropological context is closely related to animism, in that it involves the attribution of human, divine or magical powers to inanimate objects [Gamman and Makinen 1994].

¹⁸ The historical locus classicus for the exploration of the relationships between class, leisure, status from the perspective of consumption rather than production, is Veblen 1899. His analysis constitutes a theory of signification for commodities, prefiguring the modern equivalent represented in Bourdieu [eg Bourdieu 1984].

Later theorists have extended the concept of commodity fetishism to encompass the perceived general tendency to a de-humanised and abstract relation to the world engendered by capitalism.¹⁹ Whilst most writers have conceived this commodification of significance as essentially based on the substitution of exchange-value for use-value, some have challenged this conception, arguing that the acceptance of use-value as an unanalysed given, is itself fetishistic. The most extreme argument of this kind is presented by Baudrillard, who ultimately contends that the idea of 'need' which underpins this whole form of analysis, cannot stand outside the shift in signification and cannot therefore provide a stable frame of reference against which other concepts can be measured. For Baudrillard '...the logic of capitalism is the logic of meaning.'²⁰

Whilst the majority of writing on the topic of 'commodity fetishism' and 'commodity aesthetics' is embedded in the more general ideological struggle surrounding the nature of marxist and post-marxist materialist philosophy and social theory, and the nature of its response to capitalism, the core of the arguments bear directly on the nature of our perceptual and cognitive relation with products.²¹ Baudrillard's contention regarding the nature and source of meaning in modern metropolitan capitalism, for example, can be viewed as a more general and diachronic model of meaning. Products are engendered in socio-cultural contexts, and in the case of modern societies, are inosolable from their mediation. Our relationship with products is constituted in a mediated context, and our understanding of the world so dependent on forms of mediation, that the source of meaning generally can be viewed as being derived from it. It can be argued that this situation is not simply a particular phenomenon of late capitalism, but rather a pattern of cognitive development which is characteristic of human society generally, which has gained a particular momentum from the proliferation of products in mass consumption.

The form of products is wrapped up in their social context and inherently value laden. An artefact is only recognisable as a type through its multiple replication or through mediation. The fact that toolmaking becomes established at a certain stage in pre-history is only recognisable from the repeated occurrence of forms.²² The standardisation of form is not simply a consequence of its functional refinement or the exigencies of manufacture, but also intimately associated with its social identity. The need for an account of form in products which goes beyond the varieties of functional necessity has long been recognised both in archaeology, where formal classification continues to constitute a primary technique for cultural and temporal mapping in situations of functional equivalence, and in the history of material culture where the richness in the variety of

¹⁹ Lukacs 1971.

²⁰ Gamman and Makinen 1994, p21. Baudrillard 1988; 1996.

²¹ Haug 1986; Apter and Pietz 1993.

²² Kubler 1962.

made things is always found to be underdetermined by functional considerations.²³ Products are imbued with their perceived social roles and both their type and their formal articulation, mediated by the prevalent mechanisms of social communication and the social constraints surrounding their use. Their signification consisting in a complex of factors in which the notion of pure instrumental function or pure need is not evidently separable from the context of their socialisation.

In the context of the analysis of signification in modern mass consumption, it is often assumed that overt mediation through advertising constitutes a novel layer of signification, robbing the product of its 'natural' status in relation to need - a naturalness which is conceived in terms of an unacknowledged sociobiological underpinning.²⁴ Ironically the one product-related context in which the nature of 'need' and the structure of 'needs' is explicitly acknowledged is in marketing theory, where the analysis is generally based on the work of Maslow.²⁵ The form of this assumption regarding an underlying natural status is similar in many respects to the equally prevalent assumptions surrounding the use of the term 'function' in design theory. In both cases an unanalysed use of the term is assumed, which is used to demarcate an area of fictional objectivity as a frame of reference for the development of further conceptual layers.²⁶ The concept of signification in mediation as an auxiliary layer lying outside the realm of a pure and proper design practice and theory, and therefore to be shunned, is explicit in the presentation of product semantics by Krippendorff, and implicit in most treatments of the subject.²⁷ This view is at variance with the general stance of product semantics in seeking to frame design in terms of meaning, and in particular, to establish a theoretical framework as a basis for identifying the empirical grounding which would support the extension of this to new forms of design practice. The point here is not one of competing ideologies - if one wishes to purify design from the pernicious influence of marketing and advertising, then so be it, but the starting point for a meaning centred theory of design must be an adequate account of the sources of meaning, however tainted that source may appear to be in relation to a socially conscious view of the aims of design. If the aims of design are equated with the capacity for supporting the meaningfulness of products for the user, then it would require a separate argument to establish that some actual sources of meaningfulness can and should be avoided.

²³ Miller 1985, 1987; Gibbon 1987.

²⁴ This tendency is evident in a wide range of work including Marx and Papanek [Marx1974; Papanek 1972].

²⁵ Maslow 1954.

²⁶ They differ in the respect that whereas the term 'function' by dint of association with the formal cliché 'form follows function' (which is without foundation), is set up as a straw term to be ritually demolished, the notion of a basic or natural need is assumed as a necessary and desirable primitive relation whose accretions can then be viewed as compromising the original conception.

²⁷ Krippendorff 1989,1990; McCoy 1990.

The pattern of argument evident in the selective exclusion of mediation as a source of legitimate meaning in product semantics is paralleled in the post Frankfurt school analysis of ideology and meaning in advertising.²⁸ The principal device used in the articulation of such arguments consists in the elevation of a reading of the material by the analyst to the status of necessity, and the central claim of such arguments is that mediation, and advertising in particular, create structures of meaning.²⁹ The alternative view is that no new structures of meaning are created by such processes, but rather that the normal associative aspects of meaning-making which are founded, *inter alia*, on metaphoric and metonymic construction, acquire ever increasing referential domains as societies become more complex. The interanimation of concepts through metaphoric reference lies at the heart of the processes of visual and linguistic cognition, and have served rhetorical purposes in socio-cultural contexts since their socio-cultural inception.

(b) Place Marker Models (Individual Significance)

An equivalent range of models which are articulated in terms of the individual rather than the collective are represented in the material object content of psychoanalytic theories, particularly those associated with Klein, and the British 'Object Relations'³⁰ school and the work of Winnicott. The essence of such theories is that children, at particular stages in their development form attachments with certain objects, and that these attachments have a crucial role in their individual and social development. These objects, termed transitional objects, are of importance both because they allow for an articulation of identity through interaction with the world and because they subsequently become models for the individual's relationship with the material world more generally.

In Freud's psychoanalytic model, questions relating to a person's interactions with the external world were historically and conceptually secondary to questions concerning the biological source and basis of mental activity, for clinical, methodological and philosophical reasons. The result for classical psychoanalytic theory was that accounts of such relations had to be accommodated within an existing framework which gave prime place to 'drives'. Since all facets of personality and psychopathology within this theory are perceived to be a function of drives, the nature of human relations and object relations are largely understood in terms of their effect on the facilitation or inhibition of drives, or as instantiations or embodiments of the objects primary drives. The principal alternative conceptual framework within psychoanalytic theory replaces drive theory as the primary

²⁸ For example Williamson 1978.

²⁹ Sless points out the parallel structure of the supposed methodology of advertisers and the methodology of the analysis of signification in advertising, in his criticism of Williamson.[Sless 1986, pp 59-61].

³⁰ In this context, 'object relations' does not refer primarily to relations with material objects but rather with the human objects of an individual's attention and interaction - that is to say, other people.

motivational mechanism, with the concept that the development of object-relations underpins and is constitutive of the development of human behaviour generally.³¹ The most familiar and influential forms of this alternative approach are represented in the writings of Klein and Winnicott.³²

Klein's development of a theoretical position is based on the post-clinical unravelling of the material arising in the observation of young children, principally in the context of play used as a psychoanalytic technique. The framework for such observation is essentially Freudian, although it focuses on the nature and role of subject-object interactions in ontogenesis, and as such develops its own dynamic which is fully represented in her later work.³³ The neonate is assumed to be involved in object-relations from the start of life, principally in the interaction with the mother's breast, but in the context of a world in which the internal and the external are undifferentiated. The differentiation of self from other and the development of self-consciousness, occurs as a function of the gradual transformation in object relations. In the first instance the world is conceived as being constructed in the image or internal projection to which the infant is oriented. The infant experiences the first object (or part object) both as the major source of gratification and the major source of frustration, assigning its feelings as qualities or attributes of the object. In coping with this apparent contradiction in the nature of the object, the infant splits the object into a 'good object and a 'bad' object, associated with the primitive emotions of love and hate and experiences of rage and ecstasy. The mechanisms of projection, introjection and projective identification allow for a dynamic cycle of complex strategies to develop in association with developing self-identity and to establish a set of basic relations with the world. At the early stage, in which the infant relates to part-objects such as the breast, termed the 'paranoid-schizoid' position, these include the introjection of some qualities of part-objects in the development of the ego and the projection of others as defense mechanisms against persecution. At later stages, in the development of relations with whole objects - the so called 'depressive' position, the infant has to develop the means to reconcile the co-existence of conflicting qualities in the same object, leading to greater sophistication in the use of projective and introjective mechanisms, and reflected in the development of more complex cognitive and emotional responses.

Although the language of psychoanalytic theory generally, and in particular the sexualised metaphor underpinning Freudian and Kleinian conceptions of psychodynamics, have proved inimical to most strands of psychological and cognitive thinking, Klein's developmental model is structurally congruent with a number of recent models in

³¹ The conceptual basis and development of 'object-relations' theory is thoroughly analysed in Greenberg and Mitchell 1983; and developed in Mitchell 1988.

³² Klein 1975; Winnicott 1971,1988; Fairbairn 1952; Guntrip 1969.

³³ For example 'Envy and Gratitude' in Klein 1975.

cognitive science.³⁴ The co-development of emotional and cognitive capacities through differentiation from fundamental neurological responses which are essentially holistic and experienced as primitive feelings deriving from sensed bodily reactions, for example, is common to a number of cognitive theories of mind.³⁵ In addition the conception of subsequent emotional development in terms of modification in the directedness and discrimination of basic emotions, is common to the majority of theories of the emotions.³⁶ The particular value of the Kleinian model, which is developed in a parallel but distinct way in the context of Winnicott's work, is the emphasis it places on the role of the projection of feelings outward to things and the introjection of the outer world thus animated in the development of the self and the capacity for thinking.

Winnicott frames a conception of the development of the infant in terms of the role of the mother in realising the possibility of becoming a person.³⁷ The mother provides an environment in which the infant's essentially fragmentary experience can become integrated. The core of this lies in the mother's adaptive empathic capacity to anticipate the nature and timing of the infant's needs.³⁸ In the early stages an incipient but unformed need is met by the mother bringing the world to the infant - in the form of the breast, for example. The incipient need is both given form and met, and experienced by the infant as having created the object, giving rise on the one hand to a sense of omnipotence, and on the other to an associated perceptual richness which can be harnessed in framing and informing the content of future needs. This co-ordination provides the basis for the child's sense of contact with and power over the external world. Once this is established, the child learns the limits of its powers and the separateness of the real world, through the gradual accommodation to needs that are not met. The relationship between the child and the other, ceases to be an actualisation of wishes and becomes instead a response to gestures and other forms of communication.

The concept of objects in this general train of psychoanalytic models, is illuminated by Winnicott in terms of what he terms 'transitional objects' and 'transitional phenomena'. The development of a person involves a transition from an infantile state of perceived omnipotence to a recognition of an independent objective reality (both of which are present in the adult). Infants commonly form attachments with particular objects (a blanket, a soft toy), which occupy a unique place in the world - belonging neither to the

³⁴ Turkle 1984,1988.

³⁵ See Appendix B, for a review of affective theories and their interaction with cognition.

³⁶ See Appendix B.

³⁷ Winnicott 1958,1965. An integrated self is not assumed (Winnicott's clinical work was mainly with people without a sense of self - a problem for classical psychoanalytical theory).

³⁸ The needs discussed here are restricted to those related to physical objects. In Winnicott's conception equal importance is given to the need for the development of a capacity to be alone - for the unfringed experience of needlessness and unintegration, in the development of the self [see 'The capacity to be alone' in Winnicott 1965].

world of objective reality, nor to the realm of omnipotent control. The status of such objects is acknowledged both by the child and the parents, who regard and treat it as though it were an essential part of the child's self and under its control, and also as an object in the wider world. The ambiguous nature of such objects helps the child to make the transition between a subjective and egocentric sense of the world, and a world in which he is a person amongst others. The specific context of the ambiguity of these particular objects in relation to the self, is mirrored in the more general ambiguity of objects in play. In adults the transitional experience, in psychoanalytic terms, lies between primary creativity and objective perception based on reality-testing - the realm of projective thought which is neither grounded in the world as objective necessity, nor floating free in ungrounded subjectivity.

In terms of product models, psychoanalytic approaches point up the role of objects generally in intrapsychic development, emphasising their capacity as sites for projection and their symbolic and phantasy value in introjection, which are seen to be important aspects of creativity and emotional development. The development of particular kinds of relationships with objects, whether in the form of relationships perceived to be pathological such as the use of sexual fetish objects or the phenomenon of obsessive collecting, or in the form of more 'normal' relationships such as an attachment to a favourite chair or a preferred activity such as cleaning the car, are taken to be closely associated with personality and the fulfillment of individual psychic need.

Although the particular objects and forms of relationship that are chosen (or become established) are an individual matter, the mechanisms that underlie them are characteristic of development generally. Relationships with objects are not adequately characterised by dualistic and static subject-object models, but require a dynamic and interactive model with a psychodynamic component, which psychoanalytic theories attempt to provide.

(c) Place-Marker Models (Composite)

There are also a number of models related to the above groups, which either do not distinguish as sharply between the individual and the collective as a working dichotomy, or which operate in respect of the interaction between clearly distinguished domains. The most influential of these is represented in the material culture studies of Miller, based on the philosophical theory of Hegel. Related to this are models with an anthropological or sociological thrust, unerpinned psychoanalytically, such as those of Dilnot and Cixious, which treat products generally on the model of the 'gift'.

The most influential and general recent analysis of the role of artefacts in material culture and human society generally has been provided by Miller,³⁹ on the basis of a conceptual structure derived from some aspects of Hegel's philosophy,⁴⁰ which has found parallels in a number of other disciplines.⁴¹ Miller develops a non-dualistic model of the relationship between people and things using the concept of 'objectification', conceived as a process of development in which society and cultural form are mutually constitutive. The concept, as Miller uses it, essentially refers to a process of externalisation and sublation in the development of both individuals and collectives (society). It draws together the elements of psychoanalytic models and socio-cultural models in a unified treatment which is aimed at providing a general model of artefacts, particularly in the context of mass consumption, which acknowledges the centrality of the physicality of made things.⁴² Miller's contention is that whilst the various developments of Hegel's concept of objectification in the theories of Marx, Simmel and the Frankfurt School, for example, throw light on the social role of products in the articulation of societies, an effective analysis of such roles requires that the core of these theories are wrested from the particular ideological contexts in which they are embedded. This is particularly the case in respect of the essentialism that underlies the key concepts of 'need' and 'labour' for example. Similarly, the underlying contention in psychoanalytic models that the developed self is one characterised by its integration, and that fragmentation of any kind regarded as actually or potentially pathological, should be leavened by the acknowledgement of alternative models in which contradiction is an essential developmental element rather than a failure to achieve some ideal type. Taken together, the rejection of essentialist elements does not necessarily lead to the morass of universal relativism, but rather to an acknowledgement that material goods and the processes that surround them, are our culture, rather than an aberration resulting from the historical mistake of capitalism.⁴³

Conceptually, the individual and collective strands of this line of thinking are brought together in theoretical approaches which focus on the concept of the 'gift'. In contradistinction to the mainstream of anthropological accounts which emphasise the idea of obligation in the key concept of gift exchange, 'gift' theorists focus on the idea that

³⁹ Miller 1987.

⁴⁰ Hegel 1977.

⁴¹ Piaget 1962; Klein 1975; Winnicott 1971.

⁴² Miller has abstracted the concept from its context in the 'Phenomenology of Spirit', where it is ultimately grounded in Hegel's conception of a rational universal order, identified with the embodiment of God's will, which we can gradually approach. This is accomplished via the process of objectification, which is progressive and which takes the form of the externalisation of aspects of developing rationality at ever higher levels. The highest levels, for example, encompass art and religion which when re-assimilated by, and unified with the subject, reaches the state of absolute knowledge.

⁴³ Miller does not believe that such an acknowledgement precludes the possibility of maintaining a critical stance in respect of production, consumption and their social consequences, but rather that it liberates critique from the constraints of a narrow ideological perspective.

gifts essentially embody a recognition of the needs of the other.⁴⁴ This is not to deny the importance of the concepts of obligation and indebtedness and the paraphernalia of the object as commodity and the locus of power relations, but rather to assert that there is a more fundamental object relation upon which these are built. The core of this object relation lies in the idea of the match between an object and the condition of need or desire that it is perceived to mirror.⁴⁵ A product in so far as it is something made for others, can then be modelled on the idea of the gift as material recognition of the needs of a particular 'other'. The complexity of our interaction with products is in part ascribed to the complexity of the basic relation, in part to the intricacies that stem from the additional use of products as markers in social transactions, and in part to the intersection and interanimation of these elements.

(d) Feature-Structure/Content Models (Collective Significance)

The essential difference between the general category of content models and place marker models is that they are based on analyses which involve a consideration of the content of products, rather than simply the abstract form of their role in human affairs. Perhaps the most familiar model of this kind treats products as extensions of the physical and mental capacities of individual human beings or societies, and as such extrapolate the biological and evolutionary concept of adaptation to the extra-somatic realm.⁴⁶ Thus tools are viewed as extensions of the capacities of the body to reach, grip, lift and so on, and written records as an exogenous form of memory.⁴⁷ Although there is no single or definitive locus classicus for this pervasive model, a number of the key themes involved in relation to product models and theory have been developed and analysed independently by Scarry⁴⁸ and by Ihde.⁴⁹

There are two principal distinct components of models of products as forms of extra-somatic adaptation. The first is concerned with the instrumental content of products, and the effect that changing our instrumental capacities in particular respects has on our conceptual framework. The second is concerned with the nature of our experience of the products themselves, and our experience of the world through products. Both components can be viewed in terms of individual experience and development, and also in relation to socio-cultural organisation and change, although in the case of extra-somatic

⁴⁴ The classical anthropological accounts include Mauss 1967; Douglas 1967; Douglas and Isherwood 1979. In contrast modern 'gift' theories are represented for example in Cixous 1991; Dilnot 1993; Baker 1994.

⁴⁵ Therefore relating to the psychoanalytic models (Klein and object relations) discussed above pp 182-185 .

⁴⁶ White 1959.

⁴⁷ White 1959; McLuhan 1951,1962,1964; Scarry 1985 ; Donald 1991.

⁴⁸ Scarry 1985.

⁴⁹ Ihde 1979.

models the approach is generally based on collective significance, whilst experiential or phenomenological models are articulated primarily in terms of individual significance.

In general, our capacity to alter our relationship to the world in instrumental terms has had a profound effect on the content of the world, and our perception of its nature and content. If the direct effect of tools is viewed as the amplification of various human powers, then the indirect effect is a concomitant change in the way that we conceive the world. In material terms, for example, the simple lever amplifies our capacity to handle weight, and at the same time distances us from the act of handling; the plough increases our capacity to break and turn the soil and dramatically enlarges the range of this activity and our sense of the extent of our control over the land; the clock increases the precision with which we are able to identify the time of day, changing our capacity for planning and co-ordination, the nature of social and professional interaction and their conceptual basis; the telephone radically extends our capacity to communicate verbally over distances and creates new concepts of space, time and personal contact; drugs and life-support technologies have extended our capacity to resist physical decline and have reshaped our concepts of life and death. The list is endless and their ramifications relatively unmapped.

The underlying idea is that artefacts are essentially projections of the human body, and in the simplest cases projection takes the form of a directly specifiable relation of substitution for a body part. Bandages and dressings stand in for broken skin, splints substitute for broken bones, a crutch for a missing leg. Similarly, artefacts can substitute for the loss of power in body parts, for example in the use of spectacles to compensate for diminutions of sight. Such conceptions also point to the inherent limitations in our powers, and the extension of the basic idea of direct substitution to the idea that limitations can be overcome, and powers augmented, by additions - clothes that can keep us warm, shelters that protect from the weather, and levers that can shift boulders.⁵⁰

This basic conception clearly falls short of an account applying to all artefacts, since many cannot be simply mapped to body parts and their functions and powers, or conceived in terms of extensions to direct physical action.

One alternative is to conceptualise artefacts as 'mimetic' of attributes rather than directly of parts and powers, or as materialisations of counter-factual projections of the problems of sentience.⁵¹ A chair for example, might be seen as a mimetic projection and externalisation

⁵⁰ Scarry's treatment of the subject is generally expressed negatively in terms of the basic idea of the defrayal of pain, although the parallel idea consists in objectification as a creative act. In this sense it lies close to psychoanalytic accounts which ground creativity and culture in the necessity to deal with the 'absent object'. Baker on the other hand yearns for a more positively expressed but parallel account, which he finds in the idea of the 'gift' interpreted from the writings of Cixous. [Baker 1994].

⁵¹ This is the core of Scarry's approach to the analysis of artefacts. [Scarry 1985, pp 278-326].

of the spine, or more abstractly as a ‘...counter-factual projection about the problem of body weight and the pain of standing..’⁵²

The relation between approaches of this kind and the concept of affordance should be clear. Artefacts are echoes of our experience and sentience, reflected in terms of both physiological and psychical development. The world is extra-somatically adapted in physical terms to the extent that its contents are instrumentally conceived as matching physiological counter-factual expressions, and in psychical terms to the extent that its contents are instrumentally conceived as matching conceptual counterfactuality.⁵³ Viewed in this way, the empathic relationship that has often been cited less formally as the basis for conceiving the nature of product interaction,⁵⁴ can be grounded in the idea that products are there on our behalf in the sense that they embody consciousness, rather than simply being the objective contents of a separate world.⁵⁵

In a similar vein, although from a distinct and completely different philosophical and methodological standpoint, Simon articulates a conceptual view of products that is based on the idea that they are interfaces between so called ‘inner’ and ‘outer’ worlds.⁵⁶ He argues that the artificial world can be understood in a parallel way to the natural world in terms of the concepts of functions, goals and adaptation. The essential relation is three-termed and involves the purpose or goal, the character of the artefact, and the environment in which it functions. The artefact itself can be regarded as the interface between the inner world of its own substance and organisation and the outer world in which it operates. Functioning, serving an intended purpose, is dependent on the achievement of an appropriate match between inner and outer environments.⁵⁷ The corollary in terms of the present discussion is that products can to a large extent be understood in terms of the relationship between its purpose or goals and the outer environment.⁵⁸ Although the discussion pursued by Simon in the context of developing models for a ‘science of design’, is primarily concerned with the structure and sub-structure of physical systems in means-end relations, this fundamental point is conceptually congruent with the extra-somatic models noted above, and the relation of affordance to the general concept of adaptation.

⁵² Dilnot 1993, p57.

⁵³ The formulation approaches the sense of affordance, both in respect of the idea that the nature of our engagement with the world is shaped by that engagement, to the extent that the world is perceived in terms of its fit to ourselves (the possibilities in terms of which we perceive it) and that this is reflected in our perceptual and cognitive capacities and ultimately in the kinds of conceptual structure that we can mobilise.

⁵⁴ Crozier 1994; Crozier and Greenhalgh 1992, 1992b; Csikszentmihalyi and Rochberg-Halton 1981.

⁵⁵ The world is ‘to hand’ in Heidegger’s sense [Heidegger 1967 pp 95-122; King 1964pp 6-9 and 70-98].

⁵⁶ Simon 1969.

⁵⁷ Simon 1969 pp 6-9.

⁵⁸ Simon 1969 pp 7-13.

(e) Feature-Structure/Content Models (Individual Significance)

The secondary component of the extra-somatic model of products, and the primary focus for experiential models is concerned with the ways in which products are experienced, and the world experienced through products. In general terms it is clear that when we use a product, we experience the product itself, but we also experience the environment through or in terms of the product. When I use a hoe, I experience the feel and weight of it, and also the resistance of the soil which is felt through the hoe. As I write this sentence, I feel and hear the keys and watch the sentence appear. When engrossed in the content of the sentence, its appearance seems independent of the screen or the surrounding apparatus - it appears in the world of the text. As I pause to consider what I have written, the screen and the processor become more apparent and I have to find my way back to the space of the text, when I try to resume. Products generally can be seen to have this quality of hovering in the space between transparency and opacity. In so far as products are modelled as extra-somatic extensions of human capacities, then the extremes of our experience of them are captured by the idea of complete transparency - where the product is drawn so far into our selves in the act of using it, that it ceases to be experienced, and complete opacity - where we cease to experience anything beyond the product itself.⁵⁹ These different relations with products might be modelled symbolically in the following way.⁶⁰ Where H stands for a human agent, P for a product and W for the world beyond the product, and -> for a relation, then transparency could be represented as :

[H-P] --> W (product entirely assimilated to the person)

and opacity as :

H --> [P-W] (product entirely assimilated to the external world).

Clearly the majority of products as experienced, will be neither wholly opaque nor wholly transparent, and the degree of transparency/opacity will vary, for example, in the course of an interaction as a function of attention, and in the course of continued use as a result of learning and familiarisation. In addition products which have become relatively transparent, will regain opacity quickly if their performance ceases to be consistent or as expected, or if they are used in new ways.

The use of a product, on this model, effectively changes the nature of our sensory engagement with the world. A dental probe, for example, enhances the capacity for fine

⁵⁹ Clearly the aims of products in this respect may differ, some essentially aspiring to transparency and others to opacity. The degree to which this is the case might be used to articulate a classification of products (decorative objects of certain kinds might be intentionally opaque, whilst an artificial hip-joint might aspire to complete transparency) The logical status of the transparency/opacity relation is discussed in section 9.4 below.

⁶⁰ The symbolism used here follows that of Ihde [Ihde 1979, p8].

tactile discrimination, whilst at the same time narrowing the range of tactile parameters that are available.⁶¹ It also, in one sense, removes or displaces the tactile sensation away from the body and to the point of contact between the probe and the tooth. The tooth is experienced at the point of the probe. The general thrust of this view of artefacts is that they can be characterised in terms of the balance between such parameters, and the dimensions of product content in phenomenological analysis of this kind articulated in terms of transparency and opacity, and represented in the form of three principal kinds of relations in which the product mediates between the user and the world - Embodiment Relations, Hermeneutic Relations and Background Relations. Embodiment relations express the partial transparency of the product and the extent to which it is assimilated to the person in use and accompanied by particular patterns of sensory-extension-reduction. Hermeneutic relations express the partial opacity of the product and the extent to which it is a focal object of experience in use and an objective external feature of the world, requiring interpretation in terms of that world. Background relations express the complex of transparency and opacity involved when products are assimilated to the world that we experience, rather than being either objects of experience in the world or objects through which we experience the world.

The essential point of such approaches to the analysis of products, is that product content can be characterised in terms of their effects on the nature and modality of our experience of the world, and it is this that provides the fundamental basis for an analysis of the user product relation.

Overview

The range of models sampled in the above paragraphs are clearly not mutually exclusive, but rather express the different perspectives from which artefacts and products can be viewed. There are considerable commonalities and a shared set of implicit underlying assumptions, broadly represented in the intentional model of artefactuality outlined above.⁶²

Artefacts and products are taken to be physical particulars - tokens of types which can be characterised in terms of their properties, roles or functions. They are the result of intentional acts of 'making' involving material drawn from the natural world and given identity through the relation between purpose and perceived constraints on form. Their significance and meaning deriving from the various roles that they assume in instrumental, intrapsychic and socio-cultural relations.

⁶¹ For example, the sensation of temperature is lost. Ihde explores this example in detail. [Ihde 1979 pp18-23].

⁶² Dipert 1993. See above pp 175-177.

Instrumentally, products can be conceived as extra-somatic instantiations of attributes, both in the adaptational sense intended by the basic relation of affordance, and as expressions of the counter-factual content of conceptual schemes, whether these are conceived primarily in terms of individual cognition or primarily in terms of a collective and normative framework for cognition.

Intrapsychically, products can be viewed as the material elements in cycles of projection and introjection, as the objectification of the subjective, and therefore as sites for the creation and articulation of the self.

Socio-culturally, products participate in inter-subjective transactions and as such attract associated connotations deriving from the articulation of significance and meaning between persons, and come to constitute relatively independent frameworks of connotation through which the further articulation of social meaning can operate.

6.3 Product Models in Product Semantics

The model of products adopted in product semantic accounts is not one that is explicitly formulated, but which arises implicitly from the framing of a critique of design and the resulting argument that design should be re-conceptualised in terms of the concepts of meaning and understanding and their correlates. The focus for the model lies in the interaction between user and product, to the extent that one could say that a product is that which is constituted in the interaction. In this sense the basis for a product model is radically shifted from an ontologically grounded dualistic conception, to an epistemologically focused and cognitive conception. However this is by no means a systematic move. Although on the one hand the product is conceived as constituted in the interaction, the unravelling of the interaction tends to be conducted ultimately in terms of the objective properties of the product. This is evident both in the methodological means which are thought to be appropriate in the analysis of the interaction and the theoretical terms in which aspects of the interaction are articulated. Thus the psycho-physical basis of object perception, for example, which it is argued can be unpicked through feature-attention analysis, and matched to subjective accounts, rests on the assumption that the process as a whole is affordance-based at the level of objects, and where a distinction is maintained between affordance as an objective facilitating property of objects and perceive-affordance as its cognitive counterpart. In addition, although product semantic models assert the importance of narrative and expressive factors in products, the affective content of the interaction tends to be reduced to the correlation of formally conceived features or qualitative perceptual types with linguistically expressed attributes. The sense that one can gain from the studies and proposals which have been made is that whatever cultural or individual factors bring to our engagement with products, these can be assumed to be captured by the qualities and attributes associated with the idea of a formal parsing.⁶³ This view which is implicit in the work of a number of authors,⁶⁴ is mitigated to some extent by the categorisation model developed by Athavankar.⁶⁵ In this case, the identity of a product becomes central to the model, although ultimately it is constituted in metaphoric or metonymic association of product features with other identities.

One problem in identifying a clear product model at this level of analysis appears to rest in the conflation of the two aspects of the cognitive content of design which product semantic theory addresses - the cognitive model of the user and the cognitive models employed by the designer in the design process. Whilst it makes theoretical sense to relativise product models in the design process to the idea that they are constituted in the process of product interaction, it makes less sense to use this as the direct basis for the

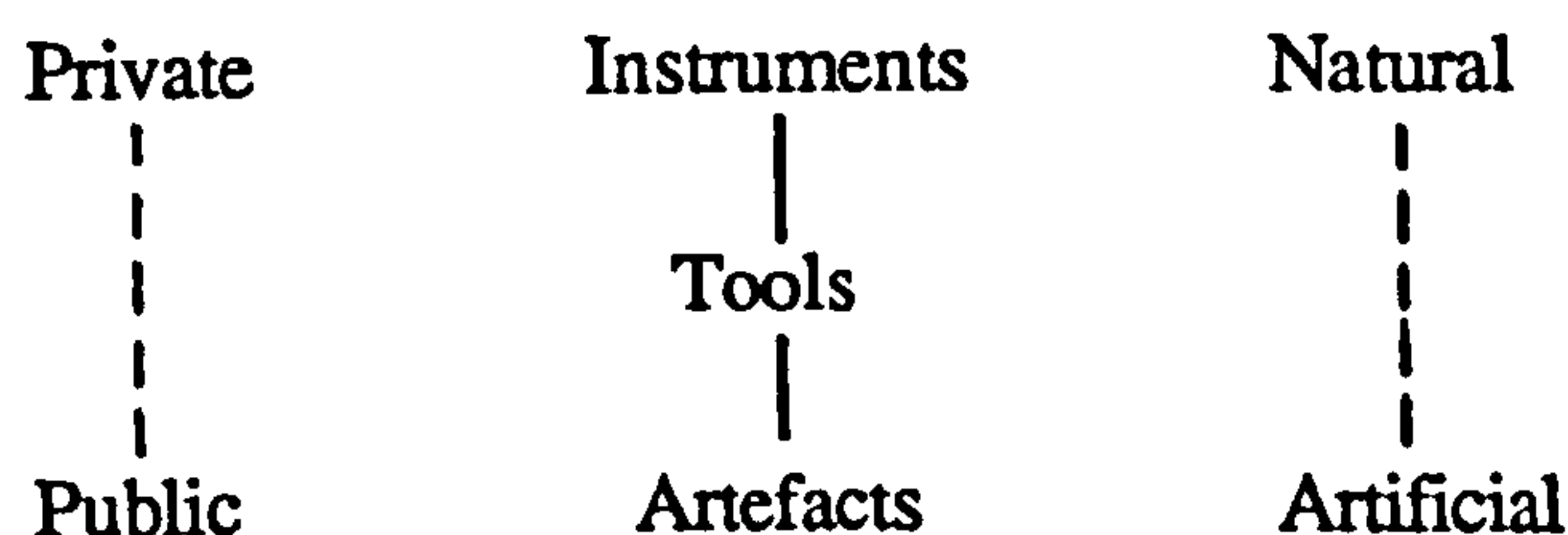
⁶³ It is nevertheless clear that this will also be subject to both individual and cultural difference.

⁶⁴ Particularly in terms of semiotic analysis [Vihma 1995] and from a methodological stance [Butter 1989].

⁶⁵ See Section 5 'Categorisation', above.

concept of a user model. This does not mean that no sense can be given to the useful idea of a user-model concept which sees the product as being differently constituted by different individual users or classes of user, but rather that the characterisation of any particular or kind of user-model in cognitive terms needs to be grounded in some sense of what constitute objective characteristics of the product. If the design process is about anything, it is about the definition of products in the form of their physical realisation, and the physical realisations constitute the reference against which interactions can be conceptualised. The problem then, given a physical particular, consists in framing the content of that particular from the point of view of a user. If it is possible to solve this problem in general terms, then it might conceivably be possible to frame the essential parameters involved in projecting a user-interaction for an as yet unrealised design.

Analysis of the hierarchy that Dipert proposes reveals that there are two parallel progressions at work which bear directly on the conception of products and product meaning in product semantics - the progression from the natural to the artificial and the progression from the private (individual) to the public (collective) :-⁶⁶

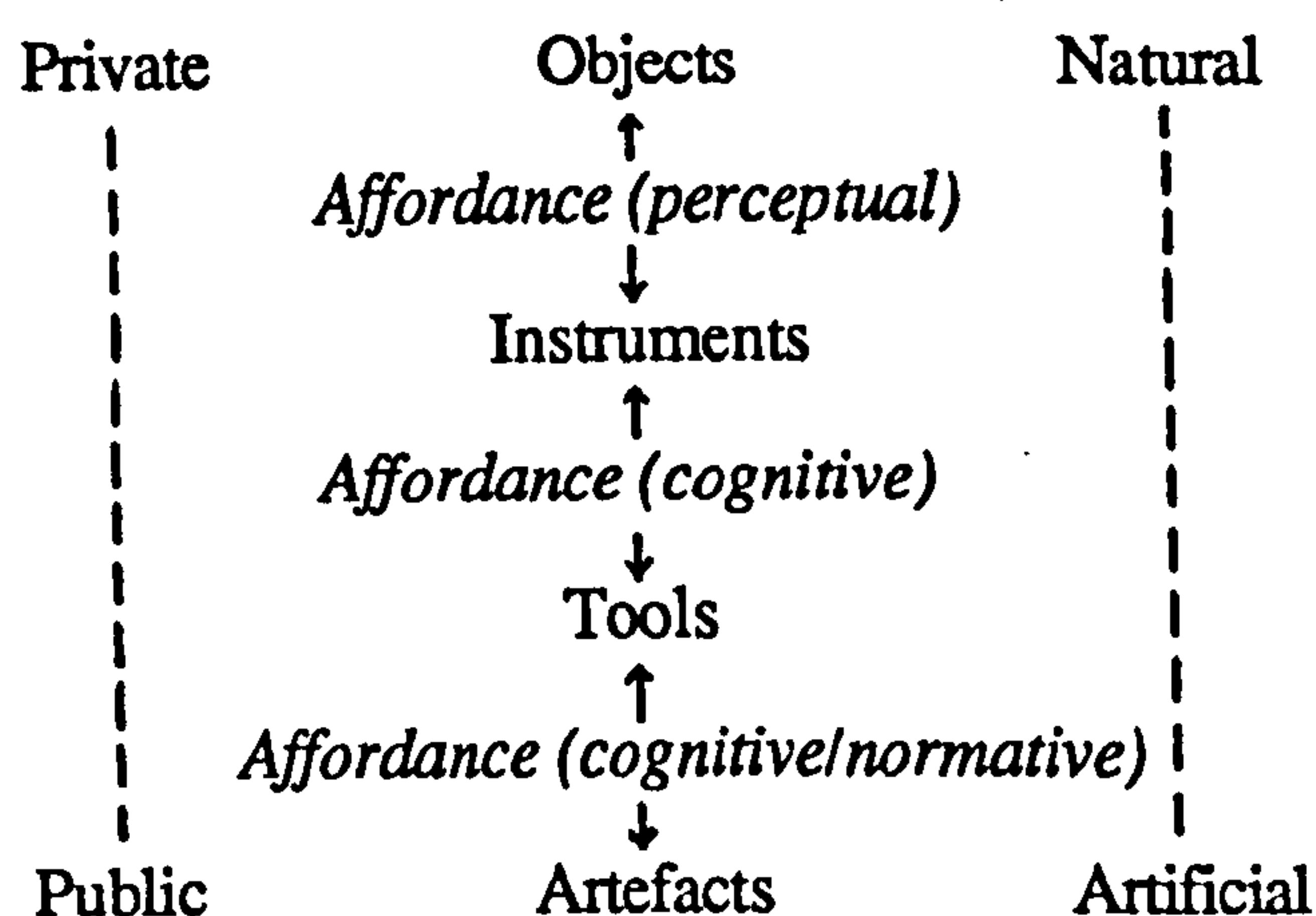


The analysis that Dipert provides is articulated uniformly in terms of properties and their selection. In the case of an instrument, its use as an instrument depends on the recognition (or presumption) of at least one property in respect of which its potential use is conceived. Similarly in the case of tools and artefacts, the intentionality involved also takes the form of property selection, although the nature of such selection involves increasingly greater cognitive sophistication as properties are engineered instrumentally and then conceived in terms of their recognition.

Although Dipert's analysis is ultimately intended to clarify the notion of agency, particularly in relation to works of art, the formal analysis of artefactuality in relation to intentionality can be used as the basis for a framework which locates artefacts in terms of their individual, intersubjective and socio-cultural roles. Modelling products on this basis provides a background for assimilating a diverse range of conceptual product models,

⁶⁶ In saying this it should not be assumed that either the private or the natural have logical or conceptual priority. It can equally well be argued that the possibility of harnessing the natural world instrumentally is dependent on the normative force of collective institutions, as that the possibility of collective notions of artefactuality are built on individual instrumental action and conception.

including the product models implicit in product semantics, particularly in terms of the concepts of artefact, interface, meaning and affordance that they employ. An initial assimilation in terms of the affordance relation, for example, might take the following general form :-



We perceive objects instrumentally. In the Gibsonian version of the perceptual relation, this engagement with the world is primitive - perception is essentially embodied, instrumental, species-specific and the result of the parallel co-evolution of systems in an 'ecological' context. The transition from instruments to tools involves the abstraction of properties and the presence and operation of some form of conceptual scheme. The transition from tools to artefacts involves the presence and operation of a normative categorial cognitive scheme. The degree to which the transitions should be regarded as a logical or developmental hierarchy is a matter of individual theoretical interpretation. In product semantics generally the relations are conceived in terms of higher order intentionality and therefore as essentially culturally-relative and normative. This is evident in the articulation of the affordance relation,⁶⁷ the nature of the proposed scheme of categorisation,⁶⁸ and the more general principle of meaning as contextualisation.⁶⁹ The upshot is a view of instrumentality and artefactuality that is consonant with Dipert's analysis in terms of properties, but which makes no commitment to the logical or developmental priority of some form of unanalysed and basic instrumental relation.

In product semantic terms the product is constituted in the interaction, which is itself constrained by the socio-cultural rootedness of conceptual schemes. There is no objective object standing outside the interactive relation, but rather a commonality of reference in linking the different objects and their contents that we individually construct. At one

⁶⁷ For example Krampen 1989.

⁶⁸ Athavankar 1989,1990.

⁶⁹ Krippendorff 1989; Vihma 1995; and see above pp 51-58.

extreme then, the product is conceived as being literally constituted in the interaction in the sense that its identity, properties and attributes are made all of a piece with the individual construction of meaning and significance. There is no set of independent features or partitionings constituting a syntactical parsing to which semantic values become attached. Philosophically and methodologically this poses a problem, since on the face of it little is left with which to articulate continuity of reference, other than the sort of continuity associated with establishing physically a chain of evidence.⁷⁰

However, in dealing with the concept of an artefact or product as the outcome of a design process, we are in a different position. In this case we are confronted with a specifiable physical particular, whose genesis is dependent on the articulation of relatively well defined parsings of a variety of kinds, associated with all the complexities of a system of production. This is not to say that the parsings associated with product genesis are definitive for the user, but rather that they provide the locus for the interaction between designer's meaning and user's meaning, at least from the point of view of the designer.

Methodologically then, product semantics operates with a concept of product meaning within design in which the construction or assumption of significance by the designer can be related to the parsings associated with bringing the object into being. The other side of the coin is that the parsing and significance of the product for a given user (the product that the user constructs), could in principle be related by the designer to the specified parsing and its associated presumed significance. Although a model of this kind is evident in product semantic accounts, it is also suggested that user models could be arrived at independently, through some form of analysis of the general operation of cognitive models deployed by the user. But it is difficult to see how this could be achieved without making some fairly general assumptions about the systematic nature of the association between content and semantic value, and to make assumptions along these lines is equivalent to asserting that meaning and significance in the case of products operates in a parallel way to meaning in natural language. If there is no simple formal vocabulary with associated semantic import (and product semantic accounts are clear in rejecting a notion of this kind)⁷¹ then we are left with the problem of identifying the source of systematicity, or rejecting this is a property associated with the semantics of objects. Nevertheless, in so far as systematic association can be construed within product semantic accounts, then it would seem to derive its stability from the feature-property association inherent in design models rather than user models.

⁷⁰ This question is taken up in Section 7 'Meaning', and in Part C 'Synthesis' below.

⁷¹ For example, Lannoch 1989, p 48; Vihma 1995 pp71-73.

6.4 Product Content

Product semantics is concerned primarily with the interaction between the user and the product, conceived in broadly cognitive terms. We have already examined aspects of one term of this interaction, or relationship, in considering the nature of our cognitive engagement with the world, categorially and in terms of affordance. The other term of the interaction is the product, and the question arises, given the theoretical position outlined in the previous section, as to just what is it with which the user interacts. Product semantics offers three broad kinds of answer to this question. In the first place the user interacts with product features in terms of their perceived instrumentality, in the direct perception of affordances. Secondly, the user interacts with product identity and content via processes of categorisation through metonymic and metaphoric association, which form a semantic network. Thirdly, the user interacts with features of the product on the basis of general schematic cognitive principles relating to domains of phenomena, 'folk psychologies', which constitute sets of expectations primarily associated with assumed or predicted behaviour. Our present concern is not with the correctness of such forms of answer, which will be addressed within later sections, but rather the ways in which constituent terms such as 'content', and 'features' may be interpreted.

Terms of this kind can be unpacked in a variety of ways which in general correspond to their use in relatively distinct forms of description. Product 'content' may, for example, be interpreted in terms of formal description (a rectangular shell with a pattern of small circular openings at the front), componential description (a row of columns on pediments surmounted by an architrave), technical description (a geodesic structure), functional description (a fan driven by a motor and controlled by a switch), evaluative description (beautiful but relatively expensive). Whilst it is probably true to say that all these forms of description (and others) are actively engaged in the design process, the extent to which they all figure in user perception and interaction is less clear.

Similarly, although forms of description of these kinds are involved in product recognition and product identity, these latter are themselves subject to a further set of distinctions in the hierarchy of classification. At the most general level this might be expressed in terms of the distinction between 'token' and 'type'. Whilst there may not be a strict correspondence between the philosophical use of this distinction and its use in the context of products, the parallel is clear. Identifying descriptions are generally characterisations of type (the Electrolux 500), whilst referring expressions relate primarily to tokens (my Electrolux 500). It is also arguable whether interactions are essentially token-interactions or type-interactions. Whilst on the face of it my interaction with a product is always a token-interaction (I wrestle with the same physical particular on

successive occasions of hoovering), there is a sense in which that interaction can be conceived as being in large measure constituted in terms of identity and knowledge of the type. It may be that this shift in perspective is what constitutes the personalisation of products - the degree to which a type becomes a token. Some sense of this can be gained from considering what might be acceptable as substitutes for tokens.⁷² Although it would make little difference to me if you substituted an alternative token of the type Electrolux 500 for my token, the same would not be true of my wedding ring, even though it is a cheap and formally undistinguished mass-produced product. There is no equivalent substitute token and it has thus ceased to be a type. Similarly, a unique token can become a type through replication.⁷³

Attempts to capture the content of artefacts in formal terms, particularly in evaluative and critical contexts have generally employed a conceptual framework that is based on formal description and componential typologies. The essence of the approach consists in defining the terms of a descriptive language relative to psychophysical attributes of sensory modalities and the segmentation of perceptual fields. These are conceived as providing the perceptual underpinning for object persistence in terms of substantiality, spatial coherence and temporal persistence. Descriptive languages at root require the capacity for reference to such objects, the assignment of properties to distinct referenda and a system of notation which is both systematic and sufficiently rich to express the necessary perceptual discriminations. In most cases this is accomplished using the resources of a first order predicate logic (or alternatively a set-theoretical equivalent) in which properties or relations are asserted as either holding or not holding in respect of an object of reference.⁷⁴ The forms of such assertions are expressed either in relational or functional terms, in which variables ranging over attribute kinds are instantiated by appropriate substitutions and either satisfy or fail to satisfy the predicate. A description is constituted by a collection of assertions of this kind, having a common reference.

The content of an object can be described in similar terms, by applying the same process to the description of its parts. However, in this case it is clear that there is an additional problem, in that an object can in principle be partitioned in an indefinitely large number of

⁷² This is the same strategy used in exploring function [see p 74 et seq above] Perceived function can be articulated in terms of substitutability and in terms of the type/token relation - there are type functions and token functions (individual and social attributions) The werewolf example works because of this distinction [see p 87 above].

⁷³ The idea of significant difference in relation to the type/token distinction has been explored in the sculpture of McCollum, who has for example produced mass products (dummy objects) which appear identical at first sight but are in fact unique. One of the key strategies in mediation and advertising consists in manipulating the type-token relation, either by creating a context in which you are invited to regard the type as a potential token (personalisation), or by generalising your token as a type which is then associated with a prospective peer group, (or more usually in the interaction or balance between these modes of presentation).

⁷⁴ For example the system of descriptive and critical languages developed by Mitchell for architectural design [Mitchell 1990].

distinct ways, and description will necessarily be relative to a particular partitioning. In formal contexts it is assumed that objects can be decomposed into elementary parts which are themselves regarded as being indivisible, and that such parts are hierarchically ordered into subsets, at various levels of inclusion in the hierarchy, forming a lattice.⁷⁵ The development of typologies on this basis has been particularly evident in architectural theory where there has been a marked persistence in particular forms of partitioning and characteristic lattice structures in the historical development of the discipline.⁷⁶ Although to some extent, the justification of partitionings of this kind are based on criteria which include parameters such as the relative perceptual and constructional independence of parts, it is generally the case in architectural design that partitioning is founded on functional derivatives.⁷⁷ The formal elements of an entablature, for example, include the architrave and triglyphs as the formalisation of parts of a structural system which have ceased to be functional in their original sense, but have nonetheless been retained in the classical architectural vocabulary as identifiable parts. The significance of functional (or instrumental) typology for product semantics will be evident from previous consideration of the nature of categorisation.⁷⁸

Description is relative to a particular partitioning, and this in turn depends on the nature of the conceptual framework that is applied.⁷⁹ In the formal notations for dance, for example, the principal distinctions between systems consist in a fundamental difference in conceptual frameworks, represented on the one hand by an ontology of classical dance 'figures' which are then subject to modification and elaboration, and on the other by an ontology of body parts and their capacities for movement which are accumulated in the construction of 'figures'.⁸⁰ The first is classical, typological and accepted as value laden (in a sense similar to that of 'tonal'). The second is modernist, atomistic, and value free (in the sense of 'atonal').

This complexity in the nature of partitioning is evident in the formal articulation of artefacts. In general, in the historical development of products, formal organisations have been rooted in functional typologies and instantiated in particular constructions. Where

⁷⁵ For the concept of a lattice and its relation to logic see Mitchell 1990; Dubisch 1964.

⁷⁶ Colqhoun in particular argues for the essential role of typologies in architectural design and design generally [Colqhoun 1969, 1981]. Steadman analyses the anatomical nature of the nomenclature and designation of parts typologies in architecture [Steadman 1979].

⁷⁷ See for example Colqhoun 1969; Summerson 1963;

⁷⁸ Section 5 'Categorisation', pp 145-146 above.

⁷⁹ Note that the idea of a 'conceptual framework' is closely related but not identical to the idea of a 'conceptualisation' as used by Mitchell in the development of formal languages for architectural description and design [Mitchell 1990, pp22-24]. Whereas a conceptualisation consists of a universe of discourse, together with specifications for functional and relational elements for example, a 'conceptual framework' is that which is constitutive of the criteria for such discourses and elements [See Appendix A 'Framework Models'].

⁸⁰ This is reflected in the different systems of dance notation used (for example Laban versus Benesh notation).

such products have persisted and developed, their formal organisation has tended to be based on the typology and terminology established in idealised and constructional prototypes, and ultimately elaborated as style, as is the case in classical architecture. In modernist architecture and design on the other hand (although typological reference is ultimately inescapable at some level) the thrust has been to establish a formal syntax which is relatively independent from classical values and from which it was assumed that alternative semantic associations would flow.

In formal systems of the kind outlined above, the relationship between description and evaluation is captured by the idea of interpretation or understanding. The syntax which establishes the regulatory framework for the validity of sentences using the vocabulary of symbols, acquires meaning through the enumeration of all possible sentences and their association with states of the world, typically expressed in terms of truth and falsity. Each total pattern of truth values for the sentences of a language constitutes a different interpretation of that language, although in this individually enumerated form, the language remains semantically opaque. It becomes transparent in so far as there is, for example, a systematic truth-functional relationship between the syntactic elements of a language, enabling the individual enumeration of sentence value to be replaced by the specification of general truth conditions.⁸¹ Interpretation consists in the systematic application of truth conditions to the sentences of a language so that they become assertions. Evaluation consists in making the comparison between what is asserted and the perceived state in the world to which it refers.⁸²

Clearly, given the historical context for the development of product semantics, it is not surprising that formal interpretations of this kind are rejected together with the perceived assumptions of modernism. Instead it is proposed that the construction of meaning lies closer to the accretion of significance relative to typological models which are socio-culturally derived. Although no explicit formal model is proposed, this approach is implicitly contained in the intersection of the categorial scheme operative in product semantics, with the contextual domains specified as characterising the range of cognitive contexts and models within which meaning is constructed.

Although the majority of formalisations are broadly expressed in the set-theoretic and truth-functional terms noted above, it is also possible to address the question of product

⁸¹ For example in the form of Davidson's truth-functional semantics based on Tarski's recursive definition of truth [Platts 1979, pp 16-58].

⁸² Mitchell, for example develops the idea of expressions in 'design languages' characterising design worlds and evaluation consisting in matching worlds [Mitchell 1990]. Evaluation can either consist in the process of matching between logical expressions of indicative form (as in the case of Mitchell's use of the predicate calculus, where states are described, and modalities such as 'desired state' 'possible state' qualify the state for the purposes of evaluation) or they can be directly built into the logical form as in the case of deontic logics [Von Wright 1963].

content and interpretation through formal models derived from communication theory. In these approaches, interpretation is typically conceived as embedded in the communication process, where the output from a receptor takes the form of an encoded description which is analysed in terms of a system of algorithms, and where the resulting description, interpretation or evaluation becomes the input for effectors.⁸³ The truth-functional state description model is thus replaced by a process model, interpreted in terms of algorithms. In developing this idea in the context of aesthetic response, Stiny and Gips distinguish between three principle types of interpretation, expressed as modes of understanding. In interpretations based on 'constructive' modes of understanding, objects are understood in terms of how they can be constructed or generated, and the process consists in a transformation of data which results in a description. Interpretations based on 'evocative' modes of understanding, on the other hand operate through the association of ideas or affects with a description which constitutes the input. A third type of interpretation is identified, which involves both constructive and evocative modes, in which a generative model of an object gives rise directly to associative understanding without an intervening description.

Formal models of this latter kind are more consonant with the principle features of a product semantic account, which emphasise the priority of user understanding and deny that such understanding can be approached through a system of determinate and objective descriptions. Product content, on such a view is inherently inseparable from processes of signification and meaning-making, and can only become determinate in the context of the operation of such processes by the individual.⁸⁴

⁸³ The approach is typified in the work of Stiny and Gips who develop an algorithmic model of interpretation relating to aesthetic response [Stiny and Gips 1978].

⁸⁴ It should again be emphasised that although the determination of content on this account is based in the individual, this does not imply that it is fundamentally individualistic, since the possibility of individual meaning-making or signification might depend for example on a collective institution of signification.

6.5 The Role of 'Artefacts' and 'Products' in Design Discourses

In one sense consideration of the role of terms such as 'artefact' or 'product' in design discourses may appear moot. However, if the question is construed on an analogy with the import of the term 'organism' in biology, then it may begin to seem less redundant. The principal distinction in the scope of the joint use of these terms as they are generally used in design and as they are used in product semantics rests on the degree to which some form of subject-object dualism is operative philosophically and methodologically. The principal distinction between the use of the terms in both contexts is that whereas 'artefact' is applied as the most general term for intentionally made things, including unique idiosyncratic individual constructions and products, 'products' is reserved for the intentional output from processes of production, which are inherently socio-cultural rather than individual in scope, and which participate in socio-cultural transactions generally.⁸⁵

Taking the term 'product' as our example, the principal form of its articulation in design discourses assumes a subject-object dualism. Products are things of identifiable kinds existing as entities in the external world, which can be seen and manipulated by active and perceiving subjects. Although this form of underlying realism is probably common to all designers and design theorists at the pragmatic level, at a philosophical level it is by no means inevitable and if pursued methodologically can lead to unwarranted assumptions. The principal respect in which this is the case is if acceptance of the pragmatic position is taken to warrant the idea of the objective specificity of content, whereas this is only the case if a particularly strong form of realism is accepted philosophically.⁸⁶ The central objection of product semantics to the mainstream of design theories is that they operate on the assumption of the objective specifiability of content.

Product models in product semantics are of a distinct kind, combining features of both place-marker and content models. They approximate to place-marker models in the sense that the product functions as a potential bearer of content for the user, rather than an object with a determinate content. They approximate to content (feature-structure) models in the sense that their ability to act as place markers and to function in individual and social transactions is dependent on the particularity of content, rather than on the abstract fact of their logical status as place-markers. The particular content that is established by the user in a product interaction underpins the possibility of place marker functions. This can be expressed in a framework that operates in terms of 'meaning' by saying that from the perspective of the user there is no given product syntax but only a context in which semantic value and reference are co-constructed.

⁸⁵ The distinction is not hard edged or subject to formal definition, and in many cases the terms are used interchangeably.

⁸⁶ See for example Searle's discussion of forms of realism [Searle 1995, chapters 7 and 8].

Although this is the case, product semantic accounts also follow the general pattern of design theories when product content is viewed from the perspective of the designer. In this case the specification of the product is taken to involve more or less determinate parsings in which semantic value is associated with product features (or clusters of features) which are themselves determined (or at least constrained) by the processes of design and realisation. But whereas the general run of design theories are content to work with the 'syntax' derived from these relatively pragmatic parsings, and to ascribe a user's semantic values to the elements of such a syntax in determining or analysing significance, product semantic theory argues for a methodology which asserts the independence of user understanding from the determinate content of design models.

The relationship between these perspectives is clearly a complex one, and the degree to which philosophical and methodological independence is in fact sustained is variable both across and within individual accounts. The problem in a more general form parallels the different stances taken in the choice of approaches to intentional theories of meaning. If the context for meaning is communication, then the question takes the form of whether an analysis of meaning should be based on 'speakers' meaning (the intentionality involved in making the utterance), 'hearers' meaning (the context necessary for understanding the utterance), or 'sentence' meaning (the abstract sense of meaning which depends on the systematicity of utterances). If a product is viewed on an analogy with an uttered sentence then in general, design theories operate on the basis of seeking for explanations in a domain which lies between speaker's meaning and sentence meaning, whilst product semantics argues for primacy in the domain of hearer's meaning. Nevertheless, there clearly must be some connectedness between these domains for the successful operation of either product design or linguistic communication.

The product semantic model emphasises the idea that the product is that which is constituted interactively, in contradistinction to the more familiar idea that it is an objective particular which is subject to interpretation. The construal and viability of either model depends centrally on the more general theory of meaning with which it is associated, which will be addressed in the next section.

Section 7 Meaning

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7.1 Language and Meaning

Questions of meaning arise most naturally in the context of language, but they are not restricted in principle to that context, and in so far as a philosophical and psychological understanding of language is conceived as a way to an understanding of our more general cognitive engagement with the world, theories of meaning based in linguistic meaning also find an application in these more general contexts.¹ By way of initiating an examination of the concepts of meaning in product semantics and design generally, we will first approach the major classes of meaning theory developed primarily in the context of linguistic meaning and their possible application in the case of objects and cultural products. The justification for approaching the issue of meaning from this standpoint rests both on the fact that product semantic accounts advert to linguistic theories in their exposition of the core idea of meaning, and also that the majority of meaning theories use linguistic meaning as a reference point. The major classes of meaning theory that will initially be addressed include 'referential', 'ideational', 'behavioural', 'truth-functional' and 'intentional' theories.²

*Referential Theory*³

The general proposal embraced in referential theories of meaning is that words or symbols mean by 'standing for' things in the world.⁴ Clearly not all words denote items, for example the logical connectives, but the fundamental operation of meaning is taken to be the tagging of things or relations with labels of one kind or another. This idea, although intuitively appealing at least in the context of language, is subject to a number of problems. In the first place, as Wittgenstein pointed out, the idea of ostension is by no means transparent, requiring disambiguation of reference both in respect of objects, parts, attributes and so on, and in respect of tokens and classes.⁵ Secondly, it is clear from Frege's distinction between sense and reference that two words or phrases can refer to the

¹ There are two particularly influential forms of this idea. The first is Frege's approach to philosophy which is based on the idea that the goal of philosophy is the analysis of the structure of thought (thought as an abstract idea which is sharply distinguished from the psychological processes of thinking) and that the proper method for analysing thought consists in the analysis of language [Frege 1977; Dummett 1973,1978,1981]. The second, which has roots in recent philosophy and cognitive science is Fodor's 'Language of Thought' hypothesis' which asserts that cognition traffics in mental representations, which are language-like symbols [Fodor 1975,1987].

² The classification of meaning theories used here (section 7.1) is based on Grayling's updated adaptation of Alston's categorisation of traditional forms of theory, augmented by the typology of the analysis of meaning and mental representation provided by Cummins.[Alston 1963; Grayling 1982; Cummins 1989].

³ Grayling prefers 'Denotative' to 'Referential' [Grayling 1982, p176] for reasons that will become evident.

⁴ Russell expressed it in the following way '...all words have meaning, in the simple sense that they are symbols that stand for something other than themselves'. [Russell 1903, p47].

⁵ How can we know, without additional non-ostensive conventions, that what is being pointed out is an object rather than its parts, functions, properties, qualities etc, when a name is uttered in an ostensive context. In addition, although a word may be used on particular occasions to pick out an individual object, the word itself does not denote any particular object, but rather the class of such objects.

same thing, though having different senses, which precludes the direct identification of the meaning of a word with its referent.⁶

As the basis of an account of meaning in the case of objects or products, referential theory has, on the face of it, little to commend it, relying as it does on extrinsic definition. Whilst in the case of the meaning of a symbol, intrinsic properties may have little bearing on semantic content (though there may be an important relation between syntactic import and semantic function), in the case of the meaning of an object it could be argued that the crucial elements are intrinsic, and referential aspects secondary or irrelevant. In the case of the product semantic account of meaning, referential theory is explicitly rejected on these grounds.⁷

Nevertheless it is possible to adopt an alternative stance in the development of a referential theory, which both addresses some of the inherent problems and begins to make some space for a more workable conception of product meaning. The basis for this lies in the distinction that can be drawn between reference and denotation - words denote objects or classes of object, but it is agents that refer to objects, by using the words that denote them. Meaning is then specified in terms of a denoting expression and its object - it is a relation rather than a referent.⁸ Whilst this formulation does not solve all the problems noted above in the context of language more generally, it does open up the possibility that the meaning of a product might be conceived in terms of the relation between a token and the class for which it is taken to be a member or an exemplar.⁹

In general terms referential theories are unconvincing because they place undue emphasis on denotative terms. These constitute a relatively small proportion of the components of language, which can more generally be seen to have functions rather than denotations, and which cannot on the face of it be reduced to denotational primitives.¹⁰ The broader implication is that such theories misidentify the location of meaning, for example, in the association of meaning with words rather than with larger linguistic units such as sentences.¹¹

⁶ Frege 1977; Dummett 1978 pp 116-144.

⁷ Krippendorff 1989, p10.[See above p 41 footnote 76].

⁸ This approach in terms of 'imputed relations' is no more appealing to Krippendorff than the simpler form ('naive referential theory') defined in terms of referents, and he rejects it on parallel grounds. [Krippendorff 1989, p10]. The perceived inapplicability of semiotics to product semantics is essentially based on an extension of this argument. [Krippendorff 1989, p11].

⁹ This possibility is taken up below, section 7.5 'Symbol Systems and Exemplification'.

¹⁰ For example, connectives, prepositions, articles, modal terms, non-denoting and abstract nouns.

¹¹ Austin 'The Meaning of a Word' in Austin 1961.

Ideational Theories

Ideational theories of meaning are based on the proposal that the meaning of a linguistic expression is the idea that it denotes. They hold a fundamental feature in common with representational theories, in that in both cases meaning is equated with a denoted object - in the former case with a referent in the external world and in the latter with an idea in the mind. Essentially such theories assert the independence of thought and language - the function of language being the communication of ideas via an intersubjectively available associative system relating signs to ideas. The elements of such a system are such that their use will co-ordinate ideas among persons.

The principal problem with such theories is the lack of a conception of 'idea' that is to any degree more perspicuous than that of 'meaning', and in canvassing the range of interpretations that have been made, one would need to include a wide assortment of mental contents ranging from what is immediately available such as sense-data or feelings, through memories and imaginings, abstractions and concepts to mental representations generally. The secondary problem is that given some workable conception of 'idea' it remains difficult to establish the nature of the relationship between words or symbols and the ideas that they stand for. On the one hand it seems clear on empirical grounds that there is no one to one relationship, since a word can in fact evoke a wide range of distinct images or ideas, and a single idea (if sense can be given to this notion) might be associated with a large number of different words. The relationship is at the very least complex and polyvalent. On the other hand, if words are indeed conceived as separate from ideas, as a way of publicly encoding ideas, then we are also faced with the unresolved problem of how such encoding or mapping is supposed to be accomplished.

Nevertheless as was the case with referential theories, there is an intuitively appealing core, which in this case perhaps consists in the sense that 'meanings' are, or are associated with, mental constructs. In terms of an application to extra-linguistic senses of meaning, then one might once again approach this via the relationship between an object, or mental representation of an object as a token, and the mental representations of the classes for which it is taken to be a member.

Referential and ideational theories can be viewed as distinct theoretical approaches to meaning theory, each focussing on a particular facet of an overall folk-theoretical conception of meaning which assumes that 'meanings' are rooted both in individual mental experience and in the furniture of a publicly accessible world. On this conception they can be taken informally to parallel the elements of Frege's model of language, including the distinction between sense and reference. However, they both rest on a

common model which takes the foundations of language, and consequently of meaning, to consist primarily in the mechanism of denotation or labelling. This conception of language has of course been challenged, particularly in the later work of Wittgenstein, since the majority of terms are not labels and it is evident that the use of language does not simply consist in deploying lists of labels. The invitation here is to think of the various components of a language as having functions or roles which are circumscribed by the rules or conventions for their use, and to think of language itself as consisting in a range of distinguishable activities such as 'stating' or 'requesting' which are accomplished by using the range of functional components deployed by the language, in an appropriate way. The different kinds of relation that can be asserted to hold in respect of a contextualised view of language of this kind, demarcates the principle distinctions in theoretical approaches which can be taken as falling under the rubric of 'behavioural theories' and 'semiotic' theories.

The principal reason for rejecting denotative theories is their failure to take account of the mediated nature of meaning relations. There is no naturally subsisting relationship between some thing in the world and that which denotes it, but only a relation that is established vis a vis some agent. One corollary of recognising this is to make the natural move of identifying meanings, not with things in the world, but with mental entities such as 'ideas' or 'concepts' as mediators. However as we have seen, ideational theories are equally problematic in respect of the nature of their referents, and other approaches to the nature of the mediating relation have been sought.

'Behavioural' Theories

The most astringent form of meaning theory falling under this general heading adopts an overtly behaviourist approach. The use of language is taken to be simply a particular form of behaviour used in communication which is to be explained in terms of the general run of behavioural transactions, shunning unobservable constructs such as intentional states and mental contents and appealing only to overt behaviours.¹² In a given case of communication these amount to the stimulus, the response, and the context of the communication - the fundamental idea being that language is essentially a system of signs but one or two steps removed from the danger signals and territorial cries of non-human species. The meaning of a sign, on this view, consists in the behavioural response or effect that it produces relative to the context in which it is used.¹³ Accepting for the moment the basic premiss, it is clear that simple forms of such theories will be subject to similar counter-arguments to referential and ideational theories, since only a relatively small part of language can be taken to be of this form. In addition, it is by no means clear

¹² Skinner 1953, 1957; Staats 1967.

¹³ Including dispositional and implicit responses.

that any sense can be given to the idea of some form of standardisation of behavioural response in respect of a given sign stimulus, even if it is claimed that disambiguation and accounts of dispositionality can be accomplished through an appeal to differences in context. In addition there are no perspicuous means of demarcating behaviours that are relevant qua response to a given sign, and therefore for individuating meanings.

Whilst it is clear that a theory of meaning based on this idea has little to commend it in the present context, the broad approach seeks for an account of meaning in the public context of communication, emphasising the active and transactional nature of meaning relations. An alternative and slightly less astringent way of pursuing the approach is exemplified in Verificationist and Operational theories of meaning.¹⁴ Given the public and transactional context set for meaning relations, these approaches attempt to capture meaning in terms of the rules applying to the use of sentences or expressions. This amounts to equating meaning with either a specification of the way in which a sentence can be verified, or the set of operations involved in performances associated with the expression.¹⁵ The public and intersubjective grounding is given in the fact that verification must ultimately be underpinned by direct verification in experience of observable facts expressed in the form of 'protocol' sentences. This approach, relying as it does on a fundamental role for ostension and denotation, is subject to the same counter arguments noted above.

In the context of object or product meaning, an instrumentalist, rather than a purely behaviourist notion does appear to have a possible application, in so far as one could assert that the meaning or significance of objects consists, at least in part, in the ways that we deploy them, and this core idea is evident in Product Semantic accounts.

The connection between meaning and use finds its fullest expression in the later Wittgenstein, in the context of a critique of denotative models of meaning which emphasises the rich variety of language use, and which is not constrained by the methodological constraints of behaviourism.¹⁶ In this proposal the elements of a language are to be thought of as instruments, whose sense is given by their use. But in contrast to essentially denotative models, establishing the sense of expressions cannot be treated as isolated cases of matching, but instead as dependent on the roles that such expressions have in the web of language as a whole. Language is essentially a transactional medium operating across a wide range of contexts, and but one activity embedded in the total range of connected activities of a community. Language develops in the context of the overall life of a community and the sense of its components derives from the ways in

¹⁴ Verificationist - Schlick 1936; Carnap 1953,1956; Neurath 1959. Operationalist - Bridgeman 1927.

¹⁵ Operationalist theories can be assimilated to verificationist theories, since the set of operations associated with an expression generalises to the set of operations involved in its verification.

¹⁶ Wittgenstein 1972.

which they cohere within and across the various 'language games' that constitute the functional differentia of language in the context of community activity.

A formulation in these terms does not invite a separate theory of meaning. Learning a language consists in coming to know how to use it appropriately in context, and becoming familiar with the relevance and effects of expressions - their functions, roles and purposes - tells as much of the story as there is to be told. There is no further feature beyond such parameters of use that constitutes the additional property of 'meaning'. In so far as it is appropriate to describe the view as holding a theory of meaning, meaning is directly equated with use.

In the case of objects or products, the natural extension of such a view would be to parallel this by associating meaning or significance with the ways in which we use objects, which is clearly part of the conception of meaning promoted in product semantics. The meaning or significance of a chair consists in the uses to which it is put - 'sitting', 'decorating the environment', 'expressing relative status' and so on. In nominating uses in this way, the specific problem in equating meaning and significance with use is brought out both for objects and for language - not all 'uses' seem to have a parallel status in such an equation. Some uses appear to be more central to the fundamental conception of a term or an object, than others. In principle it could be argued that given sufficient manipulation of the context, any object or term could be used indifferently for some, and perhaps all purposes.¹⁷ It is clearly the case for language that not all descriptions of use can be equated with meaning, since it is certainly possible to know the meaning of a word without knowing how to use it, and equally possible to learn how to use a word without knowing its meaning. Nevertheless there is an important connection between meaning and use, even if considerations such as these strongly suggest that there is more to meaning than is captured in the idea of use.

That this is the case is most strongly brought out in the development of 'use' theory, in the context of the analysis of speech acts. If expressions in a language are akin to instruments, then the problem is to explain what they are used for and what is the character of their use. The stimulus for a whole line of analytic development was signalled in Austin's observations and distinctions regarding the workings of a wide range of linguistic expressions. These included 'performative' utterances - in which an action was constituted in making the utterance - (and the extension of this to the general idea of utterances as actions involved in the production of outcomes or effects), and the distinction between acts constituted in an utterance and acts performed by means of, or

¹⁷ One could imagine that any linguistic expression could conceivably be used to 'frighten' and any object could conceivably be used to 'decorate an environment'.

through the use of an expression - 'illocutionary' and 'perlocutionary' acts.¹⁸ Typically the results of such analyses were deployed to show that meaning is intimately connected with the fact of how an expression is used to perform a speech act, essentially in the form of a functional association between a word and the speech acts in which it characteristically figures. However, it has been shown that for typical cases, changes in linguistic context do not preserve similarity of function, and that therefore meaning cannot be expressed simply as a function of speech-act function.¹⁹

In the case of extra-linguistic meaning, in addition to the observation made above in respect of the application of use-theory generally, the distinctions made regarding speech acts can be seen to have a potential place. The distinction between 'illocutionary' and 'perlocutionary', for example, could be seen to have a counterpart in the case of signification for objects and products, which mirrors the distinction between 'denotation' and 'connotation' in some forms of semiotic analysis.²⁰

Ultimately in relation to language, speech-act theorists generally deny that there can be a systematic theory of meaning relations, but only a programmatic approach to elucidating meanings. However, this tenet flies in the face of one of the key observations driving the attempt to analyse meaning - a language user's ability to understand an uncountably large number of previously unencountered sentences. The implication drawn from this fact is that linguistic ability is only explicable in terms of something like an implicit rule structure which is operative in language use, which exhibits the key features of systematicity and compositionality, and which it ought therefore to be possible to state.²¹

¹⁸ Austin in the course of his analysis of the ways in which language is used noted the distinction between saying something, and what we do in saying what we say - for example issuing a warning or asking a question (illocutionary acts). In addition, further acts may be performed in the sense that effects may ensue from the performance of an illocutionary act- for example intimidating or disgusting the hearer (perlocutionary acts). The key distinction between them is that illocutionary acts are conventional, whether they take a verbal or a non-verbal form.[Austin 1962]. Austin originally introduced the performative-constative distinction to mark off the fact that some uses of language constitute substantive actions just in case they are performed ['Performative Utterances' in 1961, pp 233-252]. Typical examples of performatives include 'I pronounce you man and wife', 'I sentence you to five years hard labour', 'I name this ship Titanic'. In his later work he revised his view, and argued that constatives could be assimilated to performatives [Austin 1971]. Austin's approach opened up the analysis of meaning in terms of the idea of speech acts, and were later incorporated into Grice's intention based model for example by Searle and Strawson [Grice 1957; Searle 1965; Strawson 1964]. See below 'Intentional Theories' pp 213-217.

¹⁹ Searle 1965, 1970.

²⁰ Barthes 1967, 1985; Eco 1976, 1980. For example in the sense that artefacts denote their functions, and in the denotation of function in a given context can connote additional significances. See below, section 7.4 'Signification, Semiotics and Meaning'.

²¹ Clearly this will also have implications for cognitive theories where there is an assumption that the language of thought has the form of external languages, or where language is conceived as an expression of thought.

Truth-conditional Theories

The major thrust in recent work on meaning theory derives from attempts to articulate principles which are capable of underpinning a systematic approach to language structure, and the dominant line taken derives significantly from the work of Frege.²²

Frege's classic distinction between sense (Sinn) and reference (Bedeutung) separates and formalises two aspects of the meaning of expressions, in a parallel way to the relation between the intension and extension of terms. The extension of a term comprises the class of things identified by the term, whilst the intension consists in the criteria for membership of the class.²³ The related distinction between sense and reference can be demonstrated in terms of an often rehearsed example. The 'morning star' (Phosphorus) and the 'evening star' (Hesperus) familiar to the Greeks as two different objects, are both in fact the planet Venus. But although both expressions evidently refer to the same object (have the same reference), they cannot have the same sense since the determination of their identity is an empirical and not a logical matter.²⁴ In applying the sense/reference distinction to sentences, Frege concludes that the sense of a sentence is the proposition that it expresses,²⁵ whilst the reference of a sentence is a truth value.²⁶

Frege's approach strictly separates the formal semantics of a language from the mental processes of an individual, and lays the foundations for both model-theoretic and truth-conditional accounts of meaning, in the objective grounding provided for the reference relations of signs. Essentially the problem of investigating the nature of language becomes the problem of elucidating the logical form of language relations, and the underpinning for

²² Frege 1977.

²³ The extension of the term 'vixen' is the class of all vixens, whilst the intension of the term vixen is what qualifies a given candidate for membership of the class, for example, jointly possessing the properties of 'being a fox' and 'being female'. Synonymous expressions are termed 'intensionally equivalent' whilst expressions identifying the same class (or reference class) are termed 'extensionally equivalent'.

²⁴ Compare the two identity statements (i) 'the morning star is identical with the morning star' and (ii) 'the morning star is identical with the evening star'. Expressions can therefore be extensionally equivalent without being intensionally equivalent. Intensionally equivalent terms on the other hand must also be extensionally equivalent.

²⁵ The use of the idea of a 'proposition' is familiar in the context of distinguishing between declarative sentences as tokens in language and their substantive content, and as the objects of intentional acts. For example in the case of beliefs, whilst we could both believe that Julius Caesar was assassinated, we cannot have the same intentional act of belief. The identity consists in what we believe (which is expressed by the proposition 'that Julius Caesar was assassinated'), not in the act of belief. Similar considerations apply for example in respect of temporal changes in beliefs, or in contradictory attitudes to a given belief. The idea of propositional content in one sense therefore expresses objectivity and independence from acts of consciousness.

²⁶ This results from Frege's attempt to develop an extensional logic (which depends on the preservation of truth-value of a sentence where co-referential terms are substituted), based on the idea of treating sentences as complex names. The problems associated with this strategy are discussed by Quine under the general rubric of 'referential opacity' [Quine 1961 'Reference and Modality'].

this is to be found ultimately in their relation to 'truth'.²⁷ The classic development along these lines is exhibited in Davidson's work in truth-conditional semantics.²⁸ Davidson's proposals stem from some well accepted conditions regarding an adequate theory of meaning, including the need for the theory to be systematic and comprehensive, and to account for compositionality.

Model-theoretic semantic theories generally approach meaning via the intermediary of the set-theoretical concept of a 'model' consisting of entities and sets. Actual or possible worlds it is argued can in principle be placed in one-to-one correspondence with some such model, and symbols have meaning to the extent that they correspond to the elements and sets of the model. Meaning is thus construed objectively in terms of the relations that obtain between symbols and elements in models. In the extension of model-theoretic approaches to truth-conditional theories, these relations are underpinned by the concept of 'truth' which is applied as a criterion for the satisfaction of a mapping between statements in an object language and linked statements in a metalanguage.

The more general consequence of Frege's distinctions, was to highlight the idea that there are important differences in kind between theories of meaning, which in fact turn out to address different questions regarding meaning. The nature of such differences in kind can be broadly expressed in terms of the distinction between philosophical and psychological theories, or alternatively in terms of the distinction between what meaning consists in, and how it is achieved.²⁹ The denotative theories introduced earlier can in this light be seen to occupy a middle ground in which the relation is taken to mirror the process, which is also the source of the problems associated with such theories.³⁰ Model-theoretic and truth-conditional theories maintain the distinction, and approach the elucidation of meaning through an examination of the relations that obtain in possible formal languages (or calculi), and ultimately apply the results in the analysis of the constructions of natural language. They are silent in respect of the psychological or sociological processes involved in the production and understanding of natural language. In order to achieve a systematic account of compositionality, psychological and sociological factors are thus suppressed in favour of the logical relations obtaining between the elements of an objectified structure, and whilst philosophically the results are satisfying, for example in linking sense and reference with meaning and truth, they offer little in the way of explanation of a continuity with the subjectivity of mind and acts.

²⁷ Frege 1977; Wittgenstein 1961; Carnap 1969. The idea of truth in these theories is ultimately dependent on correspondence. The key development in truth conditional semantics lay in the assimilation of Tarski's recursive definition of truth [Tarski 1956]

²⁸ Davidson 1967; Platts 1979.

²⁹ For example '... a model theoretic semantics should specify what is computed in understanding a sentence, and psychological semantics how it is computed.' [Johnson Laird 1983 p167].

³⁰ See above pp 204-205.

Krippendorff is clearly opposed to objectification of this kind, which he takes to be the philosophical root of the methodological inadequacies of ergonomics and psychophysics, for example, as the basis of user modelling in the design process.³¹ His objection to the centrality of the concept of 'function' in design theory is made on the same basis, claiming that it represents the objectification of meaning relations in objects, established by designers independently from the cognitive contexts of user-interaction in which meanings are actually made.³² Nevertheless in seeking to establish links with the more general run of theories of meaning, he places his approach broadly in the arena of the later Wittgenstein and speech act theories.³³

The core of the idea linking these approaches is that it is more revealing to develop a semantics based in action rather than in an objectified relational structure. Language reveals itself in use, rather than in the abstracted calculi that can be used to describe it decontextually, or to put it more prosaically (and possibly also more counter-intuitively), the idea of 'what someone means by x' is more basic than 'what x means'. The idea that the use of language, systems of symbols or expressive devices is contained within the more general idea of action (doing something), is in some respects unexceptionable, but the priority given to one or other of the above articulations marks off a fundamental difference in the context chosen to pursue questions of meaning. Giving priority to 'what someone means by x' places language and meaning in the context of the kinds of 'doing' captured by the idea of communication, whereas giving priority to 'what x means' locates problems of meaning in the realm of the logic of the mapping relations obtaining between the elements of expressions in a language and their metalinguistic designations.³⁴ Product semantic accounts clearly favour the former.

Intentional Theories

In presenting the case for the context of communication as the arena for explicating meaning, Grice distinguishes between 'natural' and 'non-natural' meaning. The former

³¹ Krippendorff 1990 pp a 6-8.

³² Krippendorff 1989 pp 14-15.

³³ The specific debt to Wittgenstein is threefold. Firstly, the relation between meaning and use; secondly, the idea of continuity through 'family resemblance'; thirdly, the Wittgensteinian legacy to prototype theories of categorisation. [See above, section 5 'Categorisation and Cognition' p 139] His only explicit reference other than to the later Wittgenstein, is to Austin [Krippendorff 1989 p 28] However he also makes implicit use of the ideas taken from speech act theory generally (Grice and Searle) in his account of meaning in the 'operational context of use' and in the 'context of language' [Krippendorff 1989 passim].

³⁴ The latter can be construed in a number of distinct ways, which are ultimately connected, for example, in what is logically required to legitimate inferences. In the philosophical arena, the attempt to ground meaning and compositionality metalinguistically, through the mechanism of truth conditions, is typified by Davidson's approach, which ultimately dispenses with any formal notion of 'meaning'. [Davidson 1967] In a cognitive rather than a philosophical context, the approach is represented for example in the requirements for fulfilling the idea of a 'language of thought'. [Fodor 1975, 1987].

which might be typified by the idea that smoke means fire, captures that sense of 'means' where something is a symptom, natural sign or evidence for something else. This sense of meaning also applies to some of the contexts in which I might try to get you to believe something, for example, in arranging for you to find evidence that P is true (which may be distinct from my meaning 'that P'). The core of the idea of non-natural meaning relates to a difference in the evidential status of what is offered in communication - referring to the case where something is offered which is to be taken as being offered as meaning 'that P'. Meaning is a species of intending.³⁵

Roughly speaking, construing non-natural meaning in this way embeds it in the context of communication involving 'utterances' and 'audiences'.³⁶ If an utterer does something, thereby meaning that P, the utterer intends that some audience should come to believe P, the utterer intends the audience to be aware of the intention that they should come to believe P, and the utterer intends that the awareness of that intention forms part of the audiences' reason for believing P. The distinction made in Grice's formulation, turns on the intentionality of the context in which something is received. If I wipe my hand across my forehead, then this might be a natural symptom, a behavioural consequence of the fact that I am hot, which could be adduced as evidence that I am hot. Alternatively I can perform the action with the intention that it should be seen and interpreted as indicating that I am hot. The former involves 'natural' meaning, whilst the latter characterises 'non-natural' meaning.³⁷

This strategy shifts the search for an account of meaning into the psychological realm and more specifically into the sphere of intentionality, characterising communication in terms of the relations holding between speakers' and hearers' intentional states - for example between what x means, where meaning is a kind of intending, and what y believes. The grounds for a general account of meaning is to be found in what is needed to sustain the relation, and the argument is that the basis for this lies in giving logical priority to the idea of meaning inhering in a more general notion of action.

In broad terms, one of the results of approaching meaning in this way is to distinguish hearer's meaning from speaker's meaning, and both from 'the' meaning. In uttering the sentence 'the door is open' I may intend you to understand that I wish you to leave, but

³⁵ Grice 1957, 1968, 1969.

³⁶ The formulation although expressed in terms of 'utterers' and 'audiences' or 'speakers' and 'hearers' is not intended to be restricted to verbal expression but is to be understood as applying to behaviour generally, or by extension to the outcomes or products of behaviour.

³⁷ The basic formulation given here applies only to statements, but is extended by Grice to cover other forms, for example 'injunctions', where if U meant A to do X, then U acted with the intention that A should do X, that A should be aware of the intention that A should do X, and that A's awareness of the intention that A should do X, should be part of A's reason for doing X.

you might conceivably understand it to mean that there is nothing to prevent someone walking in on our conversation, and both my intention and your understanding are mediated by a factual state of affairs that is designated in my utterance and recognised by us both. The situation here exemplified in the form of a linguistic act is, as we have seen in the case of gestural communication, not restricted to linguistic utterances but might be performed using a variety of means, which could include products. The line taken by Krippendorff suggests that this is the approach that he accepts, and in the case of products, speakers meaning is roughly equivalent to the idea that a product is the 'utterance' of a designer, and distinct from hearers meaning which he equates with user understanding. Analysed in these terms the methodological problem for design, from a product semantic viewpoint is how to ensure that products articulate hearers meaning - how do we avoid a lack of correspondence between speakers meaning and hearers meaning. Since the objectified notion of 'the' meaning has no place in Krippendorff's analysis, the question arises as to what supports the possibility of a mapping between these aspects of meaning.

The development of Grice's theory, both by Grice and others, has taken the form of attempting to specify the particular kind of intending that constitutes meaning.³⁸ Grice's own formulation restricts meaning to things done intentionally in making an utterance, to those cases in which the action involved as the object of the intention is the result of an effect on a hearer, and achieved by revealing the intention to a hearer. However these conditions turn out to be insufficiently restrictive. This is particularly evident in the commonplace observation that utterances typically involve a cascade of intentions, for example, in the case of my informing you of something in order to get you to believe it. In cases such as this not all the intentions in the cascade specify the meaning of the utterance. If in uttering 'the rent man is at the front door' I intend to get you to realise that I want you to escape by the back door, and intend to get you to escape by the back door, then although Grice's conditions are fulfilled, the literal meaning of my utterance seems to be bypassed. At worst, it is my intentions that have been identified and not what I took my utterance to mean.

Disaggregating the layers of intention, one of my intentions is simply to inform you that the rent man is at the front door. Achieving this requires only that you understand what I say and recognise that in saying it, I am attempting to inform you. The success of the act consists only in your recognition of my intention to perform it. The remaining cascade of intentions associated with the utterance however, are not simply dependent on recognition of the act but also on other factors. I may intend you to believe that the rent man is at the front door, but your recognition of this intention is not sufficient for you to believe this to

³⁸ Strawson 1964; Alston 1964; Searle 1965, 1970.

be the case, since you know I am an inveterate liar. The distinction between 'basic' intentions that are fulfilled merely in respect of their recognition, and those that are further fulfilled in terms of 'basic' intentions and other factors are termed respectively 'illocutionary' and 'perlocutionary' acts and intentions.³⁹ The distinction is drawn into speech act theory in the claim that speaker's meaning is specified by the illocutionary intention rather than perlocutionary intentions.

Although this brings the idea of speaker's meaning, hearer's meaning and sentence meaning closer together, it does not yet provide a means of explaining meaning generally in terms of speakers meaning. Grice's sketch of an approach to this problem is to suggest that sentence meaning is explained in terms of the illocutionary intentions held in general by people when uttering tokens of a type, rather than directly in terms of the illocutionary intentions associated with a given token utterance. The relation between speakers meaning and sentence meaning is a matter of statistical regularity or convention, for example. Although the former may be an important factor in learning a language, it is the latter that provides some purchase on key features such as the creation of novel sentences. In speech act theory, conventions relating to sentence meaning take the form of specifications of those combinations of linguistic elements that are usable in revealing illocutionary intentions, and the meaning of a sentence thus consists in its 'conventional illocutionary act potential'.

However it has still proved possible to find counter-examples to this more restricted thesis, which suggest that speakers meaning is dependent not only on illocutionary intentions, but also on beliefs regarding the conventional sentence meaning of the utterance. If I intend to deceive someone who does not know Italian into believing that I am Italian, then I might deploy a random Italian sentence that I happen to be able to recite, with the intention that it be understood as saying that I am Italian, even though I know that it does not.⁴⁰ The sentence type does not in fact have the stated sentence meaning. But uttering the token sentence under the given intention should yield the speaker's meaning of the sentence, which it clearly does not. What this suggests, if the problem is generalised, is that meaning in the use of language depends not only on tapping into conventional illocutionary act potential, but also on beliefs about conventional sentence meaning. In other words, meaning generally cannot be explained in terms of speakers meaning, but depends in part on a separate and public characterisation of meaning.

³⁹ The distinction is due to Austin, and essentially makes the same point [Austin 1962]. The assimilation of Austin's distinction to Grice's theory of speech acts is primarily attributable to Searle [Searle 1970].

⁴⁰ The example is a simplified version of a similar example deployed by Searle [Searle 1965].

This is a very general problem for Intention Based Semantics, and one that has been most thoroughly explored in the program originally proposed by Schiffer.⁴¹ If we locate the problem in a general form and philosophically, then it takes the following shape. In using words, people perform propositional speech acts, which involves the idea that there are semantic facts such as the fact that words have meaning and reference. In order to account for the demonstrable linguistic ability to produce and understand an indefinitely large number of sentences in a natural language, we need to presuppose that languages have a compositional meaning theory - mechanisms that will systematically generate meanings for a potentially infinite number of sentences on the basis of applying the mechanisms to a finite vocabulary. The criterion that ensures the systematic nature of these mechanisms is their formal relation to 'truth'. An explanation of actual language ability and language processing requires reference to a formal account of compositionality in the form of a truth-theoretic compositional semantics, or the link between the formal structure and use of a language is broken. Nevertheless, there are psychological facts as well as semantic facts, for example those taking the form of intentional states, and these are expressed correctly in the relational theory of propositional attitudes.⁴² Semantic facts are reducible to psychological facts.⁴³ Psychological facts are not irreducibly psychological (propositional attitudes are not basic), but are, for example, states of the nervous system.

The link between the intentionality of speech acts and the systematic compositionality of linguistic elements was therefore to be achieved by the assimilation of truth-conditional semantics to a developed version of Neo-Gricean speech act theory, in the analysis of sentence or expression meaning. However, the proposed programme not only failed to yield an adequate account of expression meaning in these terms, but also provided strong grounds for supposing that a number of the commonly held contributory hypotheses could not themselves be sustained, to the extent that in his later work Schiffer has argued that there can be no theory of meaning.⁴⁴ The basis for this gloomy prognosis is complex, but in large measure turns on the difficulty of providing an adequate account of intentional states and propositional attitudes, and of reconciling these with a formal compositional semantics. The alternative may be to regard the term 'meaning' as a general and relatively coarse designation which serves the pragmatically important purpose of linking a number of distinct functions, which can themselves be separately defined, but for which there is in fact no common definition.⁴⁵

⁴¹ Schiffer 1972.

⁴² This can be expressed in the case of the intentional state 'believing' that it is a relation to things believed, to values of the variable 'y' in the schema 'x believes y', and applied to intentional states generally.

⁴³ The thrust of the Gricean and Neo-Gricean programme.

⁴⁴ Schiffer 1987.

⁴⁵ Putnam's idea that meaning is like a coarse net over language [Putnam 1978] or Davidson's elimination of meaning from a formal account of language in light of the deployment of truth and reference [Davidson 1967].

This analysis of meaning bears as much on the problem of object meaning as it does on linguistic meaning, particularly for an object meaning theory couched in terms of cognition and intentionality, as is the operational meaning theory at the core of product semantics. In the first place it should be noted that the key to Grice's theory lies in the fact that the situation of meaning in communication depends on recognition that it is such a situation - it is this that distinguishes it from indexicality. A condition for meaning is that something is taken to have been meant - a pile of stones by a path can be conceived to have a description and a causal history, but cannot be said to have a meaning unless its causal history is taken to involve intentionality (of man or god).⁴⁶ However, the situation is more complex than this, since I can for example impose my own intentionality on this pre-existing non-intentional object - I can recognise it on a second visit as a sign of where I should turn off.⁴⁷ This gives a sense of both the connectedness and independence of designer's meaning and user's meaning. Designer's meaning consists in the intended significance associated with products and their contents, whilst user's meaning consists in the intentionality invested in the object by the user. But although the latter is logically independent from the former, given an intentional context for meaning both are dependent on the recognition of an operative context of intentionality.

⁴⁶Note the parallel with the belief relativity of function. [See Section 3.3 'Artefact Function- An Analysis', pp 87-88 above].

⁴⁷The pile of stones may be intended to mark the path so that I can avoid straying from it, but this is logically independent from the individual investment that I make in it in terms of my own intentional uses.

7.2 Meaning and Cognition

The close relationship between intentionality and meaning evident in speech act theory and associated approaches to language and symbolisation, raises both philosophical and psychological questions which converge on the notion of 'representation'. In so far as intentionality is conceived in terms of propositional attitudes (belief, desire etc) and their contents (that which is believed, desired etc), then intentional content is generally equated with representational content. This gives rise to two distinct but related questions - What is representation ? What sorts of things are/can be representations?

The latter question which is central to psychology, has prompted four fundamental kinds of answer.⁴⁸ The first is that just as things in the world are individuated and have identity to the extent that they consist in matter which is particularised by form, so representations are constituted in matter of some kind which is particularised by the same forms. In the case of mental representation an idea of a large ball, is one that is 'in-form-ed' by the properties largeness and roundness, just as the matter of the ball is 'in-form-ed' by largeness and roundness. Representation is therefore founded on shared properties. The second kind of answer - representations are images (mental representations are mental images) - is based on the same principle, but without the Aristotelian apparatus of 'causes'.⁴⁹ One problem with such approaches is that the relation of similarity that they depend on is not perspicuous - is an image or representation large and round in the same sense as the ball is large and round. At the very least, the notion of similarity of properties seems to need an element of conventionality subsisting in the relationship between the properties of some thing and the properties of representations, for this to make any sense.

The third approach formalises this intuition in asserting that representations are symbolic, and do not depend on relations of resemblance or similarity. The prevalent position in respect of mental representation is of this kind, holding that symbols are computable data structures, where semantic content is equatable with computable content (as represented in the Computational Theory of Mind, for example). The principal alternative also holds that mental representations are symbolic, but denies that these are equivalent to data structures, preferring a distributed model which aligns symbolisation with some state of the system as a whole (Connectionism). The fourth approach asserts that mental representations are indeed states of the system - they are neurophysiological states - and mental representation is a biological phenomenon which cannot ultimately be identified at a level more abstract than neurophysiology.

⁴⁸ The summary in this paragraph employs the categories for kinds of representations developed by Cummins in his overview [Cummins 1989, pp 2-7].

⁴⁹ This is essentially the theory espoused by Berkely and Hume [Berkely 1710; Hume1739].

The related philosophical question - what is representation - has also yielded four fundamental kinds of answer. The first is that representation is grounded in similarity (as exemplified in the first two kinds of answer noted above). The second is that the representation relation is essentially causal or the subject of covariation. In the case of a motion detector and representations of motion, for example, establishing that something is a motion detector depends on systematic covariance between some thing or activity in the world and characteristic activity states of the system. A representation is a characteristic activity state that is covariationally associated with kinds of events in the world. The third kind of approach builds on this, but generalises it in the light of the fact that characteristic activity states are difficult to pin to particular states of the world. Logically, a large number of things could be identified as covarying with a given system state, but the significant covariance is that which is involved in the adaptational development of characteristic system states. Representation is therefore grounded in adaptational role.⁵⁰ Whilst this approach makes sense in a biological context, there may be no in-principle reason for assuming that representation is restricted to such contexts. The fourth approach opens out the idea, by grounding representation in functional rather than adaptational roles.

The connection between these approaches to representation and the forms of signification found in semiotics can be brought out by considering the kinds of sign relation in Peirce's scheme, and their use in Vihma's characterisation of semantics. Relations that are based on similarity are Iconic; those based on causality or covariation are Indexical; those based on conventional association are Symbolic.⁵¹

Product semantics rests on an intentional scheme for meaning, which has implications for associated theories of mind and cognition. In its most simply stated form it shares the principal features of both folk psychology and the mainstream of cognitive psychology. Meaning-making is an active cognitive process embedded in the intentionality of agents, whose products are meanings. Meanings are mental constructs - the contents of intentional states (the objects of propositional attitudes). Intentional states are psychological states and their objects are mental contents. Intentional states and their contents are necessary in causally explaining the behaviour of agents. This position is roughly equivalent to what has been termed the 'Intentional Theory of Mind' (ITM).⁵²

⁵⁰ Also referred to as 'teleological semantics' [See above pp 125-126].

⁵¹ Approaching signification via the idea of mental representation sheds some light on the complex substructure of Peirce's scheme. It will be seen for example that Adaptational Role is not a purely indexical representational relation, since although it depends on covariation, there is no necessary relation between the thing represented and the particular form taken by the representing medium. Peirce's scheme is articulated in terms of the logically possible combinations of differences in kinds of relation, kinds of medium and kinds of interpretation.

⁵² Goel 1995.

The principal distinction between such a view and the current model underpinning a variety of approaches in cognitive science is made in respect of the propositional attitudes. Traditionally, the propositional attitudes are conceived as a limited set of psychological states that can be attributed to agents and which can be directed towards an infinite number of propositional contents (which constitute the representational content of such states). However, in the detailed development of accounts of visual perception for example, it has become clear that intermediate stages in processing may give rise to the idea of representational contents that are properties of the perceptual system rather than the organism as a whole. They are cognitively inaccessible to the organism, but are identifiable and defeasible representations having reference. The upshot is that whilst such processes have representational content, and the fact of content forms an essential part of the explanation of behaviour, such content cannot be the object of a propositional attitude. Given that this is the case, the parsimonious methodological move is to question the necessity of propositional attitudes in any explanation of behaviour. It is this move, in which propositional attitudes are abandoned but the idea of content retained, that characterises the 'Representational Theory of Mind' (RTM).⁵³

It will be clear that whilst product semantic accounts of meaning are congruent with the broad position corresponding to the Intentional Theory of Mind, they make no specific commitment to unpacking intentionality in terms of the propositional attitudes and their contents in the form that characterises the Representational Theory of Mind. On the other hand, given that they accept and use the idea of the cognitive construction of meaning and regard the constructs as representational, and employ an analogue to Intention Based Semantics in characterising the nature of meaning relations, some such commitment is nonetheless implicit. The nature and extent of that commitment is a complex issue which will be addressed in due course, having taken into consideration the less formal aspects and contexts for meaning which bear on the product semantic account.

⁵³ This is taken up and developed in the concluding sections. [Non-conceptual content and its implications for cognitive accounts are addressed in Section 11.4 'Semantic Theory and Cognition']. The general question of the commitments implied by various forms of the Intentional Theory of Mind and the Representational Theory of Mind are analysed in detail by Goel, particularly in relation to the dominant computational model in cognitive science, which he regards as 'the only game in town' (although he does briefly entertain the idea of connectionist approaches). The principal distinction in kinds of modern cognitive theories are represented in Fodor's 'language of thought' hypothesis, which accepts the general apparatus of folk psychological explanation and seeks for an account of symbolic processing in terms of a language-like structure of the mind, articulated as syntactic operations [Fodor 1975, 1983, 1987]. This is contrasted with Newell's 'physical symbol system' which equates semantic properties with the representational capacities of physically instantiated systems as functions of symbolic computation. [Newell 1980, 1990; Newell and Simon 1972]. Goel argues that Newell's account is incorrect in assuming that reference and content are the same in physical symbol systems and human beings (where there is a first person point of view), but rejects Fodor's account since it does not offer an explanation of semantic properties, but only an explanation of the capacity of syntactic structure to support semantic compositionality. Goel's proposal involves trading in the first person elements for third person assignability, so that contents are assigned to computational states underpinned by a non-arbitrary causal interpretation. Ultimately, Goel argues that even with this modification, computational accounts are insufficient to capture the experiential richness of cognition [Goel 1995].

7.3 Objects and Meaning

Product Semantics asserts that products are engaged as having meaning. Meaning is held not to be restricted to the semantics of natural and artificial languages, but is rather an inherent aspect of the nature of our engagement with the world, and equivalent to our capacity to achieve understanding through the full range of ways in which we can construe, and give sense to the contents of that world.

Assertions of this kind can themselves be construed in a number of ways, each raising problems regarding the nature of meaning and its continuity with related terms such as 'significance', 'sense' and 'understanding' and yielding different perspectives on the applicability of the term 'meaning' to products. Perhaps some idea of what might be involved here can be gained by examining examples of ways in which we apply and withhold the application of terms. In the case of meaning, for example, we would presumably have no problem with the idea that words or sentences have meanings. In contrast we might be less inclined to say that pebbles encountered on a beach have meanings, although we can imagine contexts in which the presumption of meaning seems less odd - for example, if the pebbles form a pattern, or if in a Blake-like mood I conclude that every pebble on Chesil Beach is somehow essential to it, and that every particle of creation has some meaning in the grand scheme of things. But whilst it might be true to say that every particle has a place or a significance in the whole, the idea that every particle has 'a meaning' seems somewhat strained. Perhaps the source of this discomfort lies in the form of the ascription, which is partly brought out in the contrast between the questions,

What is the meaning of 'a pebble' ?

What is the meaning of a pebble ?

which in the first case gives us a fairly clear idea of the sort of answer that would be appropriate - seeking a definition of a linguistic sign in terms perhaps of the truth conditions for its correct application, or its reference and extension, but which in the second case leaves us wondering just what kind of answer would serve. A word has a meaning in the sense that it is possible to conceive of a normative definitional sense of 'the' meaning of the word, whereas in the case of an object we are left either with the idea that we need an account of some sort which explains its role in the grand scheme of things, or an account which explains why an object of this kind might have a particular meaning for a particular person.

Inevitably the distinctions here are not cut and dried. Although words have meanings in dictionaries, their meanings are not exhausted by normative contexts such as these, and

although the socio-cultural contexts of word use provide a wide range of alternative normative constraints, in the case of words as with objects we are inclined to acknowledge that there are individual differences. A particular word may resonate for me, may hold a particular meaning for me, which you do not share even though we can both use it appropriately and co-extensively in the contexts which normalise its use. Similarly, objects tend to participate in a normative folk-science which gives public sense to their roles, in addition to the individual associations that they engender. Perhaps 'meaning' in the two cases is not so far apart, in spite of the apparent disparity in the appropriateness of ascriptions.

One way of interpreting the similarity whilst acknowledging the difference would be to note that both aspects of meaning have something to do with being able to place things in a context. In the case of word meaning, we understand the word by understanding its role or by being sensitive to its use in the language. In the case of the object we understand it by understanding its place in the scheme of things or knowing how to behave in relation to it. The individual resonances in both cases, then occupy a space contiguous with this normative contextualisation, representing the collection of associations that each of us make with the word or the object. Although there is some apparent truth to this, the limitations of the account can be brought out by considering further examples. One approach would be to look at what might be meant in the two cases by sameness and difference in meaning.

In the case of two words, sameness of meaning would be articulated in terms of the various criteria that could be applied, depending on the thrust of one's semantic theory. Two words might be thought to have the same meaning, for example, if they have the same reference or extension, or two sentences if they have the same matrix of truth conditions. Alternatively one could define sameness as indistinguishability in contexts of use. Two objects, on the other hand would not naturally be thought to be interchangeable in meaning simply as a consequence of interchangeability in their various contexts of use, or formal equivalence as types, since objects are individuals with distinct and consequential histories.⁵⁴ Ultimately however, these distinctions can be collapsed in one direction or the other. Both are subject to an arguable parity in respect of type-token relations; both may be the subject of an argument in favour of in-principle relativity as a result of the distinction between semantics and pragmatics, or their equivalents; both may be judged indeterminate. Perhaps then the relativity that results in part from the shift of context between public and private domains, needs to be addressed at a different level of detail if the distinctions apparent in the ways that we talk in the two cases of meaning ascription are to be brought out.

⁵⁴ See above, wedding ring example p 198.

One approach to doing this would be to follow the product semantics intuition, if not the detailed rubric, and to look for an account of meaning initially in terms of understanding. In relation to the question posed above, things would be said to have the same meaning if they are understood in the same way.⁵⁵ Although this formulation is ambiguous at least in the sense that 'the same way' might conceivably be understood as meaning something like 'from the same perspectives' or alternatively 'in exactly the same terms', the former interpretation will clearly not distinguish sameness of meaning. Let us assume then that equivalence of meaning implies that the two items under consideration are 'understood in exactly the same terms'. The implication appears to be that whatever criteria are chosen for the expression of understanding, then equivalence of meaning will represent the case where the two items being compared are understood as meeting the same standards for the criteria that are both applicable and applied. Does this get us anywhere? In one sense we have simply replaced the problem of sameness of meaning with the apparently no less intractable problem of sameness in understanding. On the other hand we may now be in a position to motivate an in-principle distinction between word meaning and object meaning in terms of the different criteria that are appropriate in respect of different contexts of understanding.

Whilst meaning, to this point, has equivocated in interpretation between public and private contexts, curiously understanding may not be subject to the same equivocation. What does it mean to show that something has been understood - what are our criteria for determining understanding? In the case of a word, we may be said to understand it if certain conditions are met. Such conditions are essentially public - we can show that we know how to use the word, we can give an account, however crude, of what distinguishes it from other words, we may even be able to define it. In the case of a sentence we will be able to use it in appropriate contexts in achieving desired ends such as describing, asserting, asking, ordering and so on; in hearing a sentence we will be able to respond appropriately both verbally and behaviourally. We will in short be able to show that we understand, in what we do and how we react. In addition, it is clear that in contrast to meaning, we can in the case of understanding situate the interpretation squarely in a public context, for although understanding does involve an indispensable individual component, our measures of understanding are public, and demonstrable through the ability to marshal appropriate responses and behaviours, whatever cognitive mechanisms and private contortions are involved in achieving it. The equally important corollary is that 'understanding' is a graded concept, (in that you may well be seen to understand something better than I can), and open ended in the sense that our understanding can never be said to be complete.

⁵⁵ Diffey takes a parallel approach to an analysis of meaning in works of art [Diffey 1988]

These latter distinctions are not apparent in the case of meaning. The idiom of 'being able to mean something to some extent' is not one that is usually articulated. Which although not constituting any sort of demonstration that degrees of meaning are impossible, does perhaps indicate that our concept of meaning tends to be underpinned by a determinate sense. In the case of words, this is embodied in the idea of dictionary meaning, and of translation, for example. In the case of sentence meaning, it is captured in the idea of the compositionality of language and its relation to derived meaning through syntactical relations. Beyond this, both are rooted in the need for the relative continuity of reference and a relative stability in extension, for the public use of language. The result is in some senses paradoxical, in that a relatively determinate and public concept has become the focus for indeterminacy and privacy, whilst an apparently relativistic and individually oriented concept turns out to have determinate public criteria for its application. Why should this be the case ?

The answer is, I think, partly the result of the separation of philosophical from psychological concepts in analysis, and partly the result of the dominance of a particular model of language and its relation to the world. Although the idea of the continuity of language as a whole system and the consequent relativity of its components has been the most active force in recent philosophical analysis, the folk-philosophical view which perhaps captures the concept of language and meaning in use, continues to be more consonant with the 'picture' model of language typified by Wittgenstein's early work. The general notion of the relation between language and the world remains one of a mapping relation, which is specifically underpinned by the notion of ostension. Nouns are names of things. The first steps in language are pointing and attaching labels, and we rely implicitly on the idea that the labels will not come unstuck. Adjectives are properties, bits of description in the form of lists that become attached to our objects and to our labels - if the label gets detached from the object, we now have a fair chance of being able to match them up again, even though some things on the lists will change. Verbs are what happens to things, or what one thing does to another, the results of which either add to or change the lists of attached descriptions. And so on.

For this model system to work, certain kinds of determinacy seem to be essential, and in the case of meaning, which represents that general aspect of language which constitutes the link with the world, (even though we acknowledge that the meanings of some words will change), we rely on the idea that underneath all the complexity, the majority of naming relations will hold. Meanings are essentially particular mappings, in which the words are understood by systematic reference to states of the world. The framework of such a semantics are reference and truth, and in such a system sense and understanding are not necessary to the logic, and consigned to the realm of the psychological.

If we return to object meaning, given this semantic background, we immediately encounter the root problem in applying the concept. Meaning is on this account some form of systematic relation between language and the world which relies on reference and is defined in terms of truth. Language is a system of assertions or propositions susceptible to the application of truth conditions, in which it is possible to reformulate or translate assertions or propositions in such a way that a residual identity is preserved in the transformation. Meaning is that collection of things that constitute the residual identity that is preserved. Objects are neither assertions nor propositions, and therefore not potential bearers of truth conditions, and in the context of the truth-functional semantics that formally holds such a system together, cannot appropriately be said to have meaning.

The plausibility of the idea of object meaning in continuity with that of linguistic meaning stems on the one hand from the rejection of truth-functional semantics and the 'picture' model of language in favour of structuralist and relativistic conceptions of language, and on the other from a conflation of different senses of the word 'meaning' and its derivatives. The development of alternative language models and their influence on the idea of a 'language of objects' and 'object meaning' will be discussed below.⁵⁶ For the present we will follow the initial train of argument of this section, in teasing out further aspects of the application of meaning related terms.

Meaningful and Meaningless

One source of confusion in the application of meaning terms stems from assumptions regarding the sense that can be given to the idea of meaningfulness and meaninglessness and related locutions. In the first place we appear to make distinctions in language use regarding the contexts in which we would say that something 'has a meaning' or alternatively that something 'is meaningful'. Whilst we normally assume and can state that words and sentences have meanings, it is clear that this is not equivalent to saying that they are meaningful, the latter tending to be reserved in language for occasions where a word or sentence is regarded as being particularly apt. Neither is the use of the word meaningful restricted to language, being regularly if sparingly applied in characterising actions and works of art, for example, in cases where we would not say that they had a meaning in the same sense as a word or sentence.

A similar point can be made in respect of the relationship between 'meaningful' and 'meaningless', which turn out not to be simple contradictories. If something being meaningful is roughly captured by the idea that we are able to understand or find sense in it, then its contradictory - the inability to understand or find sense in it - is best expressed

⁵⁶ See below, sections 7.4 - 7.6.

in terms of its 'not being meaningful'. Meaninglessness on the other hand is a distinct and composite concept, indicating on the one hand that the thing in question falls outside the category of meaning, and on the other that things that do fall under the category of meaning but which do not in fact satisfy the criteria for that category. The first might be represented by an example such as 'star patterns are meaningless', where one is asserting that they are not the sorts of things that can have meanings. The second by an ungrammatical sentence such as 'the slowly and transistor reddened tree' which although apparently participating in language and engendering an expectation of meaning, does not deliver. Once again though, the distinctions are not sharp, but the differences point back to the ideas of understanding and sense. In contradistinction to the idea of a relatively fixed set of meanings attached to the terms of a language, these examples tend towards the idea of making and seeking meaning as activities which we engage in, or processes that we can engage, and which essentially consist in identifying and articulating contexts for understanding. In product semantic terms, this is equivalent to locating the contexts in which things make sense for us. Unwrapping the idea of making sense in a slightly different way, one could say that we seek grounds for an interpretation in the form of an ability to situate the thing in question in a context where a contextual search can comfortably (or uncomfortably) end. In the case of the ungrammatical example offered above, for example, we might recognise it as having the general form of a descriptive statement in language, and in the light of its character assign it to the category of a fragment of poetry and construct an interpretation which is satisfying enough for us to pass on. Alternatively we might simply conclude that it is a failed or botched sentence, although in most cases the desire to attach significance to even the most unpromising candidates will tend to prolong the search.

The example perhaps also points to a further feature of the search for significance. If we contrast the above botched/poetic sentence with a more normal sentential encounter such as 'the tree slowly reddened', then we can more readily engage a scenario in which the sentence and the idea fit, in that we are accustomed to the experience of autumnal colour. Nevertheless this sentence is not entirely typical of the class of autumnal descriptions and gives an alternative context for interpretation on the basis of a parallel with 'he slowly reddened' with its connotations of either embarrassment or anger. A more entrenched example might be exemplified by a sentence of the form 'the tree slowly turned red in the succeeding weeks'. In this case the provision of a time scale in which to read 'slowly' and an alternative expression for the idea of change, provides a context in which the sentence can be immediately understood in terms of the experience of most people in cultures with temperate climates. This immediacy of engagement could be expressed in another way, by saying that this form of expression is relatively more transparent - it requires less of an effort to comprehend the sentence. The former sentences in not

providing sufficient contextual or grammatical cues engendered a less transparent relation and one which either required the consideration of a greater number of possible alternative interpretations, or which were so opaque as to require the construction of elaborate artificial scenarios to provide a context of fit.

There are however two distinct kinds of fit involved here. On the one hand there is the sort of fit which is to do with the inherent acceptability or congeniality of the sentence itself as an example of sentences in language - does it fit the pattern of what we think of as normal and proper sorts of sentences (syntactic fit). On the other there is the sort of fitting which is concerned with the fragmentary picture engendered by the sentence, which we attempt to match into the pattern of larger world pictures - a process of mutual adjustment in which we re-shape the implied content of the sentence as we select and manipulate the contexts in which it might conceivably find a place (semantic fit).⁵⁷ The more transparent the sentence in both senses of 'fit', the less likely it will be that we will involve ourselves in an extended search for interpretations.

On the face of it, there does seem to be a parallel in the case of objects. Our interaction with things does seem to have the same pattern in terms of transparency and opacity. Things of a certain kind will be presumed to have sets of associated characteristics which are expected to cohere in particular ways. Where the patterns of things conform to our sense of what is proper to things or contexts of that kind, we are unlikely to engage in an extended search, but we will rather accept the transparency of the interpretation. On the other hand, where the patterns of things are unusual or unfamiliar, we may well engage in the search for an interpretation. However, the characteristics of the process of fitting and the nature of the search are in fact different in the case of objects. In the first place it is not evident that two distinct forms of fitting are at work. It is difficult to give sense to the idea of the syntactic coherence of an object in compositional terms, which is independent from the process of its semantic contextualisation in our real and imagined worlds. The upshot is that although games of mutual adjustment do take place they differ in content.

Significance

The root of the difference lies in the distinction to be made between something 'having a meaning' and our 'finding a meaning' in something. Although there is a sense in the idea that I can find a meaning in your posture which suggests disdain, we would not normally move from this to locutions such as 'your posture means disdain', although we might well say that your posture is disdainful, implying that we interpret your posture as one expressing disdain. Similarly we might describe a chair as 'comfortable looking' in that it

⁵⁷ See section 8.3 'Metaphor', below pp 275-284.

seems to us to give expression to the idea of comfort, and not move from this to the idea that the look of the chair 'means' comfort. The difference can perhaps be expressed in terms of the distinction between meaning and significance, where meaning is interpreted in an undefined sense as a property of a sign or a sign complex (a sign can 'have a meaning'), and where significance represents that which someone finds in 'finding a meaning' in something. The implication and the connection between these two expressions of meaning contexts, is that if meaning is that which can be directly associated with signs (or sign complexes such as sentences), significance is that which can be extracted from things which are treated as though they were signs.

In linguistic contexts, the relationship between meaning and significance is disjoint but dependent. It can be argued, for example, that in order for a sentence to have significance it must first have meaning. If I receive a message, then in order for it to have significance for me, it is necessary that I understand the sentence that constitutes the message. This is not to say that the meaning of the sentence is equivalent to its significance, on the contrary it may be a distinct construal that I make in relation to its meaning. Suppose for example that the message reads 'tomorrow's meeting is off' where the meaning of the sentence is clear. The significance of the sentence may go far beyond the meaning inherent in simply understanding its form of words. Its significance for me might be, for example, that the huge and lucrative deal that I had hoped to conclude, has ended in failure. Significance depends on meaning or the presumption of meaning.

In the case of objects it is not clear that the same relationship holds. In product semantic terms the basic relation with objects is the significant relation. Significance obtains when the object can be successfully located in some context. Meaning is a construction arising out of significance, consisting in the network or totality of significances associated with a given object. The different approaches taken in product semantic accounts, rest largely on whether the focus for a given account lies in the cognitive nature of contextual fit (the psychology of processes of signification), or the nature of significance itself (the logical and epistemological relations obtaining in signification).⁵⁸ The primary context for the latter is found in the semiotic approach to product semantics introduced earlier, which will now be given further consideration.

⁵⁸ The former represented for example in Krippendorff, and the latter in Vihma.

7.4 Signification, Semiotics and Meaning

Semiotics and Semiology are the terms used to describe the systematic study of signs, signification and signifying systems. The terms are derived respectively from the work of the two thinkers who are commonly regarded as the instigators if not the founders of the discipline,⁵⁹ and are now generally used interchangeably.⁶⁰ The classic definition is drawn from Saussure :-

‘ A science that studies the life of signs within society is conceivable; it would be part of social psychology and consequently of general psychology; I shall call it semiology (from the Greek semeion ‘sign’). Semiology would show what constitutes signs, what laws govern them. Since the science does not yet exist, no one can say what it would be; but it has a right to existence, a place staked out in advance. Linguistics is only a part of the general science of semiology; the laws discovered by semiology will be applicable to linguistics, and the latter will circumscribe a well-defined area within the mass of anthropological facts’.⁶¹

Given the context for semiology provided by Saussure’s definition, it is perhaps not surprising that the idea of the ‘sign’ is conceptually embedded in the intentional context of communication between people and constitutes the core communicative device. Although language was regarded as only one of a plurality of semiological systems of expression and communication, it was identified as having a privileged role, providing a pattern for semiology generally. At the time that Saussure delivered his course in general linguistics, the discipline was defined by the two long standing traditions of etymology and comparative grammar. The contribution that Saussure made to the subsequent radical reorientation of the discipline and to the development of structuralist approaches generally, might be summarised in terms of four key ideas drawn from his lectures.

Firstly, language is a social system which is coherent, orderly and susceptible to understanding and explanation as a whole. The possibility of individual expression depends on the use of, or participation in, the rule structure constituted by semantics and syntax taken together.

Secondly, this interaction between the individual and the rule structure is constitutive of a distinction between the institution of language ‘langue’ (that collection of linguistic habits and apparatus that allows someone to understand and be understood) and ‘parole’ (particular acts of linguistic expression). Langue and Parole together constitute language.

⁵⁹ Charles Sanders Peirce and Ferdinand de Saussure.

⁶⁰ A distinction between the use of the terms has been maintained by some writers, for example Kristeva who argues that semiotics is primarily concerned with the analysis of the signifier whilst semiology is primarily concerned with the analysis of the signified [Kristeva 1969.]

⁶¹ Ferdinand de Saussure 1976 p 16.

Thirdly, the 'sign' is defined as the union of a form which signifies, 'the signifier' and an idea or concept evoked, 'the signified'. The relationship between the signifier and the signified is an arbitrary one, in that the signifier is not related in any analogical sense to the signified, and thus there is no intrinsic link exhibited by individual signs. In addition, in the context of a particular language, there is no necessary or given partitioning of either the system of signifiers or the continuum of signifieds - each language partitions the world into concepts and categories in different ways.⁶²

Fourthly, the key principle in the structure of language is that it is a system which is essentially one of contrasts, distinctions and oppositions. The elements of a language do not exist in isolation but only in their interrelation. Given that the relations are mutual and simultaneously interdependent, structure is synchronic rather than diachronic.⁶³

The appeal of semiology for product design theorists against this background is clear, since it provides a prospective theoretical context for the formal location of the pervasive idea of a language of objects which is not apparently constrained to linguistic notions, is socially grounded, and synchronic.

Peirce's distinctive contribution stemmed from a philosophical concern with the nature and role of symbols in scientific research and in thought generally. His definition of 'sign' is more abstract than that of Saussure in that in some respects its formulation suppresses the intentional implications of the idea of expression or communication between individuals in favour of an emphasis on the logical relations that obtain in systems of signs or symbols. His general definition nevertheless is that a sign is 'something which stands to somebody for something in some respects or capacity' - expressed as a set of relations. The sign participates in a triadic process of meaning-making 'semeiosis', through its interaction with an 'object' a 'ground' and an 'interpretant'. The object is that for which a sign stands, the ground is the respect in which a sign stands for an object, while the interpretant is the mental/conceptual relation perceived to hold between sign and object in a process of semeiosis.^{64,65}

⁶²This idea parallels Wittgenstein's notion that a language constitutes and is constituted by a 'way of life' - grounding in the shared practice of a community which is ultimately formally unjustifiable (there is no logically expressible preference for one partitioning of the world over another, but only the reality of a lived practice, which though not arbitrary is not necessary [Wittgenstein 1972]).

⁶³The radical interpretation of this thesis in the philosophy of mind and cognitive science leads to forms of 'holism' and 'connectionism' respectively. [See Section 10.2 'Conceptual Re-orientation'].

⁶⁴Peirce *CP*, Vol 2, para 228-303

⁶⁵The nature of the interpretant in Peirce's triadic relation has been the subject of contention since it has been argued that it refers to some interpretation of the conception of a sign and its relation to its object, rather than the interpreter of the sign. Questions then arise as to the status of the 'real' in the scheme, since Peirce appears to be equivocal as to the possibility of a direct (unmediated) experience of reality or whether reality can only be experienced via representations whose signification has been established by some form of social consensus. The arguments are reviewed by Silverman [Silverman1983].

Whereas Saussure pinned the nature of semiological method to unpacking the synchronic relations holding between the elements of language - an incipient structuralist program, Peirce was concerned to place the activity of semeiosis in a diachronic and explicitly teleological framework.⁶⁶

The logical structure of the triadic relation is located within a framework in which the classification of signs is regarded as the elaboration of the different relations between signifier and signified,⁶⁷ and equated with the foundations of logic. Logic in Peirce's view exists independently of reasoning and fact, and its fundamental principles are constituted by the definitions and divisions that are derived from a consideration of the nature and function of signs.⁶⁸ Logic can be seen as

‘...the science of the general necessary laws of signs’.⁶⁹

The basic triadic structure of the sign is elaborated into a classification of sign types through the trichotomous division of signs in terms of ‘relations of performance’, ‘relations of comparison’ and ‘relations of thought’. The most familiar of these is the division in terms of relations of performance. There are three fundamental kinds of sign defined by such relations in respect of the type of ground constituting the relation between sign and object. These are ‘icons’, ‘indices’ and ‘symbols’. An icon or iconic sign functions as a sign by means of the relation of resemblance or similarity that obtains between sign and object. An index or indexical sign is characterised by the real relation that obtains between the sign and its object - it functions as a sign through a causal or existential link between sign and object. A symbol or symbolic sign is characterised by the fact that the relation between sign and object is a matter of linguistic convention - it functions as a sign through the conventional links established between sign and object.⁷⁰

The second trichotomy (relations of comparison) is concerned with the logical possibilities inherent in the sign type itself, yielding a division into ‘qualisigns’,

⁶⁶ The nature of this framework which has been analysed, for example by Shapiro and by Short, is based on the implications drawn by Peirce from the processes involved in the triadic sign relation namely ‘sign action’ and ‘sign interpretation’. It is argued that these processes are inherently goal directed and that Peirce equates the operation of the triadic relation with ‘final causation’. [Shapiro 1991; Short 1981, 1981b.] Thus although Saussure's scheme stems from the fundamental intentionality of communication as a process, his scheme is essentially structuralist, Peirce's scheme which is essentially concerned with the structure of sign relations as the foundation of logic is grounded teleologically.

⁶⁷ Signans and Signatum in Peirce's scheme.

⁶⁸ Peirce *CP*, vol 3, para 149.

⁶⁹ Peirce *CP*, vol 2, para 227.

⁷⁰ Examples of Icons include diagrams, pictures and models which are isomorphic to their referents; Indices are typically causally connected events such as the relation between smoke and fire, or a footprint in the sand; Symbols are arbitrary or conventional connections that must be actively made by an interpretant, such as the conventional relation between the nouns in a language and their referents (‘chair’ refers to chairs), or a flag on a map which stands for an infantry division.

'sinsigns' and 'legisigns'. The qualisign is a quality which can act as a sign once it is embodied. The sinsign is an actual thing or event which acts as a sign. The legisign is a type or law that acts as a sign (and which can therefore be the subject of infinite replication in processes of semeiosis).⁷¹

The third trichotomy (relations of thought) is based on the different kinds of object that can participate in a triadic relation, yielding a division into 'rhemes', 'dicents' and 'arguments'. The rheme is a sign which indicates the understood possibility of an object to the interpretant, should he have the occasion to activate or invoke it. The dicent is a sign which conveys information about its object (as opposed to a sign from which information may be derived. The argument is a sign whose object is ultimately not a single thing but a type or law.⁷²

Possible combinations of these nine types of sign yield ten complex classes of sign expressed in the form of triads, for example 'dicent-indexical-legisign'.⁷³ These ten classes in turn, through combination, give rise to sixty-six more complex classes of sign.⁷⁴

Peirce's basic premiss is that anything that can be isolated, connected with something else and interpreted (related by some ground) will function as a sign. The complexity of the system results from the successive application of distinctions of type, but essentially it creates a range of differentia which identify the distinct ways in which signification occurs.⁷⁵ Its importance in relation to Product Semantics stems from the recognition of the various kinds of association to objects that constitutes the basis of significance in the

⁷¹ The distinctions here are essentially concerned with differences in the ontological status of kinds of sign where Qualisigns designate qualities or properties as signs (such as 'redness' or 'roundness'), Sinsigns designate individuals or particulars as signs (single objects and events generally) and Legisigns are abstractions from objects and events, for example in the form of types rather than tokens, or rules and law-like generalisations rather than particular events.

⁷² The distinctions here concern differences in the ontological status of the object in its relation to the sign, and include the idea of inferring a possible object - the Rheme (or seme); inferring properties of the object - the Dicent (or dicisign, or pheme); and inferring relations, rules and logical form - the Argument.

⁷³ For example - a 'dicent-indexical-sinsign' (an event which acts singly as a sign, conveys information about its object, through a causal relation between sign and object) for example, a weathervane; a 'rhematic-indexical-sinsign' (an event which acts singly as a sign, which indicates the understood possibility of an object, through a causal relation between sign and object) for example, a spontaneous cry of pain; a 'dicent-symbol-legisign' (a type or law that acts as a sign, which conveys information about its object, through an established set of conventions between sign and object) for example, a proposition.

⁷⁴ Although these are important in Peirce's approach to the systematisation of logic, they are not necessary to a consideration of our present concern with semiotics. Eco has provided a useful review and critique [Eco 1976].

⁷⁵ The generality of the basic premiss nevertheless allows it to capture the philosophically crucial area of epistemology - the nature of knowing, itself. Peirce argues that the framework for the existence of knowledge stems from the assertion of propositions through relations of performance (icon, index, symbol) and it is this basic trichotomy that has consequently been given most attention in the literature, and which has been most influential in the development of semiotics and philosophy generally.

object-user relationship.⁷⁶ Although Peirce's contribution to logic and signification is now receiving greater attention, particularly in relation to the formal unpacking of the logic of inference in design,⁷⁷ it has generally been neglected in the current of structuralist thought that has tended to accompany and underpin the development of semiotic analysis. This is typified in the influential contribution made by Levi-Strauss, working from the field of anthropology. In an attempt to clarify the methods of anthropological analysis, and to extend such analysis beyond comparative descriptive studies, Levi-Strauss sought the systematisation of the common underlying features that could be seen to hold for distinctive sets of relations in the organisation, patterns of behaviour and belief systems of social groups, which he found in a structuralist approach.

The influences in such work, particularly from the field of structuralist linguistics are apparent.⁷⁸ Sapir for example, believed that language was underpinned by an inherent structuring principle, as was evident in phonetics in the observed fact that the difference between two sounds only becomes meaningful when it coincides with the phonemic pattern of language. The structure of a language influences and constrains the nature of our possible perception, and ultimately possible cognition.⁷⁹ Whorf similarly argues for the cultural relativity of language and the dominance of the structure of a language over 'reality' in the occlusion of possibilities in our conceptual relation with the world.⁸⁰ The upshot of these ideas are expressed by Sapir in the following way :-

'Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society, It is quite an illusion to imagine that one adjusts to reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection. The fact of the matter is that the 'real world' is to a large extent built up on the language habits of the group.....We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation'.⁸¹

In the extension of the principles characterising linguistic structure into other areas of social life, these authors concluded that the form of culture itself was structured along similar lines. The same point is made by Levi-Strauss who raises the question :-

⁷⁶ The various and distinct interpreted qualities and properties of products can be analysed in terms of the relations of performance. Vihma, for example, uses these as the basis for the application of semantic analysis [Vihma 1995 pp 93-101].

⁷⁷ March 1976; Roozenburg 1993.

⁷⁸ Sapir 1921,1949; Whorf 1956.

⁷⁹ Sapir 1921

⁸⁰ Whorf 1956. An influential account and assessment of the contribution of both Whorf and Sapir in this field has been provided by Steiner [Steiner 1975].

⁸¹ Sapir 1949, p 162.

'..whether the different aspects of social life (including even art and religion) cannot only be studied by the methods of, and with the help of concepts similar to those employed in linguistics, but also whether they do not constitute phenomena whose inmost nature is the same as that of language'.⁸²

The analysis of kinship systems and myth as expounded by Levi-Strauss is consonant with a further feature of linguistic structure identified by Saussure - the distinction between 'associative' ('vertical' or later 'paradigmatic') relations and 'syntagmatic' ('horizontal' relations). Paradigmatic relations operate at all levels of linguistic structure and are essentially concerned with substitutability and choice of elements of a language. At the level of the alphabet there is a notional equivalence between elements (individual letters) which can be chosen and combined together to form syntagmatic relations in words. Similar relations of substitutability and similarity hold at the level of words, which may be chosen and combined together to form syntagmatic relations in the form of sentences. The importance of this for the extension of semiotics into areas beyond linguistics, particularly products and architecture, is clear in the work of Barthes and Eco.

Barthes, for example, has argued that any act involving choice in a cultural context - such as buying and wearing clothes, choosing a meal or designing a car - is an act of signification involving syntagmatic and paradigmatic relations, in so far as there exists some system comprehending the elements of choice and thus creating the possibility of social meaning.⁸³ All manifestations of social activity can be regarded as constituting languages in a formal sense, and their regularities can be reduced to the same set of abstract rules that define and govern what we normally think of as language.⁸⁴ The word 'code' is used by Barthes to refer to all types of such socially grounded systems of communication. An example of the elaborated systematisation of such a code has been provided by Barthes in relation to fashion and fashion language.⁸⁵

The principal point that needs to be addressed in respect of such analyses is rooted in their interpretation of the concept of language and the role of 'meaning'. Essentially they trade on the notion of a substantial parallelism between the language of objects and natural languages, a commerce which is underwritten by the claims of semiology to have captured the essence of language and meaning in the operations of signification. The problem is that it is by no means clear that the parallel is a substantial one, or that the essential features of language are represented in signification even though some such process may indeed be necessary for language.

⁸² Levi-Strauss 1963.

⁸³ Barthes 1967.

⁸⁴ Clearly not everyone takes this view. See below, pp 236-238.

⁸⁵ Barthes 1985.

To take the first point first. To what extent can the metaphor of a 'language of objects' be given substance? The problem in dealing with this question is that there is clearly no univocal answer to the more fundamental question of what constitutes language. In semiological terms human social phenomena generally, including spoken and written languages, objects and social systems are assimilated in the context of a general theory of significance, and it is this conception of the generalisability of 'meaning' that underpins the approach. Every facet of human activity is conceived as potentially expressive and indicative of mental states including beliefs, intentions, thoughts and feelings.⁸⁶ The various forms of expression are then conceived as having a structure which is characteristic of language generally, and exhibited most clearly in the natural languages.

Typically the key structural relations of a language are held to be the syntagmatic and paradigmatic relations between its elements.⁸⁷ Paradigmatic relations are those concerned with systematic similarity and interchangeability of elements, and thus related for example to the criteria for category membership.⁸⁸ Syntagmatic relations, on the other hand are those that constitute structure in establishing acceptable patterns of elements, and these are held to be constitutive of meaning within the system.⁸⁹ Understanding language consists in being able to recognise which substitutions of elements are acceptable in preserving a systematic pattern. In the context of the social system relating to food, for example, a restaurant menu exemplifies the syntagm in the order of elements of a meal - entree, main course, dessert; whilst the paradigmatic element consists in the various choices that can be made for each of these elements.⁹⁰ The conclusion in a semiotic approach to product semantics, would be that there is a similar systematic order in the language of products, and one in which meaning is similarly constituted in the categorial framework of paradigmatic choice and the syntagmatic relations between syntactical categories.⁹¹

⁸⁶ In many cases these internal states are not recognised by their subjects, but may be 'discovered' in the course of analysis. The shape of the enterprise is given in such observations, in that there is an underlying assumption regarding the pervasive existence of such states, and a range of methods which can be applied in revealing them.

⁸⁷ See above p 31. [Saussure 1959; Barthes 1967; Eco 1976].

⁸⁸ Note the basis for comparison between categorisation and paradigmatic relations in terms of interchangeability, or substitution.

⁸⁹ A sentence in a spoken language for example, consists of a system of 'syntagms' (classes of terms whose substitution leaves the system acceptable) [Barthes, 1967, in 1984, p121-148]. Thus in 'Hilary climbed Everest' the class of substitution instances for Hilary would include Tensing, Edward Heath and the Abominable Snowman, since the resulting structures would be acceptable ones (the truth, likelihood or empirical possibility, not being relevant). Similarly the class of substitution instances for 'climbed', might include 'vaulted', or 'levelled'. The question of how one defines acceptability in formal terms remains open.

⁹⁰ Barthes 1967 p 125. It is worth noting that although in principle any choice might be made independently for each of the elements (choosing an entree, then choosing a main course), some syntagms may be more socially acceptable than others - some entrees might be seen to more appropriately precede a given main course than others. This may also be the case in language generally and may form part of what constitutes recognisable 'styles'.

⁹¹ Examples from design and architecture include Summerson 1963; Prak 1968; Jencks 1969, 1973, 1980; Bonta 1979, 1980; Eco 1973, 1980; Preziosi 1979, 1979b; Broadbent et al 1980; Scalvini 1975, 1980.

The question is whether structures of this kind are sufficient to characterise language. The short answer would appear to be no, and for the reason that the key feature of natural languages and the source of their most important properties lies in the links between syntax and semantics. The systematic substitutability of elements within syntactical categories is not sufficient, because it does not in itself carry any inferential import, any warrant for the grounding of acceptability.⁹² This is evident if the examples provided by Barthes are pushed to their logical conclusion. Although the individual items constituting a given meal might have a connotative 'meaning', and the meal as a whole might similarly have a connotative 'meaning', the meaning of the whole is not systematically related to the meaning of the parts.⁹³ In philosophical terms the crucial element relative to language which underpins the structure and creates the possibility of systematic meaning relations is the existence of a metalinguistic criterion of acceptability. The consensus is that such a criterion is provided by the operation of the concept of truth. The logical structure of syntagms is such that the relations between the parts and the whole are truth preserving.⁹⁴ The force of a metalinguistic criterion of this kind is that it guides the acceptability of logical relations between the parts of a language, by providing a principled mechanism for the definition of constructive moves that are systematically consequential, and in short underpins grammar. The possibility of meaning in natural languages is created by the relation between syntax and semantics, and without some metalinguistic criterion of acceptability that has systematic force in structuring a grammar in the sphere of products, there can strictly speaking be no 'language' of design.⁹⁵

The above argument rests on a particular conception of language and meaning which emphasises systematicity and compositionality, and which deals with these at the level of the formal relations that obtain between linguistic elements. Although this represents the prevailing stance in semantic theory, it is possible to take the view that the language-like features of natural languages do not derive from a compositional semantics, but can equally well be expressed in terms of syntactic compositionality on the one hand, or in terms of larger scale contextual structures on the other, both operating through an underlying mechanism such as 'signification'.

⁹² See for example Scruton's critique of the application of semiotics and the language analogy to architecture and design [Scruton 1979, particularly pp158-174].

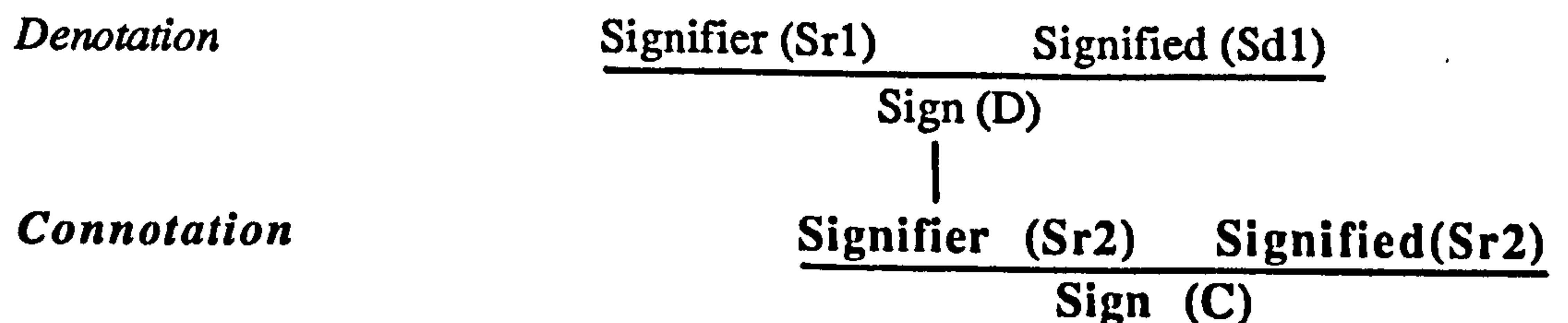
⁹³ Prawn cocktails might have the connotative meaning (from the perspective of a particular subcultural group) of 'sophisticated choice of hors d'oeuvre', and 'passee and kitschy' (from the perspective of another group). Both groups might agree that medallions of beef constitute a 'respectable if unadventurous' main course. In the context of the syntagm of the meal, what are we to conclude are the implications of these conjunctions relative to the connotation of the whole.

⁹⁴ See 'Truth Conditional Theories' pp 211-213 above.

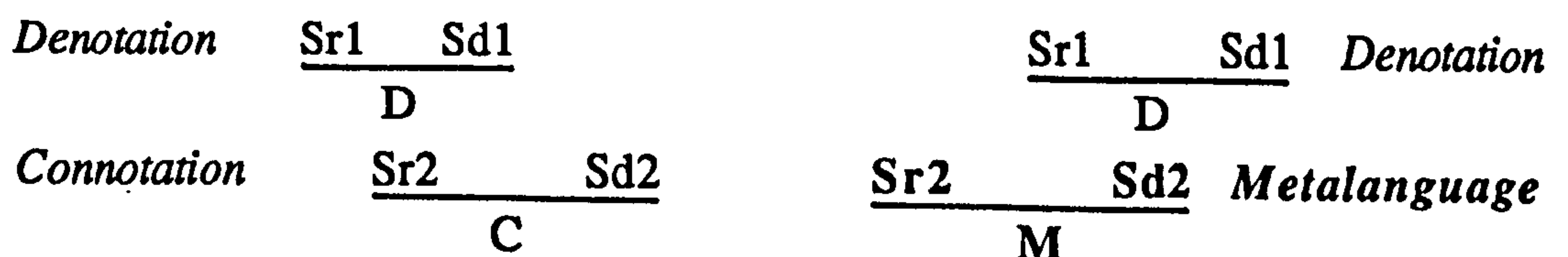
⁹⁵ Or of architecture, social relations, gestures (unless these are parasitic on natural language. Semiology may provide a basis for significance, but in itself it cannot (other than metaphorically) constitute the basis of languages in these spheres of activity.

If this is the case then object meaning could be viewed as contiguous with linguistic meaning, on the basis that the latter is not qualitatively distinct but simply has a far more extensive and complex network of social relations providing the rule structures constraining the arbitrariness of semantic interpretation.

In the case of mainstream semiotics, signification, which is the basis of meaning, rests on the construction of signs through the association of systems of signifiers with systems of signifieds. A sign is a relation made possible by the existence of contexts of signification, and which in turn can create further contexts and layerings of signification. This feature is of particular importance in relation to products in the light of the interpretations given to extra-linguistic significance and meaning. The fundamental relation consists in a denotational or referential relation, a simple example of which would include the use of a word to refer to a thing in the world. The sign constructed from the signifier (word) and signified (thing), can itself become the signifier in a further relation. The word 'lion' (sound pattern or inscription) is a syntactically well formed character of spoken or written English associated with a kind of thing in the world - lion. The association of the sound pattern or inscription with the thing constitutes the sign. That association can in turn be used as a signifier, for example in relation to a manifest general quality such as courage. The word 'lion' denotes lion, whilst the sign connotes courage. The pattern is therefore⁹⁶



Clearly given such a structure, further permutations can be constructed, the most significant of which are as follows⁹⁷



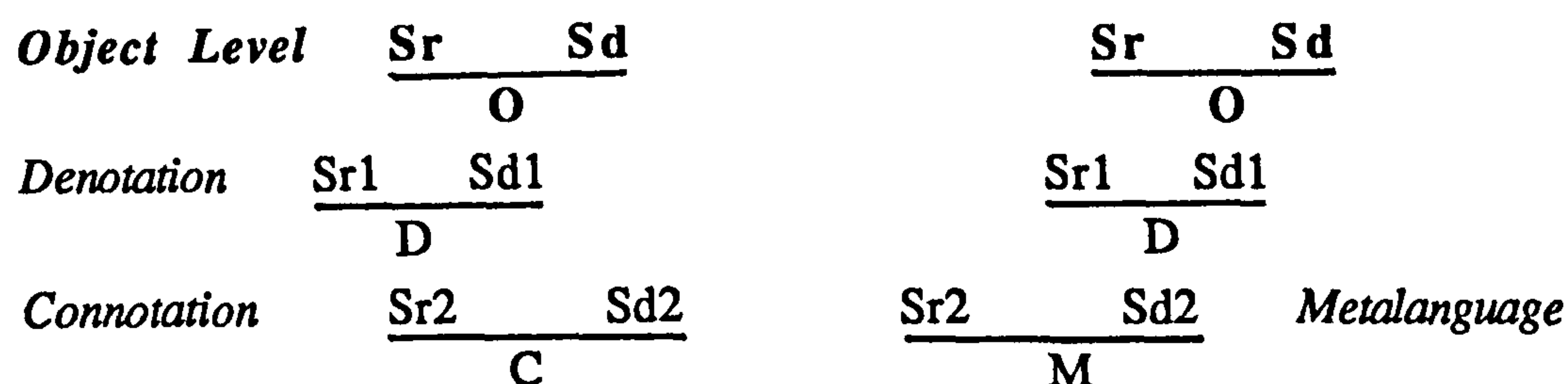
Whereas in the case of connotation signs act as signifiers in extended relations with more remote and more abstract signifieds, the parallel case where signs become the signifieds

⁹⁶ Using the general notational form adopted by Barthes. [Barthes 1967, 1985].

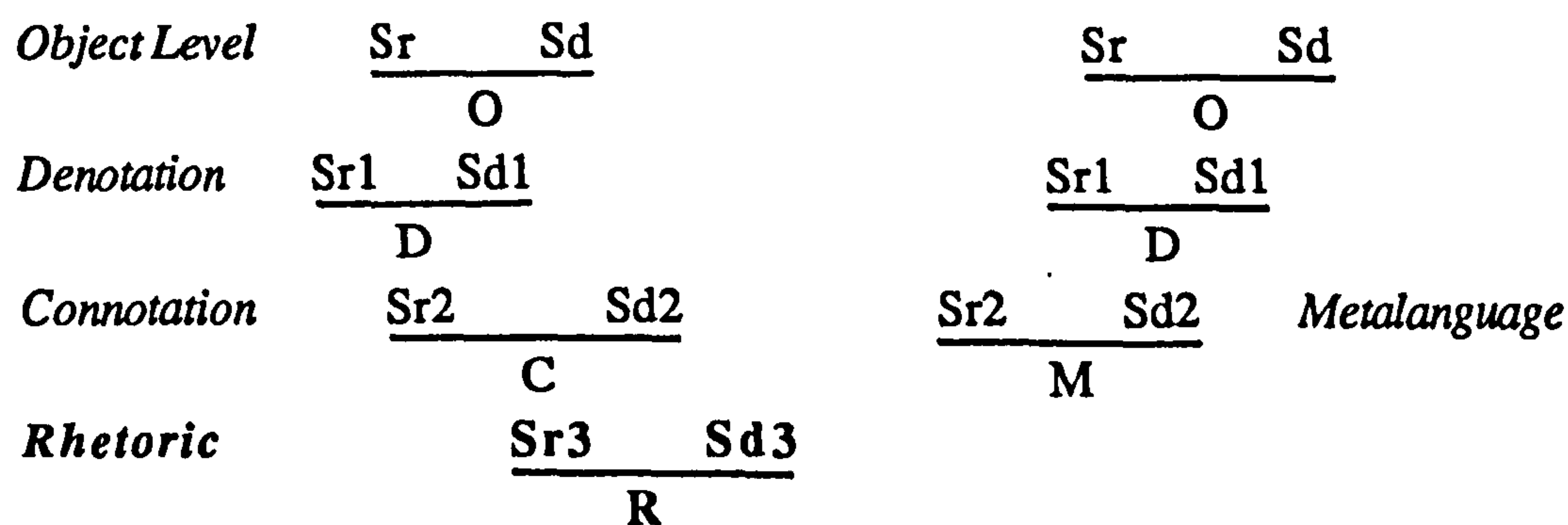
⁹⁷ The series is in-principle infinite, although in practice only two further layers are taken to correspond to intuitively recognisable categories. See below pp 239-240.

for new signifiers yields metalanguages and metalinguistic structures generally.⁹⁸

In extending the idea of signification to objects, the reluctance of many product semantic theorists to accept denotation or reference as the basis for a semiotic analysis becomes clear. Whilst the primary function of signifiers in the operation of codes or languages may well be referential, the idea does not transpose easily to product meaning. Products have purposes, identity and content which are central to the conception of their meaning, but the operation of these is not overtly referential at a basic level. On the other hand product semantic accounts recognise that product meaning is embedded in linguistic and other contexts. One way of expressing this in terms of the layered structure of signification is to acknowledge that denotation operates at the level of language and codes, but operates on a separately identifiable relation at the object level that is not denotational :-



Similarly, at the level of higher order structures the connotations of products as expressed through codes and languages, form a system of relations that are relatively autonomous and constitute a rhetorical representation of the world :-



The layered structure of signification derived from semiotics appears to have strong parallels with the 'contexts' for significance and meaning in product semantic schemes. The ordering of contexts from a basic object level (use), through linguistic levels

⁹⁸ In both cases a sign (signifier/signified relation) becomes a signifier or a signified in a higher level sign. It is important to note that although the diagrams map individual signs, semiotics conceives the elements of signs (signifiers and signifieds) as each constituting a system of interdefining networks. The 'meaning' of an individual sign or element consists in its location in the network.

(language) to the broadly autonomous level of product interaction (ecology) and the autopoietic level, maps to the connotative line in the layered scheme of signification.⁹⁹ But although this is the case, the fundamental problem for a product semantic account articulated in terms of semiotics rests with the centrality of the idea of reference and its interpretation in terms of denotation.

To some extent this problem is mitigated in Peirce's scheme, which is essentially concerned with establishing the logically possible bases on which different kinds of thing can form significant associations, and the different ways in which such associations can be formed.¹⁰⁰ The problem with Peirce's philosophical and categorial approach, in the current context, is that whilst it lends itself to the programmatic analysis of individual sign relations it sheds less light on the systematic nature of signifying systems. The most common approach to applying the scheme systematically rests on the distinctions made in terms of the triad of 'relations of performance' (Icon, Index, Symbol) and the association of these with the characteristics of sensory modes (Visual, Auditory, Tactile, etc), and the involvement of external media, rather than directly in terms of the additional triads of Peirce's scheme. Hawkes, for example, summarises some aspects of this :-

'Auditory signs are essentially different in character from visual signs. The first use time, not space, as a major structuring agent. The second use space rather than time. Auditory, 'temporal' signs tend to be symbolic in character : visual, 'spatial' signs tend to be iconic in character. The former signs, fully elaborated, yield in terms of art the major forms of spoken language and music. The latter, visual and spatial signs, yield the art forms of painting, sculpture, architecture etc. And of course, beyond these broad generalisations, there are forms of art which combine both : drama, opera, film, television, etc.

The signs may be produced either *organically*, by the body, or *instrumentally*, by means of a technological extension of the body. Language is the most 'pure' organic semiotic system. Every aspect of it signifies, and it is produced solely by means of the body. When the 'extension' of the body, which we call a *medium*, causes one organic factor to become dominant over the others (the telephone has this effect on the voice : silent film had the same effect on bodily gesture) then it will inevitably affect the nature of the discourse. That is, the medium will begin to affect the message. When this takes extreme form, we find ourselves confronted, not with a medium that simply transmits a pre-packaged message, but with an *autonomous* semiotic system, with a 'life' - that is, with messages - of its own.¹⁰¹

⁹⁹ The middle term of the product semantic contextual account (genesis) is not matched in the more general semiotic scheme. This is unsurprising given that product semantics is concerned specifically with products rather than the more general case of 'objects'. The context of 'genesis' can be interpreted as spanning the levels of the semiotic scheme.

¹⁰⁰ See above pp 231-234. In Peirce, the basic idea of reference ('standing for') is essentially denotational, but the nature of particular relations is unpacked in terms of different relational mechanisms (eg similarity in the case of icons, causality or co-relation in the case of indices, convention in the case of symbols).

¹⁰¹ Hawkes 1977, p 135.

Although the intersection of these various facets of signification is illuminating in a number of respects,¹⁰² the problem of their application is also clear. Since there is no identifiable set of principles motivating their use across cases, the structure is post-hoc, conforming to rather than providing an analytic structure for the consideration of differences in referential kinds.

The principal alternative approach to the problem of reference in the case of object-level significance and meaning, is simply to accept that objects are denotational as signifiers, in that they denote their functions.¹⁰³ The problem with this approach is that it assumes an objectified relation between form and function, even if such a relation is not taken to be direct but mediated by social codes. For a western businessman confronted with the polished aluminium, buttons and lit numbers comprising the interface of a lift, the image might well denote its utilitarian function, and the meaning connote technological sophistication. For a 'primitive man' the image might be taken to denote a mausoleum and connote the sacred.¹⁰⁴ In one sense this juxtaposition is unproblematic - denoted function is relativised to the social codes available to each of the individuals, and each constructs meanings from the materials to hand in terms of the different contextualising frames they can bring to bear. On the other hand interpreting denotation in this way severs its connection with the sense of denotation used in linguistic codes. It would be as if I could take a word from a foreign language, not knowing its meaning, and employ it as material for signification in terms of the conventions of my own language. But whilst in this latter case there is little temptation to construe the individual process of meaning-making as parallel to understanding, in the former case this is the interpretation that is most often made. In the case of product semantics the position is retrieved not by directly addressing the problem of reference but rather by the substitution of affordance for function, which can better tolerate the consequences of relativism. Nevertheless the juxtaposition of 'what it is for' against 'what I can do with it' will not easily go away.

Although the layered structure of signification is in many respects congruent with the product semantic contexts for meaning-making, the residual problem is the lack of an account of signifying relations which does not depend on the linguistic sense of denotation. In order to pursue the possibility of a non-denotational or an extended (non-linguistic) denotational analysis of such relations, some further consideration of signification is necessary in the context of an alternative approach to the characterisation of symbol systems, which is embedded in an intentional framework.¹⁰⁵

¹⁰² Particularly in respect of the bodily basis for distinctions in sign character; the conception of media as instrumental extensions; and the elaboration of media as the basis for autopoiesis.

¹⁰³ This is essentially the stance taken by Eco.

¹⁰⁴ The example is taken from Eco 1968 [English translation in Broadbent et al 1980 pp 21-22].

¹⁰⁵ An appropriate context, given the underlying commitment to an intentional scheme in product semantics.

7.5 Symbol Systems and Exemplification

The relationship between intentionality, meaning and signification can be approached via symbolisation. Intentionality is that property of some mental states that captures their 'aboutness' - the fact that I can believe or desire, and the fact that my belief is about something and my desire is for something. It has therefore two essential components, a psychological state or 'attitude' (believing), and an object or content (that which is believed), whose structure might be depicted as A(r). In the relationship between mental states and the world, each of these has a distinct role in relation to the idea of 'fit'. The type of state or attitude A (believing or desiring) determines the direction of fit.¹⁰⁶ In the case of belief if there is a lack of 'fit' then the belief must change to achieve fit; in the case of desire the world must change to achieve fit. The content (r) on the other hand captures the conditions of fit for a particular instantiated state. In the case of belief for example, such conditions might be expressed generally and systematically in terms of truth.

Signification and representation are taken to be dependent on the structure of (r).¹⁰⁷ For something to signify, it is normally assumed that certain conditions must hold. In the context of semiotics this is embodied in the idea of significant difference in both signifiers and signifieds - for signification to work there must be discriminable partitioning of both realms. Generalising, we might say that if signification is taken to be a system of relations then these relations hold between a syntactic ordering and a denotational ordering. The syntactic ordering consists of a set of tokens differentiated as types, as does the denotational ordering. The relation between them is one of compliance between a syntactic and a denotational ordering.

Differences between representational or signifying systems can be expressed in terms of the conditions on orderings that are either met or not met in a given case. In Goodman's analysis of possible structures for (r) for example the conditions take the form of two syntactic criteria and three semantic criteria, which are further differentiated with respect to the formal properties of density and repleteness.¹⁰⁸ The syntactic criteria if met, jointly ensure that there is no ambiguity between tokens and their related types. The criterion of 'disjointness' expresses the equivalence of all tokens belonging to a type, and thus that no token belongs to more than one type. The criterion of 'finite differentiability' expresses the possibility of logically exhausting the availability of types and therefore the possibility of mapping tokens to types. A system meeting both criteria is determinate in the sense that

¹⁰⁶ Searle 1983.

¹⁰⁷ This is clearly debatable, particularly in the case of meaning as understood in product semantics, since the meaning of something could be taken to depend not only on content per se but rather on the type of state in which the content is embodied.

¹⁰⁸ Goodman 1976.

types as sets of equivalent tokens are non-intersecting and non-inclusive, and tokens can always be matched to a type. Parallel criteria can be applied in the case of denotational orderings, and these form two of the semantic criteria differentiating systems. The third semantic criterion, 'unambiguity' applies to the relation between orderings and which if met ensures that there is a systematic and consistent mapping between them.

On the basis of these criteria, Goodman distinguishes between three major classes of symbolising or signifying systems - notational systems, discursive languages and non-notational systems. Notational systems are those that meet all the syntactic and semantic criteria and are exemplified by telephone numbers, postcodes and some types of musical score. Discursive languages meet the syntactic criteria but not the semantic criteria, and include natural languages and the logical calculus. Non-notational systems meet none of the criteria, and range across examples such as painting, drawing, barographs and seismographs.

Further differentiation (particularly in the case of non-notational systems) can be achieved by considering two further properties of symbol systems - their density and repleteness. A scheme is dense if it has in principle an infinite number of characters (in the sense that between any two characters there could be a third) or if the same principle can be applied to the denotational ordering.¹⁰⁹ The non-notational systems mentioned above are all dense in this sense.¹¹⁰ Repleteness refers to the degree to which the range of features of a syntactic type are relevant to its application as a type. In the case of a line graph for example, the only features relevant are the mapping of co-ordinates of points by the line, whereas in the case of a life drawing virtually every characteristic of the drawn line might be syntactically relevant.

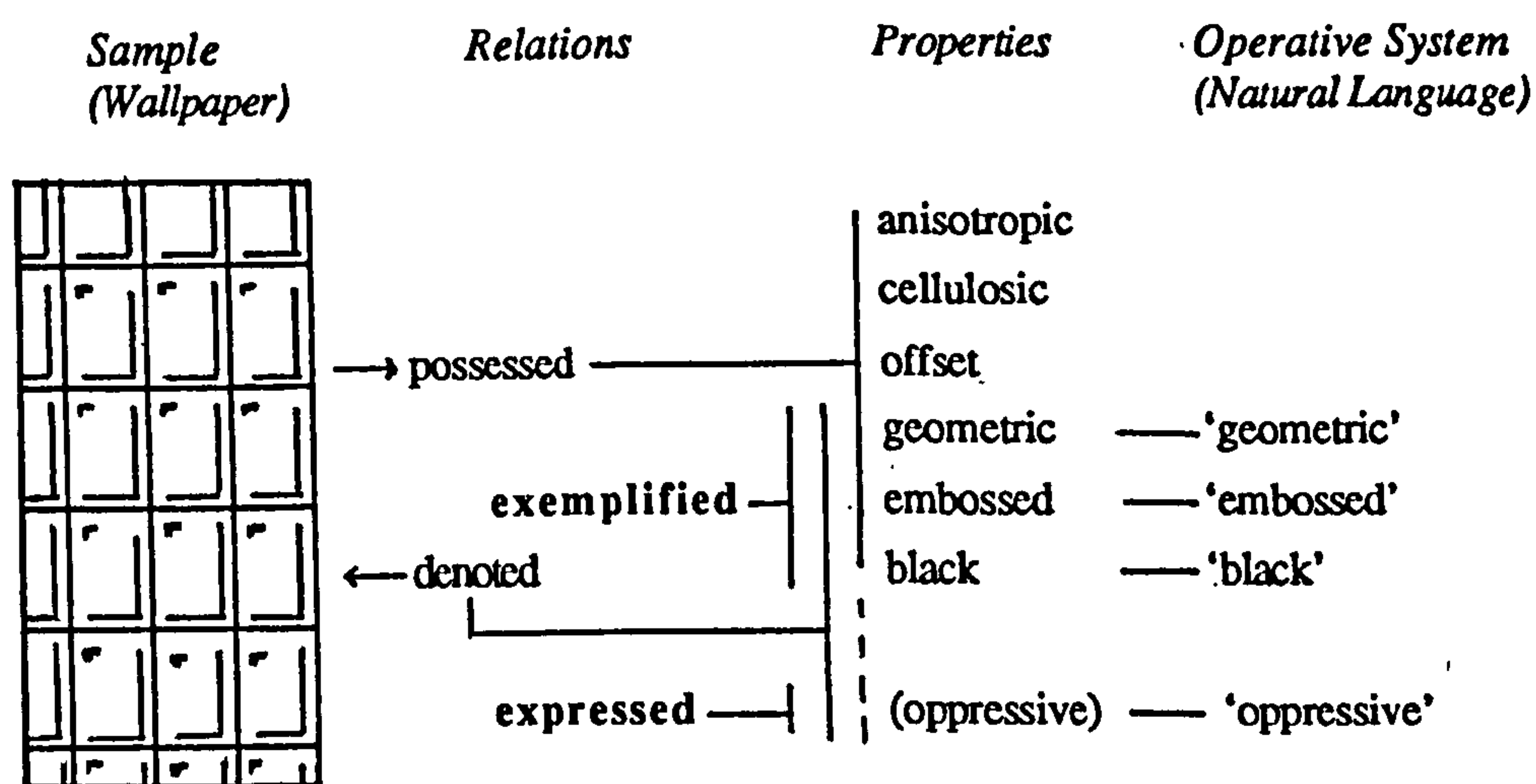
In the case of the overtly referential systems considered and analysed by Goodman, signification consists in the relation between a syntactic scheme composed of tokens classified into types and a parallel partitioning of the world, expressed in terms of compliance classes. The actual languages, codes and notational systems that we use occur as distinct places on a continuum of kinds of signification articulated in terms of definable criteria. Significance consists in the possibility of finding a compliance class relative to the criteria met by a given system on this continuum. Meaning consists in the denotational scope of a syntactic type in the relevant compliance classes of such a system.

¹⁰⁹ For example, analog rather than digital. Compare with Dretske, whose special senses of 'analog' and 'digital' are used to demarcate different orders of information encapsulation as the basis for a semantic theory of information and the nature of mental states [Dretske 1981].

¹¹⁰ Dense non-notational schemes can be roughly equated with pictorial symbol systems. Non-dense schemes are less easy to associate with instantiated categories but would include a case where all tokens fall into one of two types, and these are correlated with a denotational ordering comprising two classes.

Given the formal apparatus using criteria for notationality to distinguish between kinds of signifying systems, Goodman's key move is to open up the idea of reference. Whereas in most theories denotation constitutes the only relation underlying reference, Goodman introduces the additional ideas of 'exemplification' and 'expression'.

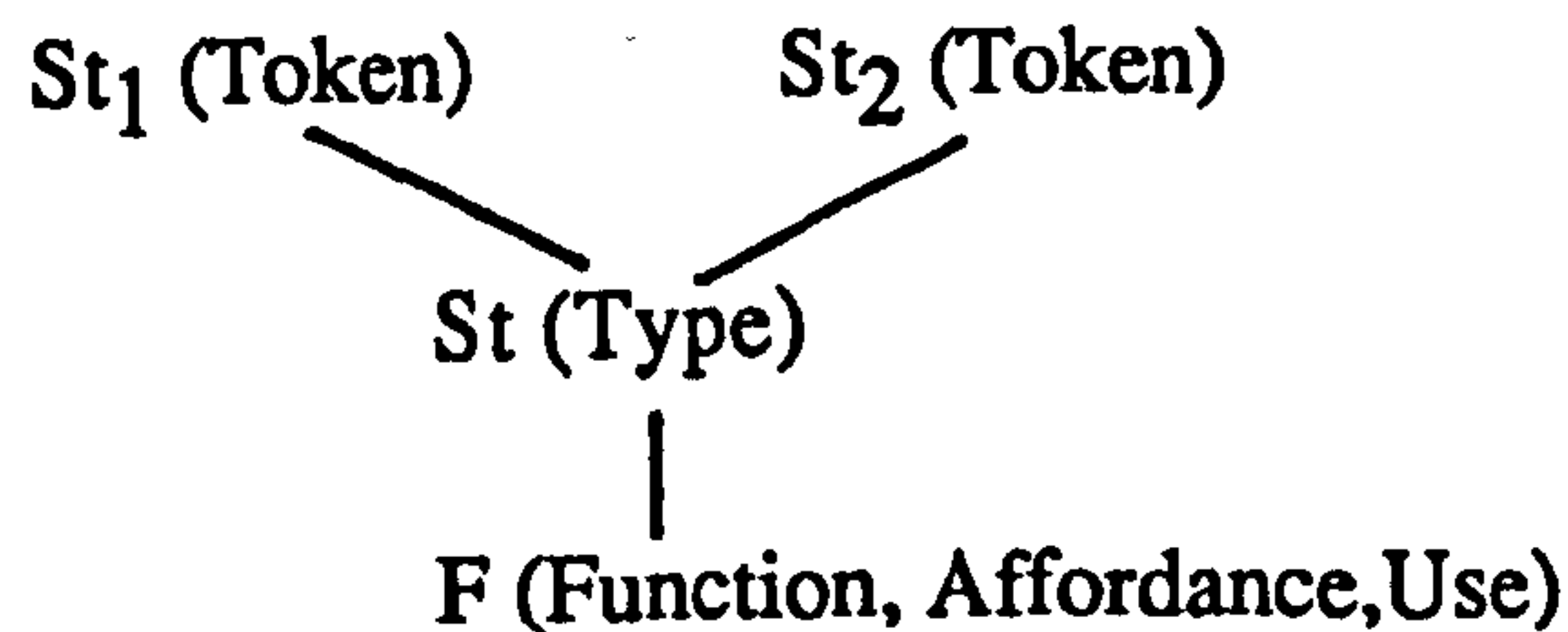
The case of exemplification captures the referential idea of a sample, such as a tailor's swatch or a wallpaper sample book, in which a given sample possesses certain properties (embossed, geometric, black, for example) of the field for which it is a sample, and is taken to denote some of these properties. The properties of the sample which are taken to be exemplified are those that are instantiated in the signifying system that is operative. In the case of 'expression', which is a form of exemplification, the instantiated properties are metaphorical rather than literal. Taking our wallpaper sample as an example, the relations might be illustrated as follows :-



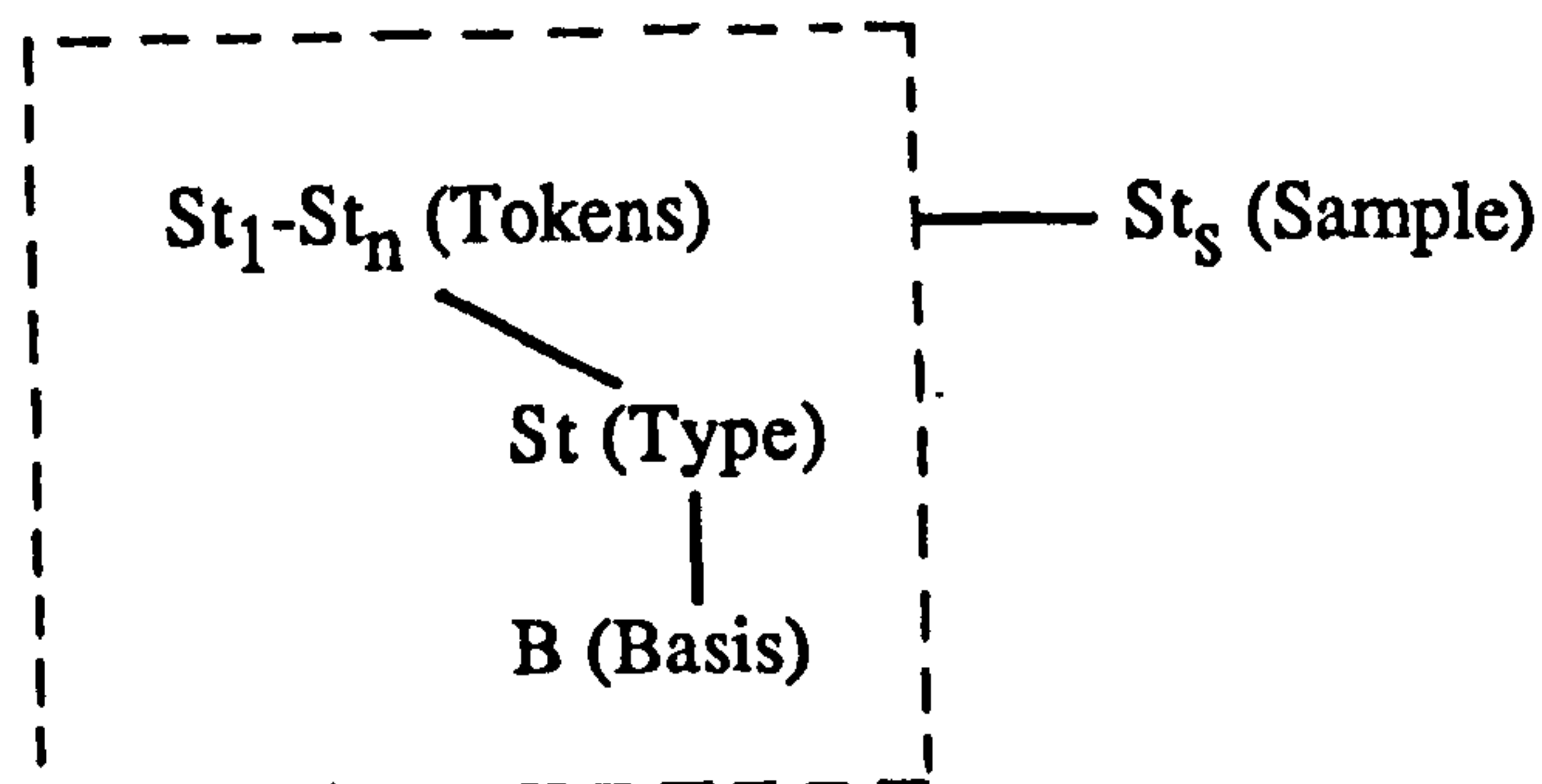
The general case of exemplification is one in which the sample acts as a symbol in respect of the association of its properties with labels in an operative signifying system, that can be applied to that symbol. It is therefore a reciprocal relation operating between the properties of a sample and the labels of some symbol system.

The importance of this for the product semantic account of significance and meaning-making is twofold. In the first place it can be used to provide a basis for object meaning that does not depend on a direct analogy with linguistic denotation and which preserves the underlying and central idea of contextual fit. Secondly it can be used to drive an account of expression and qualitative content generally, which is contiguous with the categorial schemes and interactive models of product semantic accounts.

Exemplification in its simplest form captures the relation between a sample and its field. Something exemplifies (is a sample for a field) in so far as properties it possesses have labels in some operative symbol system relative to the field. Given the root case for object signification in Vihma's scheme,¹¹¹



the relation might be generalised in the following form :-



The field consists in the subsumption of tokens as a type relative to some 'basis'. (In Vihma's scheme the basis is generally a context of use, affordance or function, but this could be generalised to take account of the broader range of bases evident in Athavankar's categorial scheme and Krippendorff's contexts for meaning, for example). The sample is taken to form part of the field, exemplifying the field in some respects. The respects in which it exemplifies the field are dependent on the symbol system applied across the field and the sample in a given case or situation. In the case of the wallpaper sample, certain properties (geometric, black, embossed), labelled in the natural language symbol system, are shared by the field and the sample. The sample is a part of, and exemplifies the field in respect of those properties co-labelled by the symbol system.

Contextual fit consists in assigning samples to fields. In product semantics generally, meaning contexts represent broad field specifications, and it is assumed that the process of meaning-making will involve the parallel or consecutive mapping of products as prospective samples to the cognitively available range of fields. Significance consists in a successful individual mapping, whilst meaning consists in the total set of such mappings.

¹¹¹See above pp 58-61.

The symbol systems that operate with respect to fields are not type restricted - they can be notational, linguistic or non-notational, with varying degrees of density or repleteness, but in each case their operation will have implications for the cognitive mechanisms deployed and the nature and range of interpretations that they can support.¹¹²

Within the spheres of both semiotics and product semantics, fields and symbol systems are not independent, but mutually constitutive. A symbol system essentially consists in the systematic possibility of applying two dimensions of choice in respect of signifiers in their relations with signifieds - selection and combination. It provides the basis both for the definition of syntagmatic structures, and for the specification of satisfaction and equivalence conditions for elements within such structures, but it does so only in relation to the totality of the field in respect of which it operates. Thus although in a developed symbol system it is possible to give an independent account of syntactic and denotational orderings, such orderings in fact arise together for a given field. This is evident both in Vihma's model signifiatory scheme for objects, which operates at a fundamental and non-linguistic level, and for the higher levels of meaning-context identified for example by Krippendorff, which are socio-culturally embedded. The upshot is that although the construction of meaning can be mapped in terms of an extended sense of signification, the latter can only be unpacked in terms of larger scale contextual structures.

The prevalence of structural linguistic analysis (in contrast to a constructivist view of semiotics) and the concept of the 'text' as a model for cultural artefacts generally, and architecture in particular, is perhaps also founded on an intuitive sense of the underlying contextual structure of related cognition and symbolisation.¹¹³ The limits of such models, which are defined by their structural and analytical notions rather than the results of empirical studies, rest on the underlying assumption that a holistic sense of 'text' is essential to the hermeneutic activity of exposing or engendering meaning. Analysis here consists in revealing structural patterns inherent in texts generally, the comparability of structural patterns among texts of cognate kinds, defining classes of texts and their genres. But whereas in the case of architecture, the parallel with the 'stage' or 'mise en scene' as the locus for textual enaction, and the continuity of architecture with art, invites a mediated context of this kind, in the case of products the more natural move is to identify the relevant larger scale contextual structures directly with socio-cultural life. Given that the model for meaning-making in product semantics is essentially cognitive, the relevant socio-cultural contexts are those captured by the idea of 'folk theories' in general and 'folk psychology' in particular.

¹¹² This is taken up in part C 'Synthesis' below.

¹¹³ See for example Propp 1958; Scalvini 1980; Bruner 1990; Ricoeur 1981.

7.6 Folk Psychologies and Meaning

The general sense of the idea of folk theories is that a given cultural community deploys a series of informal theoretical models applying to relatively distinct domains, in accounting for the world and its various phenomena. A series of this kind for a given community would typically (but not exclusively) include models applying to the states and behaviour of the physical world ('folk-physics'), models applying to the living world ('folk-biology'), and models applying to the characteristics and behaviour of people ('folk-psychology'). These models embody the basis of informal reasoning applied in the case of each of the domains, constituting an operational default for the domain. Thus for a 'folk-physics' the key elements of an ontology might consist in classes of substance and their properties, space, and proximate causality. Physical things behave as they do both because they are taken to be composed of substances with characteristic properties, and because they are impinged on by other things. The basis of a folk theory of this kind is that it is operational and experiential, and explanatory sufficiency consists in the ability to assign phenomena to normative fields of cases at the level of the commonsense ontology. Similar characterisations apply to 'folk-biologies' and 'folk-psychologies'.

In the case of 'folk-psychology' the principal alternative to a computational theory of mind underpinned by biological necessity, brings the idea of cultural evolution to the fore in developmental accounts of cognition. Rather than regarding biological principles as the 'universal cause' of human nature, they can be regarded as the structure upon which the social and individual development of the self is built, and by which it is constrained. In its most general form this approach, when extended to comprehend the basis of a theory of mind, involves an acceptance of the idea that intentional states are ineliminable in any coherent account of human reason and action, and that intentionality derives its form from inherence in the pragmatic and symbolic systems of a socio-cultural context. The chief consequence of this theoretical shift is to give less emphasis to the idea of the reconstructive logic of conceptual structures per se and a greater emphasis to the idea of 'roles' or 'functions' within normative cultural processes.

The basis of the idea can be found in Blumer's critique of sociology, founded on the earlier work of Mead.¹¹⁴ The contention is that traditional sociological theories had treated action as epiphenomenal, by regarding it as a consequence of antecedent and external determining factors, in the form of predispositions, environmental factors and socio-cultural norms. In fact the social world rather than providing the causes of action, is constituted by the process of making meaningful action. Blumer's characterisation of Mead's contribution is that he :

¹¹⁴ Blumer 1969, particularly pp 140-152; Mead 1934.

'... reversed the traditional assumptions underlying philosophical, psychological and sociological thought to the effect that human beings possess minds and consciousness as original "givens", that they live in worlds of pre-existing and self-constituted objects, and that group life consists of the association of such reacting human organisms.'¹¹⁵

arguing instead that :

'... human group life was the essential condition for the emergence of consciousness, the mind, the world of objects, human beings as organisms possessing selves, and human conduct in the form of constructed acts.'¹¹⁶

The intersection of such accounts with the developing concept of ethnomethodology, provided an important stimulus for the development of the concept of 'folk psychology' in cognitive science. The thrust of the ethnomethodological position, was to refigure social science by regarding common sense reasoning as the valid outcome of commonly held practices, rather than as social facts to be tested for their objective grounding within a theoretical scheme.¹¹⁷ The underlying assumption that our action should be accounted for as though it were a logical response to an objectively given world, gives way to the idea that action within a social framework is constitutive of intelligibility and objectivity themselves. They arise out of social practices, and the task for a social science is not the enumeration and theoretical systematisation of the practices themselves but rather an account of how common practices and intelligibility, for example, are achieved. The starting point for this was to be the psychological, sociological, political and scientific distinctions made by people in their everyday lives. In the context of cognition and cognitive science, relatively independent topically related domains which gathered cognate sets of such distinctions have been labelled generally as 'folk theories'.¹¹⁸

The single most important concept in cognitive science in terms of which the major theoretical battles have been fought is that of 'folk psychology'. The essence of the idea is that each culture employs a framework of concepts or normative descriptions which constitutes an informal theory of mind which is learnt in and with the codes and languages of interpersonal and cultural transaction. The reciprocal developmental interaction of acculturation with concept and language development ensures the congruity of socio-cultural institutions with commonsense belief systems, particularly in respect of

¹¹⁵ Blumer 1969, p 61.

¹¹⁶ Blumer 1969, p 61.

¹¹⁷ Garfinkel 1967.

¹¹⁸ Folk theories - folk psychology, folk science, folk sociology etc.

persons.¹¹⁹ Bruner informally characterises some of the constituents of a folk psychology in the following way :

'An obvious premise of our folk psychology, for example, is that people have beliefs and desires : we believe that the world is organized in certain ways, that we want certain things, that some things matter more than others, and so on. We believe (or "know") that people hold beliefs not only about the present but about the past and future, beliefs that relate us to time conceived of in a certain way - our way, not the way of Fortes's Talensee or Mead's Samoans. We believe, moreover, that our beliefs should cohere in some way, that people should not believe (or want) seemingly irreconcilable things, although the principle of coherence is slightly fuzzy. Indeed, we also believe that people's beliefs and desires become sufficiently coherent and well organised as to merit being called "commitments" or "ways of life", and such coherences are seen as "dispositions" that characterize persons : loyal wife, devoted father, faithful friend. Personhood is itself a constituent concept of our folk psychology, and as Charles Taylor notes, it is attributed selectively, often withheld from those in an outgroup.'¹²⁰

Folk psychology thus has a canonical status, since it comprises not only a descriptive ontology but also the deontic sense of how things ought to be if the world is behaving as it should. Generally speaking folk psychologies conceive of two interacting 'worlds' - an inner world of experience which is under the control of our intentional states, and an outer world that operates independently of our experience. Our perception of the outer world modifying and providing a context for our beliefs, desires and actions. A normative measure of appropriate congruence between these worlds is built into folk psychologies, delimiting intentional states and actions that require no explanation because they fit the expected patterns of congruence, and those that fall outside implicit norms and therefore demand an explanation.¹²¹

A related characterisation of folk or common-sense theories has been expounded in philosophical terms by Morton.¹²² His contention is that there are two fundamental ways in which to account for the coherence and efficacy of folk psychology, one based on the contention that the collections of beliefs, conjectures and suggestions comprising the explanatory framework for our understanding of human behaviour takes the form of a

¹¹⁹ The principle critique of folk theories generally and folk psychology in particular has consisted in a reductionist programme which argues that the intentional language characterising explanations in folk psychology have no explanatory force and should be ignored in favour of causal accounts, whether expressed in traditional neuropsychological terms, in terms of symbolic computational models, or in terms of connectionism. [For a thoroughgoing critique of folk psychology see Stich 1983].

¹²⁰ Bruner 1990, p 39.

¹²¹ A parallel analysis of the need for, and nature of explanations of behaviour is developed by Peters in his philosophical account of types of explanation found in psychological theories. See particularly the distinctions made between 'His Reason' explanations, 'The Reason' explanations, 'Causal' explanations and 'End-State' explanations, which mirror the types of interpretation appropriate to each of the domains of folk psychology as developed by Bruner [Peters 1958, pp 3-26].

¹²² Morton 1980

theory, and the other that it consists of schemes. 'Theory' in this context might be taken to imply some of the characteristics of theories in general, for example, in the possibility of constructing lawlike generalisations and the capacity for systematically supporting explanations and making predictions of behaviour. 'Schemes' on the other hand suggest a more complex and less overtly hierarchical structure based on common or conventional domain-specific patterns, with varying degrees of interrelatedness and transposability.¹²³

On either construal, folk psychologies are taken to have explanatory power by virtue of the assignment of intentional states relative to human action, language and social institutions. Typically we conclude that 'x did *such and such* because x *feared* (believed, desired, hoped etc) that *so and so*'. In short, there are a restricted number of psychological states or attitudes which are attributed to agents, whose objects (application and directedness) can be varied and thus give rise to an infinite number of intentional expressions. The states and their contents together constitute an explanatory etiology. The form of such explanations are typically held to be sufficient in folk-psychology to support explanatory accounts of human behaviour and social reasoning.

But whilst intentional states often operate as primitives in social or historical theories, which deal with larger scale structures such as social organisations, they have seldom been regarded as primitives in theories of psychology. This is the case for two principal reasons. In the first place it can be claimed that 'intentional states' throw no light on the nature of cognition, since they are not articulated in terms of a lower order ontology and lawlike compositional structure, but simply re-name events at the same explanatory level in terms of means-end relations. Secondly, since such states are not observable and the relations between environmental factors and behavioural response can be observed, measured and correlated without hypothesising intentionality, principles of parsimony would counsel that they should not be designated as primitives.¹²⁴ On the other hand their heuristic value in the prediction of behaviour and their parallel importance as higher order behavioural constructs in the statement and development of psychological theory, have commended their use as central concepts. These latter functions represent the area of continuity in their use across the boundaries of folk-psychology and scientific psychological theory.

One main branch of cognitive science, championed by Fodor, essentially accepts the intuitions of folk psychology, arguing that the computational scheme offered by cognitive science offers a parallel 'language of thought' which mirrors the folk psychological

¹²³ See below pp 252-256.

¹²⁴ Skinner 1953.

language of intentionality.¹²⁵ More generally, intentional theories of mind predominate in earlier cognitive accounts and in philosophical treatments of aspects of common-sense reasoning and the philosophy of mind. The broad position in respect of folk psychologies treats them as informal theories with a set of ontological commitments which include persons, psychological states and propositional contents (representations). In general, states and contents taken together with the physical capacities of persons are taken to be sufficient to account for conscious behaviours (and with a suitable psychoanalytic or parallel interpretation, unconscious behaviours), and by extension, to account for the contents and interactions constituting the artefactual and cultural world. The explanatory framework in which these entities function is taken to have the normal hypothetico-deductive form, with the 'logic of thought' operating along similar lines to deductive logic. In consequence the logical pattern for explanation is taken to be isomorphic with the logical pattern for prediction, differing only in their temporal structure. The upshot is the view that folk-psychology essentially takes the form of a predictive theory, whose utility is geared to the prediction of the actions of others in social contexts, and with post hoc explanation trading on the logical isomorphism with prediction.

Although this view of the nature of folk-psychological intentionality has been the most prevalent interpretation,¹²⁶ a number of recent analyses of surrounding concepts and of the relative utility of predictive models has called this account into question. The accounts provided comprise two separate though connected objections, one challenging the view that folk psychology takes the form of a theory,¹²⁷ the other challenging the view that the function of folk psychology is essentially predictive.¹²⁸

The assumption that the function of folk psychology is predictive seems a natural one in the context of our socialised development, and there is little doubt that we do have substantial knowledge of what other people can and will do. Nevertheless the theoretical context for prediction requires a stronger claim, which amounts to the idea that the knowledge about others that we use in making decisions about what we will do consists to a large extent in inferring predictions that others will perform specific actions. The claim stems from the co-ordination and management of action required by our social constitution and context, taken together with the implications attendant on the characterisation of folk psychology as a form of theory.

¹²⁵ Fodor 1975, 1987. The programme aims to reconcile the commonsense language of intentionality which seems to be indispensable in the explanation of behaviour [but see Stich 1983 for a contrary view], with the formal demands implied by the relation between syntax and semantics needed to achieve compositionality, and the embodiment of this in a physical system. Schiffer's contention is that the programme cannot be completed if one accepts the normal assumptions associated with each of these elements [Schiffer 1987 and see above p 217].

¹²⁶ Dennett 1987.

¹²⁷ Gordon 1986, 1992; Goldmann 1989, 1992; Montgomery 1987; Heal 1987; Ripstein 1987.

¹²⁸ Morton 1996.

It has been argued that the extent to which our choices of action are modelled on strategic situations involving a number of agents and which are dependent on forms of co-ordination other than prediction, is seriously underestimated.¹²⁹ Two particular points emerge from discussions of typical examples. The first is that much of our thinking is directed at intrinsically social ends, for example, in terms of what other people want, think or feel. The second is that, in decision-theoretic terms, many of our choices are strategic rather than parametric. The corollary of these observations is that the deployment of folk-psychological reasoning cannot readily be mapped to the general form of the predictive or explanatory uses of theory, but are structurally closer to operational simulations.¹³⁰

Nevertheless the dominant explanatory strategy in cognitive science, marshalled in explanation of cognitive abilities or capacities, consists (in part) in positing internally represented knowledge structures (in the form of rules, principles or propositions) which drive the expression of the given capacity. These clusters of rules, principles or propositions are typically described as the theory of the domain to which they apply. In some cases these will be consciously held and an agent will be able to say something of the principles being used. More often they are unconscious and the theory is described as tacit or sub-doxastic.¹³¹ But the extent to which such collections of rule structures or scenarios can be characterised as having the form of a theory is debatable.¹³²

Narrative Structures and Schemas

The principal alternative is that the organising principle of folk psychologies is not logical or categorical in nature, but structured in terms of narratives or schemas.¹³³

The idea of 'narrative' as an organising principle of folk psychologies, depends on certain properties perceived to be characteristic of narrative as opposed to other forms of discourse. The principal property is the sequencing of its constituents - a narrative is made up of a unique sequence of events involving, for example, people, objects, desires and

¹²⁹Morton 1996; Bratman 1987,1992.

¹³⁰Gordon 1986; Morton 1980. The general pattern of the proposal is consonant with the idea of empathetic understanding [see for example Collingwood 1946; Schutz 1967; von Wright 1971] but in the spirit of more recent accounts of practical reasoning. Gordon goes further than Morton in assimilating this to empirical work in psychology, and developing the idea that operational simulation is based on the normal capacities for practical reasoning augmented by the central capacity for pretend play.

¹³¹Chomsky describes such theories as 'tacit'[Chomsky 1965]; Stich describes them as sub-doxastic, [Stich 1969]. The general philosophical position is set out in Fodor 1968, and further elaborated for example in Dennett 1978 chapter 2; Lycan 1981,1987.

¹³²Schiffer argues that folk psychology does not yield true generalisations, and therefore does not have the basis for being of the form of a theory [Schiffer 1987 pp28-40].

¹³³Bruner 1986,1990 (narratives). Schank1972; Schank and Abelson 1977(schemas and scripts).

outcomes. Within this framework, meaning derives from the place of the constituents in the sequence as a whole - the plot. The construction and interpretation of a narrative consists in the reciprocal relationship between the acts of identifying constituents in terms of the constitutive plot, and the extraction of the plot from the sequence of constituents. In addition, narrative structures bear an odd relationship to external reality which is reflected in the fact that they can serve both empirical and fictive purposes. This is the case because the coherence and meaningfulness of a narrative whole is not dependent on the truth value of its constituents, but rather on the appropriateness of their contiguity.

In so far as a folk psychology represents the framework of concepts, beliefs and intentional states through which the objects and events of the world are construed, then the narrative form provides both the cognitive structure, and the expressive means in terms of which understanding is achieved. Narrative structure underlies the canonical aspect of cultural coherence and continuity in embedding the normative in forms which are perceived not to require explanation and elaboration, but can be simply descriptive because they are culturally situated. Our starting point is the assumption that people will act typically and appropriately in accordance with their situations - a plot which is congruent with a situation, and in which the constituents are in their correct places relative to that plot. Where the unexpected (cannonically exceptional) occurs, then our response is to seek an elaboration of the plot which draws the unexpected back into the realm of canonical expectation.¹³⁴ The form taken by such elaborations commonly consists in the invoking of intentional states and their linking to the relevant canonical cultural element.¹³⁵

The more general form proposed for the larger scale knowledge structures comprising elements of folk theories represented in cognitive psychology, include for example 'scripts', 'schemata' and 'frames'. In everyday situations an enormous amount of background information and related inferences are involved in the description of common and relatively simple actions and decisions. In order to account for our ability to negotiate these contexts the general presumption is that knowledge is organised into complexes which are operationally relevant. Essentially each of the above concepts posits mediating structures that bridge the gap between class-like and hierarchical groupings of relatively well individuated concepts and the deployment of knowledge in situated action and reasoning. Generalising across a broad body of theoretical and empirical work, one could

¹³⁴ See for example the studies carried out by Barker, relating social situations to expectations of behaviour, relative to other psychological and sociological indices, which support the conception of strongly normative and conservative socio-cultural frames of reference. [Barker 1978].

¹³⁵ Grice's account of parallel cases in the theory of language takes a similar form. Deviations from the normal parameters of conversational exchange give rise to 'conversational implicatures' - searches for meaning located in the deviation from normal usage, and constructed in terms of additional explanatory loops which make links with the portion of conversational exchange falling within normal parameters [Grice 1989].

summarise the overall idea in terms of an intersection between two kinds of knowledge structure, one which is 'script' like, and one which is 'scenario' like.¹³⁶ Script structures are essentially patterns which delimit characteristic chains of events, whilst scenario structures provide the framework for scenes and their contents. Both these types of schema, and schemata generally are taken to encode generic knowledge which can be applied specifically in respect of their instances.¹³⁷

Although acceptance of the schema idea, and the narrative structure of key elements in 'folk-psychologies' is pervasive in cognitive psychology and has been supported by a wide range of empirical evidence,¹³⁸ there is considerable disagreement as to the level of specificity at which such structuring elements occur. In the classic development of script theory and associated schematic studies relating to memory, the emphasis has been on the situational specificity of schemata, and their origins in personal experience.¹³⁹ The problem with such specificity is that it becomes difficult to account for our perspicuous ability to deal with both atypical and novel situations. In view of this, and in the light of evidence that situationally specific schemata for distinct but related scripts can engender recognition confusions,¹⁴⁰ higher level and more abstract schema concepts have also been proposed.¹⁴¹

The general development of schema theory reflects these results in adverting to the hierarchical organisation of levels of schematism, representing different levels and types of abstraction. In relation to scripts, for example, which remain situation specific, the higher level organisation is represented both in terms of 'scenes' (collections of higher level components of scripts) and 'scenarios' (groupings of scenes into complexes which

¹³⁶I have used the designation 'scenario' here to avoid the use of either 'schema' which is often used in an overarching sense to capture the range of associated concepts including scripts, or 'frame' which has a more specialised use relative to hierarchies of knowledge structures.

¹³⁷The idea of 'schemata' to account for complex knowledge organisation is generally attributed to Schank, who first used the idea of a schema in the form of prototypical act structure to account for the operation of relational concepts [Schank 1972]. The idea has been extended more generally in accounting for the comprehension of extended texts through the idea of 'story grammars' [Rumelhart 1975; Thorndyke 1977; Stein and Glenn 1979], and knowledge management in common situations through 'scripts' [Schank and Abelson 1977]. The more general development of schema concepts, particularly in artificial intelligence and visual perception has been particularly influenced by Minsky's use of 'frames' as an organising principle [Minsky 1975, 1987, Kuipers 1975, Winograd 1975]. Overarching theories for schemata have also been proposed [Rumelhart and Ortony 1977; Rumelhart 1980].

¹³⁸The principal sources of evidence for the existence of schema like knowledge organisation are derived from detailed situational analysis, and studies relating to long term memory. These include (inter alia) studies in the consistency of event structure across subjects in common situations [Bower, Black and Turner 1979], response rate of subjects assessing 'script' content [Galambos and Rips 1982], interpretation and recall in subjects relative to expectations about target events [Bransford and Johnson 1972; Anderson and Pichert 1978], comparison of performance in the recall of typical and atypical situations [Graesser, Woll, Kowalski and Smith 1980], detection of the presence or absence of expected and unexpected objects in common visual schemes [Friedman 1979].

¹³⁹Schank 1972, 1982, 1986; Schank and Abelson 1977).

¹⁴⁰Bower, Black and Turner 1979.

¹⁴¹Bobrow and Norman 1975; Minsky 1975; Rumelhart and Ortony 1977; Rumelhart 1980.

can acquire specific contextual information).¹⁴² At higher levels still, a number of theories have proposed general and thematic plot-like structures which capture the character of meaningful event sequences or typical plan-goal patterns.¹⁴³ The empirical evidence for the existence of higher level structures of this kind are typically drawn from studies of the direct utility of plan-goal patterns (in the form of adages) and the use of analogy in problem solving situations.¹⁴⁴

Whilst the thrust of such work has aimed at elucidating the nature of structures mediating between basic level or simple relational concepts and the deployment of complex conceptual structures, in contrast other researchers have emphasised the necessity of positing schemata at the level of perception and bodily movement. Neisser in particular has linked the active organisation of experience at all levels to schematic structure, equating this with the portion of the perceptual/motor cycle which is internal - the total state of the system which determines the form in which sensory information can be accepted and which in turn can be modified by sensory information.¹⁴⁵ Schematic structures of this kind are conceived as flexible integrated global system constructs involving both perceptual and motor components - patterns of action intersecting with patterns for action. The most general treatment of this kind appears in connectionist approaches which regard schemata as patterns of activation in networks rather than as representational constructs. The traditional idea of a schema on this account is most nearly realised where groups of activation elements of a network are strongly connected.¹⁴⁶

¹⁴² Schank, for example, has argued for 'scenes' as sets of parallel script components which are type organised taxonomically (eg a grouping of 'entering' scenes), and overarching structures termed 'Memory Organisation Packets' (MOP) operating at different levels and organising sets of scenes. [Schank 1982].

¹⁴³ At this higher level Schank for example proposes 'Thematic Organisation Packets' (TOP) which are not tied to particulars, but which structure sequences of MOP episodes thematically. These higher level structures enable us to compare the general character of sequences of episodes [Schank 1986, 1982]. The argument and the examples given suggest a strong parallel with the structuralist notion of basic plots, as for example in Propp's analysis of fairy tales [Propp 1958]. An alternative higher level knowledge structure has been proposed by Dyer in the form of 'Thematic Abstraction Units' (TAU) which capture plan-goal patterns. [Dyer 1983]. The parallel between abstract higher level knowledge structures of this latter kind and idiomatic linguistic forms such as adages and proverbs has been considered generally [Kolodner 1984] and also in the context of a computational approach to reasoning [Wilensky 1983].

¹⁴⁴ Dyer's TAU construct has been studied directly in the context of the analysis and production of stories [Seifert McKoon, Abelson and Ratcliff 1986] showing on the one hand that subjects could sort and produce stories which reliably matched a given TAU, but on the other that encoding and deployment of thematic structures is not automatic but dependent on task difficulty and the strategy adopted by the subject. Similar conclusions have been reached in studies related to problem solving situations, in that thematic structures can account for the retrieval of analogues, but this does not take place automatically but generally only in the case of specific search [Gick and Holyoak 1980, 1983; Holyoak 1985; Keane 1988; Holyoak and Thagard 1989]. The general consensus is that positing higher level thematic structures of these types accounts for a number of key features of situational analysis and analogical reasoning, and may mediate in retrieval from long term memory, but that access is not automatic.

¹⁴⁵ Neisser 1976.

¹⁴⁶ Rumelhart, Smolensky, McClelland and Hinton 1986.

Approaches of this kind are in part a response to the problem of determining how schemata might actually be implemented. Although the basic idea of a schema or a frame as a skeletal structure with nodes functioning as constrained place-markers is intuitively simple, it has proved difficult to achieve sufficient specificity combined with flexibility to characterise their proposed functions at these various levels of knowledge organisation. However this problem becomes less acute if the interpretation of structure in schemata is not assumed to be propositional - represented in terms of finitary predicate symbols (functions) and argument symbols.¹⁴⁷ The alternative lies somewhere between Neisser's integrated perceptual/motor system constructs and the idea of narrative schemata, and are represented by 'image schemata' in cognitive psychology and 'frame arrays' in cognitive science and artificial intelligence.¹⁴⁸ Image schemata are abstract analog structures which can be scanned and manipulated in 'mental space' and which provide the basis for mapping a wide range of concepts and event types.¹⁴⁹ A possible implementation of schematic forms computationally also involves the creation of spatial analogs in para-neurological networks (frame-arrays and trans-frames) to which a wide range of conceptual structures could in principle be mapped.¹⁵⁰

¹⁴⁷Propositional structure is nonetheless assumed in most recent theories of mind.

¹⁴⁸Abstract representational schemata have been proposed by a number of authors [for example Anderson 1980; Lakoff 1987; Lakoff and Johnson 1980; Johnson 1987, 1993], particularly in response to work on the manipulation of mental images[Carmichael, Hogan and Walter 1932; Brooks 1968; Shepard and Metzler1971, Shepard and Cooper 1982] and their intersection with the general idea of non-propositional representation . Image schemata are not equivalent to mental pictures, but are '..structures that organise our mental representations at a level more general and abstract than that at which we form particular mental images.....(containing) structural features common to many different objects, events, activities and bodily movements' [Johnson 1987, pp23-24].

¹⁴⁹See Categorisation pp 164-167 above. The interpretation of schemata proposed by Johnson provides a continuity between basic level and prototypical concepts and narrative structures, in the form of embodied patterns of experience. The conception is broadly Kantian in the sense that they constitute matrices for the construction of meaningful representations, and Johnson emphasises that they are unlike templates or skeletal structures which are filled in by particulars [Johnson 1987 pp19-30]. Johnson regards the operation of schemata as essentially metaphorical. The idea is parallel to the idea of 'structuring structures' in Bourdieu's analysis of the social origin and operation of conceptual schemes [Bourdieu 1977, and Appendix A 'Framework Models', below]. The idea of 'embodiment' however is central to Johnson's conception and represented in a broad range of recent work in philosophy and cognitive science [see for example Varela, Thompson and Rosch 1991; Clark 1997; Smith 1996; Damasio 1994].

¹⁵⁰See for example Minsky 1985.

7.7 Meaning in Product Semantics

The concept of meaning and the implied theory of meaning in product semantics is both complex and eclectic, and might be summarised in the following way relative to the various previous discussions of meaning and meaning theory.

Meaning is conceived as a complex mental construct resulting from a cognitive process, rather than a formal property that can be asserted to be held by some thing or symbol. It cannot be defined in terms of reference in the case of objects either intensionally or extensionally, although an object as token could in categorisation function referentially in relation to a type for which it is a token. Neither is it ideational in the sense of simple denotational correspondence with ideas in the mind, although as a mental construct it might be conceived to have something of the quality of a conceptual representation.

Meaning is essentially intentional in that whilst it trades on the notion of physical covariation for its material, and this is the basis for the idea of 'natural' meaning, it depends on a context of communication in which things are taken to be read as having been intended. In the context of products this is expressed in terms of an approximate equivalence between the idea of a speech act involving an utterer's meaning and a hearer's meaning mediated by conventional illocutionary act potential, and the relation between designer's meaning and user's meaning. In contradistinction to speech act theory however, the starting point for the explication of product meaning is taken to be user's (hearer's) meaning. The basis for this consists in the combination of a context of intentionality (taking things as having content or being intended) and a mechanism underlying understanding which is equated with contextual fit. In the case of products a number of key contexts of fit are identified, but the nature of the process of fitting is not explicitly defined, although it is characterised as a cyclical cognitive process analogous to hypothesis testing.

Although the process is not defined directly it can be explicated in terms of the developed notion of signification as represented in Goodman's concept of exemplification, which operates through matching particulars to fields relative to an operative symbol system. However, signification and symbol systems cannot be taken to be independent primitives from which more complex relations can be built, but rather as syntactical and denotational orderings which develop together in respect of particular fields. This construal is analogous to the interpretation of meaning relative to the application of the affordance concept in direct perception, though transposed to an explicitly cognitive level. Thus although in the case of a developed system it is possible to express meaning relations as objectively obtaining in respect of products (or sentences), defining meaning as a

specifiable primitive constructive relation is misleading.

Meaning as a complex construct consists in the collectivity of individual acts of significance that are associated through their application to a common object. The success of such acts is expressed in terms of understanding, which in turn consists in finding contexts for the object that are cognitively satisfying in the sense that they either cohere with established patterns of constructs or can be assimilated to them. The type-structure for contexts prioritises contexts of 'use' in which objects or their attributes are cognitively located in terms of the possibility for action; contexts of 'language' in which objects or their attributes are cognitively located in terms of their place in the operations of symbol systems, including natural languages; contexts of 'genesis' in which objects or their attributes are cognitively located in terms of their constitutive histories; and 'ecological' contexts in which objects or their attributes are cognitively located in terms of their place in the relational order of objects.

Signification is not taken as an independent primitive relation or act, but conceived in terms of achieving understanding through a process of contextual fitting in which particulars and fields are conceived as mutually constitutive. Thus although in principle the idea of fit is congruent with the general notion of the relation of particulars to narrative structures or schemata, these cannot be conceived as rigid templates with place markers waiting to be filled, but rather as relatively stable operative system state clusters (or some parallel construct) which are susceptible to modification by particulars. In addition, although the specified contexts for fit can be broadly related to the hierarchical levels of knowledge organisation proposed in schema theory, they do not map to these sufficiently well for them to be directly equated.

Nevertheless the broad idea of contextual fit can be expressed in terms of exemplification operating through the explicitly identified mechanisms of the metonymic and metaphoric association of particulars with fields.

The larger scale structures for the articulation of product meaning represent the central core of contextual models developed to account for linguistic meaning in cognitive psychology. The value of these concepts lies in their capacity to give form to the social development of meaning in language, and to account for the remarkable sophistication evidenced in language learning, without resorting to the specificity of innateness represented for example in protolinguistic 'deep structures' or their correlates, which have proved increasingly intractable empirically, or accounting for compositionality in the formal structure of syntactic and semantic orderings. Their essence lies in the acknowledgement of the social embodiment of language in the contextual pragmatics

framing an underlying and constitutive 'folk psychology'. The problem with these concepts is brought out in a philosophical context, where the underlying intentional account proves to be incompatible with formal approaches to semantics, and in cognitive science where it can be argued that whilst they have a heuristic role, they are methodologically inessential.

If the social location of conceptual and linguistic development can be underpinned by the concept of narrative and its essentially rhetorical structure, then it is likely that the positioning of objects within our world will be constituted in part by the ways in which objects can participate in meaningful narratives, and the nature and extent of their rhetorical function within such narratives. Objects have roles in the theatre of lived narrative, as instruments, as others and as parts of our selves, and the intuitive and informal approaches of designers to the definition of product form and style appear to square with this characterisation. The predominant modes of user modelling that occur in the design process consist in the enactment of user interaction in both instrumental and affective terms, and the creation of contextual tableaux involving the user and the product. These can take a variety of forms, but typically tableaux are created in the form of 'mood boards' in which a literal picture of the user type and an associated world of possessions and qualities are assembled. These are the canonical image equivalents of acceptable narratives, whose authenticity are established using criteria which are parallel to the 'acceptability of narrative explanations' taking the form of criteria of congruity and contiguity.

At ground level there are four dominant elements in the product semantic account of meaning. In the first place meaning is conceived as an individual mental construct which has representational content, and which is operationally significant in terms of the fact that it is representational and directly accessible. Secondly, the operation of the process of meaning-making is experientially centred - the theory of meaning is grounded in the idea that meaning is use, or a function of use. Thirdly that meaning is context dependent, in the sense that the part of the process of meaning-making which is concerned with significance and signification consists in contextual fit, and that this is primarily operative in relation to specified contextual orders. Fourthly that meaning-making processes are centred in questions of identity, and this is represented in the operation of conceptual categorisation.

Section 8 Expression

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8.1 Expression, Affordance and Meaning

The alternative way of approaching meaning in product semantics, deriving from the deployment of the concept of affordance, links meaning with the idea of expression and content. Broadly speaking, our engagement with products is taken to consist in the interaction of the expectation engendered in perceive-affordance with the 'hypothesis-testing' which confirms or disconfirms a match with affordance. A chair appears to offer the possibility of 'sitting' and 'comfort' and we can discover in action whether in fact it allows us to sit and to experience comfort. In product semantics, meaning is equated with perceive affordance, and it is an empirical possibility that a product will turn out not to afford what it meant. In such cases objects are also typically characterised as 'expressing' possibilities and qualities, where their capacity to so do is taken to be a function of their perceived properties.

This suggests that there is either an equivalence or a close relationship between the sense of the terms 'expresses', 'means' and 'perceive-affords'. Although the case of the chair (and similar examples used in product semantic accounts) suggests an equivalence, consideration of a broader range of examples emphasises distinctions of sense. Thus although we might say that frowning means or expresses consternation, it does not perceive-afford or afford consternation; we might say that 'tiger' means tiger, but does not express or perceive-afford tiger; we might say that a hilltop perceive-affords and means, but does not express, a better view; and so on.

If we draw on the idea of a continuity between natural and non-natural meaning,¹ then it begins to be possible to approach these questions systematically. A typical case of natural meaning such as 'smoke means fire' invites an interpretation of meaning which links it with indicative symptoms or effects. Smoke 'means' fire because it is a common and known effect that is sufficiently correlated with fire to be used as an indicator, and also because pragmatically we are interested in detecting fire, and the smoke is often easier to detect than the fire itself. On the other hand we also use natural meaning expressions such as 'clouds mean rain' in cases where the indicator function is predictive, linking meaning to cause rather than effect. If we allow some temporary latitude in the application of the term 'affords' then whilst we might concede that 'clouds afford rain' we would be unlikely to concede that 'smoke affords fire'.² The idea of affordance attaches to the causal side of a cause/effect relation, whilst perceive-affordance attaches to the effect side.

¹ The justification for drawing on these concepts and their continuity lies both in the fact that product semantic accounts make direct use of the idea, and refer to them indirectly in adverting to explanation of meaning in terms of speech act theory.

² The latitude must be temporary since affordance is inapplicable in either case, both because it is a relational concept involving individuals or species, and because it expresses sufficiency, neither of which are satisfied by the examples.

In extending the idea of natural meaning to non-natural cases, Grice employs the idea of physical or physiognomic indicators that are intentionally used in communication. A natural indicator which is the effect of some cause, is deployed with the intention of being perceived as deployed in adverting to the cause, rather than simply occurring as its natural outcome. In such cases the relation between meaning and expression becomes clearer. If I wipe my brow inadvertantly then the action can be interpreted as symptomatic of (expresses naturally) the fact that I am hot. But if I wipe my brow indicatively then the action means (expresses non-naturally) that I am hot and is used to express the fact that I am hot. Expression spans the natural/non-natural context for the action, whilst meaning attaches only to the non-natural case of intentional deployment.³ In terms of the idea of significance and signification, both can be assimilated to the idea of exemplification.

From one perspective, the idea of the inherent expressiveness of actions or states can be taken to be dependent on their use to express in contexts of communication. The fact that a physical or a physiognomic state or motion can be taken in itself (whether deployed inadvertently or intentionally) to have expressive content derives from the existence of contexts in which associations are actively made rather than naturally given, although they trade on natural covariational association. The alternative position would consist in asserting that the basic case of expression is actually inherent in the natural relation - the idea of expression is founded on the idea of symptomatic association, which provides the basis for a role in communicative contexts.

Products occupy a middle ground between the natural and non-natural orders. Thus although there is a relation between chairs and sitting which has the character of a natural relation, it is in fact a contrived relation which is dependent upon intentionality. Chairs are not a cause of sitting although they enable and encourage sitting (and may even be an important part of the definition of sitting). Neither is sitting a cause of chairs, even though the desire to sit underpins the existence of chairs. A grassy bank or a log may afford sitting, but chairs are intended to afford sitting. Nevertheless even at a basic level affordance is not a direct causal relation, but a natural relation expressing the behavioural accommodation that takes place between an organism and its environments, which develops in an integrated way with perceive-affordance.⁴ Products, in common with the natural order participate in the natural meaning relations that accrue from this fundamental level of engagement with the world.

³ It could be argued that non-natural meaning attaches to causes as readily as to effects, for example in the case where I clench my fist in anger, where this is interpreted as an expression of an intention to punch you. However, the fist is not the cause of the punch, and the correct interpretation in such cases appears to be that the cause is my anger (or somesuch), although clenching my fist may be necessary for the punch.

⁴ The use of 'perceive-affordance' here is intended to be neutral with respect to the differences in interpretation evident in Gibson's version of the concept and parallel product semantic interpretations (eg Krampen), and the explicitly cognitive interpretation articulated by Krippendorff.

Products also participate in the world of non-natural meaning, largely through their deployment in human transactions. This process has the effect of conceptually disengaging the 'natural' relation between perceive-affordance and affordance through the operation of intentionality. Affordance in relation to products both trades on and develops the physical, perceptual and cognitive capacities evident in natural affordance. The naturalness with which some forms of a certain scale 'come to hand' represents the lowest level legacy of natural affordance which is harnessed in products. At higher levels the relation is explicitly non-natural, in the sense that relations between form and use are socially constructed and learned. The product semantic approach to user interaction rests in part on the assertion that although such relations are conventional and arbitrary, rather than natural and necessary, they are founded on the natural relation.

Expression adverts to cause in terms of effect, or to that which affords in terms of what is afforded. Rain is an expression of clouds and chairs an expression of sitting, in the extended sense of expression that prompts us to talk of genes and their expression. Products express in the sense that they 'say' things about themselves (in that they advert to their content) but it is not content in the form of properties but content at the level of holistic representation involving association.⁵ The tendency then is to assimilate conventional meaning and expression to natural meaning and expression, in the sense that our engagement with products, though complex in its constitution, has the directness and quality associated with basic affordance. However, one can also view this as the assimilation of natural meaning to conventional meaning, since the possibility of perception/cognition is taken to be dependent on the deployment of a conceptual scheme.

The idea of expression is also generally taken to capture the more abstract and affective elements of content. In addition to adverting to the causally symptomatic and the representationally associative, 'expression' is also used to capture the idea of qualitative and emotional content - the 'austere chair' and the 'angry sky'. Given that the product semantic account is framed in terms of the centrality of experiential content, and individual significance and meaning, one might expect that these pervasive elements of our sense of experience would hold a central place. But although they are acknowledged, they are in practice generally bound up with the more literal terms of conceptual and categorial engagement, rather than considered as significant and distinct aspects of mental representation.

⁵ The tendency is for the top-down elements of the scheme to dominate the account, even though the scheme is initially expressed in terms of both top-down and bottom-up approaches. This is generally true, but particularly the case in Krippendorff's version, which re-interprets affordance in terms of a rejection of a perception/cognition distinction [See above Section 4 'Affordance', pp 111-118]. It is also evident in Vihma's account which although trading on a basic concept of affordance, uses a conceptually based notion in articulating the account of 'association' in the characterisation of products as representations [Vihma 1995].

8.2 Expression and Content in Product Semantics

The dominant model of the user-product relationship in product semantics, is pinned to a relatively austere notion of rational interaction. This is not to say that it does not take account of the possibility of idiosyncratic style, or open-endedness and creativity in the exploration of the relationship with the product, by the user, but rather that the interaction is governed by a sustained focus on ends. This is probably the case because the more theoretically worked through positions, focus on products of considerable complexity and interactivity.⁶ This is in marked contrast to the examples used to stake out the territory of 'affordance', which is almost exclusively conducted in terms of simple products where the interaction is basic and physical - the chair; the ladder; the hand tool. In neither case, simple nor complex, does the relationship with products draw in any deep sense of product character.⁷ This is perhaps surprising, given that the programme of product semantics is geared in terms of individual significance and meaning which one might argue are largely derived from the qualities of a token rather than the properties of a type.⁸ It is less surprising when one remembers that significance is linked to understanding and sense which are articulated operationally.⁹

According to Krippendorff '...objects are constituted in language, participate in interpersonal relationships through language, become built into social realities by language..' ¹⁰ Methodologically, access to the semantic properties of objects, in product semantic practice, is made through the medium of attributive terms and their associations with individual or collective product features,¹¹ and via the process of 'semantic transfer' in relation to a topological and semantic conception of space and relations in space.¹²

Affective or expressive content in product semantics are treated as embedded elements of our understanding of products, and thus generally held to be subsumed within the continuum of our general cognitive engagement with products. The idea of a distinct

⁶ Krippendorff's examples include intelligent and interactive products, computer interfaces. Although he does talk about creative play as a factor in interaction, this is not discussed as a feature of the interaction per se, but as a strategy in achieving goals and assisting motivation. [Krippendorff 1989 pp21-23].

⁷ The work carried out at Cranbrook can perhaps be regarded as an exception, although the majority of examples trade on gross metaphoric association rather than depth in characterisation [Cranbrook Academy 1990].

⁸ For example in terms of the dimensions of personal histories and product associations [See for example Csikszentmihalyi and Rochberg-Halton 1981; Belk et al 1989; Cooper 1976; Lawrie 1989].

⁹ The natural locus for the development of this within product semantic accounts is in terms of the contrast between intrinsic and extrinsic motivation [Krippendorff 1989 pp 21-23, 1990 p a15] However the links between intrinsic motivation and experiential quality are never developed.

¹⁰ Krippendorff 1990 p a15.

¹¹ Butter 1989.

¹² Lannoch and Lannoch 1989; Lannoch 1990.

'aesthetic' experience, or a perceptually-based emotional experience associated with product interaction is generally eschewed in favour of a rationally analysable, though complex, feature based response.¹³

The most striking aspect of this characterisation of product content, is the extent to which attributes are conceived in terms of perceived properties, and product quality elaborated solely in terms of levels of categorial discrimination. Even at the extremes of connotation, the element of affective engagement is virtually absent, and distinctions are not made systematically, for example between, properties, attributes and qualities.

In large measure this pattern is found to be repeated in the pragmatic as opposed to the theoretical contexts of product semantics. Butter's methodological scheme for the implementation of a semantically responsive procedure, as part of a well-defined sequential design process, for example, clusters undifferentiated characteristics into groups related to the higher order 'characters' exemplified by Krippendorff.¹⁴ Thus in the consideration of the desirable characteristics associated with selected stylistically defined characters (in the context of an automotive cab design problem), the following examples (inter alia) are identified :

Functional	Simple	Futuristic	Sophisticated
	Strong		Precise
	Industrial		Organised
	Hygienic		Alert
	Responsive		Serious

In the design process, the associated constitutive characteristics are then associated with clusters of physical elements, properties or organisations :

State of the art technology	Space-age engineering
Hidden sophistication	Cockpit layout
Water repellant geometry	Office-type hardware
Spacious dimensions	Crystalline shapes
Dirt-disguising colour scheme	Material paint scheme, featuring sparse colours

There are clearly a number of questions that could be raised in respect both of the methodology and the particular associations made, but these will be held until later. For the present we will consider the cited characters and characteristics and other examples of

¹³ The notable exception is Vihma, who treats aesthetic content separately from semantic content [Vihma 1995 pp 151-160] Ultimately however, the characterisation of aesthetic content follows a parallel path, in that it is constructive and signficatory, although largely operating within a metaphorical domain.

¹⁴ Butter 1989. Butter's scheme is not derived from Krippendorff's theoretical position, but is independently arrived at in terms of the need to implement a pragamatic scheme for identifying semantic characteristics as part of a normal design process.

qualitative expression, in terms of their similarities and differences. In a parallel context, for example, Krampen has evaluated responses to stylistically different building facades for buildings having the same function, with the following gross associations :¹⁵

Presence of decoration, Heterogeneous distribution of elements	Pleasant Friendly Overdone Diverse Playful Personal	Expressive Natural Fertile Loose Irregular
Absence of decoration, Homogeneous distribution of elements	Unpleasant Unfriendly Sober Monotonous Serious Impersonal	Inexpressive Technical Sterile Inflexible Orderly

It will be clear, even from a cursory examination of such attribute terms from both sources that both categorially and logically, they constitute a wide range of attribute types.

There are a variety of ways in which attributive terms used to characterise the properties and qualities of objects can be ordered and classified. Typically this takes the form of distinctions made in functional terms, for example, whether the terms are used descriptively or evaluatively, and formally, for example, whether the terms are employed literally or metaphorically. In addition the aesthetic qualities so described can themselves be classified, for example, in accordance with whether they are experienced as internal or external (as properties of experience or properties of objects).¹⁶

Assuming that we concur roughly with Krippendorff's basic distinction between 'dimensions', 'features' and 'characters',¹⁷ the attribute terms that constitute the bulk of terms involved in the pragmatic determination of semantic content fall under the classification as 'characters'. Nevertheless it is apparent that the category is not homogeneous in respect of the kinds of relation intended in the variety of terms which are grouped within it. To take two examples from Butter's list, the term 'simple' might be attributed in respect of a quality that results from properties such as the number and relation of parts to the whole, whilst 'responsive' captures a quality of the behaviour of a whole.

¹⁵ Krampen 1989.

¹⁶ Hermeren 1988.

¹⁷ Krippendorff 1989 pp 18-19.

The general question of the characterisation and classification of attributive types has been most often addressed within aesthetics, and Baxandall has perhaps best captured the mood of the field in his analysis and critique of the distinction between descriptive and evaluative terms, and the rough ordering of the kinds of associated terms.¹⁸

Although the distinction between description and evaluation seems intuitively clear, an examination of the terms involved even in apparently clear cases shows that the distinction, if it can be made good, is a complex one. Baxandall demonstrates, for example, the degree to which descriptive language used in relation to works of art consists of property terms which are used evaluatively to draw distinctions of kind. The way in which terms are used suggests that in characterising the content of complex visual experiences, the description is not so much a pure description of content but rather a description which follows an analysis. The words used typically figure in explanation and represent thought after the visual experience rather than the content of the thing as experienced. The character of such words is that they stand in a peripheral relation to the object and comprise relatively distinct kinds, which are distinguished as 'cause' words, 'comparison' words and 'effect' words. In one sense all such terms can be thought of as effects on the viewer, expressed in different ways. In the case of 'effect' words such as 'poignant', 'surprising' and so on this takes the form of a direct expression. Indirect forms are typified by comparison words, which are often metaphorical, such as describing colour as 'resonant' or 'vibrant' and drapery as 'columnar'. The third kind, 'cause' words appear to operate through inferences made to qualities associated with the process that led to the object being as it is, such as 'assured handling', 'well designed' 'employing a frugal palette'.

Baxandall argues that if we were to restrict ourselves to terms referring directly to the physical properties of the object, then we would be confined to a very narrow range of descriptive terms comprising only the directly and objectively measurable. Indirect forms of description provide the means by which we can locate the kinds of interest that the object has for us, via the sense that we have of the contextual continuity of things synchronically and the various diachronic elements that comprise our assumption that things have a history involving both production and consumption. Parallel conclusions have been drawn in a wide range of theoretical contexts, which significantly include the philosophy of science and philosophical semantics. In the philosophy of science the difficulty in arriving at a fundamental definition of objective properties has led on the one hand to doubts about the distinction between observation terms and theoretical terms, and on the other to the viability of the objective idea of operational definitions.¹⁹

¹⁸ Baxandall 1985, 1979.

¹⁹ See for example Hempel 1958; Scriven 1962. This is Wittgenstein's point regarding the impossibility of justifying rules and rule following in terms of matters of fact [Wittgenstein 1972, Kripke 1982].

In philosophical treatments of semantic issues generally the restrictedness of the class of genuine one-place predicates has been recognised and the implicit comparative of many terms taken to be of this form in natural language brought out in analysis.²⁰ In many cases the problems involved in sustaining semantic accounts in terms of simple predication and the assignment of singular properties have restricted predication to exact metrical properties (and colour words), with other forms of 'adjectival' construction distinguished as 'attributive'.²¹ The implicit comparative and contextual nature of property and quality attribution is brought out in all these fields, and in different ways explicated broadly in terms of operational constructs.

Hermeren, for example, classifies attributive types on a similar basis to Baxandall, but using a finer meshed taxonomy. In the case of 'qualities' for example he distinguishes between reaction qualities, emotion qualities, behaviour qualities, gestalt qualities and taste qualities. The essence of the distinctions made lie in the recognition that in each case the reference of the quality term is made in respect of, or relative to, different aspects of the object or its indirect parallel. Thus in the case of typical reaction quality terms (R terms) such as 'funny', 'moving', 'frightening', the assignment of quality is made relative to the reactions of the perceiver. The logical force of the quality term is brought out in the fact that attributions such as 'X is funny' licenses inferences to parallel statements such as 'Someone would be amused by X'.²² The general sense of the term and the licensed inference is that they are both dispositional and normative.²³

Other quality kinds have distinct references and license different inferences. Thus emotion quality terms (E terms) such as 'sad' or 'cheerful' are attributes of objects which do not license direct inferences to the reactions of the perceiver.²⁴ The common assumption is that since it is people that experience emotions rather than objects, such terms are being used metaphorically in this kind of quality attribution. Unpacking the metaphor commonly takes the form of asserting that sad people and sad objects share certain definable

²⁰ For example predicates such as 'tall' 'large' 'heavy' which logically require relativisation to two place relations such as 'taller than' and 'heavier than'.

²¹ Platts 1979 pp161-189, for a discussion of the predicate-attributive distinction and related issues.

²² Hermeren 1988. Clearly this is not an unrestricted license, in the sense that 'someone' would have to be someone of the right kind. The application of the term is both individually and culturally relative. It is clearly not necessary that any given viewer confronted with a 'funny' object will be amused, both because within a given cultural framework what amuses you may not amuse me, and because the more general sense of what counts as amusing differs from culture to culture. Nevertheless it is a necessary, but not sufficient, condition for something to be counted as funny that someone be amused by it.

²³ Statements such as 'X is funny' are not simply or even primarily autobiographical but have the sense that typically people with sufficiently similar 'forms of life' (to use a Wittgensteinian term) would find it amusing in normal conditions. The sense of 'would' is subjunctive rather than imperative, and the assignment of a disposition involves recognition of the appropriateness of having the disposition.

²⁴ It is not a necessary condition for something to be counted as sad that someone be saddened by it. The relation is a more complex one.

objective characteristics.²⁵ However it is by no means clear that this analytic sense captures the logic of the process. It has been argued, for example, that our perception of emotion qualities is direct rather than analytic; that we experience the sense of sadness in a thing and may (though not necessarily) be able to analyse the content of the experience in retrospect by the relative association of objective properties.²⁶

There are a number of different underlying questions submerged in these issues. In the first place there are semantic questions such as why we use the terms that we do use to characterise experience of objects. Secondly there are ontological questions relating to just what is being asserted about what things exist when we apply such terms. Thirdly, phenomenological questions regarding the relationship between the attribution of qualities to objects, their attribution to other people, and the quality of our own experience.

Product semantic accounts share the operational and contextual sense of attribution and in common with the above accounts, effectively restrict their compass to questions regarding the semantic value and application of terms relative to properties possessed by products. It can be argued that in so doing, a crucial element in the nature of our experience of objects is bypassed - the 'feel' of the experience. In traditional accounts of the design process and user interaction, this could be excused, since the process is not articulated in terms of the ground level cognitive construction of meaning relations, but rather in terms of explicitly normative and objective analytic criteria. Product semantics, however seeks to ground the design process in a replete model of what it is involved in our construction and use of mental representations of objects, and in that context it is by no means clear that the assumption that these are restricted to the conscious and analytic use of attributive terms, is warranted.

Affective Attribution

There is little doubt that an important and pervasive element of our engagement with the world consists in committing what Wittgenstein termed 'category errors'.²⁷ I punish the stone that has tripped me up by kicking at it; Basil Fawlty thrashes his car in anger with a branch when it fails to start;²⁸ the silversmith suffers the loss of a favourite hammer like a lost limb or a friend. We are prone to treating the physical world and the objects within it as though they were animate, or at least as though one could apply intentionality and

²⁵ Bouwsma 1959; Hospers 1965. The general sense of these accounts is that there are a family of characteristics (often expressed as choices between polar pairs such as slow/fast) which can be applied equally to people and to objects. The parallel with the semantic differential method will be clear [Osgood et al 1967].

²⁶ Heremeren 1988 p15.

²⁷ Wittgenstein 1972.

²⁸ Graves 1988.

emotional content to them, and at the extreme giving them a status compatible with harbouring motives and being deserving of praise or blame. Philosophically, this theme has most often been addressed in the context of the application of emotion terms to nature and natural phenomena - to account for 'brooding skies' and 'melancholy landscapes', and also in accounting for the expressiveness of works of art. Initially, we will take affective attribution of this kind as a model for the way in which we deal with the 'feel' of our experience of the world generally.

Although we do speak of 'brooding skies' it seems clear that this is not intended literally. We do not normally imagine that the sky is actually mulling darkly over some problem, since the capacity to brood is attributable only to minds or mindlikeness, and skies are not possessed of minds or mindlike properties. If the attribution is not a literal one, then how can it be construed - what are we actually trying to say. One approach might be to take a parallel stance to that which is sometimes taken in accounting for the capacity of works of art to engender feelings and emotions, and to assert that in some sense when we attribute emotion to an object or phenomenon then we are asserting that it has a quality which causes us to experience the equivalent emotion. At face value this seems to be more promising, but in such bald terms it does not appear to be an accurate construal. There are circumstances in which a direct causality of this kind clearly does not hold. An angry sky does not necessarily make me angry. It might make me angry, if for example it seems to threaten my intention for a walk in the fells, but equally it might exhilarate me, or leave me emotionally unmoved. The causing of an emotion in me, is neither a necessary nor a sufficient condition for an appropriate and correct attribution.

An alternative, which also draws on comparisons with the supposed content of works of art, would be to construe such attributions in terms of expression. A melancholy landscape is one which expresses melancholy. But in what respects can it be so said to express melancholy. The normal context for construals of this form is in the context of human physiognomy and gesture, where our understanding of the expression of emotion consists in characteristic association between facial expression or gesture and the inner emotion that is presumed to be experienced. The outward expression relates to an inner mindlike state, which is not presumed to be present in the case of landscape.²⁹ If the relation is not of this kind, then possibly it is akin to the attribution of expressive quality to artworks, where such attribution is not dependent on the role of the artist as

²⁹ Howarth has pointed out that some emotion ascriptions are made in respect of objects, which may have the quality of an 'as if' ascription of mental content, such as a child deciding that Teddy is sad, or that the man in the moon is angry. However he regards this kind of projection as distinct from the descriptive attribution of emotion to nature in the kinds of cases under discussion, where there is no underlying 'as if' supposition about the presence of a mind or mindlikeness [Howarth 1995 pp 109-110].

communicative agent, but rather on the idea that the relation in question is a derived metaphorical one.³⁰

Emotion and Mood

The characteristic philosophical account of the nature of emotion concepts, is grounded in the idea that they play an important role in the explanation of human behaviour in terms of commonsense or folk psychological theory, in the sense that some appropriate explanations of behaviour take the form of accounts which show that behaviour is appropriately motivated by emotion. I did this because I was angry, or that because I was frightened. Generally, accounts of this kind hold that emotion concepts require three explanatory elements - an inner feeling, an object of the emotion, and characteristic behaviour - which bear formal, though not causal, relations to each other. Typically, we feel frightened, we are frightened of something, and show our fear in the way that we behave. Identification of the emotion is in terms of its object and the characteristic behaviour with which it is associated - the feel of the experience is transferred to the external characterisation of the object relation.

However there are aspects of our affective lives which do not fall so easily into the characterisation of emotions in terms of their being distinguished by their objects. In this respect fear may be different from melancholy, in the sense that where the former is conceived in terms of its having an object (even an absent or unidentifiable object), the latter is often conceived as an objectless state.³¹ Such objectless states which are felt and which are associated with characteristic behaviour are often classified as 'moods'.³² Howarth employs a similar concept of mood in an account of the attribution of emotion terms to nature.³³ The gist of the account is that such affective states are those which tend to 'colour' all aspects of our perception, thought and action. They colour our surroundings. The nature of this 'colouring' is that we tend to give selective attention to the aspects and properties of our environment and surroundings that are consonant with our moods in the sense that they are perceived to afford an appropriate 'backdrop' for them. These will include aspects of the natural environment and its states. An appropriate backdrop might be defined as one which 'feeds' our mood. This can be given sense in

³⁰ See below, Section 8.3 'Metaphor'.

³¹ Although the distinction is ultimately a fuzzy one, the core or prototypical idea of fear is in terms of its relation to an object, whereas the core idea of 'gloom' relates only to the quality of the state and not to the presumption of an object. Clearly however reasons could conceivably be found for my being gloomy, and a sense of fear might be unaccountable.

³² The philosophical account is clearly parallel to the neurological account given by Damasio [see Appendix B, below]. A mood corresponds to the background level of body monitoring, which has a positive or negative emotional colour.

³³ Howarth 1995.

parallel with the analysis of emotions. Emotions are specified and given their sense in relation to their objects. Moods can be specified and given sense in relation to their backdrops. There is thus no clearly independent definition of mood in terms of which the characteristics of a backdrop can be specified, but rather these terms are interdefined in relation to their context of use and the characteristic behaviour associated with them. Possessing the concept of mood is dependent on an ability to discern different atmospheres, to generalise across the properties and attributes of things in general and establish their saliency in relation to broad classes of behaviour.³⁴

Although the interdefinition scheme has an inherent plausibility in its consonance with an intuitive sense of what it is to experience a mood and the pervasiveness of its colour to aspects of the environment, it is nonetheless problematic for two reasons. In the first place it is susceptible to the same objection as the account of emotion ascription, in that it is possible for one to perceive a mood in nature that is at odds with one's own mood. One could of course argue that this is characteristic of mood generally, in the sense that I can be aware that you are in a very different mood to me, but then one would have to allow the same in the case of emotion ascription, and more forcefully so given the greater specificity of the states described as emotions, over those states or qualities of general affect described as moods. The difference, if there is one would have to reside in some other features of these concepts.

Secondly, the sense given to mood on the above account is not yet grounded. Although it does not require a separate definition of 'mood' or 'backdrop' as a fundamental term through which the others may be defined, there needs to be some sense in the account that the regression of these to 'atmosphere' and what 'feeds' a mood, (or further to some other terminology), has some principled end.

The resolution of both problems seems to depend on there being some underlying sense in terms of which the reciprocal definition can be given meaning. In the context of philosophical analysis this might consist in showing how such meanings form a logical part of a system of thought, and in so far as their application depends on linguistic usage developed in the context of one domain and applied in another, what justifies or underlies this domain transfer. Although in the case of 'emotion' this seems to be a workable

³⁴ Howarth describes the various ways in which nature can be perceived as echoing our moods, in terms of their gross patterns of behaviour and the way in which we capture these linguistically, for example, in the parallel language of human movement and movement in nature. The language of the characterisation of moods is brought out in the account, for example in the perceived lightness or heaviness of our bodies, or in the physical characterisation of the moods of others as 'bubbly', 'prickly', 'edgy' 'cool' or 'down'. [Howarth 1995, pp115-116]. This account is consonant with the bodily schema concept of the structure of cognitive content [See for example Johnson 1987; Lakoff and Johnson 1980; Sheets-Johnstone 1990].

programme for an analysis, in the case of 'mood' it is not so clear, which perhaps suggests that philosophically these concept types may have different functions.

The structure, the explanatory function of, and the basis for explaining emotion, in the context of conceptual analysis, is clear. Emotions are type-identified by their objects. The feelings that we experience and the way we behave are in part explained in terms of, or at least relative to the relation between an emotion and its object. The emotion itself is in part explained by the characteristic relations held with objects. Moods on the other hand do not operate in a parallel way. In addition to their not being type-identified in respect of objects and therefore having an intrinsically different explanatory force, they differ in relation to behaviours and feelings. Although one might describe moods as having characteristic behaviours, it might be more accurate to say that moods are characterised by the fact that behaviours that occur in the course of them, have a particular tone or pattern. Similarly in respect of feelings, it might be more accurate to describe associated feelings as having a particular tone or pattern, rather than as being of characteristic types.³⁵ This suggests that the essential functional distinction between emotions and moods in the characterisation of behaviour lies in the distinction between explanatory and associative functions, and that whereas emotion is an object-relation reaction, mood is a pervasive qualitative state.

Thus one basis for distinguishing between the functions of such affect concept words is in terms of the distinct roles that they play in social communication. It has for example been argued that although emotions and emotion ascription have no role in the causal explanation of events, they do have such a function in relation to the social world, as an aspect of social communication and explanation.³⁶ Moods on the other hand operate indirectly in providing the background against which we expect the quality of our behaviour to be interpreted.

Expression, Affect and Representation

In the more general context of how things 'feel', removed from the extremes of emotion and mood, a parallel picture emerges. Our experience of things involves a qualitative aspect which comprises elements of both object relation reactions and pervasive states.

³⁵ The degree to which these alternative characterisations appear more appropriate, seems to depend on the 'depth' of the mood on a particular occasion. If I am 'grumpy' then the sense of this seems to be that I do what I do and say what I say in particular ways. Similarly my feeling grumpy seems to consist in the way that I construe what I encounter and what I hear. If I am 'deeply melancholic' then there may be things that I cannot face doing at all. There is the same relativity in respect of degrees of emotion, in the sense that I may continue to do things angrily for a while, and not simply be angry. There is an inherent continuity between the concepts and their descriptive use, but nevertheless there is a logical difference in their core relation to 'objects'.

³⁶ Sartre 'Sketch for a Theory of the Emotions' [See Appendix B, below].

There is a characteristic feel that things have in interacting with them, and there are also more pervasive patterns in the value that is attached to the 'feel' that they have, in the sense that classes of 'feel' have an overarching valence.³⁷

I put my hand into a 'feely' box and touch a surface. It has a particular and distinctive feel. In describing the feel to you I might describe it as 'smooth, almost silky, warm rather than cold, ...' or I might say '..its just like touching a snake'. In the latter case the explanation clearly operates through the idea of a substitution rather than an explanation. In explanation of the character of my experience I offer a substitute experience whose quality you can appreciate directly, rather than explaining the content of my experience. In the former case I offer an analysis of the components of my experience without reference to a particular experience that you can draw on. Both strategies have advantages and disadvantages. In nominating an experience for comparison, success will depend on your having had the experience and the assumption that the 'feel' of the experience for you was qualitatively similar to mine. Whilst in the case of a descriptive analysis, although abstracting properties from experiential particulars enables you to construct an experiential scenario of your own which does not depend on parity of particular experiences, the risk is loss of specificity, and the assumption remains that at some level the content of our parallel experiences is marked by qualitative similarity.

Experiences have a 'felt' quality as an essential part of their content, and although as in the case of emotion they may be type identified by their external references and by the characteristic behaviours with which they are associated, it requires the third element to complete the loop. With the exception of phenomenological theories generally, psychology has until recently avoided questions relating to the nature of affective content, principally because the necessary experimental resources have not been available, and because of the dominance of behaviourist and objectivist methodological models.

Although the more recent development of cognitive psychology adverts to inner states, the dominance of the computational model from cognitive science has constrained the objects of study to elements susceptible to representation in terms of symbols and symbolic processing. However, there is now an emerging picture which situates the system of affective states centrally in the characterisation of experience and the mechanics of cognition.

The essence of the idea is that the system of affective states constitutes a representational system, which though distinct from the representational systems associated with perceptual processing and higher order conceptual structure, both underpins and interacts

³⁷ For example there may be a particular content to the range of things associated with the feel of 'sliminess' which is shared but which can have distinct positive or negative valences. Whole classes of related feels might also be characterised with a pervasive mood-like valence.

with such systems. It is representational in the sense that it provides a real-time map of body states expressed in terms of the collective sense of how experiences feel. Its importance in terms of the development of cognitive theory is particularly related to how this representational system functions in social interaction, and how it can be perceived to be foundational for cognition generally. [Theories of affective states and their convergence relative to cognition, in the development of the idea of a representational affective function are reviewed in Appendix B].

In the context of product semantics, the significance of this developing picture relates both to the content of the framework as a whole, and the methods associated with the implementation of a product semantic methodology. At the conceptual level it is important because it changes the nature of how experiential and operational models of interaction are conceived. It does so because it shifts the emphasis in the nature of our engagement from 'knowing that' to 'knowing how'. In terms of an example, one could say that the 'pinball wizard' is able to engage operationally with the pinball machine, not simply because of a perceptual-motor system, mental models and processing, but because body states and actions are represented directly and affectively. Knowing how to play depends on affective content, the 'feel' of playing. In modelling product interaction, particularly in terms of characterising intrinsic motivation and operational cognitive models (the two key elements central to the product semantic conception), affective modelling can be argued to have a crucial role. Methodologically, the fallout also relates to the import of attributive terms both in the construction of semantic profiles, and more generally in the analysis of protocols.

Philosophically, it bears on the question of experiential priority. Product semantics seeks to ground interaction in our physical and mental representations, and does so through the concept of affordance. However, in developing a general semantic theory the explanatory import of 'affordance' is lost as it is assimilated to a top down conceptual scheme. In thus marginalising experiential content, the ideas of expression and content are roughly constrained to exemplification. Expression is the content of the product in respect of our capacity to establish its connectedness with fields constituted by things or properties, either in terms of perceptual associations (simple exemplification) or through the operation of conceptual association (metaphorical exemplification). The model for these processes, both generally within the product semantic conception of cognitive operation, and specifically in the operation of a prototype semantic scheme of categorisation, is metaphor.

8.3 Metaphor

Metaphor in its original sense referred to a particular species of linguistic device in the taxonomy of rhetoric - the classical 'structuralist' analysis of the pragmatics of spoken language.³⁸ In Aristotelian terms, for example, it referred to the range of devices used in language which involved a transfer of names from one object to another.³⁹ The transfer of the term 'metaphor' from language to other contexts was particularly facilitated by the conjunction of the rise in semiotic theory with the more general trend towards a structuralist methodology in the humanities.⁴⁰ Taken together, these strands of analytical thought created an explanatory framework in which the terms used in the analysis of language were used as the basis for cultural analysis as a whole. An early and influential example of the use of such a framework is represented in the typological characterisation of cultural forms of expression in terms of the concepts of metaphor and metonymy.⁴¹

The importance of metaphor has grown in parallel with the increasing dominance of the idea that knowledge of the world is the result of mental construction or computation - a contextually relativised working-through of the material of perception and memory in the light of established systems of knowledge and belief, in the construction of a picture of reality. Such a view contrasts sharply with the objectivist doctrines of logical positivism, for example, which argued for the possibility of precise and unambiguous description of the world through the direct mapping of the verifiable aspects of language onto the world whose structure it mirrored. If the latter view is characterised by the idea that meaningfulness can be equated with verifiability and expressed in the form of literal language, then the essential relativism of the former rescues metaphor and figurative language more generally from the realm of rhetoric, as a fundamental aspect of its forms of expression.

One key battleground on which this conceptual war has been fought is in the characterisation of the language of science, where the ideals of precision and unambiguity were presumed to be achievable. In positivist terms, equating meaningfulness with verifiability was thought to underpin both stability of reference and the bounds of sense, and thus to secure the firm criteria for the meaning of descriptive terms essential to the logic of science.⁴² However, the difficulty encountered in providing a principled distinction between descriptive or observation terms and theoretical terms, taken together with the acknowledged analogical nature of theoretical terms, undermined the notion that

³⁸ Barthes 1994 pp 11-94.

³⁹ Ricoeur 1978 pp 9-43.

⁴⁰ Ricoeur 1978; Perelman 1979.

⁴¹ For example Jakobson 1971.

⁴² Hempel 1958.

stability of reference could be secured or that sense could be so easily bounded. Literal language turns out to be not quite so literal, and the language of science co-extensive with language generally and equally relativistic.⁴³

In addition, the import of a broadly constructivist view of mental representation in cognition has raised the question of the more general function of 'metaphor' as an aspect of thought rather than simply a mechanism of language.⁴⁴

In general, the analysis of metaphor has been driven by its linguistic context, and the contraposition of the idea of an underlying conception of a sharp distinction between the literal as a fundamental form of linguistic expression and figurative language as deviation from normal usage, with the idea that no such distinction can be made, demarcates the principal approaches to the analysis of metaphor.

Theories of Metaphor

Theories which treat of the analysis of metaphor can be broadly divided into two types, which I will term 'semantic' and 'pragmatic'. Semantic theories assert that metaphor involves some form of change in meaning of the terms used in metaphorical expression, or some difference in meaning between the explicit content of an expression and the force of its expression. Pragmatic theories in contrast, hold that there is no such change in the meaning of terms, and that the distinctive nature of metaphorical expression consists in the distinction in uses to which the expression is put. The majority of theories of metaphor are semantic theories.

Pragmatic Theories

The strategy adopted in pragmatic theories is to include 'metaphorising' as a species of speech act, together with for example, 'asserting', 'lying' or 'promising'. In principle a given form of words can have an explicit content and an associated meaning which can be unpacked in terms of its truth conditions, but over and above this it can be employed in a variety of ways to achieve different ends.⁴⁵ Thus the sentence 'The wolf is at the door' can equally be used to assert a statement of fact, to lie, or to metaphorically express the fact that hard times have arrived. In using the sentence in this variety of ways however, it is argued that the meaning of the expression remains unchanged. A metaphor is a metaphor, not because of a change in meaning, but rather because it is used to produce certain effects. The relationship between a metaphor and its effect is roughly that of a stimulus or

⁴³ Miller 1979; Kuhn 1979; Martin and Harre 1982.

⁴⁴ Pylyshyn 1979.

⁴⁵ Davidson 1978.

prompt which has the potential somehow to invoke relations of similarity between things or situations. However, since the thrust of pragmatic theories is to reject the semantic import of metaphor, what is actually invoked cannot be cognitive in the sense of being propositional in character. How can this lacuna be filled? In the classical anti-semantic approach, Davidson argues that the operation of metaphor is akin to the operation of the duck/rabbit 'illusion'.⁴⁶ If I show you the duck/rabbit picture and say that it's a duck, then you may well see it as a duck, whereas if I say it is a rabbit you might see it as a rabbit. The point being that there is no proposition that expresses what you have been led to see - 'seeing as' is distinct from 'seeing that', and only the latter has propositional and semantic import. Metaphor prompts us then, to see something as another through the medium of a literal statement, rather than through the recognition of some truth or fact embodied in a change in meaning of the literal statement.

However, the example used to articulate the distinction between 'seeing as' and 'seeing that' which is the crux of the theory, masks the role of conventions in doing either. The particular example offers us a picture which can be seen in two ways, but which cannot be seen as both simultaneously, even though we may know that it can be seen in two ways. The focus is on two distinct alternatives of 'seeing as' - we may see it as a duck, or we may see it as a rabbit - which on the face of it precludes the possibility of 'seeing that' it is a duck or 'seeing that' it is a rabbit.

The relation of possibility, which appears to stand on its own is in fact built into a context in which what one is seeing is a set of drawn lines which is interpreted within the framework of conventions for reading drawings. Within that framework the distinction between seeing a set of lines as a rabbit, and seeing that the set of lines is a rabbit, is of a different kind. The more so if we accept explicitly that we are in the realm of drawing conventions, and express the distinction as that between seeing a set of lines as a drawing of a rabbit, and seeing that the set of lines is a drawing of a rabbit. In the latter case it seems clear that this is akin to saying that we see that it is a rabbit drawing, in contrast to seeing that it is interpretable as a rabbit drawing (implying that it is by no means clear that it is a rabbit drawing).

The moral to be drawn from the example is not that there is a distinction to be made between a perceptual process without benefit of cognition, and a cognitive process involving perception, but a difference in kinds of cognitive process relative to some operative framework of conventions. Nevertheless, the underlying logical point of the theory appears still to have some substance. For a metaphor to do any linguistic work, the content of its terms must in some sense be determinate and distinct, and this is perhaps

⁴⁶ Davidson 1978 pp 44-45.

best expressed by the idea that they preserve what literal meaning they have in the context of metaphorisation.

Leaving aside the chosen visual metaphor for metaphor, the pragmatic account of metaphor rests on the commonly made distinction between meaning and use, asserting that the distinguishing marks of metaphor lie outside the realm of meaning and within the sphere of use. In order to unpack this, we need a better sense of what constitutes these different aspects of linguistic expression. In an informal way some of their sense can be discerned in the preceding discussions, for example, in the distinction between sentence meaning and utterer's meaning.⁴⁷ However within the sphere of language use itself there are also important distinctions to be made, particularly in respect of the fundamental classification of uses into illocutionary and perlocutionary act-types.⁴⁸ This distinction is of particular relevance here, since it is essentially a demarcation between forms of use with semantic import and those without. Illocutionary acts are type-identified, and distinguishable as tokens in terms of the fact that different semantic contents are involved.

In other words a speech act such as promising is a distinguishable type in terms of its form, individual promises differing in what is promised in consequence of the different meanings employed in the terms of the promise. Perlocutionary acts on the other hand refer to the different uses or effects that can be produced by the same sentence, in that the same promise may for example deceive, frustrate, anger or intimidate.

The relationship between illocutionary and perlocutionary use is complicated by the fact that perlocutionary effects produced by illocutionary acts are in principle underdetermined. The fact that I may promise something in order to placate you, is insufficient to ensure that you are indeed placated - you might well be infuriated. Whilst this is a commonplace of life and language, the consequence for a pragmatic theory of metaphor is that it can be argued to constitute a refutation of the position. If, as pragmatic theorists contend, metaphorical expression is a non-semantic aspect of use then it is consigned to the realm of perlocutionary effects. However since these are not fully determined by the content of the illocutionary acts that generate them, whether an expression counts as metaphorical will depend on whether perlocutionary objectives are met. This would mean that if I used an expression such as 'the rector is a hyena' to indicate his sneaky, opportunistic and cruel character, then this would only count as a metaphor if it succeeded in its perlocutionary objective - if it succeeded in prompting you to see the rector in that light. In the event that your firm view that the rector is an open, honest and kind man remains unmoved, then my expression cannot be metaphorical.

⁴⁷ See meaning pp 213-216 above.

⁴⁸ See above, pp 209-210.

But clearly, my use of the expression is squarely metaphorical and not literal, and generally the relativisation of speech act-types to the meeting of perlocutionary objectives will not work, and metaphors must apparently fall into the illocutionary category, which as we have seen is marked off by its dependence on semantic difference.

Semantic Theories

Semantic theories of metaphor predominantly take the form of analyses which purport to show that metaphor is implicit simile, or that metaphorical understanding rests on comparative judgements of similarity.⁴⁹ Searle has advanced a series of arguments to show that logically there is no basis for the claim that a metaphorical assertion is an assertion of a similarity relation, even though similarity is involved in the production and understanding of metaphor.⁵⁰ The essence of these arguments is that there are clear cases of metaphor where the basis for a comparison is absent. In the case of 'Sally is a dragon', the statement does not entail literally that $(\exists x)(x \text{ is a dragon})$, and generally it is the case that metaphorical assertions cannot presuppose the existence of an object of comparison. In addition it can be shown that the truth conditions of metaphorical assertions and their literal paraphrases are not necessarily equivalent. In the case of 'Richard is a gorilla' for example, the metaphorical assertion can remain true even when the basis for the inference to similarity turns out to be false.⁵¹ Searle concludes that similarity does not therefore function as a component of meaning. If the comparison theory of metaphor is viewed in Fregean terms, then its failure to provide an adequate account of metaphor rests in its failure to explain metaphor as a relation between references.

The principal alternative semantic view of metaphor - 'interaction theories' - attempt to articulate an account in terms of a relation between senses and beliefs associated with references, rather than between references themselves.⁵² The difficulty with this approach is that it rests on the idea that metaphorical meaning is engendered by the interaction between an expression which is used metaphorically and surrounding literal expressions. The implication of this is that all metaphorical uses must be contained in sentences which contain literal uses, and this can be shown to be trivially false in constructed cases of

⁴⁹ Whately quoted in Black 1962 pp 35-36. Alston uses the notion of similarity to explicate the idea of figurative language generally, of which metaphor is identified as a special case. [Alston 1964]. Scheffler argues for an explicit characterisation of metaphor as an assertion of similarity on the basis of an inscriptionalistic account of ambiguous and figurative uses of language. [Scheffler 1979]. Miller argues that metaphorical statements should be analysed in terms of properties held by the terms of metaphor, which form the basis for comparative similarity between the terms. [Miller 1979].

⁵⁰ Searle 1979b pp 92-123.

⁵¹ Searle 1979b pp 102-103.

⁵² Richards 1936; Black 1962.

mixed metaphor.⁵³ In addition it can be shown that metaphorical meaning, in the sense of speaker's meaning, is not necessarily the result of any interaction between the terms of the expression, since it is possible to construct alternative utterances which make the same metaphorical assertion.⁵⁴

If similarity theories are inadequate because they pin too much on the relation between references, they nonetheless capture something of our intuitive sense of the working of metaphor in the idea of suppressed simile. The continuity of the idea of 'Man is a wolf' with the idea that 'Man is like a wolf in certain unspecified ways' remains strong. Similarly although the articulation of interaction theories fail logically, and cannot demonstrate the necessity of interaction between metaphorical and literal elements, they nonetheless draw the inference from the failure of similarity theories, that the production and understanding of metaphors does not operate at the level of references, but rather in relations holding in respect of intentional elements such as beliefs.

Cognitive Reconstruction

A semantic theory of metaphor which is based on the underlying intuition of similarity theories, but which attempts to remedy the inherent defects, and to reconcile the similarity view with aspects of the interaction view, has been developed by Searle. The approach taken draws on the distinctions which we have encountered above in considering pragmatic theories, namely the distinction between sentence meaning and speakers meaning. In considering a variety of examples of metaphorical expression from the point of view of the kinds of judgement that are involved in their interpretation, he concludes that there are at least three distinct stages. The first involves a strategy for deciding whether seeking a metaphorical interpretation is justified, and he argues that this takes the form of looking for an utterance meaning that differs from sentence meaning in cases where the utterance does not work if taken literally. The second comprises a strategy for generating possible alternative interpretations, and this consists in looking for possible grounds of similarity between the terms of the utterance expressed as values of the metaphorical term and distinctive features of the subject to which it is attributed. Thus on the assumption that where the sentence is given by 'S is P' and the utterance meaning by 'S is R', this would consist in finding possible values of R by looking for ways in which S might be like P, and looking for well known and distinctive features of P in order to establish ways in which S might be like P. The third stage consists in narrowing down the possible range of interpretations, through examining the subject term and determining which of the interpretations are likely or possible candidates as properties of the subject.

⁵³ Searle 1979b, p 104.

⁵⁴ Searle 1979b, p 104.

This account of metaphor is essentially a rational reconstruction of cognitive processes, expressed as inference patterns, which underpin the ability to understand metaphor. Its relation to the previously discussed theories of metaphor is revealing, in that the core of the analysis provided by similarity theories is essentially concerned with questions that relate to stage two (seeking grounds for similarity), whilst interaction theories focus on the kinds of questions that are represented in stage three (selecting relevant grounds).

Semiotics and Metaphor

A conception of metaphor, which arrives at a similar juxtaposition, is rooted in the semiotic analysis of language structure based on the co-operation of paradigmatic and syntagmatic relations in constructions of meaning. In terms of a psycholinguistic rather than a logical characterisation of speech acts, this can be expressed simply by saying that every speech act necessarily involves simultaneous processes of selection and combination. Elements making up a speech act are selected from sets of parallel items which are combined together according to the relevant rules and conventions (and therefore involve the consideration of relations of similarity and relations of contiguity). Although all discourse involves patterns of both such relations, either similarity relations or contiguity relations can gain the ascendance in particular uses of language and forms of discourse. Where similarity relations predominate, discourse is metaphorical, where contiguity relations predominate, discourse tends to be metonymic.⁵⁵

The significance of this in the development of concepts relevant to product semantics lies in the extension of this linguistic notion to encompass cultural products generally. Jakobsen, for example, argues that in the case of literature 'lyric' is metaphoric whilst 'epic' is metonymic; in fine art, that Surrealist painting is essentially metaphoric whilst Cubism is metonymic; in the genres of film, that montage is metaphoric whilst close-up is metonymic. Although Jakobsen's observations do not form part of a sustained case, his intuition has been assumed to be justified by the semiotically consonant assumption that all facets of culture are kinds of language and therefore underpinned by paradigmatic and syntagmatic relations.

This assumption however, if taken with the previously noted theories of linguistic metaphor, can be construed as an argument against the possibility of the extension of 'metaphor' to non-linguistic contexts. This is so because Jakobsen's arguments appear only to be compatible with a pragmatic rather than a semantic account of metaphor. The basis of this construal is that Jakobsen asserts that the above processes of selection and combination characterise all speech acts, and the character of speech acts is that they are

⁵⁵ Jakobsen 1971; Bredin 1984, 1988.

all to a degree metaphorical.⁵⁶ Given this continuity in character between speech acts, it is difficult to see how a semantic distinction between metaphorical and literal expressions, which are the backbone of semantic theories, can be sustained. On the other hand it is also difficult to see how a pragmatic interpretation of the position could be articulated, other than on the grounds that metaphorical meaning has been eliminated through its assimilation with meaning generally.⁵⁷

There is then no perspicuous direct application of linguistic theories of metaphor to cultural products generally. However it is possible to approach the question of metaphor in the case of cultural products in a parallel way. Rather than accepting an analysis that has for one reason or another been proposed and defended in the case of language, and applying this to cultural products, it is possible to approach the analysis of cultural products directly through analogy with the methodology applied in the case of language. Thus rather than starting from the idea of a sentence or a speech act, one could approach the cultural product in parallel terms. In the case of language and those cultural products primarily intended to operate symbolically, the key terms are reference and meaning, and the key processes similarity and contiguity. What is involved in the general case of cultural products ?

Visual Metaphor/Artefact Metaphor

The notion of 'literal meaning' that underlies most analyses of metaphor can be argued to have a counterpart in the realm of artefact meaning which is roughly equivalent to something like artefact type. An artefact is recognised as something in so far as it can be categorised as being a thing of a certain kind. As such it is essentially a thing of convention and of culture in that to be recognised as being of a certain kind it must conform to certain criteria held characteristic of things of that kind. Since the greater proportion of artefacts are type-identified by reference to their functions, the 'literal meaning' of artefacts is underpinned by their functional identity. In semiotics, this underlying sense or lower layer of signification is given by the idea that artefacts denote their functions. However the relationship between signifier and signified in denotation of this kind, which in its expression gives all the appearance of a natural and necessary

⁵⁶ In considering Jakobsen's position, Bredin argues that 'Jakobsen clearly asserts that selection and combination are fundamental in all speech acts : "in normal behaviour", he writes, "both processes are continually operative. Selection is the process that produces metaphors, so it follows that there is a "metaphorical" character to all speech acts.' [Bredin 1988 p3] However the conclusion cannot be drawn from this argument per se. The fact that selection is present in all speech acts, and selection is the process that produces metaphors, does not imply that all speech acts are metaphorical, as it is conceivable that selection produces things other than metaphor and metaphor could in principle be produced in ways other than selection. However it is clear in Jakobsem's account that the selection process in speech acts involving the consideration of similarity relations is taken to be co-extensive with metaphor.

⁵⁷ Bredin 1988.

relation and which is indeed thus embodied in 'functionalist' theory,⁵⁸ is in fact of an artificial and abstract kind. This is the case because there can be no necessary relation between a function and a particular form.⁵⁹ The denotation of function in this sense is rather an expression of the cultural conventionality of artefacts - a conventionality that is arrived at through customary association, and which is subject to change. An artefact denotes its function through the association of formal properties with the intentionality captured in the idea of function, and so establishes a more or less stable cultural identity.

At a given time in a given culture, an artefact kind is associated with a formal identity, which in terms of product semantics is presumed to constitute a categorial prototype for that artefact kind. The fluidity of formal expression is constrained by the particular shape of the semantic space constituted by the topological relationships holding between relevant prototypes. In so far as the class of relevant prototypes is relatively large and inhomogeneous, the range of formal properties available and their links with other artefact classes will tend to be rich and diverse. Conversely, if the class of distinct prototypes is relatively small and homogeneous, then the formal range and associations with other classes will be correspondingly restricted. In either case certain formal properties will become predominantly associated with the functional identity of the artefact kind.⁶⁰

In addition to the formal properties with functional type-associations, all artefacts have formal properties which fall outside this category. Some of these formal properties will establish continuity with the prototypes of other artefact kinds, and some will by extension come to constitute classes of trans-kind formal identities of the type that we might characterise as 'styles'.

One way of construing these processes, which in product semantics are generally held within the framework of categorisation, is through an analogy with linguistic metaphor. If the core of artefact identity lies in functional type-association - the equivalent of 'literal meaning' - then the additional layers of meaning acquired by artefacts can be said to operate through an equivalent to metaphorical extension.⁶¹ In terms of the analysis of metaphor in linguistic contexts, these processes can be seen to be contiguous with the relationship between metaphor, vagueness and ambiguity.

⁵⁸ Theories having the underlying contention that 'Form follows function' [De Zurco 1957].

⁵⁹ See above, Section 3 'Function'.

⁶⁰ The formal properties constituting the association need not bear any particularly relevant relation to the function of the artefact, but are simply the features through which the artefact is identified and thence linked to its functional type identity. A number of the formal features of products emanating from the Bauhaus or De Stijl, for example, were strongly associated with the idea of industrial manufacture even though they were in fact unsuited to industrial production and made using traditional craft workshop processes.

⁶¹ Athavankar 1990.

The inscriptional analysis of terms, for example, demonstrates that the principles of synonymy and ambiguity can be given expression by reference to the relations holding between terms (and replicas) and their extensions, and that certain categories of ambiguity underpin the idea of metaphor.⁶² The idea of unambiguous meaning or reference operates as an ideal formal type which it can be argued is never met in practice, all terms being to some extent and in some respects ambiguous.

In the case of the formal content of products, the condition of ambiguity might appear to be the norm, if only because there is no necessary relation between formal content and identity. Indeed one might argue on this basis that the application of the idea of ambiguity is inadmissible, since there can be no clear grounds for the expression of unambiguity. However the problem here is no greater than that for language, which can also supply no guarantee for continuity of reference or the preservation of meaning. Thus although no element or collection of elements of the formal content of an artefact unambiguously denotes a type identity, the idea of an ideal of formal denotation is both understandable and usable, and is most closely approached in the central members of prototype semantic categories.

The underlying model in both contexts is that of a basic condition in which there is a lack of discrimination - an undifferentiated order of things (or viewed in another way, a proliferation of the similarities among things). The development of discrimination takes the logical form of a necessary restrictedness in the range of bases for similarity that are detected and responded to, setting the biological agenda in terms of the affordance character of the organism. A similar process occurs at the cultural level, where the range of relevant bases of similarity are for example embodied in the predicate structure of language.⁶³ Nevertheless, the undifferentiated order continues to exist, and continues to form part of what it is to experience. If the similarities that are structurally embodied at these levels (biological and cultural) are what constitute literal meaning at these levels, then metaphor is the way in which we use that embodied structure to represent the flux that is part of our experience. The particularity of experience is grasped by exploiting the inherent fluidity of sense and reference.

⁶² Scheffler 1979. Scheffler in attempting to define a logical and semantic basis for the ideas of ambiguity, vagueness and metaphor adopts an 'inscriptional' approach (which works in terms of individual tokens and individual things that may be denoted, and excludes types, classes and universals, for example). The advantage of the approach is that it avoids a commitment to any particular theory of meaning. Scheffler identifies three fundamental sorts of indeterminism in the relation between individual inscriptions and their denotations which he terms 'E-ambiguity', 'I-ambiguity' and 'M-ambiguity'. E-ambiguity refers to the case where two tokens are identical (replicas of one another) but have different extensions; I-ambiguity refers to the case where a token can have any one of a number of alternative extensions; M-ambiguity refers to the case where a token has divergent extensions inherited from replicas with different extensions. This latter represents the bare bones of metaphor.

⁶³ Moore 1982. Applying the same predicate to different things is a way of judging them to be similar in a given respect.

8.4 Metaphor and Expression in Product Semantics

If the preceding observations are brought together, then it is possible to derive an overall position in product semantic terms. In Athavankar's categorial model, core identity is established at the 'basic' level and essentially through the relative stabilisation of product kinds and their associated formal properties. A particular product occupies a particular place in a fuzzy class consisting of an ordered set of exemplars. The central members of this spatially ordered set 'control' the product paradigm and the core identity for that product kind. Further particularisation occurs through the operation of abstract trans-kind identity, by association via superordinates, and this process is conceived along the lines of metaphor. The particular spin given to the idea of metaphor in this context is that it is an interactive cognitive operation in which visual features or properties of a product are linked with those of products of other kinds, or with more abstract values embodied in the various forms of superordinate category. Core identity opens out into the network of identities, and in terms of an approximation to interactive theories of metaphor.

Vihma conceives the product as the mental construct which results from the associations established relative to other things experienced and known. Since the conception of language and meaning relations is semiotic, the various associations will identify the 'product' as a distributed location in a space whose axes consist of paradigmatic and syntagmatic relations. Although in principle the entire spatial network is interdefining (it is formally holistic), in practice parts of the overall space will be topically grouped and relatively independent. Some of the nodes in a relatively independent local region of the space will allow access to other spaces through formal, conceptual or linguistic contiguities. The process of linking different local regions via their common nodes is equated with a metaphorical process. The parallel with Athavankar's categorial product model will be clear, and it can be regarded as a special case of Vihma's more general scheme. Athavankar's model, which is aimed specifically at the nature of product characterisation, assumes the existence of a general network of meaning relations expressed for example within the predicate structure available to us, and derives a model for the particularisation of product identities which depends on the process of linking relatively independent product domains via attributive nodes.

In Vihma's scheme there are at least two levels of structure. At ground level, the process of establishing meaning relations generally is conceived along the lines of differentiation within denotative and experiential fields. At the level of products, discrimination between domains is assumed, and product particularisation follows the general pattern of Athavankar's categorial scheme. The link between levels of structure is not spelled out, but is clearly a function of the operation of normative conventions in the socio-cultural

sphere. These conventions are of two main kinds - syntactic and pragmatic. The broad context for meaning relations at the conceptual level is established in the operation of pragmatic conventions, which are essentially the expression of the regularities characterising a particular form of cultural life. Syntactic conventions are expressions of the rule structures operative within relatively distinct spheres of activity within cultural life, and are essentially concerned with specifying the lexicon applying in a given sphere and the compositional rules that allow the lexicon to create structures which are meaningful in respect of pragmatic conventions. The element which mediates between these take the form of schemas, frames and schematic structures generally.

The idea of expression is linked to the general structure and to metaphor in the following way. Product content can be unpacked in a variety of ways, but in each case the idea of the particularity of content is observer relative. What products express is equivalent to the associations that can be made in respect of them. In product semantic terms generally this is in turn equivalent to the fields that they can exemplify, and these are conceived in two main ways - the exemplification of properties, and the exemplification of kinds. Experiential exemplification is not treated directly as a possible way in which our engagement with products might be representational. Instead the richness and complexity of engagement is analysed in terms of the class of associations which consist in inter domain links - metaphorical exemplification operating through properties and kinds. At the methodological level, this is reflected in the characterisation of products in terms of networks of attributive terms.

Part C Synthesis

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9.1 Introduction

Part C - Synthesis

The contention of the dissertation is that the product semantic framework of concepts and relations provides a substantive basis for the characterisation of user-product interaction. The nature and genesis of the product semantic account and the analysis of the concepts deployed were explored in Part A 'Stagesetting' and Part B 'Analysis'. In the sections constituting Part C 'Synthesis' it is argued that the all-through explanatory framework thus constituted is inconsistent if articulated in terms of the commitments and conceptual content jointly adverted to in the product semantic account. A proposal is advanced for the reconciliation of conflicting commitments, and the implications of the product semantic approach are considered in respect of design theory, and semantic theory and cognition. The structure and content of Part C is as follows :-

In section 9 'Concepts and Relations in the Framework', the core explanatory argument structure of the product semantic account is re-established (section 9.2 and summarised in section 9.3) in the light of the analysis of concepts (drawn from sections 3 - 8 above). Questions relating to the consistency and coherence of concepts and relations are addressed thematically relative to the explanatory argument structure, and the principal inconsistencies in the framework identified (section 9.4 and summarised in section 9.5).

Section 10 'Reconciliation', addresses the principal inconsistencies in the framework on the assumption that the core commitments in the product semantic account are retained (for example - the commitment to a cognitive and experiential account of user interaction, psychological individualism, a contextual account of meaning, and a representational conception of mental states). A conceptual re-orientation is proposed, which draws on elements of the analysis of concepts and the explanatory argument structure. The proposal argues that the inconsistencies can be resolved by identifying distinct explanatory orders and clarifying the different senses of concepts associated with those orders.

Section 11 'Implications', considers the implications of the product semantic account and the proposed conceptual re-orientation for the two principal areas on which it has a direct bearing - design theory and methodology, and semantic theory and cognition.

The concluding statement of the argument of the dissertation is contained in Section 12 'Conclusion', together with an indication of the limits of the study and directions for further research.

Section 9 'Concepts and Relations in the Framework'

The present section addresses the relationship between concepts, and their individual and collective roles in the constitution of the overall product semantic framework.

Section 9.2 and 9.3

In section 9.2 the framework is re-introduced in the form of a recapitulation of the main steps in the rationale for the product semantic approach, and expressed as an explanatory argument structure which identifies the role of concepts in the explanatory hierarchy, which is then summarised in section 9.3.

Section 9.4 and 9.5

Given the background of this explanatory argument structure, and the analysis of concepts drawn from preceding sections (section 3 -section 8), the principal questions relating to the consistency and coherence of elements of the framework are addressed thematically in section 9.4, in terms of the concepts used in product semantic accounts. The core of the section consists in a sequence of discussions in which the inconsistencies resulting from the juxtaposition of framework elements and analysed concepts are identified. These are summarised in section 9.5.

9.2 The Product Semantic Framework

In order to comprehend the overall framework of product semantics, the present section recapitulates the broad thrust of the stages in the development of the product semantic argument structure, drawing on the reconstructive analysis of concepts contained in the preceding sections, prior to a thematic consideration of their viability (section 9.4).

Product Legibility

The product semantic approach is based on a cascade of observations regarding the nature and content of user-product interactions per se, and their implications for the design process. In developing the approach, the problem of characterising user interaction is first addressed by noting the form that it takes in what is taken to be a pervasive and central conception of design - that design is function-centred. On this view, products are taken as embodying a conception of use, in the sense that patterns of use are projected relative to product content expressed in terms of functional analysis. Which is to say that the parts, features and properties of products are to be understood in terms of their roles in the functioning of the product in interaction with the user.¹ The corollary is that products are taken to embody particular operational procedures, and to embody indicators intended to be associated with the elements of such procedures. The implication is that there is a correct way (or ways) to use the product, and that correct use is associated with an operational conception which is linked to the formal parsing of the product.² There is a way in which the formal content of the product is intended to be read. A conception of this kind locates the basis for analysis in the intentionality of the design process. It also frames the problem of user understanding in terms of the success (or failure) of formal content in its indicative role in communicating procedures (where procedures are understood in terms of the product's functional organisation). In semantic terms the problem consists in the effective communication of functions, using the resources of the formal content of products.³ Given that there is no perspicuous compositional language of products evident in the mapping of roles/functions to features, methodologically the idea is deployed empirically on a case basis in order to derive general rules and guidelines for product organisation and content with the aim of maximising error reduction. This level of approach is typified in the idea of 'product legibility'.

¹ The switch has the form that it has, is located where it is, is red, and so on 'because'. The 'because' may be affective and qualitative, extending the conception of 'function' beyond simple causal relations.

² Which is not to say that the association between the operational procedure and the formal parsing is necessarily evident to the user. Logically, the association could be entirely arbitrary but storable, and if storable could provide the basis for a set of instructions which could be learned by the user.

³ Semiotically it is a starting point for the idea of a product language which is rooted in the notion of the possibility of a systematic mapping of product content (features and properties) to a structuralist conception of roles in the functional economy of products.

This is interpreted in a design context in terms of the problem of determining in what respects and to what extent intended procedures are evident to the user, from the formal content of the product. Product legibility essentially aims at the disambiguation of formal content relative to a procedural/functional model, and approaches this in two main ways - a) effective discrimination in the elements of functional/procedural and formal orders; b) continuity and consistency in form/function/procedure relations across relevant ranges of products. Given this background there are two broad ways in which products can fail in respect of user-product interaction - they can fail because procedures are themselves inappropriate and they can fail because procedures are opaque.⁴

However even if one assumes that effective discrimination and relational consistency are achievable, there is an in-principle limit to disambiguation, since no product can be specified completely. The possibility therefore exists that some feature or property of the product will not be captured in terms of the analysis, but may still be available to the user as the subject for an interpretation. There is no necessary inference from a parsing of the product from a design standpoint to a parsing of the product from a user standpoint.

Although 'product legibility' as an approach establishes the idea of communication as a key context for exploring user interaction, it falls short of the product semantic mission in a number of ways. In the first place it is empirical rather than theoretical, providing important pragmatic guidelines for product organisation, but failing to provide a substantive basis for understanding and explaining user interaction. Secondly it carries the implicit assumption that the starting point for gaining such understanding lies with the functional organisation of the product conceived from the design standpoint. Thirdly it assumes an equivalence or correspondence between functional and procedural orders - the question of 'how it is used' is not distinguished from the question of 'how it works'.

User Perspective

The clue derived from the 'product legibility' approach, which fuels a more general and theoretical conception in product semantics, rests in attempts to understand the basis for the patterns that emerge empirically in the co-ordination of formal content with the elements of procedures. Although in principle there is no necessary connection between formal content and procedural implication, in practice some choices of content (and their organisation) favour a particular procedural understanding - some readings come more naturally to users than others. Similarly and more generally although signification is in

⁴ In other words the formal parsing is ambiguous with respect to the procedural/functional cascade. The point here is not that the relation falls short of transparency, but rather that there is no consistent basis for a one-to-one correspondence between features and procedural moves.

principle arbitrary, interpretation of formal content tends to cluster in particular ways.⁵ This suggests that the stance of the user is pre-organised in significant respects.

Acknowledging this, shifts the ground of the analysis in a number of important ways. In the first place it denies the priority of the design perspective. If there are pre-existent patterns in user interaction embodied in the stance of the user (if there are 'natural' preferences and procedures), then there are sufficient grounds for an argument for approaching the parsing of products from the perspective of the user, or at least for loosening the grip of functional parsing from a design perspective as the basis for specifying formal content. In addition it suggests the need for a clean break between functional and procedural orders - viewed from a user perspective, functional order can be argued to be irrelevant.⁶ The objection to the idea of a functional order (which is how product semantics interprets function) and the preference for a procedural order, matches the idea that our engagement with the world is fundamentally operational (do this in order to get that, use this in order to accomplish that, etc.).

But beyond this shift in the locus for the definition of product content, there is the further consequence, noted above. The idea of 'naturalness' in the relation between content and procedure masks the possibility of 'naturalness' applying directly to the procedures themselves. The problem is not restricted to the question of effective communication, but is rooted in the preference for some procedural patterns over others, per se.

In seeking a theoretical basis and explanatory ground for user-product interaction, the product semantic approach therefore drives down to an account of human interaction with the world generally as the source for our preferred patterns. At a prosaic and physical level, for example, there are sequences of bodily movements which are more natural to us than others in virtue of our physical constitution. The size and disposition of treads and risers in a staircase will either fit our natural movement or not, and allow or impede free

⁵ At the lowest level one might point to the statistical preferences represented in motion stereotypes as typifying procedural preferences relative to formal content and organisation, and the various forms of grouping in the functional and affective interpretation of colours as representative of significatory clusters.

⁶ One element of the historical critique provided in product semantic accounts consists in demonstrating how the arrival of electronic products and the inoperability of the mechanical paradigm is indicative of the logical separability of functional and procedural orders. This is also the point at which conceptual confusion over the status of 'function' enters the picture. Functional analysis can in fact be applied in the case of both the order of the functioning of the product and the procedural order. I can describe a vending machine in terms of the electro-mechanical operation of a cascade of sub-systems which results in the release of the chocolate, and one way of doing this would be in terms of a functional analysis of its parts. I can also describe the procedure for getting the chocolate in terms of the interaction with the machine (putting in the money, pressing the button, and so on). The procedural description can also be expressed functionally - the function of the button is to select and release the selected chocolate. In both cases the assignment of function specifies sets of counterfactual conditionals consequent to the assignment (if I don't press the button then the chocolate won't be released; if the tripping lever is not engaged with the cam then the chocolate won't be released). Function does not define and is not attached to a particular order, but is applicable in the case of a variety of orders of description.

flowing movement. In addition the degree of bodily fit (or lack of it) will make differential demands on our attention and concentration. The degree of physical fit will have psychological repercussions. Similarly, there are preferred perceptual patterns and preferred conceptual patterns (patterns that are more readily perceived and patterns that are more readily deployed) and these will have repercussions on our physical ability to act. In order to understand user-product interaction in these terms, we need to comprehend the basis of our engagement with the world as a physical, perceptual and cognitive complex.

User Models and Affordance

The expression of this complex is initially articulated in two main ways in product semantic accounts. Product encounters are typically articulated in terms of affordance, which emphasises the direct and holistic nature of interaction. We directly experience things both in terms of their potentiality and as the things that they are. We experience the world in terms of the opportunities that it offers, and the identity of things in the world is, in part, parsed in terms of those opportunities. Affordance as an ecological concept emphasises the contextually bound nature of interaction and demonstrates that the structure and content of perception can be understood in terms of the co-ordinated development of perceptual systems, motor systems and the environment.⁷ As such it is an experiential concept which derives its explanatory force from evolutionary theory.⁸

The complex is also articulated (primarily in terms of what the user brings to the encounter) in the idea of a user model.⁹ The user 'constructs' a model of the product, in interaction with it, which is operationally useable.¹⁰ In constructing the model, physical, perceptual and cognitive patterns embodied in the stance of the user are applied to, and interact with, the content of the product present in the interaction. The construction is what the user 'makes' of the interaction, and from the perspective of the user the product is equivalent to the construct. Given a certain level of interaction, the user forms a complex operational model which is constitutive of the product and which licenses a range of inferences in the form of operational expectations. Continued interaction acts as a test on these inferences or expectations, which result in modifications to the model.

⁷ Essentially the Gibsonian sense of affordance. In the product semantic account it is used to encompass holistic relations generally at a variety of levels of interaction.

⁸ In particular in its role in Teleological or Adaptational Role Semantics. See pp 125-129.

⁹ In the broad sense in which the term is deployed in user centred system design models, and as these are interpreted in a product semantic context. See pp 111-115 above.

¹⁰ The idea of construction here is indifferent with respect to active and passive notions of construction. There is a process in which a model gets constructed, in the sense that it comes to be present and operative, but this does not imply that the user is necessarily consciously involved in the construction of the model, or even aware that a process of model construction is in progress, or that a model is being deployed, once constructed. The model is a cognitive model in the sense that it is a model used by a cognitive system, but is not necessarily a model of which a cognitive system is conscious.

Taken together, affordance and user models create a platform for the development of a theoretical and explanatory model of user interaction based on the intuition of 'product legibility' that user interaction can be understood in terms of a communication model. But whereas the essentially linguistic communication model deployed in 'product legibility' trades on the idea of identifiable syntactic elements to which semantic value (procedural significance) can be attached, the product semantic development regards product content (syntactic elements) as emergent in the course of interaction - syntactic parsing occurs in parallel with semantic attribution and cannot be pre-specified. The product exists as an operationally significant construct whose content is a function of signification, and one cannot therefore legitimately trade on the notion of the objectifiability of content.¹¹

Affordance gives expression to the situation of contextual accommodation that is achieved in interaction - what the situation allows us to do or experience, whilst the idea of a user model places the content that we have in the realm of a constructive approach to cognition. The assimilation of one to the other creates the special sense of affordance in product semantic accounts which spans perceptual and cognitive contexts.

The Semantic Order

At the most general level of expression, the product semantic framework is described in semantic terms, reflecting the view that we directly experience things and meanings.¹² The content of our experience is conceived as a function of the articulation of 'meaning' with 'understanding' in terms of 'significance'. Our fundamental orientation to the world is one in which we seek to achieve understanding and attribute meaning, and the most general expression of the mechanism through which this occurs is the process of signification.¹³ The outcome of this multivalent process is a sense, albeit temporary, of operationally effective psychological closure (understanding) and its expression as an objectified order through the attribution of identity and property clusters (meaning). The character of the process is essentially that it consists in the contextualisation of particulars. However, given the idea that particulars are not independently available, but are also a function of the process, contexts and particulars are mutually defining. This suggests that

¹¹ But this is a very strong tack to take in response to the idea that content is something to be had from a perspective rather than something that is objectively available.

¹² Our experience of the world largely consists in 'seeing' soft and inviting armchairs, rather than experiencing sensory data from which we infer that what we see is a chair which is soft and which is inviting. This is not to say that the sub-experiential process which enables us to experience the world in this way, does not operate constructively from sense data, for example, but only that content of this kind is not what we primarily experience.

¹³ The idea that we 'seek' meaning, does not imply that we consciously decide to look for or create meaning from whatever we encounter, but rather that as biological organisms of a particular kind we are organised in terms of meaning-seeking.

the character of the semantic scheme is molecular rather than lexical.¹⁴

It also raises the question of the source of meaning. If meaning is not in some sense intrinsic to the lowest level components of the scheme, but the lowest level components acquire their meaning from their inherence in meaningful wholes, then what constitutes meaning for the meaningful wholes - what is meaningfulness? The product semantic response is that meaning is a function of use and context. Meaningful wholes are operational constructs which serve our needs - they enable us to 'go on' - but they are contextually dependent, both in the sense that they are particular to the needs and capacities of a given individual and in the sense that they are responsive to the situation in which that individual is located.

Meaning Contexts

Although the semantic conception articulated is therefore profoundly relativistic, the resources available for the construction of meaning are not entirely open-ended but ultimately pinned to our shared 'forms of life', whose differentia are expressed as types of meaning contexts associated with different levels of conceptual organisation. At ground level we share a form of life phylogenetically in the range of higher order perceptual constructs that are available to us experientially through the structure of basic affordances (operational context). We also participate in socio-cultural communities in which conceptual schemes are structured in terms of the co-ordination of transactions and which are predominantly articulated in terms of language (context of language). Our transactions include the creation of explicit and implicit representational schemes and procedures for the generation and transmission of cultural products (context of genesis), and ultimately these come to constitute a relatively independent order (context of ecology).¹⁵

On one interpretation the succession of meaning contexts are associated with levels of conceptual organisation, with the ground level expressed in terms of basic affordances which acquire greater complexity and a different character as they become more socially engaged, and as such the scheme has a developmental air.¹⁶ On the other hand it is clear that as socialised adults in product interaction, the operational constructs (meanings) that we create are a complex function of the interaction between the full range of meaning contexts, rather than a simple layering.¹⁷ On either interpretation (and also given that they

¹⁴ Lexical schemes consist of basic semantic elements which are in themselves meaningful, which can be combined compositionally to create meaningful complexes. In molecular schemes, the basic semantic elements are only meaningful when they are combined in a whole which is meaningful.

¹⁵ A parallel to Baudrillard's conception of the 'system of objects' [Baudrillard 1996].

¹⁶ Krampen's ritual affordances and social affordances see pp 105-106 above.

¹⁷ See the discussion of Krippendorff's account, pp 51-58 above.

are not mutually exclusive) the bones of the semantic scheme are fleshed out by drawing on linguistic models of communication generally, and speech act theory in particular. Essentially, this represents the choice that is made from the two dominant philosophical approaches to semantic models - set-theoretic/truth-functional approaches and intention-based approaches - and given the commitments of the product semantic stance, it is not surprising that the latter is favoured.¹⁸

The framework therefore consists of both top-down elements (for example, intentionality as represented in the analogy with speech act theory and intention based semantics; and socially derived conceptual schemes), and bottom-up elements (basic affordance as an expression of physical and experiential engagement).

The Cognitive Order

In order to ground the framework in the form of an all-through explanatory structure, the semantic order requires interpretation, which effectively means making a metaphysical commitment. The broad commitment made is that the semantic order supervenes on the cognitive order - the semantic process which is descriptive of the construction of meaning can be unpacked in cognitive terms. The general form of the proposal is that the core processes that underpin meaning-making can be understood in terms of the explanatory role of mental representations and their contents in accounts of individual cognition in cognitive science.¹⁹ But with the essential difference lying in the idea that the framework generally can be modelled in terms of an extended sense of affordance which is holistic and contextually dependent on socially derived conceptual schemes. The framework is therefore ultimately structured in terms of its top-down elements, and on the product semantic account is modelled on the operation of core cognitive processes such as categorisation and the use of attributive terms, through which it is also assumed that the cognitive content of user interaction can be accessed.

¹⁸ Set theoretic and truth functional approaches assume compositionality and operate in terms of rule structures which relate reference and extension to truth. Given that the argument in product semantics is that in the case of products compositionality cannot be assumed and syntactic elements cannot be independently defined, this approach will not work. On the other hand since the underlying idea in the product semantic account is that the core of meaning lies with action and social co-ordination and is essentially signficatory, an intention-based semantic model is considerably more appealing.

¹⁹ In a form which approximates to that characterised by the Representational Theory of Mind [See above pp 219-221].

9.3 Summary - The Product Semantic Framework

The argument structure and explanatory elements deployed in the product semantic framework, can be summarised as follows :-

- a) User interaction can be modelled in terms of communication, where formal content is the vehicle, and functional or procedural role the implied content of the message.
- b) Functional role and procedural role are in-principle independent. Procedural role is primary in user interaction, given our operational orientation to the world.
- c) Formal content cannot be pre-specified from a design standpoint. What counts as a feature or formal element is as much a function of the process of interpretation as message content.
- d) Although the relations between formal content and message content are in-principle arbitrary, some interpretations are more 'natural' than others. Moreover some procedural patterns are more 'natural', per se.
- e) Naturalness in both these respects are measures of what the user brings to the interaction, and this can be conceived in terms of 'user models', which capture the conceptual structure underlying the naturalness of procedural patterns.
- f) Given that formal content and message content cannot be independently specified, the complex of interaction can be viewed holistically, and modelled in terms of affordance. The relationship between formal content and message content (perceive affordance) is a function of the conceptual structure which operates through affordance relations.
- g) The overall process of user interaction can be described in semantic terms. The primary process is constructive and based on signification, and results in holistic experiential constructs of two kinds - external objectified attributions (meaning) and subjective psychological closure (understanding).
- h) 'Meaning' and associated semantic terms are to be understood as operational constructs which serve our needs - they are a function of use and context.
- i) Semantic processes are individualistic and context dependent. They result in operational constructs effective for an individual in a context. Nevertheless, given that we share 'forms of life' at different orders of conceptual organisation, the process and resulting

constructs are sufficiently co-ordinated for a substantial sharing of meaning. The key differentia in the ways in which 'forms of life' can be shared are represented in meaning contexts (use, language, genesis, ecology).

j) The semantic order supervenes on the cognitive order. Semantic accounts are grounded by trading on the explanatory resources of the idea of 'representation' in cognitive psychology and cognitive science. The holistic character of cognition is captured by an extended sense of affordance, and conceptual structure modelled in terms of, and accessed via, processes such as categorisation and attribution.

9.4 Concepts and Conceptual Relations

The underlying contention in product semantics is that the conceptual structure asserted to be typical of design processes can be characterised as essentially realist, physicalist, dualistic, objectivist and based on a positivist metaphysics. These conceptual traits are, for example, identified with the central role vested in a hypostatised notion of 'function' in the articulation of product content, and the mechanistic approach to user-modelling represented in ergonomics. The result is an inadequacy in the capacity of the process to capture user perspective. In order to remedy this, we need to understand the nature and structure of product interaction from the perspective of the user - we need to comprehend the ways in which products become meaningful to users. The substantive proposal in the product semantic account is that the design process should be articulated in terms of user models, and that these can be characterised in terms of semantic concepts. The substance of the detailed accounts offered comprise the ways in which this idea can be unpacked, and the key elements involved are based on the idea that 'meaning' is an individual mental construct associated with 'understanding', which results from a process involving 'significance', 'affordance' and 'categorisation', and which can be grounded cognitively.

The present section draws on the reconstructive analysis of concepts and their relations, (represented in the preceding analytic sections), and the argument structure outlined in section 9.2, deriving the principal conclusions in respect of their individual sense and consistency, and collective coherence. The elements of the framework are approached topically rather than simply in terms of discrete concepts, beginning with the proposal to articulate user perspective and design in terms of meaning rather than function.

Function

The principal reason for the rejection of function as a central concept is that it is viewed as essentially deterministic. No analysis of function is presented in product semantic accounts, although through guilt by association it is equated with a determinate physical relation between means and ends. The sense of 'function' as deterministic (the acceptance of strict functionalism) is equated with determinacy. Clearly though, it does not follow from the fact that a concept is determinate, that it is deterministic. Even if it is the case that any given formal content can be identified as having a determinate function, in order to show that the relation is deterministic it would need to be necessarily true that the relation holds - that be true in all possible worlds. This sense of determinism is not one that is held by any design theory, and indeed runs counter to the very notion of design - that it is in principle possible to devise novel form-function relations. Function in this guise is therefore set up as a straw man, which it is assumed will collapse under the sheer weight

of the subsequent exposition of meaning.

It can be shown to be trivially true that function is logically distinct from particular formal content. There is no formal content that is necessary in principle to a given function, and indeed the relation between formal content and ascribed function is context dependent. However this logical point is ignored, and a key objection to the sense of 'function' prevailing in design theories is that it amounts to acceptance of a strong form of functionalism in which 'function' is taken to be deterministic and context independent. In formal terms this is simply false.

Nevertheless, there is a less formal sense in which the product semantic intuition captures something of the everyday use of the concept, and its instantiation in accounts of the logic of the design process. In conceptualising and talking about products we deploy the concept determinately in the sense that we conceive of products and their parts as 'having' functions - as though a function is a property of some set of formal and physical particulars. In the specification and explanation of a product, contents are determinately related to functions - 'this is there to do that'; 'this is round and red so that ..' The result is that in any given case there is the appearance of necessity in the relation. But the appearance of necessity is belied by the logic, and derives from the fact that the product consists in a set of relations established in the intentionality of the act of design. Clearly though, designers are not infallible and people generally can and do have different models of the relations holding in a given product. What the concept of 'function' does is to establish that if something is said to have a certain function then it is intended or supposed to instantiate a determinate relation in that particular case - it triggers a set of derived conditionals which follow from the supposition of the relation. In so far as a designer's intention asserts a set of relations in a given case, then these constitute the basis for making inferences in respect of those relations, which enable us to assess whether the asserted relations can be sustained. It is in this sense that function can be described as objective - no matter who asserts what given relations subsist in respect of a product, function ascription provides the basis for identifying the relevant derived conditionals. But this is a far cry from the assumption that the concept embodies some fixed and necessary relation across cases.

Product semantic accounts assume that 'function' is a deterministic concept, implying context independence, on the basis that this is equivalent to there being a single perspective from which sets of product relations can be viewed - the perspective of the designer. But function ascription is clearly context dependent - what counts as the function of some set of formal particulars depends on the broader context in which they are located. It is also multi-perspectival, since there is no logical bar to ascribing different

sets of relations for the same formal particulars in the same product. Function does not assert a particular relation but only circumscribes the inferences consequent upon the assertion of a particular relation.

In logical terms, a similar conclusion can of course be drawn in respect of the relation between meaning and formal content. There is no necessary connection between a given formal content and a given meaning, and meaning is also context dependent. So although both meaning and function can be logically dissociated from particular formal content, in product semantic accounts function is conceptually associated with determinate and objective particulars, whilst meaning is taken to embody the idea of perspective and in particular the perspective of an individual. These background moves conflate a number of elements that need to be kept distinct. Function ascription is essentially subjective in the sense that it depends on the intentionality of the individual, but objective in the sense that having been ascribed it defines a public and testable reciprocal relation for a situation in which the ascription is nonetheless dependent on the context constituting the situation. Context dependence is logically distinguishable from both subjectivity and perspective, since it is operative in both cases.

The deterministic appearance of function relations derives from the fact that in a given case of design they have indeed been determined, but this only amounts to an assertion that these are the terms in which the product has been conceived and implemented, and not that these are the only terms in which the product can in fact be understood and judged. In product semantic terms the traditional design specification is interpreted as an imperative - these are the terms in which the product must, or ought to be judged. Function is therefore interpreted as a concept which prioritises a single perspective (and therefore no perspective), and which instantiates a particular set of relations constituting the objective content of a product.

Given that the perceived source of communication failure in design is attributed to the inability of the process to encompass the perspective of the user, and given that 'function' is taken to elevate a particular set of relations to the status of objective content, the desire to loosen its conceptual grip is understandable. Nevertheless the implicit basis on which the argument is carried through depends on a misreading of the import of the concept.¹

¹ Nevertheless it could be argued that although the analysed concept of 'function' does not in fact imply context independence, or the objectivity of content, the common use of the term carries this implicit baggage with it and thus renders it heuristically impotent in framing a user-centred design model. I think that an argument along these lines is probably justified, and might well license the idea that it would be pragmatically and strategically better to articulate a new design model in terms of a new concept, rather than fighting a battle about what 'function' really means. However, the assumptions made about the content of the concept in product semantic accounts are misplaced, and in the construction of an overall theoretical framework the role of the concept is not insignificant, even if the core concept is taken to be 'meaning' rather than 'function'.

Communication, Meaning and Understanding

Leaving aside the question of whether 'function' on some interpretation could articulate the idea of perspective, product semantic accounts argue on the basis of a deterministic interpretation that it cannot, and assign this key role to 'meaning'. Product meaning consists in some replete set of contents which are not pre-organised in terms of a given mapping from features to attributes or functions, for example, but which emerges and is structured in the course of the encounter. In commonsense terms this amounts to the idea that every individual finds their own content in a product encounter and at the extreme, that each person experiences or constructs a different product/content complex. In so far as an effective design process needs to capture the idea of perspective, the basis for this lies in an understanding of the ways in which individuals construe and structure content given the terms of the encounter.

The underlying rationale for the product semantic project sets this question in the context of communication. Comprehending success or failure in communication involves some form of matching process involving at least two elements which are being matched. But what are these elements and how are they related? In product semantic terms the elements are the perspective of a given user and the perspective of the designer, which are separately articulated in terms of meaning, and matching consists in determining the nature and extent to which designer perspective is successful in mapping user perspective, in respect of a common referential particular. The idea of matching is kept simple, the complexity being reserved for the terms in which meaning is unpacked. In contrast and on a traditional view of the design process, the sense of mismatch itself is taken to be complex and consisting in a number of separate relations.² For example, the designer intends that a product interaction should follow some pattern, and judges that this will be achieved in a certain formal organisation which (inter alia) will allow for functions judged to be necessary to be fulfilled. The designer can be wrong both in respect of the appropriateness of the pattern of interaction that is intended and in the relationship between formal content and the possibility of an interaction having that pattern. In addition both of these ways of being wrong have more complex sub-structures.

Nevertheless the basic point is well made. Products need to be structured in ways that take cognisance of user perspectives, and it may be that pre-figuring the set of formal matching relations as a complex defined from a design perspective, closes off the possibility of significant mappings driven from a user perspective. At a prosaic level this is trivially true in the sense that products are in-principle underdetermined by their designs, but at a deeper epistemological level the argument is that the mappings relevant

² Hasdogan 1993.

from a user perspective cannot be defined in terms of the design perspective. The thrust of the product semantic argument is that an encoding-decoding model of the relationship between perspectives, based on traditional design models, privileges the design perspective and impoverishes the user perspective. If the communication model of design is to be taken seriously, then it is crucial that what is intended (determined) in a design and the manner in which it is realised, maps to the structure involved in its being experienced and understood. In addition it is also essential that what is not intended (not determined) in a design is recognised as part of the structure involved in its being experienced and understood.³ In the context of intentional theories of meaning this is equivalent to asserting that 'utterer's meaning' be structured in terms of 'hearer's meaning'.

The problem then is to define ways in which we can approach and characterise user experience and understanding, and use these in structuring the design process. Meaning is the most general concept employed in this characterisation. The content of experience, to the extent that it is understood, constitutes the meaning of the experience. Meaning therefore relates to content in terms of understanding. Understanding is conceived as context-relative and subjective in the sense that there is no set of criteria for determining absolutely that it has been achieved, but only a pragmatic measure that it is sufficient for an individual on a given occasion relative to a purpose. In product semantic accounts it is constituted in terms of significance.

Significance

Significance can be asserted in respect of features, attributes or relations and in virtue of their exemplification of, or assimilation to, some contextual field. Something is held to have significance if it can be contextually located. The nature of fields and the relation of particulars to fields is not unpacked at this level of exposition, but instead a broad framework for field contexts is defined in terms of the overarching contexts of 'use', 'language', 'genesis' and 'ecology', which are taken to imply differences in the nature of the relation and the mechanisms involved for given kinds of fields.

Without yet invoking the mechanisms involved, we can say that the process of achieving understanding consists in co-referential individual acts of signification (which take the form of the contextualisation of particulars) and their cumulation relative to some process or purpose. The meaning of something is that operative set of established significances

³ One could express this by saying that an implicit 'negative' model is as important as the explicit positive model represented in a product. Clearly as it stands the idea is problematic, since if the components of the negative model were recognised they would become part of the positive model.

which constitute my understanding and the basis on which I am able to 'go on'.⁴ Expressed in another way, the meaning of something is what I can extract from that something in terms of the set of significances that constitute my understanding of it. Meaning is related to understanding through significance, in the sense that they are the two faces of cumulative significance, one turned outwards to the object, the other turned inwards towards the process. In this way 'meaning' captures both the object and a perspective, in terms of a non-dualistic conception which seeks to avoid construing meaning along the lines of an objective property. Given that the definitions are in part stipulative there is no inconsistency in the overall structure and relation between terms. On the other hand the problem with the use of the terms 'meaning' and 'understanding' are pre-figured here, both generally, and in particular in so far as they are also conceived in relation to their use in respect of language.

Understanding as a general concept is, as we have seen, subject to public achievement criteria in the sense that the measure of my having understood something consists in various forms of my ability to act relative to that presumed understanding. If I understand a word, I should be able to use it appropriately; if I understand the parking system I should be able to use that appropriately. I can of course choose not to in a spirit of poesy or rebellion. But although there is a sense in the idea of 'my' understanding as opposed to 'your' understanding, the concept is essentially normative and assessable in the public arena of the relative consequences of having the one rather than the other. Given the sense that meaning and understanding are two faces of the same coin, a parallel interpretation also involves a normative conception of meaning.

At the level of explaining the basic interrelationship between concepts such as significance, meaning and understanding, product semantic accounts are internally consistent, although in so far as they relate these terms directly to their more general interpretations they conflate process and product, and associated public and private criteria. Nevertheless the conceptual strategy here is indirect rather than direct, and it may be the case that when the stipulative concepts are further unpacked, they may bear a more complex relation to their more generally accepted interpretations.

Meaning and Cognition

In order to explore this, the internal structure of meaning relations and their implication for significance and understanding needs to be understood in terms of the cognitive context defined in product semantics. This involves a number of stages of explanation. In the first place, the general model for cognitive engagement is taken to be roughly parallel

⁴ In the Wittgensteinian sense.

to the process for inferential perception. Given a certain experiential context, on the basis of pre-existing structures (cognitive models) and previous experience, we hypothesise a structured content or an object/meaning relation. Our continued engagement with the structure or object constitutes an ongoing test on our hypotheses, whose outcomes lead to their substitution or modification. This cyclical process has no natural terminus, but is constrained pragmatically in terms of our needs being served, or the distraction of other calls on our attention, for example. The ways in which we create structure are diverse, but characteristically and in contrast to the presumed nature of inferential perception, we find significance not through an elaborate process of model building from fundamental perceptual or cognitive 'bits', but rather through a direct process of association of the object with related objects or contexts. The relation is of course suppositious, but holistic and distinct from the kind of perceptual hypothesis-building involved for example in the hierarchical interpretation of a bit map. It is in this sense that meanings and objects are said to be perceived or cognised directly. We perceive chairs and the possibility of sitting directly, they are not inferred constructively or analytically, although their confirmation (or disconfirmation) is analytic and reconstructive. Meaning is therefore conceived both constructively and holistically, even though as normally interpreted these are taken as opposed positions in cognitive and semantic accounts.

Affordance

The model for holism and the 'directness' of engagement in product semantics rests on the concept of affordance. Affordance has a complex conceptual role in the product semantic framework, providing a basis for the experiential content of interactions, and a prospective grounding for signification and meaning relations. Given the general background of metaphysical antipathy to a sharp subject-object dualism, which is regarded as the source of the false idea of the objectifiability of content, an articulating concept is needed to give non-dualistic form to an expression of interaction. The Gibsonian notion of affordance is used as the basis for this, not only because it is a definitively ecological or relational concept which attempts to capture the idea of 'directness' in perception, but also because Gibson had himself shown that it could be applied to the artefactual world by extension from encounters in the natural world.

In its basic form it is essentially operative at the species level and takes its place in the general run of teleological or adaptational role semantics, which assimilate the explanation of perceptual and cognitive development to evolutionary theory. At this level it is a clear and important concept. However, the non-dualistic approach taken in product semantics, also encompasses the rejection of a distinction between perception and cognition. In the context of the direct quotation of Gibson's concept it becomes problematic when

'affordance' shifts from a phylogenetic context for explanation to an ontogenetic or cultural context. In product semantics the term affordance is used indifferently in respect of the directness of our perception of surfaces as 'walkable' or 'touchable' and the directness of our cognition that an abacus affords calculation, and it is at least strongly arguable that what is going on in these different contexts involves sufficiently different kinds and levels of perceptual and cognitive organisation, to challenge the assumption that the same unanalysed concept of affordance is applicable generally across cases.

Meaning Contexts

Recognition of differences that might be implied by different contexts is acknowledged in some aspects of product semantic accounts, particularly in the idea that there are 'basic' affordances (which are essentially Gibsonian primitives) and that 'ritualised' or 'social' affordances arise by accretion in basic affordances, relative to context. It is the contextual relativisation that links affordance to meaning, and distinguishes the sense of 'affordance' in product semantics. The specific contexts offered are articulated primarily in terms of categories for unpacking meaning relations.

In order to gain some structural purchase on these categories, which it is implied provide the conceptual basis for distinct aspects of a theory of meaning, they will be presented in the form of analysed relations between the agencies involved. The basis for this lies in the primacy given to the underlying concept of 'interface' which can be applied in each case to reveal structural similarities and differences.

The core of the product semantic conception of design is that it is focused on the interfaces between persons and objects - the locus of physical, perceptual and cognitive transactions. In the simplest case - the context of use (or operational context) - the interface (I) constitutes the locus of these transactions :-

(1) Operational Object — (I) — Person

In the socio-linguistic context the nature of the interface is more complex since objects participate in socio-cultural transactions generally and both constitute and are constituted by the ways of life of a community. In this case the transaction is primarily between people, with objects (O) or references to objects functioning as one kind of complex interface in social and linguistic communication :-

(2) Sociolinguistic Person — I(O)I — Person

wholly opaque since this would imply the existence of the product as part of a world without the ability to discriminate it from that world. In this case although there might be affordance and perceive-affordance relative to the object-world complex, these relations cannot subsist solely in relation to the object. In both cases the object is negated and the relation collapses to P - W.

On the basis that complete transparency or opacity is never initially achievable in relation to an object, the overall relation might be conceived as a dynamic state:-

$$\begin{array}{c} [P - O] - W \\ P - [O] - W \\ P - [O - W] \end{array}$$

The logical demand for a relation that is neither wholly transparent nor wholly opaque, is equivalent to the logical requirements for the possibility of representation, which are based on there being some discrimination in both syntactic and denotational orders.⁶ But if this is the case then the product semantic position does not square with a strict rejection of subject-object dualism, which would need to show how one could move from an undifferentiated complex to a separation of subject from object. In fact the subject-object distinction is fundamental to framing the product semantic position.

(2) Socio-linguistic Context (Language)

$$\text{Person} \text{ --- (I) --- Person}$$

In the sociolinguistic realm the primary relation is a relation between persons. In the simplest cases concrete objects are the subject of transactions :-

$$P_1 - O - P_2$$

and are subject to conditions of association or dissociation relative to the agents involved, (parallel to the relations of transparency and opacity operating in respect of relations to the world via objects) :-

$$[P_1 - O] - P_2$$

$$P_1 - [O - P_2]$$

However, what constitutes the object is an individual cognitive construction, so we cannot assume a common object (in the sense of something having the same meaning and

⁶ See signification above, pp 242-243.

content) although we can presume a common reference (the particular that I gave to you is the same particular as the particular that you received from me). This might be represented as :-

$$P_1 - \begin{array}{c} O_1 \\ | \\ O \\ | \\ O_2 - P_2 \end{array}$$

On the assumption that we cognise different objects, from the perspective of the agents we have two parallel situations, in which each projects a meaning and content to the perception or cognition of the other :-

$$P_1 - \begin{array}{c} \overline{O_1} \\ | \\ O \\ | \\ O_1 \end{array} - P_2 \qquad P_1 - \begin{array}{c} O_2 \\ | \\ O \\ | \\ \underline{O_2} - P_2 \end{array}$$

In the more complex case of transactions involving symbols or linguistic expressions which are used to refer to objects then the basic situation might be represented as follows (where L is a place marker for a symbol, word or linguistic expression) :-

$$P_1 - \begin{array}{c} 'L' \\ | \\ O \end{array} - P_2$$

Given the assumption of individual construals of the object by the two agents, we cannot assume that the content or meaning of 'L' is the same for both agents, but rather that 'L' will denote the object as construed by each agent individually :-

$$P_1 - \begin{array}{c} \overline{O_1} \\ | \\ O \\ | \\ P_1 - \begin{array}{c} 'L' \\ | \\ O \\ | \\ \underline{O_2} - P_2 \end{array} \end{array}$$

This case is more complex because we cannot now assume the commonality of reference that obtained in the case involving the direct transaction with objects.

Meaning

Expressing the relation in the terms of a product semantic account exposes a number of the facets of the complex problem of meaning, which surround the various roles taken by the place marker 'L'. In the first place, 'L' is a symbol or linguistic term, shared by the persons involved in the transaction, whose primary signification is the object O. But given that the cognitive construal of O is individually constituted for P₁ as O₁ and P₂ as O₂, then the content of L for P₁ and P₂ are distinct. If reference is determined by content then there is no guarantee of co-reference for the term 'L'. When P₁ uses the term 'L', the sense of the term consists in the content of O₁, whereas for P₂ the sense of the term is given by O₂. If the extension of a term is determined by its intension (sense) then the reference of the term for the two agents is distinct.

Looking at it from the perspective of content, as is predominantly the case in product semantic accounts, we can also regard 'L' as an externalised marker for some set of cognitive contents such as a mental representation or a concept. The problem then is to account for how co-ordination is achieved in respect of the meaning of 'L', associated reference, or conceptual content.

In product semantics the term 'meaning' is used as a generalised semantic and psychological concept, which (inter alia) encompasses both the referential and the representational aspects of transactions with the world. Meanings are constituted, for example, by affordances, identities, attributes, through processes of contextual fit, but there is no systematic differentiation in role across contexts. As an approximation and given the definitions provided in product semantic accounts, we can say that the primary act in the cognitive construction of meaning is an act of signification. The object is taken to have significance in the case that it exemplifies some field. The process of meaning making is a complex constituted in the bringing together of acts of signification relative to some co-referential particular. Meaning is a temporary network of significations in respect of some particular, held by a person at some given time and relative to some operative state of affairs. It is equivalent to perceive-affordance (in the extended cognitive sense of affordance used in product semantics), in respect of that person, at that time, in that state of affairs. The complex of significations underwrites perceive-affordance, whose content expressed in terms of the psychological states of the person comprises understanding, and whose content expressed in terms of attributions to the object comprises meaning.

Although the basic structure is coherent, two key questions need to be addressed. Since there is no independent characterisation of a particular, what binds the complex of significations together referentially at a given point in time, and what establishes

continuity of reference over time ? These questions are not addressed in the context of the direct account of meaning, but are approached in terms of categorisation, which establishes an independent but related sense of meaning.

Meaning and Categorisation

'L' as the Name of Type L

Taking a different tack from the same starting point (considering the role of the place - marker 'L'), we can say from the product semantic approach to categorisation that 'L' is the name of a kind or type. Given that we partition our worlds in terms of categories, the object O is a token of some categorial type O_t , and the role of 'L' is as a name or symbol for the category O_t . The category O_t does not consist in some definitive specification for what does or does not constitute category membership, but rather is a family resemblance set defined in terms of prototypes. Prototypes are mental representations of things taken to be typical category members, which provisionally structure the category. Meaning consists in complex category identity, centred in 'basic' category identity (middle level). In terms of the idea of signification, we could say that meaning here consists in the complex of fields (categories) exemplified by the object O. But in this case the complex is structured in terms of levels. The process of categorisation operates around the 'basic' (middle) level which anchors type identity, and through which associative complexes are constructed in respect of abstract attributes, and through which differentiation of types into individual tokens takes place. In the latter case the assumption is that token identity is a function of discrimination in type identity via subordinates, whilst in the former it consists in a generalisation across categories operating through superordinates.

The product semantic account of categorisation is firmly committed to the idea of a cognitive process operating at the basic level in terms of prototype semantics. This takes the overall cognitive account of meaning one step forward in that it prospectively anchors the complex of signification to the core act of establishing basic category identity. The difficulty is that the available empirical evidence is insufficient to pin categorisation generally to prototypes, since prototype effects occur in the case of paradigmatically non-prototypical constructs and are also equivocal in respect of paradigmatically prototypical cases. It is therefore not possible to conclude that prototypes are either necessary or sufficient for categorisation. In addition in the case of both superordinate and subordinate categories, the formation of categories is dependent on discrimination of attributes in abstraction from basic categories. At the very least, additional mechanisms are needed which relate attributes to particulars, both in the sense of comprehending how attributes are derived if they are not ontologically basic, and how they become attached to

particulars. But if additional mechanisms are required then it becomes possible to argue that these mechanisms constitute the basis for categorisation, and that prototypes are artifacts of processes rather than the basis for them.

Product semantic accounts want to hold onto both. Why? The idea of experiencing (having) a world is conceived as an individual cognitive activity which can be understood in terms of the idea of meaningfulness and the creation of meaning. In order to give sense to the directness of our engagement with and experience of the world, meaning is conceived holistically, which is to say that although the processes involved in our meaning-making can be unpicked analytically, they are in fact apprehended as an experiential complex. Meaning is therefore the cognitive counterpart to basic affordance, which in product semantic terms is referred to as perceive-affordance. It is an affordance that is accessible as a representation (a content) which takes the form of a categorial complex.

But whereas in terms of one definition the identity of particulars is not pinned to property or attribute possession (since content is an individual holistic construct) on the other, assignment of attributes is necessary to the operation of categorisation and the identification of individuals.

The problem here is the use of an undifferentiated notion of meaning which rolls together different senses of identity with the characteristics associated with individual content. If the different senses of identity are separated then we can discern one sense which is essentially to do with the problem of co-reference - the need to know that the contents that we individually assign apply to (or constitute) a common object. A second sense involves the idea of category identity - that things (or contents) are of identifiable kinds. A third sense is concerned with individuation - the particularisation of individuals among members of a kind. A fourth sense consists in the identification of the individual content that we construe with the object of the construal - the basic problem of reference.

Meaning and Identity

The semantic content of products in product semantics is taken to be definable in terms of a range of variables or semantic dimensions which characterise the complex sub-structure of 'operational meanings'.⁷ Although these are presented as though they occur at the same level of cognitive organisation, their detailed description implies a complex

⁷ The semantic dimensions identified by Krippendorff are - identities; qualities; orientations; locations; affordances; states (dispositions and logic); motivations; redundancies; [Krippendorff 1989 pp 16-17]. An overlapping set are identified by Lannoch and Lannoch as - experiential qualities; orientations; states; comparative judgements; affordances; values and conventions; [Lannoch and Lannoch 1989 pp 43-46].

organisation of dimension types and levels. The basic question of semantic content is approached via identity. It is assumed that individuals ‘..typically approach the partitions in their environment with identity questions in mind’.⁸ This takes the form of assigning things to kinds and applying names, which bring in to play associations or expectations in the form of behavioural programs. Identities (kinds and names) are established in terms of the observable characteristics of objects.’ These are asserted to be articulated in terms of ‘..cognitively constructed ideal types..’ (prototypes), rather than on formal specifications of resemblance, or formal distinctions marking out sets (classical categorisation). The particularisation of objects beyond basic kind identity is equated with qualitative difference, expressed in terms of the instantiation of attributes.

Krippendorff, in dealing with theoretical aspects of the qualities of objects, concurs with Athavankar in assimilating qualitative difference to the general scheme of creating cognitive categorial sub-structure.¹⁰ Qualities or attributes are essentially the differentia associated with the creation of subordinate categories, or which express the semantic distance between a member of a category and its prototype.¹¹ The differentia include differences in ‘dimensions’, ‘features’ and ‘characters’. Tokens and sub-categories of categorial types are individuated by increasing discrimination amongst such quality spaces, each representing a complex of attributive factors. Dimensions, for example, encompass all the objectively characterisable physical properties of objects having variable extents (including size, volume, mass, texture, colour, temperature, elasticity, relative comfort etc). Features, essentially consist in parts and their configurations and other optional properties of tokens. Characters are the symbolic analogues to features, qualifying objects as adjectives qualify nouns.¹²

The fundamental process consists in sorting things into kinds on the basis of a prototype semantic model of categorisation. This consists in the clustering of perceptual particulars relative to active prototypes, and the association of perceptual particulars across prototypical categories. This suggests that the notion of a kind consists in the probabilistic

⁸ Krippendorff 1989, p17.

⁹ Krippendorff goes as far as to say that identities may be *defined* by characteristics. These are identified as *shape* (whole appearance); typical *pattern or organisation* (the logic by which parts are connected); identifying *features* (which it has or does not have); characteristic *behaviour* (how it interacts with other things and users).[Krippendorff 1989, p17].

¹⁰ Krippendorff 1989 pp 17-18.

¹¹ Krippendorff 1989 p18. The terms ‘quality’ and ‘attribute’ are used interchangeably. It should be noted that Athavankar’s conception of semantic distance and type individuation is more sophisticated and complex than that presented by Krippendorff. See Categorisation, pp 141-147 above.

¹² Krippendorff 1989 pp 18-19. In respect of ‘characters’, Krippendorff appears to have a particular class of adjectives in mind. The examples which include ‘contemporary’ ‘functional’ and ‘futuristic’ as applied in respect of visual judgements of products, suggest that the essential mechanism here is equivalent to Krampen’s ‘Connotative Affordance’ see Affordance pp 105-106 above.

association of features or properties of candidates with the features or properties of prototypes, which together constitute a characterisation of the semantic space which is equated with the use of a 'kind' term. The term 'tiger', on this account designates an extension which includes a cognitively prototypical tiger and the range of things sufficiently associated through feature or property possession with the prototype, and sufficiently distinct from the feature or property possession of alternative extensions.

The general problem with the attributive definition of kind terms, whether classically or prototypically defined, is that it can be argued that they have no necessary attributive content.¹³ In using the term 'tiger' or 'lemon', no necessary or sufficient attributes are implied - in the sense that one can readily envisage tigers and lemons which lack the attributes normally associated with them. The extreme view is that such terms are indexical (in that their designations are rigid), and thus their meanings are not captured by a cluster or conjunction of attributes semantically associated with the term, which at best can be used as descriptions to fix the reference but not to define the term. A natural kind term instead refers to whatever has a common underlying trait or essence, whose extension is determined by a similarity relation associated with a paradigm.¹⁴ Tigers, for example, are a natural kind in that they are defined in terms of an underlying trait - their genetic specification, rather than a cluster of characteristics. The constitution of a kind is based on the instantiation of a fundamental property which is necessary to some thing being of that kind, to which other characteristic properties are only contingently related.¹⁵ This essentialist position in respect of natural kinds has also been extended to artefact kinds, which are taken to constitute a parallel case on the basis that they cannot be defined extensionally in terms of attribute possession.¹⁶

The point at issue lying behind different approaches to the characterisation of kinds and kind terms is how to make sense of the relationship between particulars and properties.

¹³ See above pp 154-155 (the causal theory of reference).

¹⁴ It has been argued for example that certain generalisations involving natural kind terms, such as 'tigers are animals' are necessary if true and yet a-posteriori and synthetic, and thus could not be falsified by a single counterexample. [Putnam 1975]. If we encounter an animal that has the characteristics of a tiger but which lacks stripes, we are generally faced with three possible choices. We could conclude that since tigers are stripy, this is not a tiger. We might alternatively consider the possibility that perhaps we have been too hasty in the past in assuming what is essential to being a tiger, and conclude that some tigers are not stripy. We might take a middle course and say that although we are convinced that tigers are stripy, this is nevertheless a rather odd tiger, whose lack of stripes is in need of some sort of explanation. The differences in the game of mutual adjustment that we play are matched by the different counterfactuals that we take to be supported. The conclusion we reach is dependent on the balance that we adduce to be appropriate given the totality of evidence that we have about tigers and their properties.

¹⁵ The idea is not unproblematic, particularly in relating the idea of an essence or fundamental and necessary property to particular instantiations such as genetic specification in the case of living kinds, or constitution in terms of elementary particles in the case of non-living kinds. [Keil 1989].

¹⁶ Putnam, for example, argues that natural kinds are not a privileged category and that kinds generally have essences. [Putnam 1975].

On the one hand it is clear that what constitutes a particular as being of a kind cannot simply be the sum of the properties that it is taken to possess or instantiate, whilst on the other the idea that the properties that a particular possesses are entirely contingent, dissociates identity from the terms of our experiential engagement with particulars. This is the general problem that is faced by the product semantic account.

Meaning and Extension

The product semantic account equates meanings with individual mental constructs, and it is these that determine extension. However, following Frege, equating meaning with intension (or concept) no longer carries with it the sense that meanings are mental entities, but rather that they are abstract entities and public property. Nevertheless grasping such abstract entities remains an individual psychological act. Understanding, and knowing the meaning of something consists in being in a certain psychological state, even though meaning cannot be equated with a psychological state. In addition, although it is clear that two terms with the same extension can differ in intension or meaning, it has also been assumed that the converse is not the case. Terms with the same intension cannot differ in extension.¹⁷ The upshot of these assumptions both singly and jointly can be seen as giving rise to the key problems associated with theories of meaning.¹⁸ The basis for challenging the assumptions rests on demonstrating that the stated relations between psychological states and extension, and between intension and extension, can be conceptually disengaged. The core problem consists in establishing what determines the extension of a term or concept, and on the face of it there are two principal candidates.

On the one hand we can regard the extension as comprising just that set of things which are de facto collected together under the term (there is no simple intension-extension relation); on the other we can advert to criteria that must be met for something to fall into the extension (intension determines extension). In the case of 'water' for example, we could say that what we mean by water is that collection of stuffs that we count together as constituting samples of water, or we could say that what we mean by water is H₂O. In the first case we group samples together on the basis of a complex set of similarity relations, whilst in the second we specify an identity criterion. Given that at some stage we had no knowledge of the fact that some of the stuff we referred to as water was H₂O, we could

¹⁷ Putnam notes that no argument has been advanced for the latter, and surmises that it may reflect classical and medieval philosophical traditions that the concept corresponding to a term is simply a conjunction of predicates and must therefore always provide necessary and sufficient conditions for falling into the extension. [Putnam 1978, p 61].

¹⁸ The first assumption gives rise to the problems associated with characterising the nature and content of psychological states, the second to problems associated with the idea of necessary and sufficient conditions. Their joint assumption underlies the problems associated with the theoretical need to assimilate formal accounts of syntactic and semantic compositionality and any version of an intention-based semantics.

not have determined its extension in this way, and in general it is no bar to the effective common use of a term that some of us are unaware of the underlying criterion.¹⁹

Nevertheless in grouping stuffs together either conceptually or linguistically, we do deploy enthymematic similarity relations. If I point to a glass of water and say ostensively 'this is water' then the force of what I say empirically presupposes that what I am pointing to exemplifies water in the sense that it bears a 'sameness' relation to the field of stuffs constituted by the normal use of the term or concept. I may of course be wrong. My empirical presupposition may be mistaken - the glass may contain gin. But the assumption in the ostensive definition is that if the empirical criterion is met, then there will be a necessary and sufficient condition for being water which consists in bearing the operative sameness relation to the stuff in the glass. But this sameness relation is a theoretical relation, and the determination of whether the ostensive sample does in fact fall into the extension defined by the sameness relation is essentially an empirical matter. We can and do discover that sample stuffs gathered together referentially turn out not to be all of a piece. In such cases we opt for a sameness relation pinned to a paradigm, and on this basis decide that some of the stuff is not water after all. The upshot is that although meanings and concepts do not determine the extension, the presupposition in the use of concepts and terms is that there is an operative sameness relation in terms of which the extension could in principle be determined.

Putnam has pointed out that in communities there is a pragmatic and a linguistic division of labour. Community use of a commodity such as gold includes a wide variety of roles involving a relation to gold, including 'wearing gold wedding rings', 'selling gold jewellery', 'testing gold' and so on.²⁰ These roles are relatively discrete but inter-dependent. All those involved will need some purchase on a concept of gold, but the necessary content of the concept relative to the role will be different in each case. Similarly, acquiring the word 'gold' does not imply being in a position to determine the extension, although it does imply an ability to use the word appropriately relative to a role or roles.

The philosophical model of the operation of reference, extension and meaning relations derived from the above analysis bears a close relation to the empirical psychological models underpinning categorisation expressed in terms of prototype semantics. In addition it points to the possible source of the problems associated with the deployment of prototype semantics to account for all aspects and features of categorisation. In the first

¹⁹ In addition to the causal reference theorists, Wettstein in particular argues the case for a minimal extension principle, demonstrating how little knowledge may be involved in the successful referential use of terms [Wettstein 1988].

²⁰ Putnam 1978.

place it supports the view that identity relations are pinned to 'prototypes' or 'stereotypes' but indicates that these are essentially the property of linguistic communities in which there is a division of labour, rather than the property of individuals. In addition it points to a philosophical basis for the 'characteristic' to 'defining' shift that is evident in the development of language and concepts.

The problem with the product semantic account is that since it locates 'prototypes' and 'family resemblance' with the individual in the form of mental constructs, it has no basis for a workable account for the determination of extension, unless this can be vested in the substructure comprising signification and affordance.

Affordance and the Directness of Meaning

If we adhere to the notion that things and meanings are directly cognised, which seems to conform to the commonsense idea that we do just see chairs and the possibility of sitting, then what place can we assign to properties and attributes. In product semantic accounts these two elements are in tension, for although it is claimed that we do cognise directly, categorisation requires assigning properties and attributes. This question is not adequately addressed or resolved in the product semantic framework, since the discussion of the structure of meaning is addressed at a different level from the consideration of categorisation.

However if we accept the general thrust of the position then a possible interpretation at this level of analysis might take the following form. We do perceive things in terms of properties, attributes and the like, but the process that involves this perception is not organised in terms of a constructive hierarchy. There is no inherent logic in composition from properties that leads to things or to meanings. Rather, properties and things or meanings are interdefining. The importance of the concept of affordance in the framework is ultimately based on this notion, in the sense that our encounters with the world are structuring as well as structured in terms of holistic action-oriented patterns. Although at some stage we become able to dissociate individual properties from experiential wholes, the organisation and development of perceptual and cognitive abilities is holistic rather than constructive. Encounters with the world consist in the correlation between patterns of activity, perceptual patterns and property clusters, expressed in terms of the concept of 'affordance'.

Our direct cognisance of things and meanings is accounted for in terms of the central role accorded to holistic ecological orderings. The first order extension of concepts and terms relates to this experiential level. Affordances rather than percepts are what we experience

directly as a result of perceptual processes, and the properties and attributes that we assign are hypotheses in second order extension. This is why the affordance concept is crucial to the framework. Meanings derive from first rather than second order extension, in that they consist in the direct reading of content into first order experience.²¹ This is methodologically important because it implies that you should not expect semantic compositionality relative to properties or attributes - contextualisation runs deeper than being merely the difference between instantiations of attributes. From the fact that an association occurs between instances of the property red, you cannot assume that difference can be accounted for solely in terms of contextual difference.

Context Dependence

Significance and meaning in product semantics is grounded in contextual fit, and the context dependence of significant and meaningful complexes. The import of this broad commitment is however ambiguous with respect to both the type and level of its application. At one level and in so far as it applies to representational or semantic schemes, it can be regarded as equivalent to a commitment to holism. Whereas atomistic schemes might be defined as those whose basic semantic elements are independent, in holistic schemes the basic semantic elements are interdependent. If new elements are added to an atomistic scheme, then the meaning of existing elements remain the same. In holistic schemes, change in one semantic element implies a change in all elements in the scheme. One form of context dependence then consists in the interrelationship between semantic elements, at the same level.

A second and distinct form of context dependence derives from differences in the kinds of compositionality exhibited by semantic schemes. In some schemes, the basic semantic elements are in themselves independently meaningful, whilst in others the basic semantic elements are only meaningful when they are combined in representations that are meaningful.²² In the latter case the meaning of an element derives from its inherence in a meaningful whole (a dot represents an eye in a cartoon face, but does not intrinsically represent an eye).

²¹ The idea of extensional orders is concerned with what is available in the sense of being descriptively referential - it provides the basis on which things can be referred to as material things and possible objects of investigation. A painting, for example, might be characterised as 'patches of green and brown on a square blue background'. This appearance (qua perceptual content) is its first order extension. It provides the presupposition and basis for second order extensional accounts, whose aim is to elucidate the physical basis of the phenomena of perceptual experience. The meaning of the painting (its content in the sense of what it represents, eg a landscape) cannot be constructed from the second order extensional account but derives from a direct reading of content into first order extension. [See for example Dennett 1969; Aldrich 1969; Schier 1986].

²² The former are generally termed 'lexical' schemes and the latter 'molecular' schemes. Taking the example of pictorial schemes, a lexical scheme might be represented by a vocabulary of pictograms (person, house, tree etc) which can be combined to form a scene, whilst a molecular scheme might comprise geometric elements (line segment, circle, square, dot, etc) which might be combined to represent a face or a house.

Product semantic accounts conflate the distinction between kinds of context dependence with the result that processes of signification, which are equated with context dependence in the sense of holism, become indeterminate, particularly in the context of a scheme which is based on individual signification.

Function

Although the concept of function is marginalised in product semantic schemes, it nonetheless plays a key role in two particular aspects of the framework. It is explicitly used in the prototype-semantic account of categorisation, and it is implicit in the acceptance of the concept of affordance, where this is coupled with a commitment to lower level perceptual components.

In relation to categorisation the role is crucial, since the basis for the articulation of semantic dimensions depends on the association of attributes with functions, and although it is possible to imagine how this might be accomplished with some other operational construct (based on affordance), function is the concept in terms of which it is in fact expressed. It is difficult to see the basis for an argument that whilst 'function' is the appropriate concept to use as the basis for the articulation of semantic properties in categorisation, it becomes inappropriate in this respect in a design context.²³

In respect of the concept of affordance, and in the context of an attributive sub-structure, the functional relation or some relational analogue is necessary to express the content of component mechanisms that underpin the relation.²⁴ It could be argued that the function concept, although necessary to the articulation of affordance at the level of interaction and cognition, is not necessary as a concept in the design process. However, a compositional structure is in principle present in the constitution of products, and relative distinctions in levels and relations will need to be made below the level of overall affordance.

Theory of Meaning in Product Semantics

The simplest form of meaning theory in product semantics adopts the general and familiar strategy of equating meaning with use. The core of the idea is that the meaning of an object (product) such as a chair consists in the totality of its uses - the collection of ways in which it has a role in practice. Practical roles consist in what the object allows me to accomplish and are identified with affordances. I can use my chair for sitting, lion-

²³ This is particularly the case, since one of the justifications for the use of a prototype-semantic categorisation model, is that it is a way in which the structure of user understanding can be mapped directly into the design process.

²⁴ See teleological semantics pp 125-129.

taming, getting the book off the top shelf, or impressing my friends, and these are some of the things that my chair affords in its relation with me and the environment (state of affairs) in which we coexist.

Given that my relations with the world are cognitively mediated (my experience of the world is a complex mental process or construct), there are two distinguishable phases comprising the interaction - my experience of the world as possibility, and my experience of it as achievement. I experience the chair as perceive-affording sitting, and I experience sitting in the chair, both of which are cognitively mediated. Product semantic accounts are concerned primarily with the relation between the cognitive content comprising perceive-affordance and that comprising affordance. Since relations with the world are conceived as mental constructs, a use theory of meaning for objects assimilates to a general theory of meaning as use.

A physical object or a mental construct is used when it is applied to some state of affairs.²⁵ Use theories of meaning take the meaning of an object or a mental construct to be determined by the states of affairs it is or can be successfully applied to - meaning is determined by states of affairs in cases of correct use. In product semantic terms this is equivalent to cases of correct use, where perceive-affordance and affordance match.

What counts as cases of correct use, distinguishes the different versions of use theory.²⁶ Causal theories identify meaning with states of affairs as correct use in the case where the states of affairs can be causally implicated in the genesis of the object or mental construct. Adaptational Role (teleological) theories identify correct use with cases in which selection and replication of the content of the object or mental construct is accounted for in terms of the states of affairs to which they have been applied.

The principal problem with use theories generally is that they fail to acknowledge the essential logical distinction between the content of an object or construct and the state of affairs which is targetted in applying the object or construct, irrespective of its content.²⁷ To take a simple example involving objects, let us assume a state of affairs consisting of a tight nut which I want loosened. I select a tool and apply it to the nut. The function of my choosing a tool (whatever my choice) is to apply it to the state of affairs. I target the state

²⁵ This can take the form either of specifying a particular use by identifying a particular state of affairs on a particular occasion, or of specifying a general use in terms of specifying the various states of affairs that it can be applied to.

²⁶ The principal types of such theories are Causal theories [for example Dretske 1981], Adaptational Role theories [for example Millikan 1989 and see above pp 125-129] and Conceptual Role theories [Cummins 1989; Stich 1983].

²⁷ A distinction which is parallel to the distinction between the validity of an argument, which is a matter of the form of the argument, and the truth of the components of the argument.

of affairs by mobilising the function and instantiating it with a particular. The question of correctness only arises in respect of the match between the content of the particular instantiation and the state of affairs to which it is applied. The content is logically independent from the state of affairs to which it is applied. If this were not the case then it would be impossible for an application to be incorrect.

To take a slightly more complex example, involving representations, let us imagine that I am planning to catch a particular train at Victoria. I have to decide whether I can get there in time. In order to do this I might represent the journey involving a 36 bus, as a series of time phases for - getting to the stop, waiting for the bus, travelling on the bus, getting a ticket, and arriving at the train. Alternatively I might represent the whole distance and apply my well-known London Mean Speed rule to compute the time. In each case the function of tokening the representation is to determine where I will be at the crucial time t_d (departure of the train). That this is the function of tokening the representation, is determined in relation to the target, and is independent of the content of the representation.

The problem (having thus allowed for the possibility of both error and correctness by asserting the logical independence of the relata) is to make some sense of how the content of a representation is mobilised and related in a relevant way to its target, without undermining this independence. Causal forms of use theories applied to mental contents take the relation between the target state of affairs and the representation to be one of causal dependence, where the content of the representation is caused by the state of affairs and derives its meaning from the state of affairs. Causal theories are explicitly rejected in product semantic accounts of meaning relations, and it is difficult to see how any simple form of causal theory can provide sufficient independence to allow for error.²⁸

The principal alternative available which is consonant with the general product semantic strategy is to mobilise some form of adaptational role (teleological) theory. The idea that this might be appropriate stems principally from the general meaning model that is deployed, which is based on a cycle of hypothesis and testing, and the deployment of the concept of affordance. The gist of the argument is that although there is no direct causal relation between the relata, the fact that some representations or constructs prove to be useful relative to states of affairs will mean that they are adaptive, and result in their being selected for. However in order to gain some purchase on the idea of selection in this context it is necessary to conceive the relation as normative, which runs counter to the basic constructs in product semantic accounts which are essentially subjective.

²⁸ The difficulty of accommodating error is the classical bugbear of causal theories generally. [see for example Dretske 1981, and the discussion of causal theories in Cummins 1989].

Experiential Content

Although the product semantic account is initiated and presented as an experiential account, there are two particular senses in which this expectation is not satisfied. In the first place, the operational level of product meaning is not analysed in terms of interactive processes. Thus although a theoretical and methodological commitment is made to understanding the operational interaction of users and products in terms of the cognitive models that they deploy, the cognitive account offered is restricted almost exclusively to representational models rather than interactive process models.²⁹

Secondly, although meaning is articulated primarily in terms of individual experience and significance, the product semantic account does not include an analysis of expressive or affective content, which are instead assimilated to the general run of the creation of categorial sub-structure, and attributive association.³⁰

Whilst in the first case one might attribute the lack of a substantive proposal to the state of development of the framework, in the latter case the omission is particularly significant, since it could be argued to be operative at the most basic level of engagement with the world, in terms of the 'quality' or 'feel' of experience.³¹

²⁹ Krippendorff, for example, identifies both a broad commitment to understanding operational practice in cognitive terms, and a more specific methodological commitment implied by this, represented in the role taken by types of method ('descriptive', 'anticipatory', 'creative') and in the characterisation of the form of such methodologies ('ethnographic' 'discourse analysis' 'protocol studies' etc). [See above, Section 2, *passim*]. The operational aspect of meaning-making is however neglected in the account of how the central product semantic concepts are deployed. Given the general commitment, one would infer that the cognitive counterpart to these methodological and theoretical orientations might take the form of product-related operational 'schemas', but the commitment is not explicitly made.

³⁰ Although Vihma does identify a qualitative experiential aspect, which in her account is assimilated to 'aesthetic content', this is analysed separately from semantic processes of signification, and could be interpreted as a further construct over and above semantic levels of signification.

³¹ There are two possible reasons for this omission. The first might be argued to rest on the idea that the product design process is concerned with the definition of types rather than the generation of significant tokens. However if this were pushed to its logical conclusion, then it could be used as an argument against the product semantic approach *tout court*, since it is in any case unpacked in terms of individual processes of signification. If individual processes of signification can contribute to an understanding of products that is usable at all, then there appear to be no *a priori* grounds for omitting selected elements of signification. The second reason relates to the role of affordance. In its basic sense it must perforce capture something of what it is to 'have' an experience. If it is assimilated to higher orders of conceptual structure, as it is in product semantic accounts, then this sense of the 'content' of experience is easily lost.

9.5 Summary - Concepts and Conceptual Relations

The principal inconsistencies that arise, given the product semantic characterisation and deployment of key concepts and their relations can be summarised as follows :-

- a) The assumptions regarding the unanalysed notion of 'function' are unwarranted. It is neither intrinsically deterministic nor determinate, but rather specifies a relation which in particular cases provides the basis for identifying derived conditionals.
- b) The relation established between 'meaning', 'significance' and 'understanding' is inconsistent in that although it is acknowledged that understanding is normative and subject to public achievement criteria, and that meaning and understanding are both aspects of cumulative significance, it is asserted that meaning is individualistic rather than normative. The established relation conflates public and private aspects of meaning.
- c) Different aspects of the product semantic account assume both compositional and holistic views of meaning, which expressed as a general view, would normally be regarded as mutually inconsistent positions in semantic and cognitive theory.
- d) The rejection of a distinction between perception and cognition, and the liberalisation of the concept of affordance, robs it of its explanatory power in a cognitive context, which is dependent upon its relation to an evolutionary theory.
- e) Although subject-object dualism is rejected, the distinction is in fact required in order to articulate the idea of opacity and transparency in product interaction.
- f) Meaning is identified as an individual mental construct constituted in terms of cumulative significance. The product semantic account is agnostic with respect to what binds significations together, wavering between an assumption that they are bound extensionally and that extension is determined by the fact that they are de facto bound.
- g) The product semantic account adopts a prototype-semantic account of categorisation. The empirical evidence suggests that an all-through prototype-semantic account is insufficient to explain the characteristics of categories and concepts.
- h) The adoption of a prototype-semantic account of categorisation, which is articulated in terms of properties and attributes, is inconsistent with the idea of directly cognisable meaning holism.

- i) The inconsistency in the relations between attributes, compositionality and holism leads to the general problem associated with the attributive definition of kinds, and the problem of indeterminacy of reference (extension). This can be partially equated with confusion regarding the relation between meaning and extensional orders.
- j) Two distinct senses of context dependence are conflated in product semantic accounts. One is concerned with the relationship between elements at the same level (semantic holism versus semantic atomism); the other concerned with the kind of compositionality that is operative (lexical versus molecular).
- k) Although 'function' is rejected in product semantic accounts, the concept is directly required in order to articulate the product categorisation model. In addition 'function' or a parallel analogue is necessary to express relations between the elements in terms of which 'affordance' is instantiated.
- l) The core theory of meaning in product semantic accounts is a 'use' theory, which is teleological rather than causal in form. Theories of this kind are essentially normative and generally held to be inconsistent with individualistic and subjective accounts.
- m) Although the framework is conceived experientially, its implementation is based on the unargued assumption that experiential content can be assimilated to general models of content in semantic and cognitive theory.

Section 10 Reconciliation

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10.1 Introduction

Although the explanatory structure of the product semantic framework is coherent in the sense that it represents a particular form of a familiar and commonly accepted explanatory hierarchy in grounding semantic accounts cognitively, the deployment of concepts within it, in the form in which they are used in product semantic accounts leads to inconsistency. In respect of the linked concepts of meaning, significance and understanding, the scheme conflates 'public' and 'private' criteria for their use, and is equivocal in respect of the normative and individualistic aspects of semantic constructs generally. The confusion is also evident in the juxtaposition of constructive and holistic views of meaning and holistic and attributive elements of categorisation. In addition the central concept of affordance (together with representation) is deployed both as a grounding concept in cognition and as a general relation of accommodation at higher levels of cognitive complexity. In broad terms the problem with the scheme, which derives from the need to accommodate a relativistic conception of meaning, rests in the dominance of the 'top-down' elements of the framework, and the transfer of higher level properties to lower level constructs.

Although this is the case, the account is clear in its commitment to an individualistic and experiential approach to user interaction articulated semantically and grounded cognitively. The strategy of the present section will be to re-examine the analysis of concepts in the light of the inconsistency and on the assumption that the core commitments are retained.

Section 10.2 and 10.3

Section 10.2 addresses the areas of inconsistency in the product semantic account in terms of four themes - a) the juxtaposition of psychological individualism with wide content (extensional definition) and context dependence; b) the role of 'representation'; c) conceptual structure; d) the sub-structure of meaning. In each case the core of the reconciliatory argument focuses on the role of affordance as a grounding and articulating construct, and the need for concepts to be defined in respect of distinct explanatory orders.

Section 10.4 and 10.5

Section 10.4 (summarised in section 10.5) re-examines the experiential orientation of the framework in the light of the marginalisation of aspects of experiential content in the dominance of the top-down elements of the framework. Experiential content is considered in terms of the contrast between 'knowing that' and 'knowing how' and also in respect of the nature of judgement and reasoning in action. The section concludes with a brief consideration of the role of affective representation.

10.2 Conceptual Re-Orientation

The conceptual framework of product semantics is derived from an eclectic range of top-down and bottom-up elements driven from both philosophical/theoretical and methodological starting points. The upshot is a composite picture which juxtaposes a number of interpretations of key concepts and their interrelation, in the context of the broad explanatory structure identified in Section 9.2 and summarised in Section 9.3 (above). Foremost among these at the philosophical and theoretical level are a broad commitment to psychological individualism in a cognitive framework, coupled with a contextual account of meaning, and a commitment to a constructive and representational conception of mental states. The juxtaposition of these commitments in the form in which they are adverted to in product semantic accounts gives rise to the principal problems identified in Section 9.4, and summarised in Section 9.5 (above). The present section addresses the question of how these commitments might be reconciled, on the basis that the core intuitions of the product semantic account are preserved, relative to the nature and deployment of key concepts in the framework.

Individualism and Context

A number of the assumptions made in the product semantics account in respect of how our general engagement with the world (and our specific engagement with products) can be semantically and cognitively characterised are shared with prevalent theories of conceptual representation in cognitive science. If the broad position is that our engagements are conducted in terms of mental constructs which are derived in part from physical inputs, then the first assumption is that conceptual representation is individualistic. The mental construct constituting a conception, or a mental state with content, is a particular in a particular mind - my mental construct of some thing is a particular that is distinct from yours. The second and related assumption is that we may entertain different conceptions of the same thing. Your conception of *x* may be qualitatively as well as numerically different from mine, even though it might be agreed that they are both conceptions of *x*. This assumption draws a distinction between the object or target of a conception and its content, and raises the question of what it is that makes a conception a conception of *x*.

The third assumption relates to the uncontroversial fact that conceptions can change over time. This claim can however be interpreted in at least two distinct ways, each of which is related to the assumptions noted above. On the first interpretation the claim is that the mental construct of *x* that I now entertain is numerically different from the mental construct of *x* that I had last month. On the second interpretation the conception is

construed as being numerically the same conception even though it has been subject to qualitative change.

Given these assumptions, there are two principal ways in which mental states such as conceptions might be individuated - either in terms of their contents or their targets. Product semantic accounts want to hold onto both forms of individuation, since on the one hand they regard mental constructs as physiologically grounded and individualistic, and on the other they wish to preserve the idea that it is possible to sustain a target identity with which different conceptions can be associated. Although both of these principles seem at face value to be acceptable, it is generally argued that in formal terms it is not possible to sustain both accounts of individuation simultaneously.¹ However, it is possible to derive a different interpretation which is consonant with both principles and which gives further shape to the product semantic account. The basis for this rests on the deployment of a relational concept of function in the articulation of semantic theory.

It is generally held that the role of mental states is to capture various states of affairs in the world under some intentional description. Thus the psychological state of believing has the function of representing states of affairs, and this function explains the role of beliefs in the behavioural economy of the individual, in a parallel way to that in which biological categories are individuated by their functions. The natural extension of this is some form of teleological semantics.² The concept of function normally deployed in teleological semantic accounts is essentially historical (etiologically) and defined in terms of adaptation.³ Given that this is the case the individuation of mental states will be in terms of wide

¹ This distinction is equivalent to the distinction between individuation in terms of 'narrow' and 'wide' content. The idea is that the mental content that I have can be specified in terms either of its relation to the (neuro)physiological states that I am in, or in terms of its relation to its external referents defined either intensionally or extensionally. The general problem is that although each of these taken individually seems to be both necessary and obvious, if taken together they lead to a counter-intuitive conclusion. 1) However mental contents are individuated they are realised as (neuro)physiological states. Token states of the same physiological kind have the same relevant effects in the same contexts. Mental contents with the same effects in the same contexts are instances of the same psychological kind. (If this were not the case then mental contents could not be invoked in causal explanation of a person's behaviour). 2) Token mental contents of the same psychological kind have the same 'wide' content (specifications of what a mental content is about). If this were not the case then we could not invoke mental contents in causal explanation of a person's interaction with their environment. 3) It follows, however, that token mental contents which are instances of the same physiological kind must have the same wide content. What something is about is dependent on physiology. The locus classicus for the demonstration of this result is Putnam's Twin Earth thought experiment. [Putnam 1975]. Fodor has provided a more recent formal discussion of the position [Fodor 1991].

² See above, Section 4.4 'Affordance and Semantics' pp 125-129.

³ An approximate definition would be that the function of a trait 's' is to 'a' just in case 's' is an adaptation for doing 'a'; where 's' is an adaptation for doing 'a' means that it has contributed to average individual fitness in the past by doing 'a'. The definition of function thus ties tokens to the adaptational history or etiology of other tokens of the same type. Teleological semantic theories generally employ a concept of function of this type [for example Millikan 1984, 1989; Griffiths 1992]. The general definition of function in terms of etiology is due to Wright [Wright 1973, 1976].

content and non-individualistic.⁴

It was argued above, however, that a general analysis of function is properly made in terms of a relational rather than an etiological conception.⁵ The significance of an analysis of function of this form is that it emphasises that functions are functions relative to context. The upshot is that if mental states are individuated in terms of relational rather than etiological functions, then a given token physiological state can instantiate more than one psychological state, given a difference in context.⁶ The intuition of wide content is preserved since mental content is pinned to context, whilst the idea of individualism is not violated since it will still be true that states of the same physiological kind will realise states of the same psychological kind, where context is shared.

The two principles which underpin wide content and individualism respectively, can be seen as reflecting two different orders of explanation in cognition and psychology. Wide content is typically deployed in explaining behaviour, and in order to do this we need to be able to sort psychological kinds in terms of their wide contents. On the other hand a distinct and important aspect of explanation is concerned with how psychological functions are implemented in terms of the physiological systems in which they are realised, and the key to this lies in sorting psychological kinds on the basis of formal equivalences amongst physiological kinds (individualism). The essence of the formal incompatibility of wide content with individualism rests on the expectation that compatibility would be represented in the possibility of a simple mapping between the taxonomies independently derived from the two different ways of sorting psychological states. But this expectation is in itself unrealistic since the properties of psychological states picked out by wide content are semantic properties, whilst the properties picked out by individualism are formal or syntactic properties. The link between the two, which is signalled in product semantic accounts in the idea of the co-development of syntax and semantics, might be described as 'context fixing'. Thus although physiological type-identical tokens can instantiate different psychological states, once a context is established they will in fact have the same wide content and instantiate a single psychological state.⁷

⁴ McGinn 1989.

⁵ The analysis of function (Section 3, above) was carried out primarily in respect of artefacts, though taking account of the literature relating to the biological concept of function, and the continuity of the idea of function across contexts. A recent critique of etiological function, and arguments in support of a relational concept, specifically in respect of biological function ascription has been provided by Walsh [1996], in the light of explications of the essential relativity of fitness value [See for example Burian 1983; Brandon 1990].

⁶ The idea has recently been elaborated and explored in detail by Walsh under the rubric of a position entitled 'Wide Content Individualism', which extends his previous analysis of teleological function in biology [Walsh 1996] into the domain of teleological semantics. The form of the present argument is substantially based on Walsh's more recent article [Walsh 1998], although the analysis of function and its relation to the cognitive content and commitment of the product semantic framework is independently derived.

⁷ The idea is equivalent to giving a particular interpretation to a formal system.

This interpretation, which is based on deploying a relational concept of function in respect of the mechanisms that constitute the system components that go to make up affordances, is able to reconcile the two distinct principles of individuation, provided that they are recognised as belonging to two different orders of explanation. It also brings the product semantic account closer to the general run of teleological semantics. The frog has a relationship with flies because they afford nutrition. The relationship consists in a complex set of mechanisms which instantiate parts of that relationship (eg detecting flies visually). But the content of these mechanisms can be regarded as formal - they offer a range of values for specific parameters (eg registering small black dots passing across the retina at a certain speed) - and have semantic content (flies) only in the context of the overarching idea of an affordance relation.⁸

The sense in which syntactic and semantic orders can be said to be mutually constitutive is clear at this level. An organism relates to its environment in terms of broad ecological interactions expressed in terms of affordances. It does so by utilising its available physical mechanisms, some integrated set of which constitutes the physical instantiation of a given affordance relation for the organism. The content (values of system states) of a given mechanism has a functional role and semantic content in so far as the system and its states contributes to an affordance relation, and reciprocally the affordance relation consists in the set of mechanisms that are integrated in its implementation in an environment.⁹ From a semantic point of view the scheme is 'molecular' since the values of system states only have significance in terms of their integration relative to affordances.

The role of 'affordance' at this level in the conceptual scheme is therefore pivotal in providing the link between semantic and cognitive orders. System states (including the neurophysiological states in which cognition is grounded) whose properties are essentially formal (syntactic), acquire semantic value in virtue of their role in the implementation of an affordance relation. The important point to note is that the explanatory power of 'affordance' at this level derives from its role in the evolutionary context of teleological semantic theory.

⁸ If the context is changed then although their operation might remain the same - they will still register small black retinal dots - their functional role and semantic content will depend on the relation operative in the new context.

⁹ Affordance is essentially an ecological concept, which from the perspective of the organism can be expressed in terms of capacities that can be exercised in a given environment. From an evolutionary perspective one can say that at a given stage an organism is endowed with certain intrinsic capacities to sense and to act, instantiated in its physical constitution and mechanisms. The development of these capacities overall occurs in the context of mutual interaction among the mechanisms themselves in interaction with the environment. Thus sensory capacities develop which are action oriented relative to the environment. A developed mechanism will have an integrated relationship with other mechanisms, its functional role having been in part determined by the mutual interactions relative to an affordance. Affordance relations, in evolutionary terms, constitute the level of organisation at which 'selection' can be said to take place.

Representation

Although the link between semantic and cognitive orders can be established in terms of affordance relations, the question remains as to how the components of the cognitive order itself, as represented in system states with syntactic values, can be used by the system. In this respect the clearest cognitive commitment in product semantics is to a representational account - the idea that cognitive functioning can be explained in terms of the fact that system states can be characterised as 'representational'. The assumption is that being in a particular mental state involves being in a particular (neuro)physiological state, and that such states play characteristic information bearing roles in the behavioural economy of the individual, in virtue of which they have particular semantic content. Representationalist accounts generally trade on a substantial analogy between language and thought, and mental states are taken to have content and meaning in much the same way as do sentences. In addition it is assumed that both exhibit an underlying propositional form, which is instantiated in language in the form of sentences deployed for a variety of purposes (stating, requesting, ordering etc), and in the mental order in the form of the content of attitudes. Thus coming to believe something P, is to move a mental sentence token that means P (or has the propositional content that P), into your 'belief box'. However, it is not clear that the mobilisation of an explicitly propositional form is a necessary generalisation of the idea either of information content or of representation.

In the first place it is clear that information content can be implicit rather than explicit - can be operative though not explicitly represented. In a sequence of programming steps, the fact that a system undertakes step 2 may be dependent on the fact of a certain state having been instantiated at step 1. In such a case a certain information content is implicit, though not represented in the second step.¹⁰ In addition, it is conceivable that even in cases where explicit representation is operative, it may differ in form from propositional representation (for example representation in the form of disjunctive states).¹¹

¹⁰ Cummins 1987; Stalnaker 1993. Cummins explores the example of a search routine in a word processor, which reads the second character of a word only if the first character matches. If the machine is reading the second character then the fact that the first character matches is implicit though not represented. Stalnaker points out that the system might have functioned by storing the information, but does not need to do so and in fact does not. He also notes that some forms of representational theory [for example, Lycan 1993] might stretch the underlying metaphor in such a way that implicit information can be counted as representational on the grounds that representational states may be diffuse and distributed rather than modular or physically salient as are public linguistic tokens.

¹¹ Stalnaker 1993. Stalnaker presents the example of a simple information carrying device consisting of four light bulbs wired so that only one is on at a given time. A sensor determines which bulb lights, on the following basis - if p and q are true, light 1 goes on; p and -q lights 2; -p and q lights 3; -p and -q lights 4. If light 1 is on then the system carries the information that p (and the information that q). But what represents the token state equivalent to p. Either the system is viewed as having a token state that represents two distinct informational states, or the system represents the fact that p in the form of a disjunction ($1 \vee 2$) which has no obvious token equivalence. The argument is that there is no in-principle reason for rejecting holistic information states, except on a too literal interpretation of the linguistic/propositional metaphor.

Neither is it obviously the case that the systematicity and combinatorial complexity of mental states is restricted to the kinds of recursive compositional rules which are deployed by semantic theories in explanation of the representational properties of linguistic expressions. The metaphor of language is not the only available representational metaphor and it is at least conceivable that other forms of external symbolic structures (maps, diagrams, pictures) might usefully inform a conception of informational content for mental states.¹²

Product semantic accounts trade on both propositional and non-propositional models of representation, but the level at which these are intended to apply is seldom clear. Thus although propositional models are explicitly used in articulating product content from the perspective of the user in the form of subject-predicate structure, at times it is assumed that this model is fundamental in the organisation of mental constructs, whilst at others it is taken to reflect a more remote relationship between mental content and linguistic expression. Similarly, although mental representations are taken to be the core of perceptual and cognitive processing, accounts are uncommitted in respect of whether such representations are conceived as mental images.¹³

Although it is possible to take the view that product semantics therefore subscribes to a mixed economy view of the nature of mental representations, it would be more accurate to say that it reflects an ambivalence about the way in which mental representations are conceived to be explanatory. This is particularly the case in the light of the link forged with intentionality, communication and speech act theory. The active sense of meaning is a form of intending embedded in a communicative performance, and the content of an associated representation determined by the intentions with which it is deployed. Given the fact that shared meaning depends on the operation of conventions, the semantic properties of representations are derived either directly from the intentionality of 'speakers' and 'hearers' or indirectly from the intentionality implied by a convention.

However, it is clear that conceiving the relation in this way, robs the concept of explanatory power in cognitive contexts. The point of appealing to representation in respect of explanation in cognition generally is that it is regarded as a generic semantic term, which offers the prospect of an analysis in non-semantic and non-intentional terms, and could therefore be used to underpin the general analysis of semantic notions. It is therefore important that representation is analysed or defined in such a way that it does not

¹² Cummins 1996; Stalnaker 1993; Goel 1995.

¹³ Smets, Athavankar, Vihma and Krampen all seem to equate mental representations with mental images, although this is not explicitly stated. In the context of the present discussion the difference is not significant. Goel, makes a similar point in respect of a parallel level of cognitive exposition, in relation to Kosslyn's theories [Goel 1995; Kosslyn 1980, 1994] .

depend on semantic and intentional terms.¹⁴ In a context that lies outside intentionality, we would therefore need to establish a sense of 'representation' that is intrinsic rather than extrinsic. One approach to this would be to draw on the commonsense conception of representation in which something is representational to the extent that its features map to features of that which is represented, or more formally in a mathematical sense where representation is conceived in terms of structural isomorphism.¹⁵ Although this does provide a workable basis for the relation, grounded in intrinsic properties, it does not establish the order of the relation, for which it would appear that we would need to deploy an intentional conception.¹⁶ Alternatively we can accept the symmetric character of the isomorphic relation and see how it fares in practice.

In the case of a simple organism which has a rudimentary visual system and moves about on legs, we might establish that there is an isomorphism between excitatory patterns in the visual system and light values in the environment. Similarly we might establish that the registered pattern of angular displacements of leg positions deployed over uneven ground are isomorphic with the terrain. The fact that the values for these two systems are representational is dependent not only on their isomorphism with the environment, but also on their availability to the organism in going about its business. The systems are deployed as an integrated set relative to an affordance for the organism, and have developed together to this effect in characteristic environments. Thus although there is an intrinsic content in the systems themselves (the fact that they are isomorphic with features of the environment) which is the basis for their being representational, what makes them representational is that they are *de facto* used by the organism in the implementation of perceive-affordance relations.

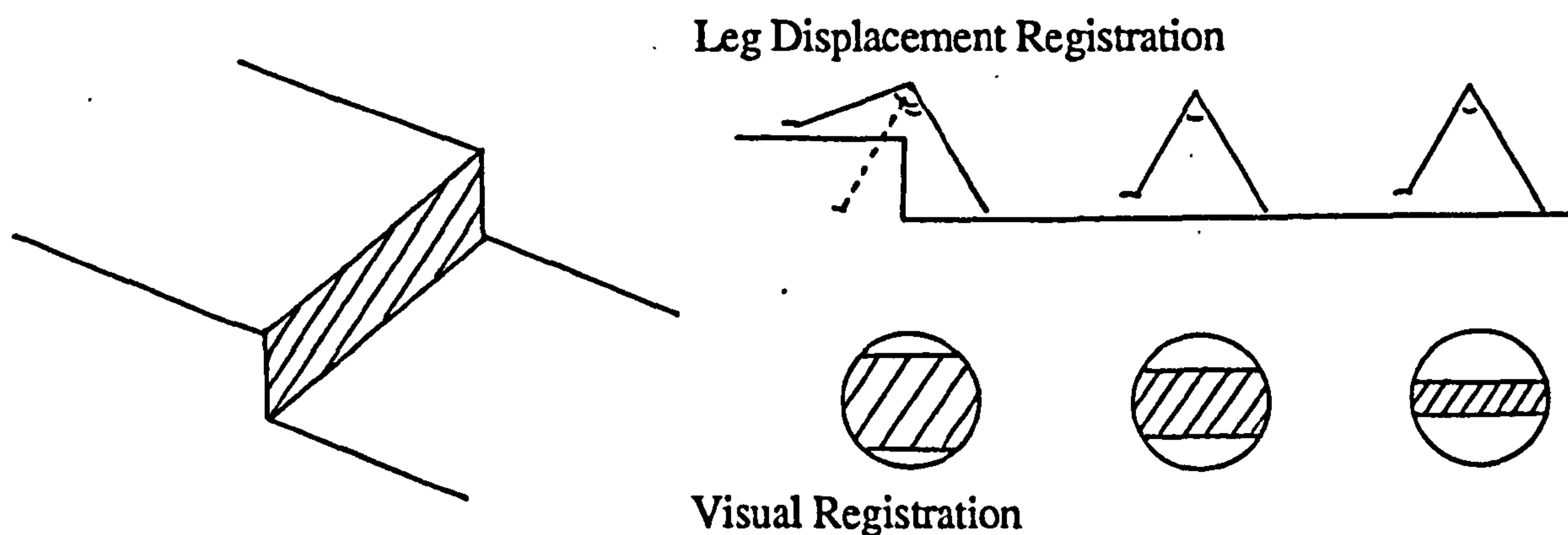
An affordance relation is a temporary state of equilibrium obtaining between a set of system state values and environmental values, whilst affordance itself is the completion of a transition from one state of equilibrium to another. The step affords 'stepping-up' if the transition from ground level to the higher level is achieved. Perceive-affordance is the conditional form of an affordance relation, where some subset of the set of system state values projects to the set as a whole. This can be illustrated with a simple example.

¹⁴ The implication of the analysis supplied by 'Intention Based Semantics' is that the content of representations is determined by the intentions that are operative, and this is inapplicable in the case of mental representations [See Dennett 1978; Lycan 1981, 1987; Cummins 1989]. The rejection of accounts of this form are extended by Cummins to include 'intended use' theories generally, including Wittgensteinian 'meaning as use theories' which are also appealed to in product semantic accounts of meaning [Cummins 1989].

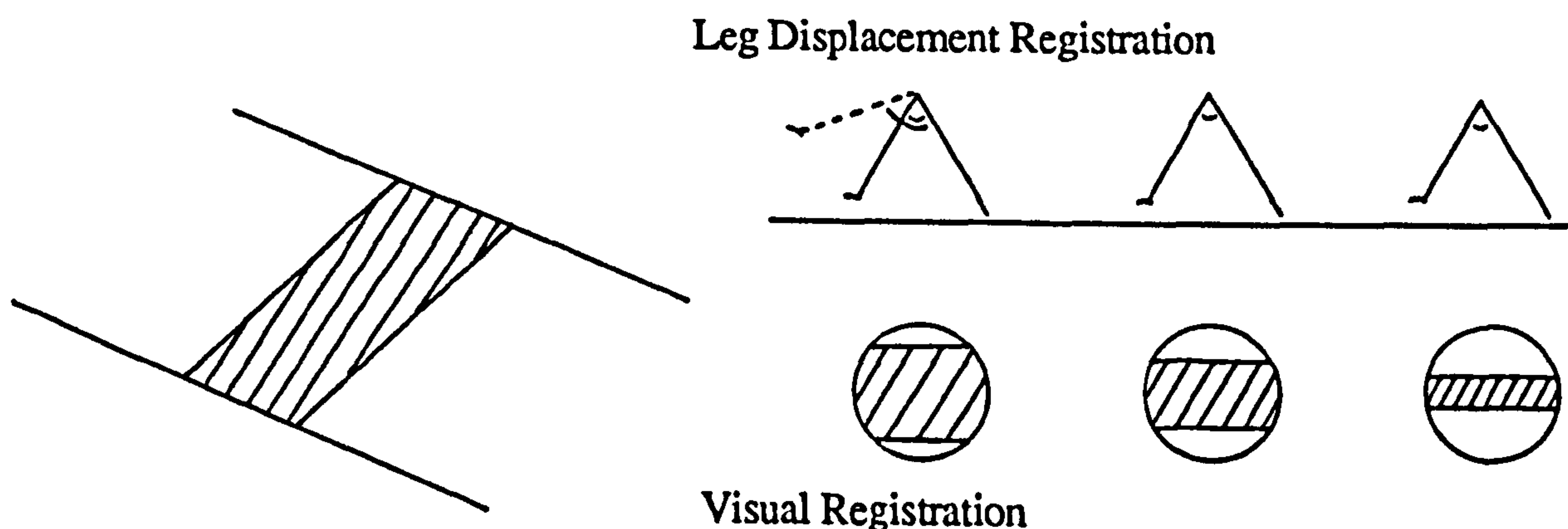
¹⁵ Swoyer 1991.

¹⁶ Although a photograph of the landscape is isomorphic in relevant respects to the landscape itself, the relation of isomorphism is a symmetrical relation, the implication being that the landscape is as much a representation of the photograph as the photograph is of the landscape. In order to make the distinction between a representation and what is represented, we seem to be obliged to deploy extrinsic and intentional properties (eg causal priority or intended use).

Imagine our rudimentary organism with a visual system and locomotion encountering a step. Its progress can be mapped in terms of a succession of registrations of visual system excitation and angular displacement of its legs. The environmental feature that we call a step is experienced as the set of system states associated with the encounter. They are the content of the affordance relation from the perspective of the organism. The values of the state of the visual system acquire their significance from their correlation with other system states, particularly those relating to action components.¹⁷



If we move the organism to a new environment in which there is no step, but where some other environmental feature causes the values of visual system states to be preserved, then the organism may project an affordance relation involving leg displacement, which cannot be implemented.



The environment perceive-affords 'stepping-up' but does not afford 'stepping-up'.

¹⁷ There are essentially two ways in which correlated development can occur - an evolutionary process or a learning process. In the context of the present argument, where we are considering the lowest level of implementation of cognitive systems, the relevant context is an evolutionary one.

There is then a basis for grounding the representation relation non-semantically in terms of isomorphism, and for establishing the order of the relation in terms of functional role relative to an affordance, and thus securing the explanatory role of 'representation' in cognitive contexts.¹⁸ Representation as a process consists in systematically harnessing intrinsic isomorphisms between system states and environmental values, in mediating the control of behaviour.¹⁹

At a fundamental level, user interaction can be understood in terms of the deployment of operational representations (perceive-affordances) whose organisation has been shaped by the isomorphisms that have developed in situations of contextual equilibrium (affordance relations) - affordance sets the agenda for perceive-affordance. The ecological sense of affordance suggests that we experience the world in terms of the higher level perceptual constructs which relate to an adaptive order. Thus, in order to make sense of 'seeing' we need to identify the level at which the mechanisms comprising 'seeing' form an integrated organisation (together with other mechanisms, for example those comprising 'acting') relative to an adaptive trait, rather than treating them as independent components. This is also the level at which we experience operationally significant experiential complexes holistically - as 'walk-able', 'grasp-able', 'hide-under-able', 'bounce-able' and apprehend them as substances, surfaces, objects and properties.²⁰

In addition to providing the articulation between semantic and cognitive orders, the concept of affordance provides the basis for establishing the order of the representation relation, where this is analysed non-semantically and extra-intentionally in terms of intrinsic isomorphism.²¹ The explanatory role of the affordance concept is here again dependent on its inherence in an evolutionary scheme.

¹⁸ This is consonant with the general analysis of function developed earlier, in which function is conceived as relational and context dependent, and where the relevant context is established as that which is the subject of selection - either in the form of intentionality, or as in this context in the form of de facto selection in an evolutionary context. The order of the representation relation is similarly determined relative to the term of the relation which is the de facto subject of selection.

¹⁹ Although it is more natural to think in terms of representation as a property of perceptual systems, the relation between different system states is symmetric, and one should therefore treat action systems as equally capable of being representational for the organism.

²⁰ In Brian Smith's memorable phrase 'Objects are our way of having a world' [Smith 1996].

²¹ The concepts of affordance, perceive-affordance and meaning, and the role of representation are explored in more detail in terms of their mapping to a simplified abstract system model, in Appendix C 'Mapping Affordance and Meaning'. Essentially the mapping demonstrates that there are two distinct contexts for meaning-making, one embedded in the relationship between an individual and the material world, the other in the co-ordination between individuals. In the case of the former, meaning consists in an interpretation in respect of a functional role for a representation, where a representation consists in the implementation of particular values for a set of relevant displacement functions in a given environment (equivalent to system state value isomorphism in the present discussion).

Representational Content, Concepts and Identity

The semantic and cognitive contexts discussed so far have essentially consisted in those elements of the framework operative at an operational and perceptual level. These can be articulated in terms of 'representation', given an evolutionary context for 'affordance' and a relational conception of function applying to component systems and states.

There is however a distinct and different sense of what can constitute a constructive and representational conception of mental states, which is most clearly apparent in Vihma's principal contribution to the conceptual framework. This consists in the notion that products (and things generally) are semantically specified in terms of their 'representational' content. The relevant sense of 'representational content' is here conceived along the lines of the accrual of signifiatory associations to (or in the form of) the mental representation of the product.²² This inversion of the idea of reference is structurally equivalent to a generalisation of Goodman's analysis of denotation in terms of exemplification. Objects and products are meaningful in that they acquire associations referentially through the fact that literally or metaphorically they 'exemplify'.²³ This sense of the idea of representation and content, which expresses a general theme running through product semantic accounts, is used to articulate and emphasise the idea that perception and cognition are conceptually driven and culturally relative.²⁴ Ultimately this results in a top-down conception of cognitive explanation, which negates the crucial explanatory role of the bottom-up elements outlined in the preceding paragraphs.²⁵

However one chooses to interpret the idea of a conceptual scheme, in order for the associative sense of representation to be a workable notion there needs to be a core or a

²² This sense is compatible with Krippendorff's rejection of the applicability of the idea of reference as central to semiotic conceptions of signification and symbolisation, since the process is associative rather than referential (the product acquires or has meaning in virtue of the fact that it clusters associations, in contrast to the idea that the meaning of a product consists in that to which it refers).

²³ Signifiatory associations are of three basic kinds derived from Peirce - Icons, Indices and Symbols. Vihma does not address the question of what it is that the associations are associated with, but given the fact that association is taken to be a form of signification constituting the semantic properties of objects that also have non-semantic properties, it can be assumed that the process is one of accretion to some 'substrate' rather than the formation of a complex from associations per se.

²⁴ The idea that perception and cognition are conceptually articulated and culturally relative is in one sense unexceptionable, in that these are generally held to be necessary elements of behavioural explanation. The difficulty arises if these elements of an overall account are taken to be sufficient for cognitive explanation.

²⁵ The problem results from the failure to recognise that the explanatory power of 'affordance' derives from its inherence in an evolutionary scheme, and that although this warrants its role in a bottom-up account, it does not follow that it has the same sense in the context of a top-down account which does not depend on evolutionary underpinning (product semantic accounts explicitly reject the idea that conceptual schemes, which are held to be culturally relative, can be explained in evolutionary terms). There are essentially two ways to go in resolving the problem. One would be to accept that there is a general concept of affordance that can be applied in the two contexts, but which has a different implication in each context. The other would be to assert that there are in fact two distinct concepts with different roles in the two contexts.

mutual 'location' for the application of the conceptual schemes involved in the clustering of associations.²⁶ One approach to defining such a core in product semantic terms would be to equate core object identity with the affordance relation. There is a strong sense in which the phylogenetic version of the concept can be viewed as a sub-conceptual parsing of the world in terms of interaction complexes. The idea is roughly that the kind of information available in the perceptual array for a given species consists in the net result of the complex of system-environment interactions adaptively selected for over evolutionary time. The level at which these are available to the system is in the form of the direct perception of the environment as organised in a particular way and having operationally defined attributes. Our engagement with the world consists in interacting with it as 'things' and 'substances', in experiential terms.²⁷

Whether this constitutes a semantic parsing is open to debate. In one sense one could regard the properties of objecthood or substantiality as the lowest common denominators of a scheme that is conceptually driven. On the other hand one could regard the parsing as the way in which the perceptual system derives structure from flux, unmediated by a conceptual scheme.

The former case is based generally on the idea that discrimination of any kind requires some basis and that individuals are picked out in terms of 'sortals' - concepts which provide principles of individuation and identity, and this requirement extends down to the lowest levels of perceptual and cognitive processing.²⁸ The position is therefore committed to a top-down view of cognition operating through conceptual schemes.

²⁶ See footnote 23 above. The possibility that structures might arise as emergent properties of complex systems (implemented as neural networks for example) is not compatible with the product semantic account.

²⁷ These are the qualities that Gibson approximates descriptively in nominating affordances (walkable, pliable, moveable etc), which are system experience attributions rather than objective properties (although they rely on there being objective properties which can be the subject of system experiences). There are at least two aspects to this that might be brought out. In the first place, processing in perceptual systems involves a number of levels. In the case of the visual system, for example, Marr defines a number of levels of processing which include among its outputs the 2 1/2 D sketch. [Marr 1982] The nature of this representation is determined in part by the nature of raw inputs to the system and lower level processing (eg edge detection on the basis of contrast differentials) and in part by the co-adaptive development of effector systems. Surfaces are surfaces, not because of the intrinsic visual properties processed, but because the processing of properties is organised in terms of the whole interaction of the organism with the environment. Secondly, although at lower levels of processing different systems may be functionally isolated, at the level of affordance they are effectively cross-modal.

²⁸ The principle is due to Frege who observed that one cannot count without specifying what to count. [Frege 1984]. The formal development of the idea has consisted in trying to establish principles for individuation and identity in terms of the logic of sortal concepts. [Geach 1962; Wiggins 1980; Hirsch 1982; Macnamara 1987; Lowe 1989; Macnamara and Reyes 1994]. The underlying contention is that there are no 'bare particulars' (property free individuals to which properties become attached), and that all discrimination is ultimately driven top-down conceptually through the application of sortals. It has been argued contra the strict logic of sortals [Wiggins 1980; Macnamara 1987] but in the spirit of the approach, that count nouns such as 'object' or 'thing' are low level sortals, and that this is supported by empirical evidence from studies of infant development. The general case and its relation to available empirical evidence is reviewed by Xu [Xu 1997].

The alternative position derives both from the logical inconsistency associated with the unconstrained use of sortal concepts, and more directly from the fundamental idea that for a conceptual scheme to be successfully applied implies the prior existence of discriminative differences.²⁹

The product semantic account is initially presented in terms of both top-down and bottom-up elements, which are taken to be jointly necessary for the semantic and cognitive explanation of user interaction.³⁰ As the framework develops, the cultural relativity of conceptions and their linguistic grounding dominate the scheme with the result that the top-down elements come to be regarded as providing explanatory principles which are sufficient to account for the operation of semantic and cognitive orders.³¹ The explanatory contribution of the bottom-up element is effectively lost and the entire framework becomes concept driven. But in order to make sense of an associative scheme of representational content in product semantic terms, the conceptual level must be grounded non-conceptually, and in a form capable of providing identity criteria. It is therefore essential to the operation of the framework that the role of 'affordance' as a lower level experiential construct, is preserved.

Concepts, Categories and Representations

The associative sense of constructive and representational content, although grounded non-conceptually, operates in terms of concepts and conceptual schemes and provides the basis for the contextual account of meaning. This aspect of cognitive theory in product semantics is given shape by specifying kind of thing that a concept might be. In the first place it is generally assumed that concepts are mental representations.³² Secondly that

²⁹ Ayers provides a general critique of the implications of the logic of sortals and the relation of this to the question of prior discrimination [Ayers 1997]. The general principle that there must be some prior 'similarity spacing' for the logical possibility of the application of a conceptual scheme (or for satisfying the conditions under which a system can learn) is due to Quine [Quine 1969].

³⁰ The dichotomy between the conceptual(sortal) and sub-conceptual positions is implicitly rejected. This is parallel to the implicit rejection of individuation in terms of either 'wide' or 'narrow' content (See pp 325-326 and footnote 1, above). The core idea is that although there are concepts, kinds and semantic values, these develop together with and operate on (supervene upon) the formal or syntactic properties of physical systems.

³¹ This effectively disconnects the link between semantic and cognitive orders, and syntactic and semantic content, which can be established via the concepts of affordance and representation. There are two principal ways in which this occurs. The first, noted above, lies in the failure to recognise that the explanatory power of 'affordance' in accounting for the holistic nature of interaction depends on an evolutionary context. The second relates to the concept of 'representation' which similarly loses its explanatory credentials through change in context.

³² The associative scheme in product semantic accounts is ambivalent with respect to whether mental representations are specified in terms of their contents or their targets. The more general presumption is that they are characterised by their contents (at the extreme, products are conceived as being constituted by the contents of our representations of them), although this is coupled with the idea that concepts are semantically identified by their targets (my concept of a wombat, may be entirely different in content from yours, but they may still both be concepts of wombats).

concepts are structured clusters of knowledge (typically though not exclusively restricted to perceptual knowledge) relating to a given target. Thirdly that concepts are perceptually based prototypes. Fourthly that concepts are mentally represented categories.³³

One problem with the product semantic account is that it runs together a number of distinct notions and uses them interchangeably. This is particularly the case in respect of the ideas of categories, concepts and mental representations.³⁴ Typically in product semantic accounts the mental constructs which are the vehicles for semantic content (which are taken to be mental images) are equated with individually held concepts and these in turn are equated with categories. In the first place it should be noted that categorisation is a process of sorting particulars on the basis of discriminable differences. The resulting partitioning groups particulars into categories, but since there is no specification for the completion of a process of categorisation which is independent from the basis for the sort, there is no natural terminus of the process which necessarily aligns with conceptual structure.³⁵ Being able to sort sheep from goats may be an important part of what is involved in having the concept of a sheep, but it is not all there is to having the concept. Secondly, although having a mental representation of a prototypical sheep may be an invaluable component of categorisation, it does not follow that a concept or a category can be equated with a mental representation. Thirdly, although some mental representations may take the form of mental images, this is by no means necessary.

One central way in which concepts are conceived is that they are akin to files in a filing system, in the sense that they are a means which can be used to gather together knowledge or information. The kind of material gathered may be diverse and could include images, diagrams, descriptions, affective responses, manufacturing instructions, and borrowed theories, for example. Conceived along these lines, the basis for making a number of distinctions will be apparent - a) representations can be of different kinds (eg

³³ The word concept is used in three principal ways in the cognitive science literature. It is used philosophically, particularly in the tradition of post-Fregean semantics, as a designation for an abstract object. In parallel with the idea that a sentence expresses a proposition, a term expresses a concept. It is typically used in a psychological sense, to designate a knowledge structure - an organisation of knowledge relative to a target. It is also used in a psychological sense as an equivalent for a mental representation of some target. If these senses of 'concept' are blurred then the tendency is to equate mental representations with knowledge structures and to think of these in terms of the instantiation of some abstract object.

³⁴ Woodfield has noted that this is a pervasive problem, which occurs even in key texts relating to the exposition of these concepts [for example Smith and Medin 1981; Markman 1989] which muddle psychological and philosophical questions [Woodfield 1991].

³⁵ The basis for sorting may be effective in a given context, but peripheral conceptually. In a given situation I may be able to sort effectively purely in terms of size but have little grasp on the conceptual content of the things that I am effectively sorting. The assumption in the relationship between categories and concepts is that categorisation is conceived maximally and hierarchically, for example in the sense developed by Komer. [See Appendix A 'Framework Models']. In this context a conceptual scheme is abstractly mapped to the idea of a complete categorisation, and the notion of categorial structure is used to model the logical systematisation of conceptual relations.

pictures, descriptions, analogs); b) not all contents need be representations (recipes, propositions, theories); c) categories are possible that do not align with a single file. This suggests that in addition to the fact that not all representations are images, categories are distinct from concepts, and both are distinct from representations.

There are essentially two ways of individuating files or concepts - either in terms of what they contain, or in terms of what they are about (irrespective of what they contain). One stance would be to say that what makes a given file a cat-file, or concept a cat-concept, is that it is intended to be applied to cats. This is a necessary consequence of the common-sense commitment that we can entertain different conceptions of the same thing.³⁶ On the other hand, one would presumably not want to accept the idea that the contents of the file are not relevant, since the utility of the file depends on the applicability of its contents to its designation.³⁷ This suggests that there are two aspects of semantic identity, one centred on what ties a file to its target (the relationship between the file and what is external to it), and the other centred on what ties contents together (the relationships among the contents of a given file, and/or their relationship to other files or the contents of other files).³⁸

In order to make the product semantic associative representational scheme workable, both conditions need to be satisfied. In the first place concepts need to get their semantic identities relative to their targets (so that contents can vary). Secondly there must be some basis for interanimation among the contents of concepts (so that meaning can be constructed in terms of content).

Meaning and Representation

There are two distinct senses of meaning corresponding to the two conditions noted above, which can be brought out in the difference between the characteristics of internal and external representations. Taking a map as an example of external representation then

³⁶ We can have different sets of mental contents which can be about the same thing in the sense that they are targeted at the same thing. The implication is that the semantic identity of concepts is in principle independent of content, and dependent on the target.

³⁷ However if we take the tack of saying that concepts are individuated by their contents, then we are committed to the idea that having a concept of a certain kind is in principle dependent on having particular mental contents. In addition, taking this tack blurs the distinction between content and target which is essential to semantic theories generally, in their capacity to account for error.

³⁸ The most common theories of concepts in cognitive science hold that concepts are defined by their relationship to other concepts, either in terms of classical notions (decomposition into a set of concepts expressing necessary and sufficient conditions), prototypical notions (decomposition into a set of concepts expressing statistical conditions), or theory-theory (inferential connections with other concepts). Clearly since decomposition or definition cannot regress indefinitely, some basic concepts must be defined in some other way or alternatively must be innate. The principal theoretical alternative (termed 'atomistic' theories) define concepts in terms of their relationship to their external referents. The underlying assumption is that concepts can be conceived as equivalent to mental representations.

we can say that it communicates a number of things to us - that London is south of Leicester and east of Bristol, and so on. It is able to do this because of some structural isomorphism between the map and the territory, and in virtue of a context of communication in which we understand that there is an intentional relationship embodied in the map. The relations that systems bear to their internal representations are not of this kind - there is no context of communication, only an isomorphism. An internal representation is a pattern in systems states that is isomorphic with some state of affairs external to the system, which enables it to be used by the system, and it is in this sense that it has meaning (semantic content). Internal representations participate in cognitive functioning, not by communicating something to their users and thereby having meaning (semantic content), but by having semantic content which the system can use.

In the intentional context of language and communication on the other hand, and taking our lead from speech act theory, something has meaning in virtue of the fact that it communicates something to its users. The meaning of a word or a gesture, for example, consists in what is understood from it by speakers of the language (users of the system of communication). In this context the idea of meaning gains its sense from co-ordination and the operation of convention in acts of communication, as a sub-class of social action, and not from the representational potential of intrinsic isomorphic content.

Some external representations, like maps, trade on both senses of meaning - meaning as representational content and meaning as the operation of co-ordination conventions. But whilst the first sense of meaning is semantic (dependent on content and 'aboutness') the second need not be regarded as semantic at all, since they may have no intrinsic content. In other words language and communication systems generally are not representational per se, since their elements do not have intrinsic representational content, but are signficatory in the sense that their elements have functions as signals in co-ordinated social action. Words and signs have 'content' (meaning) in virtue of how they are used.³⁹ This does not mean that languages and communication systems cannot be used to represent, clearly they can, but the isomorphisms that are the basis for representational relations are in this case created rather than intrinsic.⁴⁰

³⁹ The distinction between the two sources of meaning, and the nature of the representation relation is explored in more detail in terms of their mapping to a simplified abstract system model in Appendix C 'Mapping Affordance and Meaning'. The mapping demonstrates that there are two distinct contexts for meaning-making, one embedded in the relationship between an individual and the material world, the other in the co-ordination between individuals. In the case of the latter, meaning consists in the behavioural significance of a conventionally established co-ordinatory signal.

⁴⁰ In the dinner table re-enactment of war games, the salt stands for the infantry and the pepper for the artillery, because conventional isomorphisms (and the limits of their application) are explicitly established. In general, signficatory functions are established through a mixture of explicit assignment and conventional de facto 'acceptance'.

Drawing these elements together suggests the following reconciliation at the conceptual level. The semantic identity of concepts is intimately connected with words in language or signs in conventional schemes of communication. The functional role of words and signs is established by convention in the context of social co-ordination - they are primarily signals with behavioural consequences, rather than representations. They are linked to the content of concepts in virtue of the fact that behaviour generally is associated with representations which are derived from intrinsic isomorphisms with the environment. In other words, although words have no intrinsic semantic content, their role in behavioural co-ordination mobilises the representations associated with behaviours of a parallel kind, which do have intrinsic semantic content.⁴¹

Concepts are not abstract objects, but are organised knowledge clusters pinned to signficatory or linguistic elements which have conventional uses. There is no definitive specification for the particular knowledge or its organisation that is necessary and sufficient for a given concept, nor need all the knowledge associated with a concept be held by any individual. You might well have a richer concept than I do. But the centre of gravity of knowledge associated with a given concept is pinned to the conventions regarding its labelled use in a given community.⁴²

Explanatory Contexts, Meaning and Affordance

Although the product semantic account is ultimately expressed as a single top-down concept-driven explanatory framework, in order to preserve the core intuitions and to reconcile the various commitments made, it is necessary to recognise two distinct explanatory contexts (orders).

At the level of the constitution of cognitive systems (as implemented in individuals) the context for explanation is necessarily extra-intentional, since the point of invoking explanation is to ground cognitive functioning in physical systems in ways which are susceptible to the normal constraints of physical explanation. It is possible to achieve this within the product semantic framework, on the assumption of a concept of affordance

⁴¹ Words function as a public place marker which creates a nucleus for concept building, the content of which initially consists in representations trading on intrinsic semantic content. They are like creating labelled files which have a limited content, but with two kinds of identity condition, one kind pinned to the public context of co-ordination (target context) the other kind pinned to associated representations (content). Although concepts are not abstract objects, the philosophical basis of the idea is in part correct, in the sense that terms or signs mobilise concepts. Once this basic system is in place, then the potential for complexity and additional conceptual levels derives from the interaction between the content of the two distinct sources of meaning.

⁴² A number of authors have noted how little content need be associated with a given concept label in order for it to be successfully used in linguistic communities, and the degree to which the range of knowledge (contents) associated with a given concept is distributed across individuals in social groups or embedded in cultural products [See for example Wettstein 1988; Putnam 1978; Clark 1997; Donald 1991].

which gains its sense from the evolutionary context of teleological semantics, an associated relational analysis of function, and an analysis of representation and semantic content (meaning) based on isomorphism.

At the level of the deployment of cognitive systems (as implemented in social groups) the context for explanation is both intentional and conventional,⁴³ since the point of invoking explanation is to rationalise behaviour relative to cognitive functioning. It is possible to achieve this within the product semantic framework in terms of a communication model which acknowledges the signficatory role of words and signs in social co-ordination, and the derived sense of representation which is based on isomorphisms which are constructed rather than intrinsic. In this context 'affordance' expresses a general relation of contextual sufficiency, and semantic content (meaning) is derived rather than intrinsic.

The inconsistencies that arise within the framework are primarily attributable to the conflation of explanatory orders. This takes two forms. If the concept of affordance is generalised across contexts in the form of contextual sufficiency, then it is no longer explanatory at the level of the constitution of cognitive systems. On the other hand, if it is generalised relative to adaptation, then it is no longer acceptable as explanatory in respect of the deployment of cognitive systems.⁴⁴ Similarly, if the concept of representation is taken to be constructive across contexts, then it ceases to be explanatory at the level of the constitution of cognitive systems. On the other hand if it is taken to be based on intrinsic semantic content, then it ceases to be compatible with a constructive and associational account. In respect of both concepts, the product semantic framework adopts a stance derived from the context of the deployment of cognitive systems (top-down conceptual explanation), and transposes this to the context of the constitution of cognitive systems.

The particular value of the product semantic framework lies in the links that are made between conceptual and experiential orders in accounting for user interaction, and the relation of these to semantic and cognitive orders of explanation. In order for the framework to be conceptually consistent and viable it is necessary for the two sources of meaning (intrinsic semantic content based on representation and isomorphism, and derived semantic content based on signals and behavioural co-ordination) to function as distinct but interacting explanatory orders.

⁴³ For which the product semantic model approximates to Neo-Gricean speech act theory.

⁴⁴ Product semantic accounts reject sociobiological models generally.

10.3 Summary - Conceptual Re-Orientation

- a) The inconsistencies identified in the product semantic account are in part attributable to the need to sustain individuation in terms of both 'contents' and 'targets'. In so far as the account adverts to traditional approaches to semantic and cognitive explanation in characterising individuation, these are incompatible.
- b) If the proposed relational analysis of function is adopted and deployed in the context of a teleological semantic approach, then it is possible to reconcile the two forms of individuation. This is dependent on recognising the different explanatory orders with which they are associated, and the 'molecular' form of the semantic scheme.
- c) The role of affordance in this context is pivotal in securing continuity between semantic and cognitive orders, and derives its explanatory power from its inherence in an evolutionary scheme.
- d) A further group of inconsistencies arise in respect of the different roles accorded to 'representation' within the framework. It is used both as a grounding concept underpinning cognitive explanation and to characterise higher level mental content.
- e) The appeal to representation in grounding cognitive explanation, without circularity, depends on the possibility of its analysis in non-semantic and non-intentional terms. This can be approached in terms of the ideas of mapping and isomorphism between system states and states of the world. The order of the relation can be secured in terms of the role of isomorphisms with respect to affordance, in the functioning of the system.
- f) The second sense in which representation is deployed is in the form of an associative and constructive schema applied to the idea of product content and identity. In this case rather than providing a grounding account for cognitive explanation, it is descriptive of higher level content articulated in terms of conceptual structure.
- g) If the two senses of representation are conflated and assimilated to a top-down concept driven account (as they are in the product semantic framework) then the prospective role of the concept in cognitive grounding is undermined.
- h) In order to secure these roles, both of which are essential to the framework, it is necessary to recognise that 'representation' is used in two distinct senses associated with different explanatory orders.

- i) Concepts and conceptual schemes are essential to characterising the associative and constructive sense of representation, but the idea of 'concepts', 'categories' and 'mental representations' are used interchangeably within product semantic accounts. It is argued that they are in fact distinct, and that the individuation of concepts depends both on their targets and their contents.
- j) The two components of conceptual identity (target and content) and the two senses of representation correspond to two distinct senses of 'meaning'. The first equates meaning with representational content (intrinsic semantic content of system states analysed in terms of isomorphism). The second equates meaning with the role of signals in behavioural co-ordination (conventional and associative, with no intrinsic semantic content).
- k) The consistency and viability of the framework depends on the recognition of two distinct explanatory orders and the different senses that need to be accorded to associated concepts. The two explanatory orders are interactive and together provide the basis for an all-through account which links conceptual and experiential elements in semantic and cognitive accounts of interaction.

10.4 Experiential Content

The product semantic scheme emphasises the importance of subjectivity and experiential content in the rationale for semantic and cognitive accounts of user engagement, which are taken to be the basis for the articulation of perspective. Although the scheme is derived from both top-down and bottom-up explanatory elements, ultimately the exposition gravitates towards the dominance of a top-down concept-driven conception, which is generalised across the framework as a whole, giving rise to a number of inconsistencies.¹

In section 10.2 (and summarised in section 10.3) a resolution of the conflicts arising from the juxtaposition of key commitments in the framework was sought in terms of the analysis and application of concepts relative to distinct explanatory orders relating respectively to the existing top-down and bottom up elements. It was also noted that both propositional and non-propositional forms of mental representation are present in product semantic accounts. However in trading on a general representationalist conception, which is strongly informed by a linguistic model for mental content, the non-propositional forms which most closely relate to experiential content are in fact marginalised, although they are crucial to the framework in establishing the continuity between explanatory orders. The present section addresses the question of how one might approach a characterisation of non-propositional content, which is consistent with this role in the framework.

Knowing-how and knowing-that

The inadequacy of the use of propositional modes of representation as a general model for knowledge representation in particular and cognitive activity more generally, has been pointed out by Ryle.² Our use of language reflects the distinction that we make between the idea of knowing that something is the case and knowing how to do something. Whereas the former finds its natural completion in propositional form, the latter is generally satisfied by the specification of an activity.³ Although the most obvious examples of knowing how, such as knowing how to ride a bicycle, relate to physical activities, the idea can also be argued to apply to more cognitively located activities such

¹ See Section 9.3 and 9.4 above.

² Ryle 1949.

³ On the propositional model of knowledge, knowledge expressions are typified by examples such as knowing 'that London is the capital of England'; knowing 'that Aluminium is a metal', and so on. In general and in a cognitive context knowing is an intentional state whose contents are declarative statements implementing an underlying abstract propositional form. Ryle's argument is that propositional knowledge is only one aspect of human cognitive activity, and does not capture the idea of knowledge in the sense of what it is that constitutes our being able to do things. Knowing how to play the flute is not captured by the idea of retrieving the propositional form, but is rather represented in the capacity to marshal certain abilities to plan, execute and monitor our actions.

as calculating, arguing, and playing chess.⁴

The general thrust in cognitive contexts is to argue that since it is possible to acquire intelligent dispositions in learning how to do things, it ought also to be possible to give an account of the constitution of knowing how, in terms of mental activities. Typically this takes the form of accounts which trade on the idea of procedural knowledge - the knowledge required to perform an activity - which is embodied in the form of rules. These are essentially propositional in form (in formal terms they are composed of ordered strings of symbols, as are implementations of propositions) but they are instantiated in the imperative rather than the declarative mode. Knowing how is thus accounted for in terms of procedures which are ultimately grounded in propositional knowledge, which are instantiated as performances in terms of combinations of motor activity implicated by propositional strings.⁵

Although this general picture is to some extent supported by the notion that teaching people how to do something typically involves imparting procedural rules, it is also clear that simply imparting the rules is insufficient, and at the very least some element of engaging in the activity (or some simulacrum of it) will be necessary.⁶ In the product semantic context, direct engagement can be viewed as underpinning non-propositional knowledge in terms of the concept of affordance. Since the basic concept of affordance is holistic and ecological, the terms of the relations upon which affordances supervene can be viewed symmetrically. A step affords stepping-up, but equally the associated set of system states afford stepping-up, and collectively (step and states) they are contextually sufficient for stepping up.

⁴ Ryle's range of examples encompasses activities of these kinds, and it is clear from the general thrust of his argument the extent to which he viewed knowing how as a category that permeates intelligent activity generally. However, given his commitment to a form of behaviourism, Ryle's analysis extends only as far as analysing knowing how in dispositional terms. Nevertheless he does distinguish between dispositions as habits and dispositions in the form of intelligent capacities which can be modified and are the subject of learning.

⁵ There are two distinct ways in which this general approach is taken up in cognition and artificial intelligence. In the first case, rules are taken as abstract representations relating to competence. The classic example is the use of the idea of generative grammars to account for the features of linguistic knowledge. [Chomsky, 1957]. The alternative is to regard them essentially as performance models. The most familiar general approach of this kind is represented in the idea of 'production systems' which are broadly modelled by the logical form of implication. Where certain conditions are met then an activity will result, which may then satisfy a condition for a further activity. [Newell and Simon 1972]. In either case the form of knowledge representation underlying the rule system and its implementation is propositional.

⁶ Learning to play the flute involves, for example, getting a feel for the embouchure. Although to some extent this can be imparted by verbal instruction - 'imagine you are sucking liquid through a straw; hold the shape of your lips and face and spit out short bursts of air, using your tongue to control the expulsion of the air...and so on' - ultimately learning and understanding the production of sound depends on a direct experiential sense of the feel of the action and the quality of sound produced. Similarly although the fingerings can be procedurally notated in an explicit way, which relates directly to performance production, the production of fluent fingerings does not wholly depend on the propositional knowledge embodied in the rule system underlying the notation.

Knowing-how at ground level (exercising sensorimotor skills) can simply be viewed as an alternative perspective on the affordance relation, in which registered action-states can be representational in the same way as perceptual states.⁷ In the evolutionary development of organisms, capacities in given environments are refined by selection relative to adaptive traits. The difference here is that the capacities alluded to need not be ones that are available phylogenetically, but may be acquired by the individual. They include (and are typified by) skills that can be habitually acquired and learned, and can be conceptually linked to a core sense of 'affordance' in terms of the idea of selection.⁸ A key sense of non-propositional content associated with knowing-how thus consists in representations which are functionally deployed by the system in mediating behaviour, both in the phylogenetic context of innate capacities for action and the nature of associated perceptual content, and in the ontogenetic context in which such capacities and content can be responsive to operant circumstances. The essence of both representational contexts is that they are constituted in terms of contextualised holistic patterns.⁹

In order to complete the product semantic account coherently along these lines a similar argument would need to be applied in respect of levels of cognitive operation in which conceptual schemes are explicitly operative. In this case the idea of affordance would retain its sense as the level of selection operative with respect to habituation or learning, but would be tied explicitly to the propositional form of concept representation associated with the operation of languages and systems of communication.¹⁰

The context in which the nature of procedural knowledge (knowing-how) has been most extensively explored, in terms of both cognitive and physical activities, is in the

⁷ See above pp 331-333 and footnote 19.

⁸ The idea of 'cognitive learning theory' although not made explicit, is central to the development of the product semantic account, particularly in the form presented by Krippendorff. The suggested interpretation in terms of affordance is consonant with the development of cognitive accounts of action and skill on the basis that conditioning and learning are underpinned by de facto selection. The role of affordance in this context is conceptually parallel to its role in an evolutionary context, since it represents the level in terms of which selection takes place and can be understood, and is the organising principle in terms of which the component elements are related.

⁹ As exemplified phylogenetically, for example, in the Gibsonian features of the 'perceptual' array and environmentally relative natural action sequences, and ontogenetically in the idea of body-image as a holistic dynamic representation constituted by kinesthetic and perceptual elements, in the ongoing maintenance of balance over rough ground.

¹⁰ There are two distinct ways in which this might be interpreted. On the one hand it is possible to equate affordance with signification at this level, since semiotic conceptions of 'sign' are holistic complexes involving relations between signifiers and signifieds (or exemplifiers and fields which are reciprocal and mutually constitutive). On the other hand one can regard affordance as encompassing a holistic set of relations in the network comprising signs (since sign systems and communication systems generally are conceived as interconnected networks which cannot be disaggregated atomistically into discrete signifier/signified relations). Given that the product semantic scheme is molecular, rather than atomistic or lexical, it is possible to reconcile these positions, for although it is possible to conceive meaningful individual sign relations, their sense is derived from the application of the system rather than from the intrinsic significance of a given individual sign relation.

characterisation of expert performance. The results of studies of knowledge representation and reasoning in human experts subverts the widely held assumption that increasing expertise is dependent on the assimilation of ever higher level and more sophisticated rule structures of propositional form.¹¹ Instead, the picture that emerges is of a qualitative difference in the forms of reasoning and knowledge representation employed at different levels of expertise. Typically the development of expertise moves from the application of defined rules to specifiable situations which are relatively encapsulated, through an increasing recognition of the influence of context and the co-ordination of rules in the achievement of goals, to judgement in terms of holistic similarity, which is intuitive rather than analytic.¹²

The distinguishing feature of higher order expertise is taken to comprise a holistic recognition of similarity which involves (inter alia) simultaneous recognition of situations and outcomes, and which can be unpacked in terms of the idea of pattern recognition. The principal way in which the idea has been extended to physical and cognitive capabilities generally, is in terms of the idea that a wide range of ground level abilities can be treated as areas in which, at an appropriate stage of development, we all exercise higher order expertise.¹³ In parallel, it has also highlighted the degree to which the assumption that lower orders of judgement are rule-based (as opposed to being susceptible to modelling in terms of rules) has been misplaced. The particular way in which the product semantic account can be unpacked in terms of the generalised concept of affordance (defined in terms of de facto selection, rather than just selection in an evolutionary context) is therefore consonant with a more general developing picture of the character of physical and cognitive skills, and their continuity.¹⁴

The general point is that the appropriate model for significant areas of cognitive activity is holistic and non-propositional and continuous with models for representation and content applied in the case of physical skills. At the extreme one could say that rather than accounting for knowing-how in terms of knowing-that, they should be regarded either as distinct but interacting forms of knowing, or that knowing-that might be accounted for in

¹¹ See Anderson 1981, for a survey.

¹² Dreyfus and Dreyfus 1986.

¹³ See for example the treatment of visual perception and reasoning in Bechtel and Abrahamsen 1991.

¹⁴ The closest parallel evident in the literature, in terms of this aspect of analysis is represented in de Gelder's interpretation of Piaget [de Gelder 1982; Piaget 1966]. The core idea is that there are a number of levels of representational content corresponding to three levels of action - sensorimotor, thinking, and articulating. Sensorimotor representations are essentially action schemes which are available to the cognitive system, but not available as representations to the subject; thoughts are representations of schemes; articulations (which are operative features of linguistic systems) are representations of thoughts. The key difference is that on the present account the latter are not regarded as intrinsically representational, but signficatory.

terms of knowing-how.¹⁵ In either case, the product semantic articulation can be expressed in terms of the concept of affordance, and the significance of this for modelling cognitive content is the application of a parallel sense of content holism across the contexts of physical and cognitive engagement.

Reasoning and Judgement

Given that we engage with the world both physically and cognitively in terms of action patterns, whose content is the basis for situated judgement, the associated context for considering the nature and role of experiential content relates to the fact that on the product semantic account, judgement and reasoning are action-centred and context dependent. In support of this view there is now a substantial body of literature reporting the results of direct empirical investigations of reasoning, which although differing in terms of the explanatory accounts offered, concur in demonstrating that strategies in reasoning vary systematically with problem content.¹⁶ The principal reasons forwarded for content effects in reasoning are that they are a reflection either of variability in individual knowledge, or of an underlying structural pattern in the organisation of reasoning itself. In the latter case, for which there is now a considerable body of evidence, the nature of this organisation is expressed variously in terms of model-building,¹⁷ evolutionary social strategies and modules,¹⁸ domain specific schemas,¹⁹ and environmental adaptation.²⁰

One of the most pronounced content effects encountered consists in the distinction between real world strategies used in parallel tasks presented abstractly or contextually.²¹ At the level of general strategies in reasoning, there are essentially two approaches - indicative reasoning (reasoning about fact) and deontic reasoning (reasoning about value). Deontic reasoning, which is most frequently applied in contextually presented cases, is

¹⁵ A case could be made for either approach in the terms of the product semantic account. Given the emphasis on subjectivity and experiential content in articulating the framework, the natural move might be to provide an account of knowing-that in terms of knowing-how. On the other hand, if the concept driven element is accepted as a model for the framework as a whole, as it is in the detailed development of the framework, then a distinct sense of conceptual content is required which will provide a direct account of knowing-how. Although this begins to look like the standard cognitive approach, equating them is dependent on equating conceptual content with propositional content, which product semantic accounts are reluctant to do. The argument of the previous sections is that there are at least two distinct explanatory orders, which generate two senses (and sources) of semantic content. The implication of this for the present argument is that the conceptual level, as represented in the signficatory functions of language and communication systems, though not accounting for knowing-how directly, is implicated in our ability to make sense of skills represented in knowing-how and their higher order application.

¹⁶ Wason 1968; Wason and Johnson-Laird 1972; Byrne 1989.

¹⁷ Johnson-Laird and Byrne 1991; Manktelow and Over 1991.

¹⁸ Cosmides 1989; Cosmides and Tooby 1989, 1992; Cummins 1995, 1996

¹⁹ Cheng and Holyoak 1985, 1989.

²⁰ Oaksford and Chater 1994, 1996

²¹ Wason 1968; Wason and Johnson-Laird 1972.

typified by a strategy which can be characterised as the detection of rule violation. (In the case of $p > q$, the strategy consists in looking for $\neg q$). This contrasts with the most general strategy deployed in abstract contexts - a version of indicative reasoning which takes the form of seeking rule confirming evidence. (In the case of $p > q$, the strategy consists in seeking $p \wedge q$).²²

The results of these empirical studies are important in a number of respects. The most general point is to note that in formal terms, although there is an underlying mode of inference in each case, the relationship between the strategy and the assumed mode of inference is indirect - the process is not captured by the inference rule, but rather the inference rule gives formal expression to the rationality of the strategy. This is important because the strategy is not necessarily derived from an inference rule, but may arise from a non-inferential schema of some other kind, to which the inference rule can be mapped.²³ The second point to note is that the two forms of reasoning and their strategies are not deductive, (and in the case of indicative reasoning does not conform to the strategy implied by standard propositional logic) but have the general inferential form of abduction and induction, respectively. In addition, indicative and deontic forms tend to operate in distinct spheres of reasoning, associated with different facets of our interaction with the world.²⁴ Indicative reasoning is concerned with the logical correlation between states of affairs and therefore ultimately about the epistemic status of rules. Deontic reasoning is concerned with the logical constraints on action and therefore ultimately about the normative status and moral force of rules. The two basic forms of reasoning can therefore be related to the two distinct contexts for meaning-making, one rooted in the functional representation of states of affairs and the other in achieving co-ordination between individuals, but it is notable that the strategy adopted in contextualised cases (whether the mode of reasoning is indicative or deontic) maps to the deontic form associated with co-ordination.

²² In the general context of pattern recognition, in terms of which holistic models are grounded, this can be expressed as a distinction between the detection of pattern dissonance (looking for something that does not fit), and pattern assonance (looking for something that does fit).

²³ Johnson-Laird 1983, Johnson 1987, and see above pp 164-167 and 252-256 (schemas and inference).

²⁴ It has been argued that the distinction between modes of reasoning is innate and has developed as a part of cognitive architecture in evolution as a result of selective pressure favouring distinct strategies for survival within dominance hierarchies [Cummins 1996]. Although the evidence drawn in support of this does not entail innateness, specific architecture or development on an evolutionary scale [Chater and Oaksford 1996], it is clear that the distinction appears at an early stage in development and is not sensitive to the cultural background of the individual. In addition it has a parallel in the reasoning of other primates, which is evident from studies of social groups in non-human primates in that transitive inference can occur in deontic reasoning contexts but not in parallel object oriented tasks [Cheney and Seyfarth 1990] and similar distinctions are apparent in relation to causality and reciprocity [Hinde 1983]. Parallel functions can be disrupted by bilateral damage to the prefrontal cortex in both human and non-human primates [for reviews of the neurological evidence see Damasio 1994; Donald 1991].

Whether deontic reasoning develops with the development of socialisation, develops in the context of social groups, or whether it is innate and underpins the possibility of effective socialisation, its structure is essentially concerned with patterns of co-ordination and the detection of pattern violations. In the context of non-propositional modes of representation it can be conceived to underpin a holistic approach to practical reasoning and judgement in action, which maps to the extended sense of affordance encompassing higher order action patterns.²⁵

Conceiving judgement and practical reasoning along the lines of a propositionally based scheme involves a strong 'planning' model of human action with an underlying belief-intention model, which drives the form given to experience and judgement back into the propositional camp. The product semantic account ultimately gravitates back to this procedural and propositional approach, in spite of the initial commitment made to the priority of the experiential, and the context-dependence of judgement in action.²⁶ The alternative, which is more consonant with the driving intuitions of product semantics rather than its detailed theoretical realisation, would be to reject the implicit idea that indicative forms of reasoning and belief/intention models constitute the default, and to assert instead that they represent abstractions from the pragmatic context of acceptance and judgement. There are a number of distinct but closely related general models for this, which might be drawn on in defining a position, from the spheres of philosophy, cognitive science and user interface design. Their common root lies in the idea that rather than conceiving of judgement as a form of theory-based planning, it can be conceived as context dependent simulation.²⁷

²⁵ The model for propositional content relates directly to the common conception of content for intentional states, where these are conceived as the content of attitudes, particularly 'belief' which is taken to be the key psychological attitude operative in reasoning. In the case of non-propositional content, the cognate concept relates to co-ordination and convention and takes the form of 'acceptance'. The relationship between propositional content and non-propositional content articulated in terms of this distinction is discussed in Appendix E 'Belief and Acceptance'.

²⁶ This is the case for two main reasons. Firstly in enlarging the Gibsonian notion of basic affordance to encompass the cognitive location of the 'direct' interaction with the world in terms of meaning, the experiential and body-centred force of the concept is lost, and the framework shifts from a top-down and bottom-up model, to an entirely top-down model. Secondly in assimilating qualitative difference entirely to the realm of categorial sub-structure, a large element in the nature of experience - its feel (what is often referred to in philosophical contexts as 'qualia') is lost to a propositionally based form of attributive association.

²⁷ The most explicit example is drawn from the philosophy of mind and represented in the work of Morton. Morton's contention is that analysing mental functioning on a theory driven propositional model leads both to inconsistency and the requirement for an infinite number of additional clauses to achieve generality in psychological explanation. The proposed alternative acknowledges that there are strong de facto constraints on conception and that a 'scheme theory' which operates in terms of those constraints views mental functioning and judgement as a stream of improvisation relative to a schema or a simulation. [Morton 1980] A parallel view from cognition and interface design is represented in Suchman's notion of 'situated action' [Suchman 1987]. The prime example drawn from cognitive theory is the schema theory proposed by Johnson [Johnson 1987].

Affective Representation

The link between non-propositional modes of representation (knowing how), deontic forms of reasoning and situated models of judgement and action depends in part on the idea that they are informed by representational models involving affective states. Affordance is the generalised expression of interaction between an organism and its environment, and is dependent for its sense on an evolutionary model involving the adaptive selection of behavioural and sensory system complexes. As such it can be regarded as the substrate of objectifiable properties and of felt experience. In both respects, what is initially involved is a holistic relation of system states which reflects an objective relation of accommodation with the environment (to an observer), and which holistically constitutes an experience on the part of the subject. Perceive-affordance consists in the move in which some part of the complex of system states functions as a representation, in the sense that it stands in for the holistic complex. One way in which this can be implemented is in the form of affective representation.

In the theory developed by Damasio for example, the role of affect in judgements related to social interaction takes the form of the direct association of emotional states with situations, to the extent that can be characterised as representational of situated action.²⁸ Empirical work which has sought to establish the basis of primitive responses (particularly in relation to fear), points to a direct relation between environmental factors, instinctive response and a characteristic felt experience, represented in functions associated with the most primitive neurophysiological structures. At later stages in phylogenetic development, although the primitive pathways are preserved, they are augmented by additional loops which channel the input via slower and more richly connected pathways, through which more complex assessment and association is achieved. The thrust of recent associated theoretical work is that the affective system generally plays a key role in socially situated judgement, and underpins 'knowing how' at a low affective level. The essence of this is that what we learn in 'knowing how', in addition to the pattern of the experience, is the feel of the experience, which is a function not simply of kinesthetic feedback but also of affective representation involving a whole range of body states. Similarly, affective representation is linked to propositional forms of representation not simply as an outcome of propositionally based judgements, but as a representational system which works in parallel with other cognitive systems.

²⁸ The general development of this position and its relationship to the broad thrust of theories of emotion and affective state are discussed in Appendix B.

10.5 Summary - Experiential Content

- a) The product semantic account emphasises subjectivity and experiential content in semantic and cognitive accounts of user interaction.
- b) Although both propositional and non-propositional forms of representation are present in product semantic accounts, the top-down emphasis marginalises the non-propositional forms which are essential to explanatory continuity within the framework.
- c) The distinction between 'knowing that' and 'knowing how' reflects the distinction in representational forms. The latter can be related to the affordance concept, and to broader approaches in the characterisation of expert performance which emphasise holistic and non-propositional judgement, and to which propositional models can be assimilated.
- d) The key articulating concept for experiential content in the product semantic framework is 'affordance'.
- e) The product semantic emphasis on the action-centred and context-dependent nature of interaction, is reflected in situated models of judgement and reasoning applied, for example, in the case of content effects in reasoning. The logical form of two basic modes of reasoning (indicative and deontic) can be related to the two distinct contexts for meaning-making identified in the conceptual re-orientation of the framework
- f) The general model which maps both to an experiential account and a situated conception of judgement and reasoning, conceives content in terms of context-dependent simulation rather than in terms of propositional theory-based planning.
- g) The concept of affordance provides the underpinning for linking objectifiable properties and individual experience. Perceive-affordance consists in the representational role of selected system states in projecting to a situated complex. The affective states can be viewed as a system with a representational capacity of this kind, which has an important role in characterising the content of 'knowing how'.