

Johnjoe McFadden
Faculty of Health and Medical Sciences
University of Surrey
Guildford, UK

Review of by Fingelkurts *et al*

Dualism, the belief that mind, consciousness, the spirit or the soul is made of very different material than the stuff of the body, is probably as old as human thought. Nearly four hundred years ago the French philosopher Rene Descartes incorporated the principle into Cartesian dualism, but also uncovered a severe problem: how can an immaterial mind cause anything in a material body, and vice-versa? Descartes proposed that the interaction between body and soul take place in the tiny pineal gland. We now know that, far from harbouring an immortal soul, the gland performs the rather mundane task of regulating our circadian rhythm. Most neuroscientists have however taken a very different path embracing *monism* (the belief that mind and matter are made of the same substance) and specifically, *materialism* (the belief that that substance is matter) which claims that consciousness and the mind can be accounted for in terms of properties of matter within brains.

However, despite its severe drawbacks, the belief that mind is not made of matter persists in most belief systems around the world. Its enduring popularity has much to do with our inner perception of what our own mind *feels like*. It just doesn't feel anything like our arm or leg or even that soft squishy stuff inside our skulls. Mind *feels* different from matter. The article by Fingelkurts *et al.* attempts to address this problem by embracing a new kind of dualism, which I call *scientific dualism*, which claims that the mind is indeed made of different stuff than the brain. Whereas the brain is made of matter the conscious mind is made of the electromagnetic fields generated by the neural activity of the brain.

The brain's electromagnetic (em) field has of course been known to exist for more than a century and Fingelkurts and his colleagues have made significant contributions to its study by the technique known as electroencephalography (EEG). But in the last decade the idea that the brain's em field is also the seat of consciousness has been gaining ground (McFadden, J., 2002; Pocket, S., 2000, John, E.R., 2002). Placing our mind in the brain's em field solves many problems, not least the 'binding problem' of how diverse attributes of sensory objects are somehow bound together into unified percepts in the conscious mind. Locating consciousness in the brain's em field effortlessly solves this problem since em fields are, by definition, unified.

In their article, Fingelkurts and colleagues, delve further into the physics of consciousness by considering the nature of space and time within the conscious mind. They review the neurobiology of the brain and particularly the organization of neurons and discuss how they generate the brain's em field, as measured by EEG. This leads them to the notion of an operational space-time generated by synchronized neural activity, as evidenced by EEG (one of the best-documented *correlates of consciousness*) which, they propose, is isomorphic to the phenomenological space-time of our perceptions. They then consider a mind-brain hierarchy consisting of increasingly coordinated mental operations taking place within their operational space-time from relatively isolated unconscious events become increasing integrated

and involving more and more of the brain's activity until, at its highest level, it equates with our conscious perceptual experience.

Consciousness remains a fundamental puzzle for both biology and physics. The article by Fingelkurts *et al.* represents a bold attempt to apply insight from both disciplines to the problem.

1. McFadden J. Synchronous firing and its influence on the brain's electromagnetic field: Evidence for an electromagnetic field theory of consciousness. *Journal of Consciousness Studies* 2002;9:23–50.
2. Pockett S. *The Nature of Consciousness: A Hypothesis*. Lincoln, NE: Writers Club Press; 2000.
3. John ER. The neurophysics of consciousness. *Brain Research, Brain Research Reviews* 2002;39:1-28.