

But there are other ways of bringing out the false reading. For example,

(13) In some possible world, the teacher of Alexander did not teach Alexander.

strikes me as false. Moreover, it is one thing to claim that the most natural and immediate reaction to examples like (12) and (25) is that they are true. It is another to claim that it is impossible to hear them as false.

In any case, given Sainsbury's commitment to a truth-theoretical framework for semantics, he cannot adopt the view that all definite descriptions are referring expressions. There are an infinite number of definite descriptions in English. If each is treated as a rigid referring expression, then the truth-theory will contain an infinite number of reference axioms. But as Davidson has pointed out, if the truth-theory for a language contains an infinite number of axioms then the language is unlearnable. A finitely axiomatizable truth-theory must show how the contributions that definite descriptions make to truth-conditions are determined compositionally from the parts of those descriptions. This means that definite descriptions cannot be treated alongside names in the referential portion of the truth-theory. Furthermore, uniformity demands that if any definite descriptions are treated compositionally then they should all be so treated. The upshot of this is that no definite descriptions are referring expressions.

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***Natural Minds*, by Thomas W. Polger.** Cambridge, MA: The MIT Press, 2004, 320 pp., £25.95 / £12.95 (paperback, 2005).

The dispute between physicalism vs. functionalism is hot again. An old idea of mind, the identity theory (that mind equals brain, and sensations are brain processes), was brought to the open discussion by Thomas W. Polger (TWP), from the University of Wisconsin-Madison (USA). Against all odds, he challenges the guardian philoso-

phers of mind about well-established truths, standards and dogmas (functionalism, dualist theory), and the giants Putnam and Dennett.

The thesis is that

Conscious processes (events, states, or processes) are type-identical to biological processes (events, states, or properties).

and he is not alone in the field of physicalism: current and historical neurobiological data support new evidence in favour of identity theory. The reason is clear: finally, there is a theory of mind with a robust explanation of how mental phenomena can cause physical phenomena, which makes mental causation entirely unmysterious. Causal function is backed by the notion of a function able to define relations that are more abstract than basic physical relations, but less abstract than mere behavioural relations.

But it is not only in philosophy (natural minds) that we find such a dispute. In artificial sciences (artificial intelligence (AI), cognitive science), some recent books try also to extend the discussion about dualism. In *Mind and Mechanism* (The MIT Press, Cambridge, 2001), by Drew McDermott, and in *What is Thought?* (The MIT Press, Cambridge, 2004), by Eric Baum, the problem of mind is presented from the computational point of view. McDermott tries to answer the question of how it is that a purely physical entity, the brain, can have experiences. He begins by demonstrating the falseness of dualist approaches, which separate the physical and mental realms. He then surveys what has been accomplished in artificial intelligence, clearly differentiating what we know how to build from what we can imagine building. McDermott then details a computational theory of consciousness, claiming that the mind can be modelled entirely in terms of computation, dealing with various possible objections. Baum proposes a computational explanation of thought, arguing that the complexity of mind is the outcome of evolution, which has built thought processes that act unlike the standard algorithms of computer science, and that to understand the mind we need to understand these thought processes and the evolutionary processes that produced them in computational terms. Both authors face up entities that exemplify their theories, yet they seldom refer experiments that force us to think carefully about proposed explanations of mind. And it is urgent to explore would-be worlds in order to put our conjectures in practice.

It seems that this identity theory is a neo-Humean theory, because the mind is an assemblage of conscious mental states. In Humean materialism, mental states have now real relations between them, and they are bundled into mechanisms by their own causal connections. TWP wants to return to the idea of a mind and self combined, and the self as a biological phenomenon. Part of this idea is analogous to the one defended by myself and my associate Milton Corrêa (*Proceedings of the 7th Congress Iberomerican on Artificial Intelligence, Lisboa, 6–9 de Outubro*, Springer-Verlag, Lecture Notes in AI 1484, pp. 64–75, 1998): there is a kind of periodic table of mental states (mind instead of matter), structured into three components, the nucleus (basic properties), the attributes (external content, unsatisfaction, uncertainty, urgency, importance, intensity and insistence), the laws (ten relations among mental states about the dynamics of mind) and ten rules of control (establishing the guidance of the mind). The tables incorporate a mixture of declative (definitions) and procedural (mechanisms) points of view, and cover individual and collective states. With such apparatus, we can implement clever agencies in computers and proceed with nice experimentation in human sciences (sociology, politics, and economics).

Weak AI is linked with explanatory functionalism, because the semantics of a mental state is not just its functional role, but also its causal connections to objects in the world. As a matter of fact, realizing a functional state is a matter of having a function. And according to TWP ‘whether a system is a mind is just a matter of whether its states have the world as an interpretation.’ From the point of view of machine functionalism, being a mental state is being a realization of a functional state of a machine; that is, ‘to be in a mental state M is to realize or instantiate machine program P and be in functional state S relative to P.’

For TWP, machine functionalism is just an example of metaphysical functionalism. How does a physical state realize a functional state relative to a machine program — what is the realization relation for machine functionalism? We need to know more about functional states relative to machine programs. So a complete repertoire of behaviours a device is capable can be specified by a finite set of statements. Type identity conditions for mental states can be specified purely in terms of their mutual interconnections and relation to stimulus conditions and behaviour. Mental states are to be identified with functional states of systems that realize certain machines. So

Turing machines seem to be physical devices and abstract entities at the same time.

Modern theories about the brain, coming from the neurosciences, are quite relevant for this kind of discussion. For example, two recent ideas, 'the brain, in particular the neocortex, is not a processor but a hierarchical memory system that stores memories in sequence and retrieves them quickly' and 'brains are distributed neural networks,' seem in contradiction, but from the computer sciences perspective they make sense.

Identity theory has many objections, and TWP responds to two major ones. The first one, Putnam's argument from multiple realizability, evokes creatures with brains unlike ours that could also have mental states. TWP argues that the identity theory can accommodate an appropriate degree of multiple realizability. The second one, Kripke's modal argument against mind-brain identity, is based on the contingency of the identity statement between mind and brain. TWP argues that the identity theory can itself satisfy the kind of explanatory demands that are often believed to favour functionalism.

TWP recognizes functionalism is a mess, and varieties of functionalism are as varied as fingerprints but not nearly so constant. After arguing that identity theory is a live option, he compares it with the competition by providing a framework for understanding the many varieties of functionalism and how they are related to one another. His taxonomy is able to distinguish over one hundred variations, and he concludes that only some of these variations compete with identity theory.

In the last chapter, 'Minds, Brains, and Persons,' TWP advocates that our conscious life is a biological phenomenon and that mental states are brain states. Before he argued that identity theory can accommodate the varieties of multiple realizability worth wanting and that it is compatible with the apparent contingency of the mind-brain relation. He concludes that conscious mental states, being identical to brain states, are robustly causal, and they are the sort of items that figure in mechanistic explanations of mental capacities. Such final conclusions are quite important to the research carried out now in AI and in the computing sciences at large, as Drew McDermott refers in his book cited above. It is not only the mechanistic explanation of brains or the dissociation of artificial assemblages that go together, but how mental states or how sensations are bundled to implement robust artificial agents capable to drive a car along the Mojave desert

(the \$2 million Grand Challenge) or a robot (Pathfinder, Spirit, Opportunity) on Mars planet. The success of Stanley in the 128-mile Mojave race (October 8, 2005) to obtain the prize money from DARPA (more four vehicles completed the course behind the Stanley agent) is resumed in a simple sentence: autonomous vehicles ('Look, Ma, no hands') have arrived for good and for evil.

Philosophy is a field more grounded in the reality around us that we can really imagine. This book of TWP brings back a good argument to assert that engineering needs to be triggered by philosophical ideas, and philosophy can be helped a lot by disciplined experimentation done upon innovative prototypes. IBM Deep Blue was mainly processing power (brute force) against Kasparov mind and brain. It did not think. Stanley thinks. We have moved away from simple rule-based thinking in artificial intelligence. The new paradigm is based upon probabilities. It is based on statistical analysis of patterns. And it is a better mirror of how our minds work.

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Contextualism in Philosophy: Knowledge, Meaning and Truth, org. por Gerhard Preyer e Georg Peter. Oxford: Clarendon Press, 2005, 402 pp., £17.99.

O número de discussões acerca do contextualismo actualmente em curso na filosofia é surpreendente. Em disciplinas como a epistemologia e a filosofia da linguagem, nomeadamente, muito do mais interessante trabalho recente gira em torno do tópico. No presente volume, ligado ao projecto Protosociology, baseado na Johann Wolfgang Goethe Universität de Frankfurt (<http://www.protosociology.de/>), os coordenadores, Gerhard Preyer e Georg Peter, reúnem um conjunto de textos que exemplifica tais discussões. O volume contém contribuições de participantes centrais nos debates sobre o contextualismo, como, por um lado, Herman Cappelen e Ernest Lepore (cujo livro *Insensitive Semantics* (2005) se tornou uma bandeira do anti-contextualismo, especificado como «minimalismo semântico» e