EXPERIMENT 8: ***Rhythmic TMS Causes Local Entrainment of Natural Oscillatory Signatures, Thut et al., 2011***

**Introduction**

* while the previous experiment (experiment 7) found an (indirect) correlation between *rTMS bursts* and *brain oscillation entrainment* by means of subject’s perception measured as the accuracy of their responses to the presentation of a peri-threshold visual stimulus (a phosphene, in that case), this one aimed at proving a ***direct correlation between rTMS bursts and brain oscillation entrainment*** by showing how this transcranial stimulation is able to change the synchronization measuring the potential generated by the brain through an *EEG recording*

**Protocol/Techniques**

* rTMS
* EEG

**Method**

* indeed, as well as the previous one the experiment was tested by undergoing participants many ***subsequent, rhythmic TMS burst***, but in this case subjects were not asked to perceive anything (instead, the *TMS* was specifically calibrated and placed in certain areas not to generate phosphenes on subjects)
* in order to prove the effectiveness of the study, many different sessions were done, each one changing one parameter so to have meaningful control data; the following control conditions were useful to say that if the effect was specific for the rhythmic TMS condition, then no entrainment should be seen in the brain itself in the other control conditions. We have 3 control conditions and 2 other sessions.

1. in the *real session*, named *α-TMS*, pulses were given at a fixed rate α (calibrated with the subject’s individual alpha frequency, *IAF*) in order to prove the entrainment of this α-rhythm
2. in the *control session* named *ar-TMS*, the same number of pulses were given arrhythmically in order to prove that no entrainment could be achieved in this way
3. in the *control session* named *α-TMS90*, pulses were given with the coil perpendicular to the stimulated area in order to prove that less entrainment (or no entrainment at all) could be achieved (not maximizing the induction of action potential in the neurons underneath that brain area)
4. in the *control session* named *α-TMSsham* pulses were given with a *sham* *TMS* in order to prove that entrainment was not the achieved because of external factors independent from the *TMS* stimulation itself
5. a final *control session* used a *fake head with no brain activity* (watermelon) on which *α-TMS* pulses were applied in order to show that the presence of synchronized alpha waves was not a mere consequence of the rhythmicity of the pulses themselves but, instead, a consequence of the ability of pre-existent waves (those from the brain) to entrain with the incoming ones (those generated by the *TMS*).

**Results**