

concepts

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Mental self: The person within

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If the readers of *Nature* were asked to define the concept of 'self', I imagine that the answers would cluster around two principal meanings. One would be refreshingly precise: "what the immune system identifies as belonging to the body", a topic that was ably tackled by Guy Nossal in an earlier essay in this series. The other meaning, corresponding to the everyday idea of mental self, would be more difficult to pin down. The answers would include: "the sense of one's own being", or "the sum total of qualities that distinguish the mind of one person from that of another", or "one's personal identity".

Can we make the concept of mental self more precise? And are the immunological self and the mental self related to each other? I believe that the answer is yes on both counts.

In an attempt to peer through the conceptual haze of the mental self I have come to consider it from two perspectives: that of introspection and that of biology. Introspection tells me that the mental self is not a thing but a process, one that produces phenomena ranging from the very simple (the automatic sense that I exist separately from other entities) to the very complex (my identity, complete with a variety of biographical details). On the other hand, combining the results of introspection with a biological perspective suggests to me that the mental self represents the individuality and continuity of a living organism.

The value of such a symbol is that it serves as a reference for other contents of the mind, such as representations of the objects with which organisms interact, and of the events in which organisms participate. Having a sense of self as a regular component of the mind allows us to create a freshly minted new entity: a protagonist for the objects and events that populate our mental universe. In effect, the simplest level of self allows us to manufacture the idea that objects and events are perceived from a singular perspective, that of the organism symbolized by the self. At a more complex level, we can generate the idea that the mental processes that occur in this organism are our own property. Finally, with the assistance of past memories of objects and events, we can piece together an autobiography and reconstruct our identity and personhood incessantly.

Where should we look for the neural basis of these self-involving processes? I propose that we search in the neural mappings of our own body, because the body as a whole is the 'thing-process' that is symbolized as the mental self. Others have had this intuition before: Benedict Spinoza and William James perhaps most vividly, but also Friedrich Nietzsche, Martin Heidegger, Maurice Merleau-Ponty and Charles Scott Sherrington, a venerable founder of what we now call neuroscience.

There are two reasons why mappings of the body are well suited to signifying the self in the mind. One is the relative invariance of the body — the design and operations of one's body remain largely the same throughout one's lifetime. The other reason is an often-overlooked fact: that the brain's representation of the structure and operations of the body is continuous.

To illustrate this, look up from the page you are reading and observe intently whatever is in front of you for a few seconds; then look again at this page. As you looked up, many neural stations of your visual system, from the retinas to the cerebral cortex, shifted rapidly from making neural mappings of the page, to mapping the room in front of you. But when you returned to the page these components resumed mapping the page again. In quick succession, the same visual brain regions constructed entirely different neural maps by virtue of the different sensory inputs that you gathered, resulting in different mental images. However, while your visual brain changed obligingly, several regions in your 'body-sensing' brain, which has the job of mapping

varied aspects of your body, did not change at all in terms of the kind of object that they represent. The body remained the 'object' of the body-sensing brain all along.

The moral of this story is that some parts of the brain are free to roam over the world and to map whatever sound, shape, taste or smell or texture that the organism's design enables them to map. But some other brain parts — those that represent the organism's own structure and internal state — are not free to roam at all; they can map nothing but the body, and are the body's captive audience. It is reasonable to hypothesize that this is the source of the sense of continuous being that anchors the mental self.

We are beginning to discover the neural machinery that is required to map the body. This machinery includes pathways that transmit chemical signals from the internal milieu, through the bloodstream, directly to brain regions such as the area postrema or the hypothalamus; and neural signals from the viscera and muscles that are conveyed by nerve fibres to brain regions in the spinal cord and brainstem. Within the brain itself, dedicated pathways signal this body-related information to certain sectors of the thalamus (a nucleus known as VMpo), and of the cerebral cortex (a sector of the insula). The integration of such signals constructs composite and dynamic maps of the body's state from moment to moment.

These dedicated pathways and regions did not evolve so that we could build a mental self, but rather because continuously updated maps of the body's state are necessary for the brain to regulate life. How intriguing that nature, ever the tinkerer, may conveniently use the same equipment for another purpose: grounding the mental self. Curiously, seen in this light, the mental self becomes a closer relative of the immunological self.

FURTHER READING

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