

way that even Chomsky wouldn't deny: Any propositional attitude can be *thought* consciously, for example if the agent is asked (this seems the most natural reading of step 5). What Freud, Chomsky, and most cognitivists are denying is of course not *that*, but rather that the possession of an attitude must be *introspectible*. But put this way, Searle's claim seems awfully implausible – for starters, introspective skills seem to vary arbitrarily in the population (see e.g. Nisbett & Wilson 1977); for another, the attempt to do psychology under this constraint, the “introspectionist” psychology of a century ago, was a ludicrous failure. Is Searle really advising a return to Wundt?

In any case, if we are to take Searle's dispositional claim seriously, we need to have some idea of the activating circumstances. The most we are told (steps 5, 6) is that they include the absence of lesions and repression since, at least in *those* cases, even Searle agrees that someone's attitudes could be unconscious. But then suppose these lesions and repression are genetically determined, and gradually spread in the population so that they become the normal condition of humankind: Wouldn't whatever explanations we now apply to these cases apply then to the whole population? And if this is possible, why shouldn't it be possible that we are in that evolutionary state right now? Indeed, one could take the work of Freud and Chomsky to show just that: that we've evolved into systems that inherently suffer from “natural” lesions and repressions that render many attitudes inaccessible to introspection. It would be scientifically most peculiar if the explanatory power of Freud's or Chomsky's theories depended upon this not being so.

Quite apart, however, from whether consciousness is *required* for mentation, a deeper problem for Searle is how it is supposed to be of any help. If there were no “objective” way to draw the above distinctions, I don't see how there could then be any “subjective” ways either. First-person stances and privileges are all very nice: I regularly enjoy them myself. But I don't see how they bring in the philosophical wash. How is *introspection* to tell me whether my introspected attitudes are literal or metaphorical, whether, for example, it is *they* that are causally responsible (recall sect. 5, para. 5) for my behavior?⁵ Are we supposed to know *introspectively* that epiphenomenalism is false? I don't.

Moreover, if there is no *objective* fact about whether I mean *water* or *waterhood* by “water,” I don't see how beating my breast and insisting on a “subjective fact” will do any good. The question is: Just what is the fact on which I'm supposed to have such a privileged grip? That by “water” I mean water and by “waterhood” waterhood? Without any objective basis, this seems no better than thinking you know how tall you are by placing your hand on your head to prove it (Wittgenstein 1953, p. 279). If there is no objective fact describable in third-person terms, there seems to me nothing for me in the first-person to be right or wrong about; and so nothing for me to know (Searle seems to have provided finally the right target for the private language argument). In any case, Searle owes us an account of precisely what these further nonobjective, essentially “subjective facts” might be, and how they don't undermine the materialism that he otherwise seems to want to believe.⁶

NOTES

1. Lest Searle reject this proposal as running afoul of his “Chinese Room,” note that it is a proposal of a (*propositional*) *representational* theory of mind. Whether one thinks further that the causal processes involving representations are *computational* depends upon what one thinks of such “sociological phenomena” as the work of for example Turing, Simon, Fodor, and practically the whole of cognitive psychology. See Rey (1986) for a defense of these latter enterprises against the several “Room” fallacies.
2. Searle considers only very crude behavioral and neural correlate proposals. He might also consider for example Stampe (1977), Devitt (1981), Dretske (1981; 1988), Millikan (1984), Block (1986), and Fodor (1987; 1990).
3. He does suggest a kind of in-principle argument a little later, claiming that, even were there neural correlates of intentional states,

“there is still an inference, and the specification of the neurophysiological in neurophysiological terms is not yet a specification of the intentional” (step 3). Now, neural correlates may not be the best candidates for specifying intentions, but I don't see their *inferential status* as a problem. There may always be an inference between water and H₂O, but the latter is a perfectly good specification of the former.

4. This isn't to say that there aren't more difficult cases that Searle might have mentioned. For a more compelling case for Searle's claim, see Bealer's (1984) adaptation of Quine's (1960) rabbit/rabbithood argument to functionalist theories of mind. But Bealer's claims also suffer as negative conceivables.

5. Actually, it's not at all clear how introspectible facts about aspectual shape – which “cannot be constituted” by any objective facts (step 4.2) – could *themselves* be causally efficacious at all. I don't quite see how Searle thinks he's succeeded in extricating himself from his own contradiction or avoided classical epiphenomenalism.

6. I'm grateful to Michael Devitt and Ken Taylor for comments on earlier drafts of this commentary.

On being accessible to consciousness

David M. Rosenthal

ZfF, Universität Bielefeld, D4800 Bielefeld 1, West Germany and City University of New York, Graduate School, New York, NY 10036-8099
Electronic mail: drogc@cunyvm.bitnet

Searle believes that the idea of intentional states that are in principle inaccessible to consciousness is incoherent. “[I]t is incoherent, in the [rather special] sense that it cannot be made to cohere with what we already know to be the case” – presumably the Connection Principle and the premises that Searle believes lead to it. No explanation that posits such deep unconscious intentional states and processes (henceforth “deep explanations”) can be true, he concludes, though some corresponding explanation that is not literally intentional may well be.

Searle may well be right that some deep explanations are inviting largely “because we lack hardware explanations of the auxin type.” And when connections hold among states with content we probably infer too readily that the processes linking those states also have content. But Searle's examples are of questionable relevance. If, for example, the hardware circuitry that keeps eyes pointed in the same direction ran through suitable regions of the cortex, it would plainly be reasonable to suppose that mental processing plays some role.

In any case, Searle's master argument from the Connection Principle fails to show that deep explanations are never warranted. There are two main difficulties: the “in principle” clause, and the role in the argument of aspectual shape.

Searle recognizes the need for clarity about what “in principle” means. An unconscious intentional state is, Searle claims, a “possible conscious thought or experience” and he explains “possible” here in terms of “capable”: unconscious intentional states are states “capable of causing subjective conscious thoughts.” So an unconscious intentional state is “in principle” (he occasionally says “intrinsically”) accessible to consciousness if, and only if, it is “capable of causing the conscious experience.”

But what does “capable” mean? In section 6, it emerges that a state can be thus capable even if there is some hardwired obstacle to the relevant causal linkage, and that obstacle involves “nothing pathological.” This is reasonable; a state may have distinctive causal powers even if, because of some hardwired, nonpathological blockage, those powers cannot be realized. But why wouldn't this degree of inaccessibility be enough for even the most hard-core proponent of deep explanations? Unconscious intentional states might well, for example, have the relevant causal powers even though some hardware blockage puts those states, as Chomsky suggests (Note 1), “beyond the reach of conscious introspection.” Even granting the Connection Principle, the difficulty for deep explanation does not follow.¹

The Connection Principle, however, is itself dubious at best. All intentional states, conscious or not, have aspectual shape. Searle's argument is that unconscious intentional states consist wholly in neurophysiological phenomena, but their aspectual shape "cannot be constituted by such facts." Searle also claims, however, that "it is reasonably clear how . . . conscious thoughts and experiences" have aspectual shape. So the only way for unconscious intentional states to have aspectual shape is by having the power to cause states that, by virtue of being conscious, have aspectual shape directly and in the primary sense. Thus unconscious intentional states in effect have aspectual shape only indirectly.²

Why does Searle think aspectual shape is unproblematic in the case of conscious intentional states? Presumably because of its tie to agents' points of view. "[A]spectual shape must matter to the agent. It is . . . from the agent's point of view that he can want water without wanting H₂O."

But what matters may not matter consciously. Conscious intentional states matter in part because of their effect on other intentional states, both conscious and unconscious; the same holds for unconscious intentional states. Thus my unconscious desire is for water but not H₂O if I believe the two to be different and my desire would be satisfied by what I believe to be water but not what I believe to be H₂O. All these beliefs may themselves be unconscious. In this case I unconsciously want something as water, and not as H₂O; similarly for other unconscious intentional states. The causal connections my unconscious intentional states have to other intentional states, which may themselves not be conscious, manifests their aspectual shape and how it matters to me. By the same token, an agent's point of view need not be wholly conscious; one's unconscious beliefs and desires partially define one's point of view. Thus the tie between aspectual shape and viewpoint does not guarantee a connection between aspectual shape and consciousness.

Searle would respond that all this makes no sense unless the relevant unconscious states can produce conscious states with the relevant aspectual shape. But why? One's conscious first-person perspective doubtless reveals the aspectual shape of one's intentional states, but that hardly shows that aspectual shape cannot exist unconsciously. Nor does consciousness in any way help explain aspectual shape. Differences in aspectual shape are differences in how something is represented; so to explain aspectual shape we must have a theory of content.

Differences in aspectual shape also emerge with speech acts; the reason speech acts can be about water but not about H₂O is because of the words they use. Searle may think this kind of explanation is unavailable for intentional states because such states have no medium corresponding to the words of speech acts.³ But he also concedes that "the mental simply is neurophysiological at a higher level" (Note 4); as he puts it elsewhere, intentional states have physical "forms of realization" (Searle 1983, p. 15). So neurophysiological differences can help explain differences in the aspectual shape of intentional states in just the way that different words do for speech acts.

Searle insists that neurophysiological differences cannot make for differences in aspectual shape. A certain ambiguity threatens here. Searle puts his point this way: "No set of neurophysiological facts under neurophysiological descriptions constitutes aspectual facts." This is undeniably so, but only because facts are relative to how we describe things.⁴ Describing things neurophysiologically is, of course, different from describing them in terms of aspectual shape.

But "the mental simply is the neurophysiological at a higher level" (Note 4).⁵ So, even though we cannot describe aspectual shape in neurophysiological terms, aspectual shape is still a property of neurophysiological states. There is thus no reason why those neurophysiological states that are unconscious intentional states cannot have aspectual shape. Searle cannot invoke here the connection between aspectual shape and consciousness, since that very connection is at issue. So the neu-

rophysiological character of unconscious states does not prevent them from having aspectual shape in their own right.

Moreover, if the mental is simply the neurophysiological "at a higher level," even conscious intentional states are neurophysiological states. Since consciousness itself is a property of neurophysiological states, why can't aspectual shape be, as well? Again, it begs the question to appeal here to the alleged tie between consciousness and aspectual shape.

Searle argues that unconscious intentional states are purely neurophysiological by considering the intentional states of unconscious people. This strategy conceals an important distinction. Unconscious intentional states also occur when we are awake, and thus conscious. Despite connections between them, what it is for a state to be conscious is distinct from what it is for a creature to be conscious.

Searle assumes that no facts other than neurophysiological facts or the fact of consciousness could explain aspectual shape and neurophysiological facts plainly cannot do so. If so, we cannot understand intentionality without understanding what it is for an intentional state to be conscious. This arguably makes it more difficult, and perhaps impossible, to explain such consciousness; intentionality is plainly far harder to understand if it is essentially conscious.⁶ In the absence of more compelling argument, therefore, we should reject the tie Searle hopes to forge between aspectual shape and consciousness.

NOTES

1. Nor is it wholly obvious that cognitive science requires deep explanations. In the quoted passage Chomsky himself hardly seems wedded to deep explanations: The posited states "may be . . . even beyond the reach of conscious introspection" (my emphasis). Shallow unconscious intentional states that are for practical purposes inaccessible to consciousness would presumably suffice for most or all theoretical purposes in cognitive science.

2. Indeed, it is unclear why Searle does not conclude that unconscious states, though accessible to consciousness, have merely as-if aspectual shape, and thus only as-if intentionality.

Searle's views about unconscious intentionality are reminiscent of his claims about intrinsic and derived intentionality. The intentionality of speech is "derived," he maintains, in that "the direction of logical analysis is to explain language in terms of [the] Intentionality [of the mental]" (Searle 1983, p. 5). Similarly, he now urges that we can understand unconscious intentionality only in terms of conscious intentionality.

3. Searle argues from the lack of a mental medium to the intrinsic intentionality of intentional states in Searle 1983, pp. 27-29). See Rosenthal 1985 for discussion of this point.

4. Similarly with phenomena, which Searle also invokes in putting the point.

5. Searle's claim that "there is no aspectual shape at the level of neurons and synapses" presumably trades on a notion of "level" such that the neurophysiological level is the level of neurophysiological description.

6. See (Rosenthal 1986; 1990) on this point, and also for how consciousness can be explained if intentionality is independent of consciousness.

When functions are causes

Jonathan Schull

Haverford College, Haverford, PA 19041

Electronic mail: jschull@hvrford.bitnet

I think Searle is right in calling attention to the tacit but unacknowledged question of consciousness in cognitive science and the need for a "Darwinian" revolution in the explanation of mind-body relations. He gets the significance of Darwinism wrong, however, conflating intentionality with regularity and rule-following and intrinsic intentionality with subjective consciousness. When these errors are corrected, the implications of Searle's interesting discussion are hardly what he supposes.

- Modularity and the motor theory of speech perception*, ed. I. G. Mattingly & M. Studdert-Kennedy. Erlbaum. [DH]
- Hopfield, J. & Tank, D. (1986) Computing with neural circuits: A model. *Science* 233:625-33. [CAS]
- Horn, B. K. P. (1977) Understanding image intensities. *Artificial Intelligence* 8:201-32. [AIH]
- Huttenlocher, P. R. (1979) Synaptic density in the human frontal cortex - Developmental changes and the effects of aging. *Brain Research* 163:195-205. [PDZ]
- James, W. (1890) *The principles of psychology*. Holt. [GU]
- (1890/1950) *The principles of psychology*. Dover Publications. [JL]
- (1896) *Principles of psychology* (Great Books edition, 1952) University of Chicago Press. [JS]
- Kahneman, D., Slovic, P. & Tversky, A. (1982) *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press. [MP-P]
- Klatzky, R. L. (1984) *Memory and awareness: An information-processing perspective*. W. H. Freeman. [GU]
- Kohonen, T. (1984) *Self-organization and associative memory*. Springer Verlag. [CAS]
- Kushwaha, R., Williams, W. J., Shevrin, H. & Sachellares, C. (1989) An information flow technique in ERP application. *IEEE Engineering in Medicine and Biology Society 11th Annual Conference. Session 2770:715-16*. [HS]
- Lehky, S. R. & Sejnowski, T. J. (1988) Network models of shape from shading. *Nature* 333:452-54. [AIH]
- Lewicki, P. (1986) *Nonconscious social information processing*. Academic Press. [GU]
- Lewicki, P. & Hill, T. (1989) On the status of nonconscious processes in human cognition. *Journal of Experimental Psychology: General* 118:239-41. [MC]
- Limber, J. (1978) Goodbye behaviorism. *Behavioral and Brain Sciences* 1:581-83. [JL]
- (1982) What can chimps tell us about the origins of language? In: *Language development*, vol. 2, ed. S. Kuczaj. Erlbaum. [JL]
- Lisberger, S. G. (1988) The neural basis for learning of simple motor skills. *Science* 242:728-35. [aJRS]
- Lisberger, S. G. & Pavelko, T. A. (1988) Brain stem neurons in modified pathways for motor learning in the primate vestibulo-ocular reflex. *Science* 242:771-73. [aJRS]
- Lloyd, D. (1989) *Simple minds*. Bradford Books/MIT Press. [DL]
- (in press) Leaping to conclusions: Connectionism, consciousness, and the computational mind. In: *Connectionism and the philosophy of mind*, ed. T. Horgan & J. Tienson. Kluwer Academic Publishers. [DL]
- Marcel, T. (1983) Conscious and unconscious perception: Experiments on visual masking and word recognition. *Cognitive Psychology* 15:197-237. [GU]
- McKoon, G. & Ratcliff, R. (1986) Inferences about predictable events. *Journal of Experimental Psychology: Learning, Memory and Cognition* 12:82-91. [JSU]
- Michenfelder, J. H. (1988) Assessing the brain. In: *Anesthesia and the brain*, ed. J. H. Michenfelder. Churchill Livingstone. [JCK]
- Millikan, R. (1984) *Language, thought, and other biological categories*. MIT Press. [GR]
- (1986) Thoughts without laws, cognitive science with content. *Philosophical Review* 95:47-80. [AC]
- Neely, J. H. (in press) Semantic priming effect in visual word recognition: A selective review of current findings and theories. In: *Basic processes in reading: Visual word recognition*, ed. D. Besner & G. Humphreys. Erlbaum. [DH]
- Neely, J. H., Keefe, D. E. & Ross, K. L. (1989) Semantic priming in the lexical decision task: Roles of prospective prime-generated expectancies and retrospective semantic matching. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 15:1003-19. [DH]
- Newman, L. A. & Uleman, J. S. (in press) Assimilation and contrast effects in spontaneous trait inferences. *Personality and Social Psychology Bulletin* 16. [JSU]
- Nisbett, R. & Ross, L. (1980) *Human inference: Strategies and shortcomings of social judgment*. Prentice-Hall. [JSU]
- Nisbett, R. & Wilson, T. (1977) On saying more than we can know. *Psychological Review* 84(3):231-59. [GR]
- Pope, K. S. & Singer, J. L. (1978) Regulation of the stream of consciousness: Toward a theory of ongoing thought. In: *Consciousness and self-regulation*, vol. 2, ed. G. E. Schwartz & D. Shapiro. John Wiley. [GU]
- Puccetti, R. (1981) The case for mental duality: Evidence from split-brain data and other considerations. *Behavioral and Brain Sciences* 4:93-123. [JCK]
- Putnam, H. (1975) The meaning of meaning. In: *Mind, language, and reality*. *Philosophical papers*, vol. 2, ed. H. Putnam. Cambridge University Press. [GH]
- Quine, W. V. O. (1960) *Word and object*. Technology Press of MIT and John Wiley & Sons. [aJRS]
- Reber, A. S. (1989) Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General* 118:219-35. [DH]
- Reber, A. S., Kassim, S. M., Lewis, S. & Cantor, S. (1980) On the relationship between implicit and explicit modes of learning a complex rule structure. *Journal of Experimental Psychology: Human Learning and Performance* 6:492-502. [GU]
- Reeves, J. W. (1965) *Thinking about thinking: Studies in the background of some psychological approaches*. Secker and Warburg. [AWY]
- Reingold, E. M. & Merikle, P. M. (1988) Using direct and indirect measures to study perception without awareness. *Perception and Psychophysics* 44:563-75. [DH]
- Rey, G. (1986) What's really going on in Searle's "Chinese Room." *Philosophical Studies* 50:169-85. [GR]
- Rips, L. J. (1983) Cognitive processes in propositional reasoning. *Psychological Review* 90:38-71. [RAC]
- Rock, I. (1984) *Perception*. W. H. Freeman. [aJRS, GR]
- Rogers, R. L., Papanicolaou, A. C., Baumann, S. B., Eisenberg, H. M. & Saydjari, C. (1990) Spatially distributed cortical excitation patterns of auditory processing during contralateral and ipsilateral stimulation. *Journal of Cognitive Neuroscience* 2:44-50. [JCK]
- Rose, S. (1987) *Molecules and minds*. Open University Press. [CAS]
- Rosenthal, David M. (1985) Intentionality. *Midwest Studies. Philosophy X*: 151-84 (reprinted, with postscript [1989] in *Rerepresentation: Readings in the philosophy of mental representation*, ed. S. Silvers. D. Reidel Publishing Co.) [DMR]
- (1986) Two concepts of consciousness. *Philosophical Studies* 49(3):329-59. [DMR]
- (1990) A theory of consciousness. Report, Center for Interdisciplinary Research (ZiF), Research Group on Mind and Brain, University of Bielefeld, West Germany. [DMR]
- Ross, L., Lepper, M. R. & Hubbard, M. (1975) Perseverance in self-perception and social perception: Biased attribution processes in the debriefing paradigm. *Journal of Personality and Social Psychology* 32:880-92. [JSU]
- Rozin, P. & Schull, J. (1988) The adaptive-evolutionary point of view in experimental psychology. In: *S. S. Stevens' handbook of experimental psychology*, 2d ed., ed. R. Atkinson, R. Herrnstein, G. Lindzey & R. D. Luce. Wiley. [JS]
- Sarna, S. K. & Otterson, M. F. Gastrointestinal motility: Some basic concepts. *Pharmacology Supplement* 36:7-14. [aJRS]
- Schacter, D. L. (1987) Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 13:501-18. [DH, JSU]
- Schacter, D. L., McAndrews, M. P. & Moscovitch, M. (1988) Access to consciousness: Dissociations between implicit and explicit knowledge in neuropsychological syndromes. In: *Thought without language*, ed. L. Weiskrantz. Clarendon Press. [DH]
- Schull, J. (1990) Are species intelligent? *Behavioral and Brain Sciences* 13(1):63-75. [JS]
- (in press) Evolution and learning: Analogies and interactions. In: *The evolution paradigm*, ed. Ervin Laszlo. Gordon and Breach Science Publishers. [JS]
- (in preparation) William James and the nature of selection. [JS]
- Searle, J. R. (1969) *Speech acts: An essay in the philosophy of language*. Cambridge University Press. [rJRS]
- (1976) The rules of the language game (review of Noam Chomsky, "Reflections on Language"). In: *The Times Literary Supplement*, Sept. 10. [aJRS]
- (1980a) Minds, brains, and programs. *Behavioral and Brain Sciences* 3:417-57. [aJRS]
- (1980b) Intrinsic intentionality. Reply to criticisms of Minds, brains and programs. *Behavioral and Brain Sciences* 3:450-6. [aJRS]
- (1980c) Rules and causation. *Behavioral and Brain Sciences* 3:37-38. [DH]
- (1983) *Intentionality. An essay in the philosophy of mind*. Cambridge University Press. [aJRS, RAC, DMR, PDZ]
- (1984a) *Minds, Brains and Science*. Harvard University Press.
- (1984b) Intentionality and its place in nature. *Synthese* 61:3-16. [aJRS]
- (1987) Indeterminacy, empiricism and the first person. *Journal of Philosophy* March:123-46. [aJRS]
- (1989) Consciousness, unconsciousness, and intentionality. *Philosophical Tendencies* 17(1):269-284. [JRS]
- (1990) Is the brain a digital computer? Presidential address to the Pacific

Contents Volume 13:4 December 1990

RECEIVED

Searle, J. R. Consciousness, explanatory inversion, and cognitive science 585

Open Peer Commentary

Block, N. Consciousness and accessibility	596	Matthews, R. J. Does cognitive science need "real" intentionality?	616
Bridgeman, B. Intention itself will disappear when its mechanisms are known	598	McDermott, D. Zombies are people, too	617
Carlson, R. A. Conscious mental episodes and skill acquisition	599	Piattelli-Palmarini, M. Somebody flew over Searle's ontological prison	618
Chomsky, N. Accessibility "in principle"	600	Rey, G. Constituent causation and the reality of mind	620
Clark, A. Aspects and algorithms	601	Rosenthal, D. M. On being accessible to consciousness	621
Czyzewska, M., Hill, T. & Lewicki, P. The ability versus intentionality aspects of unconscious mental processes	602	Schull, J. When functions are causes	622
Dresher, B. E. & Hornstein, N. Language and the deep unconscious mind: Aspectualities of the theory of syntax	602	Shevrin, H. Unconscious mental states do have an aspectual shape	624
Dreyfus, H. L. Searle's Freudian slip	603	Skarda, C. A. The neurophysiology of consciousness and the unconscious	625
Freeman, W. J. Consciousness as physiological self-organizing process	604	Taylor, C. The possibility of irreducible intentionality	626
Freidin, R. Grammar and consciousness	605	Ter Meulen, A. The causal capacities of linguistic rules	626
Glymour, C. Unconscious mental processes	606	Uleman, J. S. & Uleman, J. K. Unintended thought and nonconscious inferences exist	627
Harman, G. Intentionality: Some distinctions	607	Underwood, G. Conscious and unconscious representation of aspectual shape in cognitive science	628
Higginbotham, J. Searle's vision of psychology	608	Velmans, M. Is the mind conscious, functional, or both?	629
Hobbs, J. R. Matter, levels, and consciousness	610	Young, A. W. Consciousness, historical inversion, and cognitive science	630
Hodgkin, D. & Houston, A. I. "Consciousness" is the name of a nonentity	611	Zelazo, P. D. & Reznick, J. S. Ontogeny and intentionality	631
Holender, D. On doing research on consciousness without being aware of it	612	Editorial Commentary	632
Kulli, J. C. Is Searle conscious?	614	Author's Response	
Limber, J. What's it like to be a gutbrain?	614	Searle, J. R. Who is computing with the brain?	632
Lloyd, D. Loose connections: Four problems in Searle's argument for the "Connection Principle"	615		

Penrose, R. Précis of *The Emperor's New Mind: Concerning computers, minds, and the laws of physics* 643

Open Peer Commentary

Boolos, G. On "seeing" the truth of the Gödel sentence	655	Libet, B. Time-delays in conscious processes	672
Boyle, F. Algorithms and physical laws	656	Lutz, R. Quantum AI	672
Breuel, T. M. AI and the Turing model of computation	657	MacLennan, B. The discomforts of dualism	673
Butterfield, J. Lucas revived? An undefended flank	658	Madsen, M. S. Uncertainty about quantum mechanics	674
Chalmers, D. J. Computing the thinkable	658	Manaster-Ramer, A., Savitch, W. J. & Zadrozny, W. Gödel redux	675
Davis, M. Is mathematical insight algorithmic?	659	McDermott, D. Computation and consciousness	676
Dennett, D. C. Betting your life on an algorithm	660	Mortensen, C. The powers of machines and minds	678
Doyle, J. Perceptive questions about computation and cognition	661	Niall, K. K. Steadfast intentions	679
Eagleson, R. Computations over abstract categories of representation	661	Perlis, D. The emperor's old hat	680
Eccles, J. C. Physics of brain-mind interaction	662	Roeper, T. Systematic, unconscious thought is the place to anchor quantum mechanics in the mind	681
Garnham, A. Don't ask Plato about the emperor's mind	664	Roskies, A. Seeing truth or just seeming true?	682
Gigerenzer, G. Strong AI and the problem of "second-order" algorithms	663	Smithers, T. The pretender's new clothes	683
Gilden D. L. & Lappin, J. S. Where is the material of the emperor's mind?	665	Stanovich, K. E. And then a miracle happens . . .	684
Glymour, C. & Kelly, K. Why you'll never know whether Roger Penrose is a computer	666	Taylor, M. M. The thinker dreams of being an emperor	685
Higginbotham, J. Penrose's Platonism	667	Tsotsos, J. K. Exactly which emperor is Penrose talking about?	686
Hodgkin, D. & Houston, A. I. Selecting for the con in consciousness	668	Varela, F. J. Between Turing and quantum mechanics there is body to be found	687
Johnson, J. L., Ettinger, R. H. & Hubbard, T. L. A long time ago in a computing lab far, far away . . .	670	Waltz, D. & Pustejovsky, J. Penrose's grand unified mystery	688
Kentridge, R. W. Parallelism and patterns of thought	670	Wilensky, R. Computability, consciousness, and algorithms	690
		Zytkow, J. M. Minds beyond brains and algorithms	691
		Author's Response	
		Penrose, R. The nonalgorithmic mind	692