

GRAPHIC SKILLS AS A DIAGNOSTIC TOOL FOR WORKING WITH THE ELDERLY

ABSTRACT

Graphic skills may reveal a dementia process in progress. The observations are based upon about 1,500 aged subjects (>75), half of them with cognitive deficiency and the other without, residing in central Stockholm. The intention of this study was to develop a simple, non-verbal screening method for subjects with social and/or cognitive disorders. Graphic competence was compared with cognitive capacity. Geometric copying, handwriting and freehand figure-drawing capacities were shown to drop in a prescribed order with decreasing cognitive functioning. Copying a three-dimensional cube was the most sensitive to cognitive derangements, and signature writing the least sensitive. These two tasks represent the extremes of a scale which also included performance on other copying tasks including handwriting ability and freehand figurative drawing. As a whole, the proposed graphic test technique seems less sensitive to cultural and educational factors, including verbal factors, than ordinary measurements of mental functioning.





The child develops its drawing and writing capacity during the first twelve years of its life (1). From the study of a number of drawings produced by elderly people in institutions, that corresponded to those made by children aged four to twelve, the question arises, "Does everybody regress in the capacity to draw a figure as a product of getting older—or is it a function of a degenerative process in the brain? A review of the literature shows that very few studies have been done on the progression of freehand figure drawing (FFD) in the aged as related to cognitive functioning level.

After having studied 1,500 drawings from elderly people, 75 years or older, we can say that the drawing level reached during childhood probably stays the same through most of life—that is to say, normal aging does not increase graphic capability. It is possible that a long period of institutionalization in a less stimulating environment can influence the capacity to produce graphics, but this is not yet shown. However, when there is a degenerative process in the brain, as in senile dementia (SD), drawing capacity seems to regress in about the same time period (ten to fifteen years) as the original drawing development during childhood.

BACKGROUND ON DEMENTIA

Senile dementia (2) is a cortical and subcortical lesion in the brain characterized by the presence of amnesia (memory loss), aphasia (language impairment) and apraxia (inability to carry out motor activities despite intact comprehension and motor function). Even if non-verbal information is involved later (3) in the dementia process than verbal, it should be included in the early stages of study of the dementia syndrome even though it may have an unclear diagnostic profile. Furthermore, there are certain connections between aphasia, apraxia and agraphia (loss of the ability to write a spontaneous, legible sentence).

APHASIA AND APRAXIA

Aphasia is often observed before proper apraxia is developed (4) although apraxia can also be seen in patients with good language function (5). Apraxia is often observed (70-80 percent) in senile

dementia (6). The apraxia in dementia (i.e., disturbances of represented space) progresses in an order which is the reverse of the normal acquisition of praxic functions during childhood (7). First to be involved is constructional apraxia, (i.e., copying a three-dimensional figure), which has been shown to be associated with the presence of focal organic cerebral lesions (8,9). Dementia regression subsequently involves ideomotor apraxia (movement performance on verbal command) and ideational apraxia (serial actions requiring the use of several objects to achieve an intended goal 5).

AGRAPHIA AND DEMENTIA

Agraphia is a common feature in Alzheimer dementia (10) and is related to the severity of the dementia (11). By means of a test of spontaneous writing, diagnosis of apraxia and aphasia (as detected by agraphia), could, in principle, gain from including tests of copying and freehand figure drawing (FFD) abilities. These tests might also reveal a reduction in copying ability in normal old age. Nondisturbed aged people do sometimes show difficulties on tests of immediate reproduction of line drawings and of space representation (12). In these normal aged subjects, however, perspective remains unchanged(7). Moreover, FFD is sensitive to changes in personality-connected cerebral lesions (13). Thus, to employ graphic tests with their diagnostic potential for aphasia, apraxia and personality changes would be in line with the diagnosis of dementia according to the *Diagnostic and Statistical Manual of the American Psychiatric Association* (14). Graphic incapability may indeed indicate a dementia in progress.

FACILITY IN FREEHAND FIGURE DRAWING (FFD)

The nine primary details drawn (arms and legs in two dimensions; clothes; shoulders; good body proportions; hair; movement, i.e., arm joints; glance, i.e., pupil directed; general coordination) disappear in a fixed order with decreasing cognitive functioning. It is noteworthy that the order of the loss of these details is the inverse of the order observed during the development of the child (1). For example, in FFD only non-figurative





drawings (i.e., circle and scribble) are observed in people who score below ten out of thirty on the Mini-Mental State Examination (MMSE [15]). This cutoff point of ten often represents the necessity of institutional care, when these patients cannot any longer function or be grouped with others, which is a requirement for a day care center. However they can still live in a group facility for the demented, where there are staff present all the time.

The decrease in higher cortical functions is first observed in the copying of complex geometric figures and in the writing of a spontaneous sentence. Moreover, our studies show that, to some extent, the different tasks of copying geometrical figures, of writing sentences, of FFD and of writing a signature are interchangeable as tests for cognitive functioning. This may be useful where a person who does not want to cooperate in producing an FFD may, instead, be interested in completing the sentence writing tasks and the geometrical copying tasks. Thus, we are able to evaluate the state of cognitive functioning from a subset of these parameters. However, on the whole, one will obtain more complete information concerning a person's cognitive functioning when all these graphic measures are combined (16,17). See figures 1-4.

There are significant correlations between cognitive dysfunction and dependent living needs. Sweden has about 8.3 million inhabitants, and 1.45 million (17.4 percent of the population in 1985) were ages 65 years or older (18). More than 20 percent of this group needed care, with institutional care being necessary for 7.3 percent and home help care for 13.5 percent. This study supports Adolfsson, who reported that 10.3 percent of the population age 65 and older was institutionalized in Northern Sweden (19).

Dementia requires adequate functional maintenance and information that facilitates support from family (and community), even in an early stage. These fortify the contact between caring relative and the patient, and also support a prolonged period of an acceptable perception of reality in the patient. Thus, the con-

tributions aim to facilitate home care. It has been observed (20) that older couples can maintain considerable independence by caring for one another, by developing closer relationships with kin or friends (21,22,23). This minimizes premature institutionalization (24). The feeling of being in control or of not having anything to say over what happens in one's life has far-reaching consequences for both physical and mental health (25,26).

There might be different characteristics observed in elderly subjects who are involved in the institutionalization process, such as forgetfulness and confusion (27), and dependency in activities of daily living (28,29,30). If identification of subjects in need of institutionalization can be made in the earlier stages of organic cerebral diseases, it would make proper planning of future housing needs possible. Cognitive dysfunction with constructional and visual-spatial disabilities can be measured from FFD, copying of geometrical figures, and sentence and signature writing (31, 9, 32, 33, 13, 34). Those subjects living independently in the community made drawings of a considerably greater representative ability (i.e., more body details) than their neighbors who were living collectively. In institutions, there were only about one-fifth who were capable of presenting a figurative drawing, and one-in-ten made a non-figurative drawing or scribble (35).

It has been stressed (36) that living arrangements, especially the presence of a family caring unit, is a critical factor in predicting placement of chronically ill/disabled elderly. Understimulation is frequently encountered by the elderly, particularly in those staying in an institution because of dementia. One way to ameliorate understimulation is to stimulate and initiate active participation in different activities. A central component in the activation program is to stimulate social interaction with other people.

But at the same time, we must be careful not to induce what has been labeled "learned helplessness" and thus be at risk of hastening, through a series of events known as "the social breakdown syndrome," the elderly becoming institutionalized



(37). By using the patient group as a resource, we can change the staff's attitude towards the patient, including introducing a belief that the patient is willing and capable of doing more than he believes. The staff can also learn not to redo the mistakes, to "take over" the responsibility for the patient's life, resulting in "learned helplessness" (38).

In summary, the FFD is non-verbal, inexpensive, a simple and quite rapid method of screening for cognitive dysfunction in old age. This method might be used by most categories of professionals in medical care. There may be an advantage when the patient does not consider the drawing tasks as a test situation but as part of a rehabilitation activity; this could provide better results. For demented subjects, non-verbal tasks like FFD may be more pertinent for calculating the mental functioning of subjects without major somatic handicaps. Tests of drawing ability require accurate perception of the visual stimuli, accompanied by intact motor functioning. This might be a disability for the screening of cognitive dysfunctioning in subcortical and vascular dementia processes with motor or sensory complications.

TABLE 1 RELATION OF SCORES TO HOUSING TYPES

Participation	Independent Housing		Dependent Housing
	In community (n=515)	In collectivity (n=48)	In institution (n=157)
<i>Mental status</i>			
MMSE, scores/30	25	21	9
<i>Free-hand figure drawing</i>			
Figurative drawing, %	74	52	18
Non-figurative drawing, %	1	2	11
Incapability, %	3	6	50
Non-cooperation, %	22	40	21

Figure 1 Score analysis for graphic functioning in the elderly







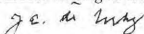
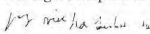
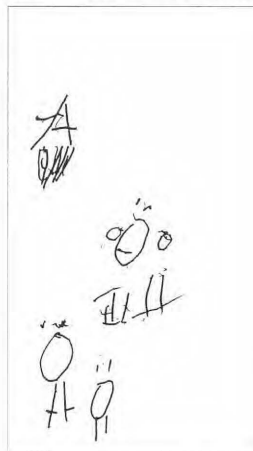
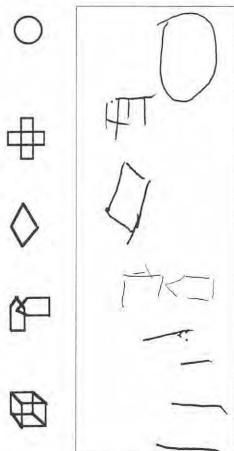
<p>Elements in writing a signature</p> <p>5 pts Fluent style 4 pts Missing fluent style 3 pts Deformed letters 2 pts Repetition or change of letters 1 pt Scribble 0 pt Non-cooperation</p> <p>Elements in writing a complete sentence</p> <p>5 pts Correct (verb, subject and makes sense) 4 pts Missing the sense 3 pts Missing the verb or subject 2 pts Write a single word or letter 1 pt Scribble 0 pt Non-cooperation</p> <p>Elements in writing a sentence at dictation</p> <p>5 pts Correct (with no faults) 4 pts Missing preposition 3 pts Missing verb or noun 2 pts Missing 3 or 4 words 1 pt Scribble 0 pt Incapable of writing or non-cooperation</p> <p>Copying geometric figure</p> <p>maximum score is 15</p> <p>1 pt  4pts  2 pts  5pts  3 pts </p>	<p>Caring form</p> <p>Day care center Geriatric ward Dementia unit Nursing home</p> <p>Mini-Mental State Examination (MMSE)</p> <p>maximum score is 30</p> <p>Free-hand figure drawing scores</p> <p>maximum score is 15</p> <p>15 pts Glance 14 pts Movement 13 pts General coordination 12 pts Pupil 11 pts Hair 10 pts Shoulders 9 pts Correct body proportion 8 pts Lower extremities two-dimensions 7 pts Higher extremities two-dimensions 6 pts Clothing 5 pts Stickfigure 4 pts Head/footer 3 pts Circle 2 pts Write a word or letter 1 pt Scribble 0 pt Non-cooperation</p>
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Figure 2-4 Examples of graphic functioning demonstrations by the elderly

Sex Female	Age 86	Housing form Dependent
Signature writing /5 5		Caring Form Geriatric ward
		MMSE scores /30 23
Sentence writing at dictation /5 5		Writing a complete sentence /5 5
		
Copying geometric figures scores /15 4		Free-hand figure drawing scores /15 4





Sex *Female* Age *89*
 Signature writing /5 *4* *signad*
 Sentence writing at dictation /5 *5*
Ja är förtig

Housing form *Dependent institution*
 Caring Form *Dementia unit*
 MMSE scores /30 *9*
 Writing a complete sentence /5 *2*
gåvara om älskling

Copying geometric figures scores /15 *1*

Free-hand figure drawing scores /15 *4*

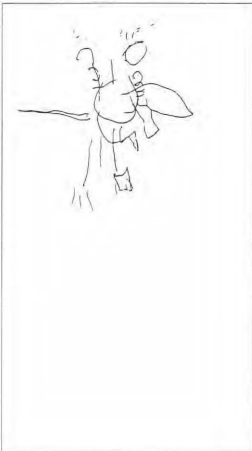
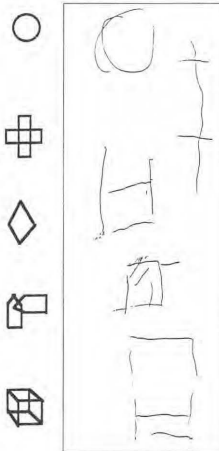


Figure 3

Sex *Male* Age *91*
 Signature writing /5 *5*
Levande
 Sentence writing at dictation /5 *5*
Ja är förtig.

Housing form *Independent community*
 Caring Form *-*
 MMSE scores /30 *30*
 Writing a complete sentence /5 *5*
*Ja antar inte vad ni menar
 då förmodligen kommer jag
 bli barmhärtigt behandlad*
 Free-hand figure drawing scores /15

Copying geometric figures scores /15

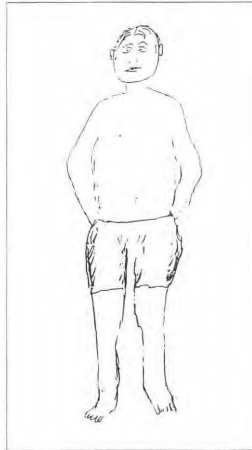
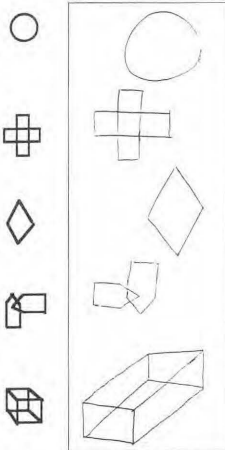


Figure 4

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Jan chooses not to use the computer but her hands instead. because she says it is directly connected to her eyes and to her heart. as the information needs to be delineated she scribes accordingly. when emphasis is needed upper case letters are created. feeling centered her hand produces all lowercase letter forms. when writing a love note chancery italic flows from her pen. and deep in thought and questioning she reverts to abstracts symbol markings. during lectures, music concerts, poetry readings and at faculty meetings she takes typographic notes. these textural texts are translated into textile designs. intrigued by early writing systems; Jan is inspired by Klee Schwitters and Sonia Delaunay and encouraged by Gurtler, Müller, Blazer, Ripson and Ockerse. University of California at Santa Cruz captured her creative spirit for an undergraduate venture and Yale University made her a master in graphic design. papermaking. textiles. book arts. alphabets and India are some of Jan's passions. she is presently an enthusiastic associate professor in graphic design at the Rhode Island School of Design.

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Jan Baker, cover, endsheets, pp. 136 & 227

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COLOPHON

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