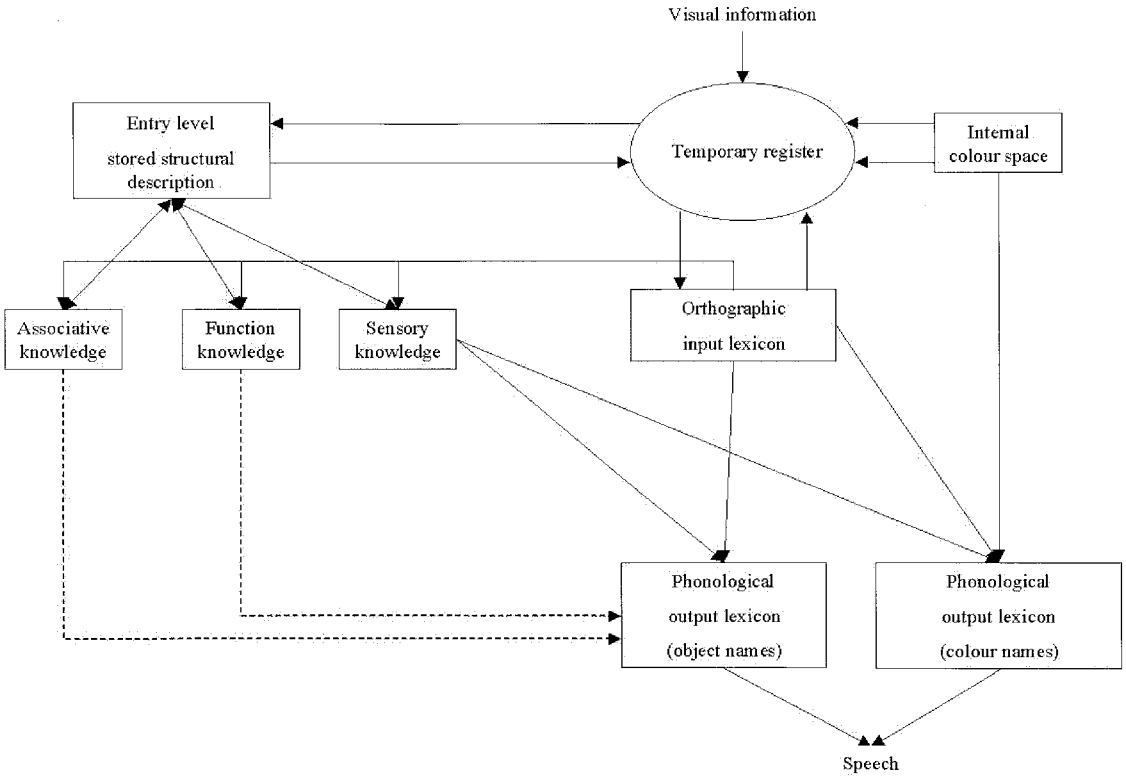

Figure 1 (Davidoff). A model of object naming (adapted from Davidoff & de Bleser 1993).

sensory knowledge that is not included in Figure 3(Top) is that of colour. Since Lewandowsky (1908) it has been known that an impairment in the retrieval of object-colour knowledge occurs without impairment for object identification. Thus, the position of this type of sensory knowledge is likely to be after structural descriptions and connected to the more direct path to naming (see Fig. 1). While the role of colour in superordinate categorization tasks is unsettled (Davidoff & Ostergaard 1988; Price & Humphreys 1989), its role in naming is undisputed (Biederman & Ju 1988; Ostergaard & Davidoff 1985; Price & Humphreys 1989). Moreover, the admittedly rather sparse clinical evidence is in favour of object-colour being beneficial to naming in aphasia (Bisiach 1966; Montanes et al. 1995). If colour is more reliably associated with living things, one might have thought that impairments in the retrieval of object-colour knowledge would have gone consistently with a category specific naming impairment. Yet, the evidence is that it does not (Forde et al. 1997; Luzzatti & Davidoff 1994). Indeed, more generally, the pattern of dissociations in patients shows no necessary link for functional or sensory properties to either living or nonliving things (Laws et al. 1995; Powell & Davidoff 1995).

H&F recognise that finding an explanation "concerning patients with visual/perceptual impairments that are not category-specific, is more difficult." Their answer is two-fold; H&F first argue for what is essentially a compensatory strategy that may be available to some patients by interrogating functional or associative knowledge. In Figure 1, it is clear such a procedure could promote an increase in naming ability. Second, H&F consider simulations with HIT using dynamic noise and note the consequent changes in naming output do not produce a category-specific impairment. However, there is a simpler solution. Sensory knowledge, even if reliably posted on the direct route to naming, is only of secondary importance. The critical aspect for identification, as H&F say, is sorting out the visual information at the level of the structural description. It is surprising how lacking in detail that selection process need be (Davidoff & Warrington 1999); their patient RK could accurately name animals but performed at chance in discriminating parts, global shape, and colours of the animals. Of course, there must be a limit to the changes made to an animal before recognition becomes impossible but with so much naming that can be achieved with so little, one may have difficulty in allocating any role for the other forms of sensory knowledge in explaining category-specific impairments.

The accumulation of data has not provided a clear answer as to why our minds so obviously divide the world into natural and artificial kinds. Figure 1 and HIT give a better account of naming than they do of category specificity. Natural kinds differ from artifacts in both their taxonomic classification (Disendruck & Gelman 1999) and in their uniformity of conceptualisation (Berlin 1999). Perhaps neuropsychology needs to look elsewhere for an answer.

Conceptual deficits without features: A view from atomism

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Abstract: Humphreys and Forde fail to account for the ontology of the "features" that they claim are constitutive of concepts. This failure is common to decompositional theories of conceptual representation. Category-specific deficits can be better explained by a theory that takes inferential relations among atomic concepts to be the key characteristic of conceptual representation and processing.

Concepts play a prominent role in the cognitive sciences because, qua mental representations, concepts are the very elements of thought and higher cognition. Regarding the nature of the represention of concepts, proposals range from several types of decompositional theories – from definitions to prototypes – to ver-

sions of atomism (Fodor 1998). In recent years, category-specific semantic deficits have been an important source of evidence for the nature of conceptual representation since patterns of deficits arising from focal brain damage or disease reveal aspects of conceptual organization which are not always transparent in studies with normal subjects.

But what, after all, is the nature of conceptual representation? If you start reading Humphreys and Forde's (H&F's) article with this question in mind – assuming research on conceptual deficits aims at unveiling the answer to that fundamental question – soon you realize that you are in a theoretical loop in the middle of an empirical maze from which you can leave only if you have answers to other even more fundamental questions: What is the nature of a perceptual feature? What is the nature of a functional feature? Are they concepts? Do they have the same status as other concepts (DOG, for instance; Is DOG a concept in the HIT model?)? Are they "sub-concepts"? Are they primitive elements? Where do they come from? Unfortunately, H&F do not have answers to these questions. However, the types of commitments one makes regarding the nature of conceptual representation set the conditions under which one can evaluate the pattern of conceptual deficits. In fairness, although H&F do not provide a full account of the nature of the elements constitutive of conceptual representation, it is quite clear that they are committed to the idea that concepts are represented by bundles of features.

Actually, it became a standard assumption in the field that no matter how one organizes one's conceptual stock – whether by hierarchical trees whose topmost branches are LIVING and NONLIVING or by any other taxonomic principle – concepts are represented by bundles of features. The idea is that the concept DOG, for instance, is in fact represented at some level as a finite or infinite set whose elements are things such as BARKING, FURRY, FOUR-LEGGED, PET, CANINE (see, e.g., Rapp & Caramazza 1991). The concept SCREWDRIVER, feature theories suggest, might also be represented at some level by a set of properties which should include things such as SCREW-DRIVER (function?), ELONGATED, HAS-A-HANDLE, and so on. Functional and perceptual properties – whether or not with different weights and whether or not represented within different subsystems – are in fact sets of features that supposedly contribute to concept tokening (i.e., for one's entertaining of the concept SCREWDRIVER in screwdriver contexts).

Elsewhere (see de Almeida 1999a), I have suggested that the cost of assuming that concepts are bundles of features is not only undermining the ontological foundations of one's theory but also committing to a noncompositional view of conceptual representation (see also Fodor 1998). In fact, in psycholinguistics, most empirical studies suggest that lexical concepts (i.e., concepts labeled by natural language morphemes) are not definitional or do not decompose into sets of more primitive elements (see, e.g., de Almeida 1999b; de Almeida & Fodor 1996; Fodor et al. 1975). This is certainly the case of verb concepts; and in fact, to my knowledge, thus far no one found evidence for "category-specific" verb concept deficits (e.g., that "features" such as CAUSE or GO, supposedly constitutive of complex verbs, are selectively impaired).

If not features, then what? In the remainder of this commentary, I will suggest that an atomistic view can better account for the pattern of dissociations of conceptual deficits. But before I move on to the analysis of category-specific deficits, I have to present briefly some of the basic assumptions of the atomistic-inferential view advocated here (for further discussion see de Almeida 1999a). First, it is assumed that concepts are atomic representations. Contrary to feature theories, the content of a concept is determined by epistemic liasons, not by its inferential relations (see also Fodor 1990). Thus, the content of X is determined by its property of "being an X," not by the relations obtained between constitutive elements (such as features). The present proposal assumes that all relations between concepts are inferential in nature – which means that for someone to possess concept X does not imply also that someone possesses concepts Y and Z: In this sense, concepts are individuated by virtue of their nomic relations with words, objects, events, and so on, not with their constitutive relations with other concepts. Second, it follows that any relations that are obtained between concepts X and Z are by virtue of their association or, more precisely, by virtue of their shared inferential domains – roughly, the sets of inferences unleashed by concepts. Much in the spirit of meaning postulates (henceforth, MPs; see Carnap 1959), those inferences are taken to be entailments. Suffice it to say for now that the inferential domain of concept X is a set of MPs. The assumption is that the inferential domain of X is the set A of inferences that are caused by X and also the subset B of inferences that are caused by Y but of whose entailments X takes part.

Categorical effects, thus, can be taken to constitute overlapping inferential domains. Under this view, category-specific deficits can be taken to arise from damage to concepts constitutive of certain MPs (for instance, the concept LIVING which might be related to ANIMAL via the MP [$\forall$x, ANIMAL(x) $\rightarrow$ LIVING(x)]). There are two related hypotheses to consider. The first is that the loci of the deficits are in the sets of inferences unleashed by the tokening of concept X (say, DOG). Since those inferences might be disrupted by the broken entailments that involve LIVING (as in the MP above), patients may have trouble selecting the appropriate lexical items in naming tasks. The assumption is that the tokening of DOG (by the word or the picture) causes the computation of the inferential domain of DOG – which intersects with the inferential domain of many other concepts, thus giving rise to semantic paraphasias. The second – and perhaps stronger – hypothesis places the locus of category-specific deficits in the selection of the appropriate concept, given a certain token stimulus. That is, it is possible that the specificity of the problem is in the causal link between the proximal stimulus dog and the concept DOG. Thus, in this sense, when dog is presented, DOG may be accessed but the inferences it unleashes (e.g., to ANIMAL) may lead the patient to consider other alternatives (CAT, COW) which are in the inferential domain of ANIMAL. Patients' strong performance in word/picture matching tasks even in "impaired" categories may provide evidence for the causal link hypothesis. Also, the fact that patients are able to produce items that are within the category (or, possibly, inferential domain) of the target item suggests that they are able to determine the nature of the stimuli (i.e., by assumption, dog may cause [DOG or CAT or COW]) but are unable to produce "dog" and in many trials they produce an incorrect response.

In sum, it appears that an atomistic-inferential theory of conceptual representation and processing can account for the pattern of dissociation without the perils of ontological vagueness and without sacrificing compositionality.

Structural descriptions in HIT – a problematic commitment

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Abstract: Humphreys and Forde conceptualize object representations as structural descriptions, without discussing the implications of structural description models. We argue that structural description models entail two major assumptions – a part-structure assumption and an invariance assumption. The invariance assumption is highly problematic because it contradicts a large body of findings which indicate that recognition performance depends on orientation and size. We will delineate relevant findings and outline an alternative conception.

We are in accordance with the two basic principles of the HIT model – a hierarchical processing structure and top-down (inter-