ood at multitasking? Exploring parallel and serial processes in the human brain

n Marti, PhD INSERM, U992, Cognitive Neuroimaging Unit, F-91191 Gif/Yvette, France CEA, DSV/I2BM,
n Center, F-91191 Gif/Yvette, France

an brain exhibits fundamental limitations when attempting to execute two tasks simultaneously. When atte
tracted by a task, subjects are more likely to miss an independent target stimulus (the 'attentional blink'). I
eport seeing the stimulus, their responses are slower (the 'psychological refractory period'). How the brai
in such multitasking situations is hypothesized by two competing models arguing that resources are share
tasks or serially allocated to each task respectively. To test these models, we investigated the brain respo
e perceptual tasks performed successively, using a combination of magnetoencephalography and multiva
nalyses. The results confirm previous evidence suggesting that dual-task interference essentially affects p
al processes. In addition, we provide a complete decomposition and characterization of the series of proce
ng both tasks. This revealed that (i) each task is computed by a chain of partially overlapping brain proces
e second task, elements of the chain are first purely parallel (<300-ms), then prolonged (~350-450-ms) an
>500-ms); (iii) serial processes of Task 1 and 2 repulsed each other, shortening the duration of Task 1 pro
oning the ones of Task 2. Together, these results reveal a much more complex picture of the computing
ure at play during task interference than originally hypothesized. We propose an original model which inco
llel and serial processes, and opens the door to understand how the brain organizes multiple tasks.