Gamma wave

A gamma wave is a pattern of neural oscillation in humans with a frequency between 25 and 100 Hz, though 40 Hz is typical.

According to a popular theory, gamma waves may be implicated in creating the unity of conscious perception (the binding problem).

However, there is no agreement on the theory; as a researcher suggests:

Whether or not gamma wave activity is related to subjective awareness is a very difficult question which cannot be answered with certainty at the present time.

The robust steady-state cortical activation elicited by flickering visual stimulation has been exploited by a wide range of scientific studies. As the fundamental neural response inherits the spectral properties of the gazed flickering, the paradigm has been used to chart cortical characteristics and their relation to pathologies. However, despite its widespread adoption, the underlying neural mechanisms are not well understood. Here, we show that the fundamental response is preceded by high-gamma (55-125 Hz) oscillations which are also synchronised to the gazed frequency. Using a subdural recording of the primary and associative visual cortices of one human subject, we demonstrate that the latencies of the high-gamma and fundamental components are highly correlated on a single-trial basis albeit that the latter is consistently delayed by approximately 55 ms. These results corroborate previous reports that top-down feedback projections are involved in the generation of the fundamental response, but, in addition, we show that trial-to-trial variability in fundamental latency is paralleled by a highly similar variability in high-gamma latency. Pathology- or paradigm-induced alterations in steady-state responses could thus originate either from deviating visual gamma responses or from aberrations in the neural feedback mechanism. Experiments designed to tease apart the two processes are expected to provide deeper insights into the studied paradigm [1].

1)
Wittevrongel B, Khachatryan E, Carrette E, et al. High-gamma oscillations precede visual steady-state responses: A human electrocorticography study [published online ahead of print, 2020 Sep 4]. Hum Brain Mapp. 2020;10.1002/hbm.25196. doi:10.1002/hbm.25196