BRIEF OR NEW

The Effectiveness of an Electronic Memory Aid for a Memory-Impaired Adult of Normal Intelligence

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Memory disorder is a frequent consequence of acquired brain damage. Usually part of a constellation of deficits, memory impairment may in rare cases occur in persons with normal or near-normal IQ and ability to initiate behavior. This clinical picture may occur following acute infections, arteriovenous malformations, or more infrequently, traumatic brain injury. Despite areas of preserved ability, functional deficits resulting from memory disturbance may be severe (Gianutsos & Grynbaum, 1983) and may necessitate techniques that increase functional independence. This paper describes the use of an electronic memory aid with a memory-impaired patient of normal intelligence.

Glisky, Schacter, and Tulving (1986) investigated the ability of people with memory impairment of varying severity to operate and interact with a microcomputer. Results demonstrated that patients could learn to perform basic computer functions, but indicated that the learning may be highly specific. Harris (1984) has reviewed electronic equipment used to assist people with memory impairment in day-to-day living. To be effective, an electronic memory aid should be (a) readily portable, (b) easy to learn and operate, (c) interactive (i.e., have a programmable alarm), (d) powerful enough to perform the required functions, and (e) attractive (so that the patient will use it). Unfortunately, few devices meet these criteria (Harris).

Recently, we have been experimenting with the Psion (pronounced “sigh-on”) Organiser, a microcomputer that retails for approximately $150 (see Figure 1). The standard version described here weighs 225 g (8 oz) and has 16K of random access memory (RAM) and 32K of read-only memory (ROM). The whole system is expandable to 128K with additional reasonably priced data packs. The Organiser is small enough to fit into an inside jacket pocket or a handbag, but it has a keyboard large enough for easy data entry. The Organiser has an easy-to-read two-line display. If an entry exceeds the screen's capacity, it will be scrolled by continuously. Menu-driven functions include time, which displays time, date, and day; calculator, which unlike most calculators displays the computation as well as the answer so that errors can be eliminated; diary, which allows separate entries to be made for each half hour on any date, even years ahead; and alarm, which can be set to sound independently, with a diary entry, or at varying times prior to a diary entry. In addition, memo pad allows the storage of a wide range of miscellaneous information (e.g., addresses, telephone numbers, and birthdays). Information is accessed by the find command, which will compare any string of letters entered to the content of all records. For example, if a person cannot recall the last name of his friend Harry, he can just...
normal household activities at specific times when at home over the weekend. The activities were similar but varied, as were their times of execution, to limit a practice effect. All activities were related to L.C.'s daily life and were decided on with her help prior to initial testing. Activities included watering the plants, feeding the cats, and taking out the trash. Instruction in the tasks was given on Friday, and results were collected on Monday. Baseline information was gathered on two occasions, and two experimental conditions were employed so that an ABAC experimental design was used (Kazdin, 1982). L.C. was asked to record in a separate book if and when the task was performed. The first baseline (A) was followed 2 weeks later by the first experimental condition (B) (the pocket diary). One month later, the second baseline (A) was recorded, followed 1 month later by the second experimental condition (C) (the Psion Organiser). The baselines and experimental conditions were widely separated to minimize practice effects and to allow a comparable period between all conditions. During the recording of both baselines, L.C. was prevented from recording the instructions in any way. In the first experimental condition, L.C. used the pocket diary, which she had been using for 2 months. Immediately following the second baseline, training with the Psion Organiser was begun. After 4 hours of individual therapy, L.C. used the manual and practiced with the Organiser for an additional 6 hours (with help from relatives). After 1 month, she felt comfortable with the machine and used it consistently. The second experimental condition, during which the Organiser was used, was then carried out.

Results

During the baseline conditions, in which no recording of instructions was permitted, L.C. neither performed nor recorded assigned activities. She reported that she had forgotten about the instructions until reminded on Monday. The first experimental condition

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Wechsler Adult Intelligence Scale</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>107</td>
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<tr>
<td>Performance</td>
<td>84</td>
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<tr>
<td>Full Scale</td>
<td>97</td>
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<tr>
<td>Wechsler Memory Scale: Logical Memory</td>
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<tr>
<td>Immediate</td>
<td>13</td>
</tr>
<tr>
<td>Delayed</td>
<td>7</td>
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<tr>
<td>Wechsler Memory Scale: Visual Reproduction</td>
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<tr>
<td>Delayed</td>
<td>1</td>
</tr>
<tr>
<td>Reitan Trail-Making Test</td>
<td></td>
</tr>
<tr>
<td>Part A</td>
<td>1 min, 16 sec</td>
</tr>
<tr>
<td>Part B</td>
<td>2 min, 27 sec</td>
</tr>
</tbody>
</table>

Subject

L.C., a 25-year-old woman, experienced a massive subarachnoid hemorrhage with bleeding into the ventricles. She underwent several surgical procedures over a period of 4 months; her medical recovery from the procedures was uneventful. L.C. was admitted to the Transitional Living Center 18 months after the final surgery. She had a significant memory disorder in functional settings, which resulted in behavior such as missing or mistaking the time of appointments. L.C.'s neuropsychological test results are given in Table 1. L.C. retained average intelligence and was interested in and enthusiastic about learning to use the Organiser.

Method

On admission to the Transitional Living Center, L.C. was taught to use a pocket diary, in which each day was divided into half-hour periods. L.C. carried the diary with her at all times. To provide quantifiable data about function, L.C. was asked to perform 10

Figure 1. The Psion Organiser. The outer section slides up to cover the keyboard but leaves the screen visible.

enter the first name, and all the Harrys in memo pad will be displayed. The appropriate Harry can then be selected.

Table 1
Neuropsychological Test Results Indicating Moderate Memory Impairment
(the pocket diary) resulted in the performance of 8 out of 10 items, 6 of them on time or within a half hour of the scheduled time. In the second experimental condition (the Psion Organiser), 9 out of 10 activities were performed, all within the half-hour time period. Three months after testing, L.C. continued to use the Organiser and stated that she preferred it to the diary. She was observed to use the Organiser effectively in daily life.

Discussion

L.C.'s improved performance with the Psion Organiser over the diary may be accounted for by the alarm function, which she uses regularly. This supposition is supported by the reduced number of timing errors L.C. made when using the Organiser. L.C. was in many ways an ideal candidate for training on this type of equipment. She was aware of her deficits, her memory disorder produced functional impairments, but her IQ was in the normal range and she had only mild difficulties in initiating behavior. It is unlikely that improvement over the course of the study resulted from spontaneous recovery, because it had been 18 months since she was injured. The nature of the study and the widely separated baselines with identical results also argue against this explanation. Since this work was carried out, we have had comparable results with another patient with similar deficits. However, workers in another center have failed to develop functional use of the Organiser in a client who has a more profound memory impairment but who is similar to L.C. in other criteria (J. Clark-Wilson, personal communication, 1988).

The Psion Organiser is a considerable advance over earlier memory aids, which were reviewed by Harris (1984), and it may be helpful to other memory-impaired patients. Our only major criticism of the device is that the alarm is not adjustable and is difficult to hear in a noisy environment. To determine the usefulness of an electronic memory aid for a client, we suggest consideration of the following criteria:

1. Average or near-average intelligence
2. Retained or mildly impaired reasoning skills
3. Insight into deficits
4. Adequate ability to initiate behavior
5. Functional disorder resulting from significant memory impairment

Patients with profound memory impairments may find it easier to use a diary because it relies on previously acquired knowledge and does not demand a significant amount of new learning to make entries. In these cases, a behavioral approach will be necessary to train clients to refer to a diary regularly enough for it to be of functional use (Giles & Clark-Wilson, 1988).

Acknowledgments

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References