Aim: This study aims to show whether the neural systems for nonspatial visual, verbal and auditory working memory (WM) exhibits a functional dissociation in a functional magnetic resonance imaging (fMRI).

Methods: 33 healthy right-handed subjects performed a delayed recognition task for previously unfamiliar visual, verbal and auditory clues. Task-specific activations, as well as age related areas in all tasks were obtained using General Linear Model.

Results: Both the dorsolateral and ventrolateral prefrontal cortices are conjointly activated across all stimulus types. No stimulus-specific differences in the activation patterns of the prefrontal cortex could be demonstrated giving support to the view of an amodal prefrontal involvement during WM processes. However, extra-frontal regions specialized on feature processing and involved in the preprocessing of the stimuli were selectively activated by these different subtypes of WM. Considering age as an independent variable, we found that, with age, there is a reduction in the hemispheric specialization of cognitive function in the frontal lobes.

Conclusions: Right lateralization in prefrontal cortex, as mainstay area in WM tasks might be attributed to heavy load of the utilized tasks; a finding which was highlighted in previous studies. Bilateral activation in the frontal lobes in elderly might be related to dedifferentiation of function, deficits in function and/or functional reorganization and compensation. From a clinical standpoint, considering potential impacts of modality type and normal aging on WM processes are mandatory steps when we want to report any memory deficit in neurologic diseases.