The objects of attention: Causes and targets

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If the distinction between cognitive and sensorimotor pathways of the visual system does not offer a source for the evolution of the logical relations necessary for language, what does? A more likely alternative is the planning process that all mammals possess and that becomes particularly important and well-developed in primates. Plans for action exist separate from the sensory or motor worlds, and their steps must be executed in a particular order to be effective. Grammar may have appropriated an existing capability for planning of action sequences to the planning of communicatory sequences (Bridgeman 1992). Language, then, is a new capability built mostly of old parts, but the parts originate in motor planning, not in visual coding.

**The objects of attention: Causes and targets**

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**Abstract:** The objects of attention can be located anywhere along the causal link from the source of stimuli to the final output of the vision system. As causes, they attract and control attention, and as products, they constitute targets of analysis and explicit comments. Stimulus-driven indexing creates pointers that support fast and frugal cognition.

Hurford suggests that the objects of attention should be understood as indexed, arbitrary objects identified by their location in a mental, spatial map. Objects of attention are available to the subject without categorisation or encoding of their properties or locations.

I do not agree with Hurford’s characterisation of indexed objects as arbitrary and identified by their location in a mental map. First, indexing is not really arbitrary but is stimulus-driven. Not any object will be indexed, but only those that are salient enough to impinge on the subject. Indexing is caused by some property of the object, although that property will not be encoded (Pylyshyn 1999; 2000). Furthermore, at the moment of indexing, the objects are distinguishable as visual patterns or clusters in the visual field. Finally, the spatial map is not mental, but the scene in the real world forms a local map that contains the indexed objects. The scene itself does not have to be memorized. Indexed objects serve as pointers that allow the subject to access and revisit locations in a distal environment without engaging attention. Thus, indexed objects support fast and frugal cognition, which exploits information in the environment (Brooks 1991; Hutchins 1995).

It is difficult to see how indexed objects could be objects of
Commentary/Hurford: The neural basis of predicate-argument structure

Hurford draws attention to a parallel between, on the one hand, the roles of the ventral and dorsal pathways in vision, and, on the other, the roles of predicates and variables in predicate calculus. Just as the variable in predicate calculus has no role other than a deictic or indexical one, of locating an individual to which certain predicates belong, so the dorsal pathway (it seems) has scarcely any role other than to locate an object in space, nearly all its other characteristics being processed via the ventral pathway. How significant is this for language, either today or at an earlier evolutionary stage? Hurford does not claim that the correlation is today very close, and I agree with him. One cannot identify the dorsal-ventral contrast with the noun-verb contrast, for example. But he alleges a reflection of the dorsal-ventral contrast in the mental representations of all animals except modern humans, inasmuch as (he claims) only modern humans have a concept of individuals that are in principle proper-nameable — that is, individuals associated with more semantic content than mere indexical place-holders. On that, I find what he says unpersuasive. So I suspect that the parallel that he adduces has even less significance for language than he suggests. If so, then visual perception sheds little or no light, unfortunately, on the puzzle of why language (particularly syntax) is as it is.

"Protothought had no equivalent of proper names," says Hurford (sect. 1.3), and that is why it is easy to fool tern chicks about their parents: visually they are so easily fooled that they will react towards a loudspeaker as if it were a parent tern. Hurford concludes from this that tern chicks have no mental representation of their parents as individuals. (Hurford would presumably interpret in the same way the apparently sophisticated social awareness of vervet monkeys; see Cheney & Seyfarth 1990.) But that seems an overambitious conclusion. Terns may be easier to trick than humans are, but that proves nothing relevant to this issue. Let us suppose that, unbeknownst to me, Jim Hurford has an identical twin brother, Tim Hurford. I know Jim Hurford slightly from occa-

What proper names, and their absence, do not demonstrate

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Abstract: Hurford claims that empty variables antedated proper names in linguistic (not merely logical) predicate-argument structure, and this had an effect on visual perception. But his evidence, drawn from proper names and the supposed inability of nonhumans to recognize individual conspecifics, is weak. So visual perception seems less relevant to the evolution of grammar than Hurford thinks.

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