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Visuospatial Perspective Taking and Theory of Mind in a Clinical Approach: Development of a Task for Adults

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Abstract : Visuospatial perspective taking (VSPT) is a process that allows to integrate spatial information from different points of view, and to transform the mental images we have of the environment to properly orient our movements and anticipate the location of landmarks during navigation. VSPT is also related to egocentric perspective transformations (imagined rotations or translations of one's point of view) and to infer the visuospatial experiences of another person (e.g. if and how another person sees objects). This process is deeply related to a wide-ranging capacity called the theory of mind (ToM), an essential cognitive function that allows us to regulate our social behaviour by attributing mental representations to individuals in order to make behavioural predictions. VSPT is often considered in the literature as the starting point of the development of the theory of mind. VSPT and ToM include several levels of knowledge that have to be assessed by specific tasks. Unfortunately, the lack of tasks assessing these functions in clinical neuropsychology leads to underestimate, in brain-damaged patients, deficits of these functions which are essential, in everyday life, to regulate our social behaviour (ToM) and to navigate in known and unknown environments (VSPT). Therefore, this study aims to create and standardize a VSPT task in order to explore the cognitive requirements of VSPT and ToM, and to specify their relationship in healthy adults and thereafter in brain-damaged patients. Two versions of a computerized VSPT task were administered to healthy participants (M = 28.18, SD = 4.8 years). In both versions the environment was a 3D representation of 10 different geometric shapes placed on a circular base. Two sets of eight pictures were generated from this: of the environment with an avatar somewhere on its periphery (locations) and of what the avatar sees from that place (views). Two types of questions were asked: a) identify the location from the view, and b) identify the view from the location. Twenty participants completed version 1 of the task and 20 completed the second version, where the views were offset by ±15° (i.e., clockwise or counterclockwise) and participants were asked to choose the closest location or the closest view. The preliminary findings revealed that version 1 is significantly easier than version 2 for accuracy (with ceiling scores for version 1). In version 2, participants responded significantly slower when they had to infer the avatar's view from the latter's location, probably because they spent more time visually exploring the different views (responses). Furthermore, men significantly performed better than women in version 1 but not in version 2. Most importantly, a sensitive task (version 2) has been created for which the participants do not seem to easily and automatically compute what someone is looking at yet which does not involve more heavily other cognitive functions. This study is further completed by including analysis on non-clinical participants with low and high degrees of schizotypy, different socio-educational status, and with a range of older adults to examine age-related and other differences in VSPT processing.

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