The time course of neural activity predictive of impending movement.

The readiness potential is a reliable correlate of self-initiated movement. It manifests as a buildup of neuronal activity leading up to the time of movement onset. However, after decades of empirical research, we are still not at all certain what this buildup reflects.

Does it reflect an intentional process, directed at producing a movement, like flicking over the first in a row of dominoes? Or does it reflect a non-specific, stochastic process that gets caught in the flash photo of movement-locked averaging? This is an important question in the debate about conscious free will and the study of volition in general because of the RP's status as a temporal marker of "planning and preparation for movement". Ultimately, the question should not be about the RP per se, but rather about what the RP is presumed to reveal: the time course of neural activity predictive of impending movement. We sought to map out that time course using machine learning combined with a novel self-initiated movement task, and ask whether or not it exhibits the slow buildup associated with the RP. I will discuss this and other work that casts doubt on the classical interpretation of the RP. I conclude that, while the RP is a reliable correlate of self-initiated movement, it is at best a poor predictor of movement onset and that we should not lean on it too heavily when drawing conclusions about conscious free will, until we have a clearer idea of how to interpret it.