The Digital Clock Drawing Test (dCDT) – V: Using total drawing time and latencies to assess decision making and capacity to shift mental set in patients with Alzheimer's disease and Subcortical Vascular Dementia

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BACKGROUND

In our companion poster Penney and colleagues report that digital Clock Drawing Test (dCDT) latency (seconds) prior to placing the first clock hand (PFH-L) and total clock drawing time (TCDT) differentiate AD from amnesic Mild Cognitive Impairment (aMCI) and Healthy Controls (HC). The current research examined these and other dCDT parameters with patients with Alzheimer's disease (AD) and subcortical vascular dementia (VaD).

SUBJECTS AND METHODS

Subjects: AD= 29, VaD= 33. Groups were equated for age (M= 80.50) education (M= 12.59), and performance on the MMSE (M= 22.93).

The Clock Drawing Test: Subjects were asked to draw the face of a clock, put in the numbers and set the time for 10 after 11. The copy condition immediately followed the command condition.

Digital Clock Drawing Elements

1.) Total Clock Drawing Time (TCDT)
2.) Hour Hand – total drawing time for that hand
3.) Minute Hand – total drawing time for that hand
4.) Digits – Total Time that the pen was in contact with paper to Draw All Digits

Digital Clock Drawing Inter-Components

5.) Pre-Clock Face Latency (PCF-L) – Latency before clock face was drawn.
6.) Pre-First Hand Latency (PFH-L) – Latency measured from the end of the stroke for whatever was drawn just before the first clock hand and the beginning of the first hand stroke
7.) Pre-Center Dot Latency – Latency before center dot was drawn

Table 1: Command Test Condition

Clock Variable	AD	VaD	p value
TCDT	49.06 (24.84)	71.63 (4.77)	p< .019
Hour Hand	2.23 (1.35)	3.59 (2.54)	p< .015
Minute Hand	2.60 (1.58)	3.23 (2.59)	ns
Digits	8.66 (3.81)	10.08 (4.16)	ns
PreCF-L	1.91 (1.23	3.10 (2.55)	p< .025
PreFH-L	3.99 (3.39)	6.69 (6.52)	p< .053
Pre-Center Dot -L	5.61 (6.99)	4.52 (6.68)	ns

Table 2: Copy Test Condition

Clock Variable	AD	VaD	p value
TCDT	38.78 (11.87)	48.69 (22.23)	p< .037
Hour Hand	2.04 (0.95)	2.86 (1.79)	p< .032
Minute Hand	2.23 (1.08)	3.03 (2.02)	p< .063
Digits	8.61 (3.50)	10.86 (4.70)	p< .040
PreCF-L	1.88 (1.03)	2.01 (1.19)	ns
PreFH-L	2.15 (1.80)	4.16 (4.70)	p< .035
Pre-Center Dot - L	1.25 (1.08)	3.98 (4.26)	p< .017

RESULTS

Command Between-Group Analysis (Table 1) – VaD patents required more time to draw the entire clock (p< .019) and the hour hand (p< .015). VaD patients also presented with longer pre-clock face latency (p< .025) and pre-first hand latency (p< .053).

Copy Between Group Analysis (Table 2) – VaD patients continue to require more time to draw the total clock (p< .037), hour hand (p< .032), and center dot (p< .017). Pre-First Hand Latency was longer for VaD patients (p< .032).

AD Within Group Analysis – After total clock drawing time was co-varied, AD patients demonstrated slower response latencies in the copy compared to command conditions for pre-first hand latency (p< .045), pre-center dot latency (p< .022), and post-center dot latency (p< .004).

VaD Within Group Analysis – After total clock drawing time was co-varied no command versus copy differences were noted.

CONCLUSIONS

Greater total clock drawing time and longer latencies to produce individual clock components for VaD patients suggests a general bradyphrenia in VaD. Longer between-group VaD latencies during transitions from one clock component to another suggest decision-making impairment related to the capacity to switch mental sets.

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