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Constructional Apraxia is related to Different Cognitive Defects across Dementia

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Abstract

Background: In visuo-constructional copying tasks, individuals with dementia can reproduce distorted or

Conclusion:

Keywords: Drawing; Al heimer's disease; Parkinson's disease; Dementia; Constructional apra ia; Vascular dementia; Fronto-temporal dementia

Introduction

In visuo-constructional cop ing tasks demented patients ma perform poorl on drawing, producing simpli ed gures, alterations in spatial relationships among the parts, lack of perspective, or failure in correctl integrating single elements in a coherent whole. Such behaviours can all be described with the term of Constructional apra ia (CA), which was rst proposed b Kleist [1] to designate a speci c disturbance which appears in formative activities (such as assembling, building, or drawing) in which the spatial form of the task is missed, although there is no apra ia of the single movements .

In the subsequent ears, cop ing drawing performances have received revamped attention in literature being used increasingl for the identi cation of cognitive impairments especiall in elderl [2,3]. Indeed, the occurrence of constructional impairments in cop ing drawing tasks has been o en considered as a neurops chological marker for di use cognitive deterioration, a er lesions in either le or right hemisphere [4,5].

Drawing disorders have been observed in focal brain-damaged patients [6-8], and more o en described and investigated in patients with progressive mental deterioration [9-15]. Among demented patients, visuo-constructional impairments have been usuall considered one of the most common behavioural alterations in individuals with Al heimer's disease (AD) [7]. However, no converging data would seem clarif the cognitive mechanisms underl ing constructional impairment in AD patients. Indeed, some neurops chological and neuroimaging ndings ascribe a crucial role to the spatial-constructional processing and bilateral parietal atroph on a hand, or planning abilities and fronto-temporal-parietal atroph , on the other hand [13,16].

A few studies e plored constructional impairments in individuals with Fronto-temporal dementia (FTD). ese studies compared performances on cop ing gures in FTD and AD patients, but reported contrasting ndings. Some authors [11] observed that FTD and AD patients showed similar scores in cop ing geometrical gures, but more recentl other authors [12,17] reported that FTD patients were more accurate in cop ing gures compared to AD patients.

Similar con icting results concern patients with Vascular dementia (VAD), where performances have been reported similar [18] or poorer than AD patients [19].

In individuals with Parkinson's disease and associated dementia (PDD) onl a few studies e plored the constructional apra ia. It has been reported that that earl impairment of pentagon drawing is a

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Results from logistic regressions exploring the association between CA and neuropsychological scores revealed that in AD patients the model was statically significant [χ^2 (4)=20.55; *p*<0.001; Cox and Snell R^2=0.248]; the MMSE Z-score (odds ratio, OR: 0.375; confidence intervals, 95% CI: 0.171-0.820; *p*=0.01), and the visuo-spatial composite Z-score (OR: 0.303; 95% CI: 0.120-0.766; *p*=0.01) were significant predictors of the accuracy in copying drawing task. In VAD patients, regression showed that the model was statically significant [χ^2 (4)=20.87; *p*<0.001; Cox and Snell R^2=0.285]; the frontal/executive composite Z-score was the only significant predictor of the visuo-constructional dysfunction (OR: 0.034; 95%CI: 0.008-.0446; *p*<0.001). In FTD patients, the model was statically significant [χ^2 (4)=19.65; *p*<0.001; Cox and Snell R^2=0.313]; the frontal/executive composite Z-score was the only significant predictor of the presence of constructional disorders (OR: 0.009; 95% CI: 0.000-0.482; *p*=0.02). In PDD patients, the model was statistically significant [χ^2 (4)=10.89; *p*=0.02; Cox and Snell R^2=0.289]; drawing accuracy was significantly associated to visuo-spatial composite Z-score (OR: 0.055; 95% CI: 0.004-0.723; *p*=0.02).

Discussion

In the present study we explored visuo-constructional copying skills across different forms of dementia, including individuals with AD, VAD, FTD, and PDD. To this aim we employed a visuo-constructional copying task that would have high sensibility for detecting visuo-constructional defects [2,16]. Our results revealed significant differences between patients' groups, such that FTD patients produced more accurate copies than all other groups, and that similar performances occurred between AD, VAD and PDD patients. These findings would confirm that in FTD patients the visuo-constructional copying performances would be better than AD patients as reported in some previous studies [12,17], and clarified that drawing abilities do not significantly differ between AD and VAD patients [18]. However, our results additional revealed that visuo-constructional copying abilities would be relatively preserved in FTD patients compared with the other forms of dementia. In our study, we