Working Harder But Producing Less: 
The Digital Clock Drawing Test (dCDT) 
Differentiates Amnestic Mild Cognitive Impairment And Alzheimer’s Disease


On behalf of the THink ClockSketch Consortium and the Consortium for Epidemiologic Neuropsychological Data Analysis (CENDA)

SUBJECTS AND METHODS

The digital Clock Drawing Test (dCDT) was administered to 106 Framingham Heart Study older healthy control participants (FHS-HC) and 60 aMCI and 79 AD from the THink ClockSketch Consortium. Groups differed in MMSE (FHS-HC=29.5±0.69; aMCI=27.2±1.2; AD=21.4±2.9; p=.001). All groups were well-educated, with reported education attainment of at least some college. Groups were compared on total clock drawing time (TCDT), time spent thinking (T-Think, i.e., not drawing), total time inking (T-Ink), total drawing production (measured by total ink length, L-Length), and clock size (Size).

RESULTS

As the table above indicates, TCDT differentiated AD (62.9±41.5 sec, p=.001) from FHS-HC (37.1±13.4 sec) and aMCI (41.7±24.0 sec). AD spent more time thinking (longer T-Think p=.001, 44.0±34.6 sec.; 66.3±10.9% than FHS-HC (22.2±9.8 sec.; 59.0±8.4%) and aMCI (26.5±21.0 sec.; 60.2±10.2%). Although AD T-Ink was also longer (p=.001, 18.9±10.1 sec) than FHS-HC (14.9±5.4 sec) and aMCI (15.2±5.8 sec), AD total L-Length was less than both groups (p=.001). Clock size as calculated by the square root of height times width differentiated all groups (p=.001, FHS-HC=80.6±18.3mm> aMCI=71.2±19.6mm= AD=57.7±23.0mm).

CONCLUSIONS

Patients with AD appear to work longer and harder, but produce less output (i.e., less ink and smaller clocks) when compared to cognitively intact participants. The level of effort necessary and amount of ink produced are useful for detecting and monitoring cognitive impairment, independent of drawing accuracy measured by standard clock scoring systems.