A Case Study of an Octogenarian identified with Dementia by Diagnostic Application of Projective Drawing Tests

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Abstract: Dementia is a serious form of cognitive impairment that is currently untreatable and can decline rapidly over time. Beginning with mild cognitive impairment, such as memory loss, poor judgment, difficulty in task performance, misplacement of things, disorientation, language problems and loss of initiative, the severity of cognitive loss becomes gradually more apparent. In fact, dementia impacts five key cognitive functions: attention, executive function, memory, language, and processing speed. In this case study of a female Singaporean octogenarian was suspected to suffer from dementia. The authors administered three projective drawing tests – i.e., the Human-Figure Drawing Test for Cognitive Impairment (HFD-CI), the Human-Figure Drawing Test for Dementia Screening (HFDT-DS), and the Clock Drawing Test (CDT) – and the Mini-Mental State Examination (MMSE) in their dementia identification procedure to make an immediate referral to a geriatric psychiatrist for the client's mental health follow-up.

Keywords: Cognitive Impairment, Dementia, Projective Drawing Test

1. Introduction

Dementia is defined by the World Health Organization (WHO, 2021) as "a syndrome – usually of a chronic or progressive nature – that leads to deterioration in cognitive function (i.e., the ability to process thought) beyond what might be expected from the usual consequences of biological ageing. It affects memory, thinking, orientation, comprehension, calculation, learning capacity, language, and judgement. Consciousness is not affected. The impairment in cognitive function is commonly accompanied, and occasionally preceded, by changes in mood, emotional control, behaviour, or motivation" (para. 1). According to the US Centers for Disease Control and Prevention (CDC), "[D]ementia is not a specific disease but is rather a general term for the impaired ability to remember, think, or make decisions that interferes with doing everyday activities" (CDC, 2019, para. 1). The most common type of dementia is Alzheimer's disease. Though dementia mostly affects older adults, it is not a part of normal aging.

Worldwide, according to the WHO (2021), "around 55 million people have dementia, with over 60% living in low- and middle-income countries" (para. 9). This number is expected to rise astronomically to 78 million in 2030 and 139 million by the year 2050 due to the fact that "the proportion of older people in the population is increasing in nearly every country" (WHO, 2021, para. 9). In the US alone, the CDC (2019) has estimated 5.0 million adults, aged 65 and above, suffer from dementia in 2014 and projected the prevalence to be almost 14 million by 2060.

In Singapore, where the authors are based, statistics and facts have indicated that "dementia affects 5.2% of the total population, aged 60 and above" (Home Instead, 2021, para. 6). Around 28,000 Singaporeans aged 60 and above experienced symptoms of dementia, with 45.5% of the cases being vascular dementia, according to the findings from the Well-being of the Singapore Elderly (WiSE) study conducted in 2011-2012 (cited in Fauziana et al., 2016; Ong et al., 2017; Subramaniam et al., 2016). Home Instead (2021) reported that the prevalence of Singaporeans with dementia is expected to increase to 80,000 by the year 2030.

According to WHO (2021), each demented individual is different from another and it depends on the underlying causes in addition to the person's health conditions and cognitive functioning before becoming demented. The WHO (2021) has listed the symptoms of dementia under three stages from the time of its onset (see Table 1 below).

Table 1. Three Developmental Stages of Dementia

Developmental Stage	Early Stage	Middle Stage	Late Stage
Observable Symptoms	✧ Becoming forgetful ✧ Losing the track of time ✧ Becoming lost in familiar places.	✧ Becoming forgetful of recent events & names of people ✧ Becoming confused even at home ✧ Having more communication problems with others ✧ Requiring assistance with personal care ✧ Experiencing behavioral changes (including wandering and repeated questioning	✧ Becoming less aware of the time & place ✧ Having more problems in recognizing familiar people (including relatives & friends) ✧ Requiring more assisted self-care ✧ Having more mobility problems ✧ Experiencing behavioral changes (including being easily frustrated that may escalate into aggression).

The prodromal symptoms eventually lead to the onset of dementia. The three stages of dementia as it progresses from mild to severe or profound can be briefly summarized as follows:

(1) The early stage of dementia, considered mild in terms of severity, is often overlooked because its onset is gradual.

(2) In the middle stage, dementia progresses to become more moderate in terms of severity as its symptoms become clearer.

(3) The late stage of dementia, being severe or even profound in in terms of severity, is one of near total dependence and inactivity. Memory disturbances have become more serious and its physical symptoms become more obvious.

The question of what the causes dementia are and the possibility of someone getting dementia is difficult to answer. There is no straightforward answer or explanation. While old age is the most common risk factor for dementia as well as Alzheimer's disease, it is not the only contributing factor. Other probable factors that contribute to dementia include obesity, diabetes, and high cholesterol. They can trigger the onset of dementia. Hence, living a healthy lifestyle is often promoted by allied health professionals as the best way to prevent, but cannot fully stop, dementia from occurring. For instance, senile dementia – caused by depression, poor nutrition, thyroid dysfunction, drug poisoning, and alcoholism – can often be remediated by treating the underlying problem. However, Alzheimer's disease and multi-infarct dementia are degenerative diseases without any effective treatment to stop them from worsening over time.

Other reasons for acquiring dementia include the following:

(1) Family History: When dementia runs in a family, a person may be vulnerable to it even if s/he lives a healthy lifestyle.

(2) Genetics: Studies (e.g., Filippi, Agosta, & Ferraro, 2016; Kim et al., 2018; Loy et al., 2014) have indicated two categories of genes, i.e., deterministic genes and risk genes, can determine if an individual would develop dementia. For example, Cuccaro et al. (2017) found Alzheimer's genes to be present in both

categories. However, Home Instead (2021) reported that "less than 1% of all Alzheimer's cases are due to deterministic genes" (para. 12).

(3) Other Risk Factors: In addition to the family history, hereditary conditions and age are also contributing factors to the onset of dementia. Recent studies (e.g., Guisado-Fernández et al., 2019; Howlett, Rutenberg, & Rockwood, 2021; Nagamatsu et al., 2014) have discovered interesting clues that can help to reduce the risk of acquiring dementia by embracing a healthy lifestyle and adopting better wellness choices.

2. Case Study

2.1 Brief Background of the Client

As dementia in its early stage is often overlooked because its subtle onset is gradual, many such cases of elderly with dementia are often missed out for early identification or referred for geriatric psychiatric follow-up. This paper aimed to inform community service workers (also known as special needs community practitioners), who are providing care services for elderly clients living in community homes, how they can identify the early onset of dementia in the elderly.

The current case study of an illiterate elderly female client with the initials GK[1] (with the permission granted by the client's primary caregiver) was under the professional care of the first author. The second author analyzed the data collected from the various assessments. The authors' focus was on the process of identifying dementia by administering three projective drawing tests – the Human-Figure Drawing Test for Cognitive Impairment (HFD-CI), the Human-Figure Drawing Test for Dementia Screening (HFDT-DS), and the Clock Drawing Test (CDT) – and the Mini-Mental State Examination (MMSE).

Briefly, GK has three sons, one daughter, three grandsons and five granddaughters. All her children except the youngest son are already married. Currently, GK is living with her youngest unmarried son, who is also her primary caregiver. Her husband passed away in 2009 due to coronary artery thrombosis pneumonia.

During the Covid-19 pandemic in last two years, GK's two younger brothers living in India also passed away. As she was unable to pay them her last respect due to travel restrictions, she was saddened by the loss and went into depression. Another loss happened in February 2022 when GK's close relative in Singapore passed on.

At the time of observation and assessment, GK was having difficulty in walking and relied heavily on her walking stick to move about at home. It was observed that GK was also unable to communicate clearly with her grandchildren, who were also unable to empathize with her current situation. Moreover, GK felt handicapped as she could not perform activities of daily living (e.g., cooking, operating the washing machine, and calling on her handphone) independently and so required assistance from her family members. As a result, she felt helpless, unmotivated and often generated negative outlook in life. She would sleep the entire day and/or prefer to stay in her bedroom alone. GK would easily become irritated when her immediate needs were not met.

Before the occurrence of the Covid-19 pandemic worldwide, GK would often look forward to going to a nearby seniors' activity center, where she participated in many activities as well as meeting her friends there. The center was closed for almost one-and-a-half year due to widespread of Covid-19 infection in Singapore. As a result, GK had since stopped attending the center. This also led her to a gradual withdrawal from others including her family members. She isolated herself in her bedroom and later went into depression.

GK's son living with her has noticed his elderly mother's frequent forgetfulness that affects her daily function including difficulty in performing familiar tasks, confusion of time and place, misplacing things, poor judgment, problem in communicating with her family members (especially with her grandsons), changes in her personality, mood and behavior, and withdrawal from social activities with the family. As a result, the two authors were consulted concerning GK's suspected condition of dementia.

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[1] GK is the initials of the client's name. Her full name has been kept anonymous to abide with the requirements of the Personal Data Protection Act 2014 in Singapore.

After discussion with GK's son, the authors decided on an assessment battery to determine if the elderly lady was demented. Below is a brief description of the assessment battery under two categories: (1) three projective drawing tests and (2) a neuropsychological test.

2.2 Projective Drawing Tests

Two key projective drawing tests were selected for administration. The first one involves a combination of two Human-Figure Drawing (HFD) tests, i.e., the Human-Figure Drawing for Dementia Screening (HFD-DS; Wang et al., 1998) and Human-Figure Drawing for Screening Cognitive Impairment (HFD-CI; Ericsson et al., 1996). The seconds one is the Clock Drawing Test (CDT; Freund et al., 2005; Shulman, Shedletsky, & Silver, 1986). The results of these projective drawing tests were triangulated to confirm if GK indeed suffered from dementia. These findings were then used to complement with the results obtained from the administration of a neuropsychological test – Mini-Mental State Examination (MMSE; Arevalo-Rodriguez et al., 2015).

Below is a brief description for each of the projective drawing tests:

a) HFD-CI: This free-hand projective drawing measure was administered "to differentiate between demented and non-demented people as well as between dementia of different severity" (Ericsson et al., 1996, p. 105) by checking for omission of HFD parts that "can indicate the beginning of cognitive deterioration" (Ericsson et al., 1996, p. 105; also see Larkin, 1960).

b) HFD-DS: This other free-hand projective drawing measure was administered to assess an individual's intelligence and cognitive maturation (Wang et al., 1998). It can provide useful information about cognitive function "as it requires visuo-spatial and constructional skills, spatial orientation, attention/concentration, and accurate perception of the visual stimuli, accompanied by intact motor functioning (Moore & Wkye, 1984)" (cited in Wang et al., 1998, p. 26). The rationale for administering this test is twofold: firstly, it is to identify constructional apraxia commonly observed in people with dementia in its early onset (Villa et al., 1986); and secondly, to detect any impairment in visuo-spatial skills often seen in elderly with Alzheimer's disease (Ainslie & Murden, 1993).

c) CDT: This projective drawing test was administered as a quick screener for cognitive dysfunction secondary to dementia, delirium, or a range of neurological and psychiatric illnesses. It can also be effectively administered to resistant and non-compliant elderly (Freund et al., 2005).

2.3 Neuropsychological Test

Mini-Mental State Examination (MMSE; Arevalo-Rodriguez et al., 2015), also known as the Folstein test, is a 30-point questionnaire that has been applied extensively in clinical and research settings to measure cognitive impairment or screen for dementia. It is the only neuropsychological test chosen for administration with the client in this case study. Its results were used to complement with the findings from the three projective drawing tests to provide information on GK's cognitive status, and, more importantly, "to increase the screening capacity" (Wang et al., 1998, p. 26).

3. Discussion of Results

Figures 1 shows the size of the human figure (HF) drawn by GK on a sheet of A4 paper for both the HFD-CI and HFD-DS administration.

Figure 2 is an enlargement of the HF measured from the center of the paper as indicated by the two blue bold arrows.

Results from the HFD-DS administration showed the absence of arms, legs, eyes, nose, ears and mouth being indicative of the beginning stage of cognitive deterioration as confirmed by Wang et al. (1996) in their study. According to Buck (1948), absence of essential details in the HFD indicates an intellectual deterioration. Wang et al. (1996) found that in scoring the seven essential body features (i.e., head, body, arms, legs, eyes, mouth and nose), mildly and moderately demented scored 4/7 while severely demented scored 2/7, but urged that "the HFD Test

cannot replace Mini-Mental State Examination (MMSE) in routine population screening when MMSE and HFD-DS were combined, the sensitivity of detecting dementia increased by approximately 4.2% according to the Receiver Operator Characteristic curve at the optimal cut-off point, with the specificity remaining unchanged" (Wang et al., 1996, p. 32).

Results from the HFD-CI administration are shown in two parts:

(1) Hierarchical levels (see Table 1); and

(2) Centeredness & Position (see Table 2).
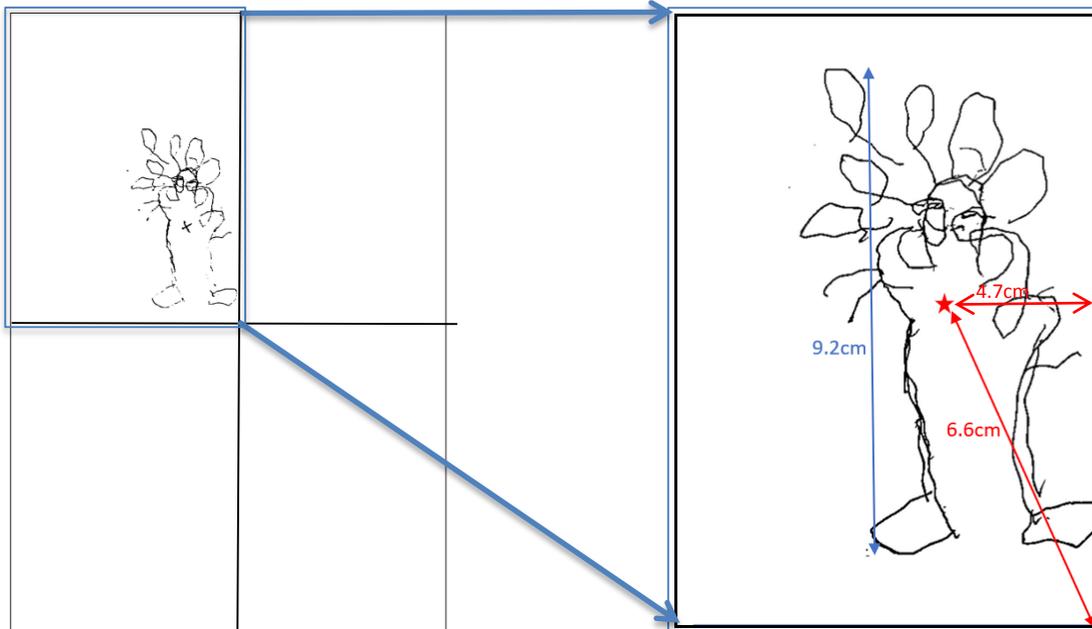
Figure 1. GK's HFD on A4 Sheet   Figure 2. Enlargement of GK's HFD

Table 1. HFD-CI Results: Hierarchical Levels

Scoring Scheme	Scores	Details
Height	9.2cm	Mean score: 9.3cm (SD=5.7) for age group 80-84 years old
Correct Propositions	3	Legs, feet, eyes
Two Dimensionality	2	Legs, feet
Stick Figure	3	Head, eyes, legs
Headfooter	3	Head, eyes, legs

Scoring scheme for Hierarchical Levels in HFD-CI is provided as follows:

(1) Correct proportions: ≥2 of the details (arms, legs, trunk, feet, eyes)

(2) Two dimensionalities: ≥2 of the details (arms, legs, trunk, feet)

(3) Stick figure: ≥4/7 essential details (head, eyes, mouth, nose, arms, legs, trunk)

(4) Headfooter: 3/7 essential details (head, eyes, mouth, nose, arms, legs, trunk)

In terms of response for drawing of essential body details by dementia status, GK scored 3/7 (i.e., head, eyes and legs). The decreasing number of essential details (including omission of two arms) are often seen in HF done by demented elderly drawers in the HFD-CI administration (Ericsson et al., 1996).

In addition, the height of HF drawn decreased significantly with the progression of dementia, from 10.9cm in non-demented individuals to 7.0cm in severely demented individuals (Ericsson et al., 1996). For the demented elderly, the degree of severity ranging from mild through moderate to severe): a stick figure drawn with mean height at 8.0cm (SD=4.7) for mild; 7.0cm (SD=.6 and 4.5 respectively) for moderate & severe; 7.4cm (SD=4.2) for Alzheimer's disease; and 7.8cm (SD=4.9) for vascular dementia. For centeredness of the HF drawn, the mean distances are 2.6cm (SD=1.7) for mild, 3.4cm (SD=1.9) for moderate, 4.2cm (SD=3.0) for severe, and 2.6cm (SD=2.0 and 1.7 respectively) for Alzheimer's disease and vascular dementia, respectively, and the HF position for mild occupied at upper centered, while the HF positions for the others occupied at upper left-hand side (Ericsson et al., 1996).

According to Ericsson et al. (1996), the HFs drawn in 2-dimension by elderly aged 90 and over were either classified as stick figures or as "headfooters" with height of 7.5cm (SD=4.7) and centeredness at 2.4cm (SD=1.8) in the approximate centered/upper left position" (see Ericsson et al., 1996, p. 108, for detail). In GK's case, the 2-dimensionality of HF (see Figure 2) was 9.2cm with 0.1cm less than the mean score of 9.3cm for the HF height, and the centeredness was 6.6cm way above the mean score of 1.9cm for people in the age group of 80-84 years old, at the approximate centered position.

Table 2. HFD-CI Results: (b) Centeredness & Position

Scoring Scheme	Scores	Details
Centeredness	6.6cm	Mean score: 1.9cm (SD=1.6) for age group 80-84 years old. Distance from the center of the human figure to the center of the upper left quadrant: 3.1cm
Position	--	Upper left

Scoring scheme for Centeredness & Position in HFD-CI is as follows:

(1) Centeredness: The distance in cm from the center of the paper to the center of the figure.

(2) Position: It refers to the placement of the human figure from the approximate centered point within a quadrant: (a) Upper left quadrant; (b) Upper right quadrant; (c) Lower left quadrant; and (d) Lower right quadrant.

The centeredness increased with the HF drawn approximately centered, or centered in the upper part in the non-demented individuals to HF placed at the center in the upper part of the A4 sheet, mostly in the upper left-hand corner by those with dementia (Ericsson et al., 1996). Mildly demented people use the center but upper part of the A4 paper. Moderately and severely demented people use the upper left-hand corner. "This position (upper left hand of the paper) is characteristic for subjects who are markedly anxious or regressed and indicates a tendency to keep away from new experiences and a desire to return to the past seeking for emotional satisfaction (Buck, 1948)" (cited in Ericsson et al., 1998, p.108).

The mean score for centeredness is 1.9cm (SD=1.6) for the subjects aged 80-84 years old in Ericsson et al.'s (1996) study. GK's score for centeredness was 6.6cm – 4.7cm above the mean score of 1.9cm – in the upper left quadrant – indicative of having dementia.

Results from the CDT administration showed that GK's mental decline was a clear sign of dementia. She had problems reading the time on a clock which requires her to interpret the placement of the clock hands and the time they represent. This ability is often lost in people with early dementia (see Budson & Solomon, 2017, for detail).

According to the CDT interpretation and scoring scheme, the normal score is ≥4 points. At the time of the CDT administration, GK complained that "it was demanding for her to draw the clock." Figure 3 shows the clock drawn by GK. An oval-shaped clock was drawn with numbers 1 2 1 2 1 6 (without the correct time given or the numbers put in the correct spatial position) and followed by two more indecipherable symbols (one is somewhat like a reversal 4 and the other a O with a tail sticking out at the top). The absence of the two clock-

hands was noticeably obvious. GK only scored 1/5 which obviously fell short of the required ≥4. The CDT results provided a strong indication that GK manifested severe cognitive impairment and also the prodromal symptoms typical of dementia.
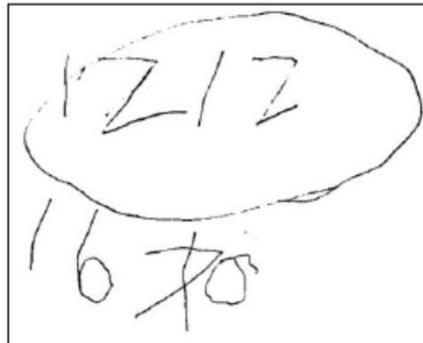
Figure 3. GK's CDT

Finally, Table 3 below shows GK's score of 15/30 on the MMSE administration that put her in the category of severe cognitive impairment.

Table 3. MMSE Results

	GK's Score	Score Range	Interpretation
Scores:	15/30	0-17	Severe Cognitive Impairment

According to Palsetia et al. (2018), the CDT can detect early dementia even when results from MMSE and other related tests are normal.

4. Conclusion

The current screening procedure for memory or cognitive functions is not always an accurate diagnosis of dementia. Many elderly adults still remain under-assessed or under-diagnosed for dementia as well as other psychiatric and neurological conditions (Pachana, 2016).

The results in the present case study suggest that applying the two key projective drawings - the HFD test that is a combination of HFD-CI and HFD-DS, and the CDT - to the MMSE in the diagnostic administration has increased the screening capacity (Ericsson et al., 1996; Wang et al., 1998) in identifying elderly for dementia. In other words, when the projective drawing test results were triangulated and complemented with the MMSE results, the authors noted an increased sensitivity in dementia identification as in the case of GK, who was later referred to a public psychiatric hospital where a psychiatrist confirmed her condition in a subsequent follow-up session.

The authors suggest more research involving a bigger sample size of participating subjects is needed, before the application of the HFD-CI and HFD-DS as a combined HFD test, the CDT and the MMSE can be recommended as a quick dementia screening procedure in order that early treatment for the demented can be promptly facilitated.

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Informed Consent Written consent was obtained from the participant.

Conflict of Interest: The Authors have no conflicts of interest to declare that they are relevant to the content of this article.

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