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Aspects and algorithms

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empty categories, case theory, etc.), namely, there is "a hardware level of interpretation." By the same logic, we can eliminate the strange and complex constructions of quantum theory and molecular biology: it is much simpler to say that the phenomena are explained by unknown properties of unknown mechanisms.

Searle also offers an alleged reductio of the explanation of (1)–(4) in the manner indicated. The latter, he says, is "exactly analogous" to what he calls sarcastically "the deep unconscious rule" (R): "if it is infrared, don't see it." There is an analogy, but not the one Searle gives. His (R) is analogous to the rule: "if it is (4), don't understand it and regard it as deviant." (R) is thus an odd formulation of one of the facts to be explained, but contrary to what Searle assumes, it is in no way analogous to the proposed explanation of these facts. The difference between the principles of UG and Searle's (R) is the difference between significance and vacuity, a rather considerable one.

There are numerous other problems in Searle's account, but putting them aside, the "cognitive science paradigm," as he terms it, is in no danger from these considerations. For many years, Searle has been attempting to provide a critique of the approach that I and others have taken to UG. In response, I have repeatedly argued that his objections reduce ultimately to a demand for conscious accessibility, one that is arbitrary and pointless, despite its distinguished ancestry. His latest effort is of value, I think, in making it more clear than before that this is exactly what is at stake, and that it makes no sense at all. Putting aside questions about Searle's account of the history of the matter (see Chomsky 1980a, Chapter 6) there is no doubt that the demand for conscious accessibility has deep roots. Searle's paper provides another indication that it is a fundamental error, and should be abandoned.

Aspects and algorithms

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Ultimately, I suppose, there is only physics. But our scientific world-view posits a set of overlaid structures; the chemical, the social, even the computational. Searle offers a timely, elegant, and disturbing assault on one of those layers – the citadel of the information-processing unconscious. His goal is to show that information-processing descriptions (except insofar as they pick out states which are in principle accessible to consciousness) have no intrinsic place in such a hierarchy of levels. His main tool is a requirement of aspectual fixity (i.e., the world must be presented under a particular description, e.g., the glass of water presented *as* water and not as H_2O). The only way of getting such aspectual fixity, he argues, is by appeal to the nature of our conscious awareness.

Searle may be right about aspectual fixity. Indeed, the whole notion of an aspect seems bound up with that of a conscious point of view. But if this is to be an argument against the ontology of information-processing psychology, Searle must show not just that we lack (for the unconscious cases) a notion of *aspectual* fixity, but also that we lack a notion of *algorithmic* fixity. This I believe he fails to do.

Searle's argument depends on demonstrating that there is (in the case of in principle unconscious "mental contents") no logical space available between neurophysiological descriptions of the brain, on the one hand, and functional descriptions which are merely a reflection of the particular interests of conscious theorists on the other. But (*pace* Searle) I believe we have a robust and respectable notion of just such a space. I shall try to say why.

Searle's idea is that we must treat putative cases of non-conscious information processing either as gestures at the actual neurophysiology or as statements about functional role. He is careful to add, however, that the functional description is not to be seen as a legitimate level of a scientific ontology (unlike, say, chemistry). Instead it is "simply one of the causal levels described in terms of our interests"). Thus, when we say that the heart functions to pump blood, all we are doing (according to Searle) is highlighting those of its (brutal, physical) causal powers "to which *we* attach some normative importance" (section 4, p. 12, my emphasis).

But this downgrading of the idea of a genuine functional level of description is deeply unconvincing. To see why, we need to consider the way (a) a story about historical origins and (b) ways of differentiating algorithms, can combine to yield a robust and fully realistic notion of the nature of *selecting a particular algorithm.*

The historical dimension is straightforward (see, for example, Millikan 1986). It is surely true that the heart has the function it has quite independently of my attaching normative importance to that function (pumping blood). For that physical structure would not exist were it not for its ability to perform that function – it has been selected (by a nonconscious mother nature) *because of* its functional role.

Consider now the idea of a cognitive module whose task is (let's suppose) the computation of shape from shading as part of a low-level vision system. We can argue, in ways directly analogous to the above, that the functional description picks out a proper, full-blown level of scientific description. For the structure was selected *because of* its ability to compute shape from shading. It is at this point that the reality of algorithms must be recognized. For there will be many different ways of computing shape from shading. The theorist will now want to discover *which* algorithm nature as exploited. There are various ways to do this. Different algorithms will yield different relative response times for different classes of problems. And different pathologies will be possible according to exactly which information-processing strategy is in use. (Virtually all of psycholinguistics and much of cognitive neuropsychology are devoted to such fine-grained differentation of algorithms). Nothing in the target article looks to undermine this conception of the functional and algorithmic fixity of particular information-processing descriptions – a fixity achieved independently of the conscious accessibility of its contents and the idiosyncratic normative interests of the human theorist.

A second worry is that the crucial notion of what is consciously accessible "in principle" is left dangerously vague, so vague, in fact, that it runs the risk of becoming trivial. Thus we are told that any genuinely contentful but unconscious mental state is one which is at least "the *sort of thing* that can be brought to consciousness." But in response to (legitimate) worries about pathologies and "blockages" (see, e.g., sect. 6, para. 2 and 3) Searle is forced to unpack this in terms of a notion of the "in principle" as opposed to the "actual" accessibility of the contents. But this is problematic. Consider the following thought-experiment. Suppose (I do not for a moment believe it to be so simple!) that conscious awareness was caused by the development of an extra mental module which monitors and recodes the activity of other modules. Suppose, furthermore, that humans have and hamsters lack this module. But it turns out to be biologically feasible to "add on" a consciousness module to the hamster so that it can monitor, integrate, and recode its own lower level information processing. Does this show that the hamster actually had those (unconscious) mental states all along? Were those states (in Searle's terms) in principle consciously accessible? If so, it seems as if there may be no limit, after all, on the extent of our unconscious mental contents! Searle might reply that imagining such extensions to the hardware is illegitimate. But suppose we discover, in the human pathological cases, that what is causing the "blockage" is, precisely, damage

to such a module. Then how can we justify allowing determinate unconscious content where the creature has a (damaged from birth) recoding module yet disallowing it to creatures who simply lack the module? Indeed we may, if we wish, suppose that the damage just *is* the absence of the module from birth! What this case suggests is that the notion of in-principle accessibility to consciousness, once it is weakened to deal with the cases which Searle addresses in section 6, may become too liberal to be of use. Perhaps there is a way of adding hardware to a cactus so that it becomes aware of the way its own growth is stimulated by sunlight! Even so, this had better not imply that the cactus, here and now, has just such latent, but genuine, intentional states.

In sum, the stress on aspectual fixity looks doubly blighted. It is blighted because the crucial notion of in-principle accessibility of some state to conscious (aspect-fixing) awareness is ill-specified. And it is blighted because such fixity may in any case be a red herring as regards information-processing psychology. For the content-using descriptions of such a discipline require only the cheaper algorithmic fixity which can be purchased by a combination of causal history (the device was selected because of its information-processing abilities) and instantaneous structure (it can be seen, for example, to implement a *specific* shape from shading algorithm).

The ability versus intentionality aspects of unconscious mental processes

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This commentary will be short because its main point is rather straightforward. In his target article, Searle argues strongly against the general notion of unconscious mental processes as typically postulated by cognitive science and maintains that this notion is "a mistake." His major argument is that unconscious mental processes imply some kind of intentionality, whereas, as he argues, we cannot invoke the notion of "intrinsic intentionality" without reference to consciousness. Thus, according to his position, unconscious mental processes "cannot exist."

The major problem with Searle's position is that he appears to understand the notion of unconscious processes in a manner that is based more on the lay (and "everyday language") tradition than on contemporary cognitive research on mental processes, where these terms have the status of hypothetical constructs in an explanatory system aimed at generating empirically verifiable hypotheses. Searle's notion of unconsciousness stresses mostly the aspect of the "intentionality" which is not only irrelevant to (or even inconsistent with) what cognitive investigators of those processes have studied, but it also appears conceptually erroneous, at least in not being instrumental (because the concept of intentionality seems very difficult to operationalize for cognitive research).

The distinction between conscious and unconscious mental processes in cognitive research is based not on the motivational (or psychodynamic) concept of "intentionality" but rather on the informational concept of "ability," that is, whether specific information *can* be accessed at specific levels of processing (e.g., the "ability" to report verbally on information or the functional "accessibility" of specific information). There are quite trivial (and difficult to refute) reasons for maintaining the current (cognitive) notion of unconsciousness as defined in terms of informational access. The most important of these is the abundant empirical evidence for the existence of qualitative differences between the functional status of information that (a) can

be accessed by the individual in a consciously controlled manner (e.g., reported, identified, explicitly used in reasoning) and information that (b) cannot be accessed in this way but is still stored in memory and can systematically affect cognitive processes (Hill et al. 1989). [See Holender: "Semantic Activation Without Conscious Identification in Dichotic Listening Parafoveal Vision, and Visual Masking: A Survey and Appraisal" *BBS* 9(1) 1986.]

Searle's arguments might be useful in explicating some common features of the "metaconceptual" or philosophical nature of conscious and unconscious processes. They do not appear to provide evidence for any flaws in the current distinction between these two categories of processes (as understood in cognitive psychology), however, because this distinction is simply justified by the empirical data themselves. Even if one could imagine convincing linguistic or other formal arguments against using the specific term *conscious/unconscious* to denote the empirical differences mentioned above, there would still be a need to make up a term for those differences because their functional and conceptual importance for the entire field of cognitive science is firmly established (Lewicki & Hill 1989). To convince cognitive researchers otherwise would require demonstrating that the huge body of empirical data in support of this distinction is somehow invalid.

We acknowledge the importance of philosophical reflection on even those issues and questions that can be ultimately resolved only by empirical research (e.g., the specificity of unconscious as compared to conscious mental processes). The contribution of such reflections, however, should be measured by the extent to which they provide guidance for empirical research (i.e., its eventual specific functionality for that research). It appears that in order to offer such guidance, Searle's Connection Principle is in need of further elaboration.

Language and the deep unconscious mind: Aspectualities of the theory of syntax

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Searle focuses on three questions to which we "need to know" the answers if we are to understand a biological phenomenon:
(1) What is its mode of existence?
(2) What does it do?
(3) How do we find out about it?
He leaves out the one type of question that most scientists spend their time on:
(4) What is its fine structure?
To use Searle's example: What sort of pump is the heart? This type of question is of particular concern to us, for it is in trying to answer (4) that linguists have been led to postulate rich innate representational structures which are not accessible to consciousness. These are precisely the sorts of entities that Searle believes to border on the incoherent.

To help see how such entities bear on Searle's claims, it is worth considering a sample account in a bit of detail. Consider the data in (5):
(5) a. The men like each other
b. *Each other like the men
c. The men expect each other to win
d. *The men expect Mary to kiss each other