

8 Application to Neuropsychology

The most direct evidence pertaining to the effects of conscious choices upon brain activities comes from experiments in which consciously controlled cognitive efforts are found to be empirically correlated to measured physical effects in the brain. An example is the experiment of Ochsner et al. (2001). The subjects are trained how to cognitively re-evaluate emotional scenes by consciously creating and holding in place an alternative fictional story of what is really happening in connection with an emotion-generating scene they are viewing.

The trial began with a 4-second presentation of a negative or neutral photo, during which participants were instructed simply to view the stimulus on the screen. This interval was intended to provide time for participants to apprehend complex scenes and allow an emotional response to be generated that participants would then be asked to regulate. The word ‘attend’ (for negative or neutral photos) or ‘reappraise’ (negative photos only) then appeared beneath the photo and the participants followed this instruction for 4 seconds.

To verify whether the participants had, in fact, reappraised in this manner, during the post-scan rating session participants were asked to indicate for each photo whether they had reinterpreted the photo (as instructed) or had used some other type of reappraisal strategy. Compliance was high: On less than 4% of trials with highly negative photos did participants report using another type of strategy.

Reports such as these can be taken as evidence that the streams of consciousness of the participants do exist and contain elements identifiable as efforts to reappraise.

Patterns of brain activity accompanying reappraisal efforts were assessed by using functional magnetic imaging resonance (fMRI). The fMRI results were that reappraisal was positively correlated with increased activity in the left lateral prefrontal cortex and the dorsal

medial prefrontal cortex (regions thought to be connected to cognitive control) and decreased activity in the (emotion-related) amygdala and medial orbito-frontal cortex.

How can we explain the correlation revealed in this experiment between the mental reality of ‘conscious effort’ and the physical reality of measured brain behavior?

According to the precepts of classical physics, the subject’s behavior is controlled by physically described variables alone, and his feeling that his ‘conscious effort’ is affecting his thinking is an illusion: the causal chain of physical events originating in the instructions being fed to the trained subject is controlling the brain response, and his feeling of ‘conscious effort’ is an epiphenomenal side-effect that has no effect whatever on his brain.

The validity of that picture cannot be empirically verified or confirmed: it is an unverifiable conjecture. Nor has this conjecture any rational foundation in science or basic physics. The conjecture originates from the classical principle of the causal closure of the physical, which does not generally hold in quantum theory. That principle rests on a classical-physics-based bottom-up determinism that starts at the elementary particle level and works up to the macro-level. But, according to the quantum principles, the determinism at the bottom (ionic) level fails badly in the brain. The presumption that it gets restored at the macro-level is wishful and unprovable.

According to quantum mechanics, the microscopic uncertainties must rationally be expected to produce, via the Schroedinger equation (of brain plus environment), macroscopic variations that, to match observation, need to be cut back by quantum reductions. This means process 1 interventions. This leads, consistently and reasonably, to the entry of mental causation as described above, where the subject’s conscious effort is *actually* causing what his conscious understanding *believes*, on the basis of life-long experience, that effort to be causing.

There is no rational explanation for the existence of the ‘illusion of conscious influence’ when no such influence exists, but a completely reasonable explanation for the subject’s believing that his conscious effort has an influence when that experienced effort has an influence that incessantly demonstrates itself to the subject.

As regards causation, the structure of quantum theory effects a *replacement*, within the dynamics, of what is *unknowable in principle*, namely the empirically inaccessible microscopic features of the brain, by data of a different kind, which *are* knowable in principle, namely our efforts. This replacement of inaccessible-in-principle data