11. Interactive exploration of 3D objects and individual differences in visuo-spatial abilities

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When we study complex matter, learning from theory is often not enough: We need to experience it in practice. However, sometimes it is impossible to present a real life experience. There are various situations thinkable, when practice is not feasible; when it is expensive (e.g. aerospace), unethical (e.g. medical training) or indefinite (e.g. engineering and design). Computer games can offer a solution in that they can simulate these situations, so that a virtual experience becomes possible. This raises two questions: 1) What exactly is the importance of interactivity, and 2) Who benefits from it? In the current study, we investigated the added value of interactivity when exploring abstract (3D) objects and whether the individual_s abilities are of importance. In two experiments, 36 participants were divided into a low, middle, and high visuo-spatial ability (VSA) group, which was determined by Vandenberg and Kuse's MRT-A test (1978). In the experiments, the influence of four types of exploration (none, passive 2-D, passive 3-D and interactive 3-D) on building 3-D mental representations was investigated. First, 24 simple and 24 complex objects (consisting of respectively 3 and 5 geons; Biederman, 1987) were explored and, subsequently, tested through a mental rotation test. Results revealed that participants with a low VSA benefit from interactive exploration of objects opposed to passive exploration. This refines James et al.'s findings (2001), who reported a general increased performance with interactive as compared to passive exploration. Our results underline that individual differences are of key importance when investigating the human's visuo-spatial system, but also when developing virtual learning environments.