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SINGLE-TRIAL TIME-SPACE TRAJECTORIES OF EVOKED MAGNETIC RESPONSES TO APPARENT MOTION USING CROSS-WAVELET ESTIMATORS. Bakardjian H.[1,2], Uchida A.[1,2], Takeda T.[3,2] and Endo H.[1,2]*. [1]National Institute of Bioscience and Human-Technology, Tsukuba, Japan; [2]Core Research for Evolutional Science and Technology (CREST), Kawaguchi, Saitama, Japan; [3]Faculty of Engineering, University of Tokyo, Tokyo, Japan.

In recent years a number of studies have contributed towards completing the pathway map of the visual system. Special attention has been given to the parallel processing structure and the connections between visual areas in the striate and extrastriate cortex. However, in cases when magneto- or electro-encephalographic (MEG/EEG) response timing is used as evidence, decrease in temporal resolution due to averaging becomes a serious obstacle to finding the precise activation trajectories in time-space. Other factors discouraging usage of averaging may concern low spatial sensor resolution and high inter- or intra-experimental variability due to attentional shifts, learning or habituation. We studied single-trial evoked magnetic responses to two-bar apparent motion and single-bar flash stimuli displayed on a fast-response plasma display screen in an attempt to confirm or reject the hypothesis for parallel processing in areas V1 and V5. In order to improve the signal-to-noise ratio, to amplify only selected features and to increase control over which visual areas are activated, we employed cross-conditioning experimental design and cross-wavelet multiresolution decomposition. Cross-connections included in-out motion, on-off flash and motion-flash combinations. Construction of the time-space trajectory for each selected trial could then be completed with optimal time resolution by iterative source estimation through simulated annealing. Although this technique was not able to guarantee trajectory information extraction from each single trial available, in most cases our preliminary results using MEG showed clear activation pathways (starting as early as ~40ms after stimulus onset) from the striate cortex (V1) to the medial temporal cortex (V5) with dipole orientation changes at 100..130ms and 170..200ms. (Supported by CREST)