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Journal

Clinical Gerontologist, 13(4)

ISSN

0731-7115

Author

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Publication Date

1993-12-22

DOI

10.1300/j018v13n04_03

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Memory Rehabilitation in Alzheimer's Disease: Preliminary Findings

Curt A. Sandman, PhD

ABSTRACT. Until the cause of Alzheimer's disease (AD) is discovered, programs designed to extend functioning are critical to confront the projected increase in cases and the escalating cost of patient management. A program of rehabilitation designed to improve memory was developed that focussed on effortful and involuntary processes of memory and amplification of attention. Eleven patients with probable AD and their spouses enrolled in a four week course to improve their ability to recall names and faces, and recent events. Rehearsal and stimulation of "deep" processing significantly improved the ability of AD patients to recall name-face relationships. Recall of television content was significantly improved with procedures requiring patients to expend effort while they watched. A significant event technique that provoked "emotional" memories and produced "flashbulb" memories was the most effective procedure. Patients had nearly perfect recall for events during days of significant events. Generally the most effective techniques for improving memory involved manipulation of the environment and de-emphasized memorization as a goal.

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Supported by grants AG03975-04 and AG00096 from National Institute on Aging.

This work was presented in part at the 1989 American Geriatric Association conference.

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Clinical Gerontologist, Vol. 13(4) 1993

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Forgetting names, words and becoming lost often are the first symptoms of Alheimers Disease (AD) noticed by patients and caregivers (Howard & Patterson, 1989; Nebes, Martin & Horn, 1984) and may precede other symptoms and even sophisticated signs from scanning procedures by as many as three years (Cutler, Heston et al., 1985). Although there are a number of cognitive and memory rehabilitation techniques (Seron & Deloche, 1989), generally they are not effective in patients with reduced mental and physical stamina (van der Linden & van der Kaa, 1989). Most of the methods of cognitive rehabilitation focus on retraining of language/memory function and are designed for patients with head trauma (Berrol, 1990; van der Linden & van der Kaa, 1989; Wilson, 1987) or for healthy volunteers (Cermak, 1975; Lorayne, 1974; Minninger, 1984) including aged individuals (Poon et al., 1980; Poon, Fozard & Treat 1978; Smith, 1980, Zarit, 1981). These strategies encourage semantic or phonemic association to assist in the manipulation and organization of material. They have not been successful with AD patients, probably because the foundation of these procedures (the ability to make associations) is vulnerable in these patients (Craik & Watkins, 1973; Miller, 1975; Morris & Kopelman, 1986; Rabinowitz, 1984).

Two common association strategies are the peg and loci methods. Both of these procedures require that the patient establish an association between information to be memorized and visualized cues such as a prelearned list of objects or a location. These procedures may be effective if (a) patients *can* use visualization and (b) if patients *will* use visualization. Some patients with deficits are able to visualize (Baddeley & Warrington, 1973; Craik & Watkins, 1973; Howes 1983; Kovner & Pass, 1985; Moffat, 1984; Robertson-Tchabo, Hausman & Arenbert, 1976; Wilson, 1987) but do not use these procedures when left on their own or with complex material (Howes, 1983; Hulicka & Grossman, 1967; Kovner & Pass, 1985; Moffat, 1984; Robertson-Tchabo, Hausman & Arenberg, 1976; Wilson, 1987).

Although very little formal data exist, AD patients do not benefit from visual imagery. For instance, Patten (1972) reported that among the three patients who did not benefit from the peg method was the single patient in the group with AD. Grafman (1984) reported that 19 of 42 patients from a variety of etiological groups (including AD) improved with their intricate imagery procedures. However, most of the patients showing improvement were below age 40. Brinkman et al. (1984) examined the synergistic effects of visual imagery and Lecithin on memory in 10 patients with AD, and found no effects of either treatment.

These approaches offer promise for the repair of memory, however, there are very few studies, perhaps none, including drug studies (Brink-

man et al., 1982; Goodnick & Gerson, 1984; Peabody et al., 1985; Penn et al., 1988; Reding & DiPonte, 1984) that have reported significant improvement in memory of AD patients. Many of these procedures require extensive cognitive resources (Schacter, Rich & Stamp, 1985) and are not effective in patients depleted of intellectual and emotional reserve. Further, expectations often predict success or failure (Perlmutter et al., 1987) and many AD patients may expect, and thereby ensure, progressive decline. The procedures described below were developed from clinical experience with memory complaints in AD patients and were designed to "amplify" attention and mobilize "involuntary" memory (Hirst, 1988) by focusing on action rather than intention.

METHODS

Subject Enrollment. Eleven patients and their caregivers diagnosed with possible or probable AD according to NINCDS-ADRDA guidelines (McKhann et al., 1984) through the Memory Disorders Clinic at UCI, were admitted into the Memory Retraining program. Each patient was evaluated by a multidisciplinary team including a neurologist, psychiatrist, two neuropsychologists, and an occupational therapist. All patients received MRI, multichannel EEG scan, computerized EEG (event-related potentials) and a biochemical screen. Patients were not included with evidence of space-occupying lesions, infarctions, focal damage or infections. Small groups of 2-4 patients/group were formed for four week sessions. The patients were mild to moderate AD (see Table 1).

Each AD patient was accompanied by their spouse and in some cases, an adult child. The spouse served as a control and received the same instruction and evaluation as the AD patient so that (a) the training effects on healthy controls could be evaluated and (b) the spouse could learn to implement techniques for the program in the home.

Procedure. The four week program began with a 15 minute discussion of memory. A model was reviewed that illustrated the many processes of memory and the variety of problems contributing to memory deficit. The purpose was to emphasize that memory was complex and that improvement required hard work (i.e., was effortful).

NAMES AND FACES. Upon entry to the first session, a Polaroid picture was taken of each person. A xeroxed copy of the photographs (4 to a page) was provided for each member. With the sheet of pictures in front of them, each member introduced themselves by name and discussed their hobbies, interests, accomplishments and any other relevant details to facilitate "deeper processing." All members were encouraged to take notes under

Table 1

Characteristics of patients in memory retraining program

Age	69
Years of Duration of Dementia	
Self-Report	2.8
Informant	4
MMSE	19
Reisberg	2.7
Verbal IQ	102
Performance IQ	90
Full Scale IQ	98
Wechsler Memory Scale	91

the picture. After introductions, members were asked to describe other members when asked—by name if possible but also by hobbies, interests and accomplishments. Difficulties were prompted and corrected.

Members were asked to take the sheets of pictures home to rehearse in accordance with the PQRST procedure (Seron & Deloche, 1989). The group was told that they would be tested during subsequent sessions. On each subsequent session, before any socializing occurred, patients and spouses were administered a sheet of photos with the order of pictures reorganized. Each member of the group was asked to write the first and last names under the pictures that corresponded to the face. After this, recognition was tested by verbal recall in the group. Failure to name members was accompanied with encouragement to recall aspects of the persons hobbies, interests, etc. The responses were scored immediately, tabulated and presented in graphical form as feedback to the group.

Recall of Television Content. Next, the group was given the task to agree on a television program that they would all watch each week and were informed that they would be tested each week about details of the program. On subsequent sessions, 10-item free recall, 10-item primed recall and 10-item recognition tests were administered. The same 10 items were repeated for all 3 versions of the test. The 10-item free recall was re-administered after the recognition test. On the third session, patients and spouses were asked to construct their own test of program content similar to the one they had taken on previous sessions, and bring it to the group. This task was intended to focus attention and facilitate encoding while they watched the program.

The Set. The SET involved the planning, execution and discussion of one significant event (SE) during the week. Because the usual lifestyle of participants in the study typically was regimented (eliminating demands on memory) and socially isolated, significant events (i.e., something unusual) were easy to construct. Trips to an important place, picnics in the park, shopping, dinner at a special restaurant were examples of the events chosen. Discussion of possible SE's was started in the group but patients and spouses were encouraged to continue discussion at home.

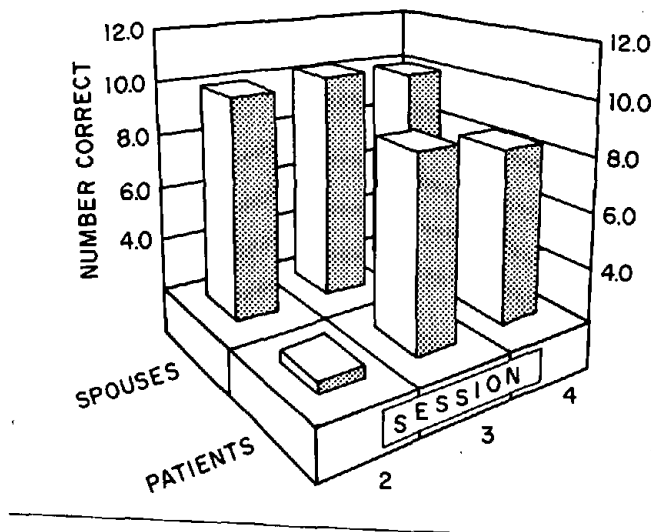
During the first session, before the SET, participants were asked a series of objective questions about a day (e.g., Thursday) in the past week (control day). On subsequent weeks 2 and 4, participants were asked the same questions about their SET day. The questions focused on details of the SE day not on the event itself. Thus, they were asked to recall the clothes they wore, the food they ate, the route they took, the people they met, etc. On week 3, they were asked not to have a SET but were tested for recollection of details on an arbitrary control day.

AROUSAL/INTEREST. The influence of the arousal/interest dimension on memory recall was tested for 5 minute film clips of movies. The clips were "Golden Pond," "Raiders of the Lost Ark," and "Elephant Man." Objective, free recall measures of content were administered immediately after each clip. The order of presentation across groups was balanced but not all clips were included for each session.

RESULTS

Names. Our procedure required learning and remembering the names of 8-10 new people. As illustrated in Figure 1, spouses were perfect after a single session. The AD patients benefitted significantly from this procedure and were nearly perfect on the third and fourth session ($F_{3,7} = 12.31$, $p < .001$). Patients were significantly ($t = 6.71$, $df = 21$, $p < .001$) worse

FIGURE 1. The number of correctly identified photographs in AD patients and spouses during the last three sessions of the memory retraining program.

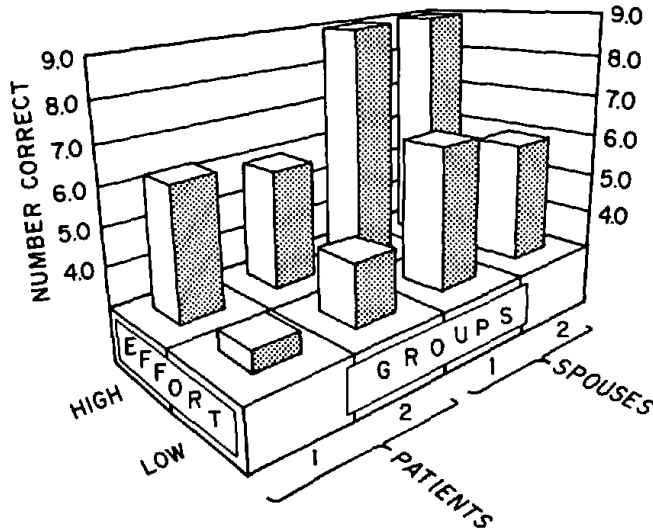


than spouses on session two. But the differences disappeared by sessions three ($t = 1.71$, $df = 21$, $p < ns$) and four ($t = 0.56$, $df = 21$, $p < ns$).

Recall of Television Content. Patients did much worse than spouses on free recall, ($F_{1,15} = 26.17$, $p < .001$) although they did improve over sessions ($F_{3,15} = 5.26$, $p < .01$). Figure 2 illustrates that the main effect of effort was highly significant ($F_{1,15} = 15.63$, $p < .001$). This was later confirmed in separate replications in different training groups. In a high effort condition the AD group equaled the low effort performance of the spouse, (i.e., absence of significance between groups; $F_{1,15} = .097$ ns).

SET. Memories during the SET were compared with ordinary days. As seen in Figure 3, patients performed as well as spouses on SET days ($F_{1,19} = 1.10$, $p < ns$) but recalled significantly less on ordinary days ($F_{1,19} = 22.16$, $p < .01$). Spouses did equally on control and SET days. The same data from independent cohorts are presented as percent change from control in Figure 4 illustrating the dramatic improvement in the patients. In addition to these data, the anecdotal reports from spouses indicated that the level of functioning during SET was comparable to their recollection of pre-AD performance.

FIGURE 2. The number of items correctly recalled about a television by AD patients and their spouses. Results from two separate cohorts of patients are presented during low effort ("normal" TV watching) and high effort (participants designed a test about the program) conditions.



Interest/Arousal. The results, illustrated in Figure 5 indicated that patients and spouses recalled more facts about "Golden Pond" than exciting sequences from "Raiders of the Lost Ark" ($F, 1, 15 = 8.61, p < .05$). The possibility that empathy with a disabled hero was responsible for improvement was tested in one group by presentation of a clip from "Elephant Man." As illustrated in Figure 6 each group of patients recalled most from "Golden Pond" and nothing for "Elephant Man." In two patient/spouse groups (one and four), recall of facts from "Golden Pond" was comparable in the patients and spouses.

DISCUSSION

A memory rehabilitation program was developed with a focus on recall of names, faces, places and events. Procedures designed to "amplify" sensory information were employed with an emphasis on effort, rehearsal and arousal/interest and by engineering the interaction between the patient and the environment. The most troublesome complaint of AD patients in

FIGURE 3. Accuracy of recall of details (clothes worn, food ate, etc.) in AD patients and spouses on two randomly selected control days and a SET day (day with an unusual event).

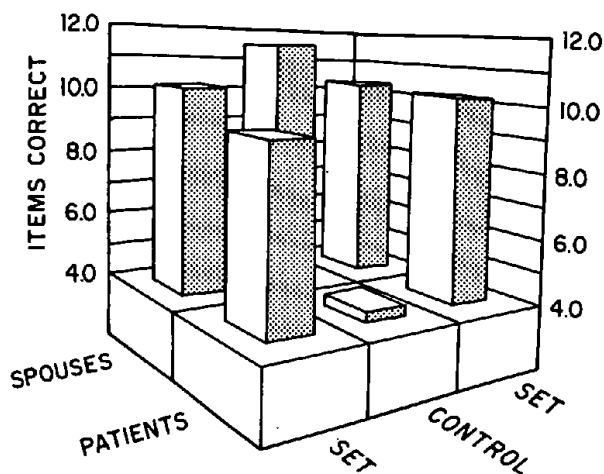


FIGURE 4. The percentage of improvement in accuracy of recall for details on SET days in two separate cohorts of patients and spouses.

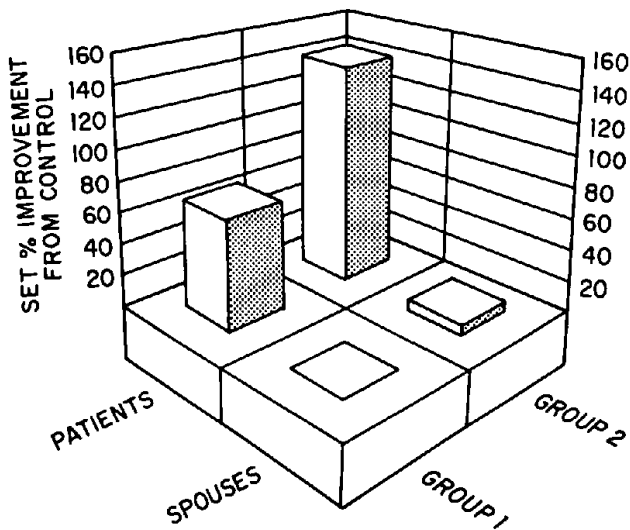
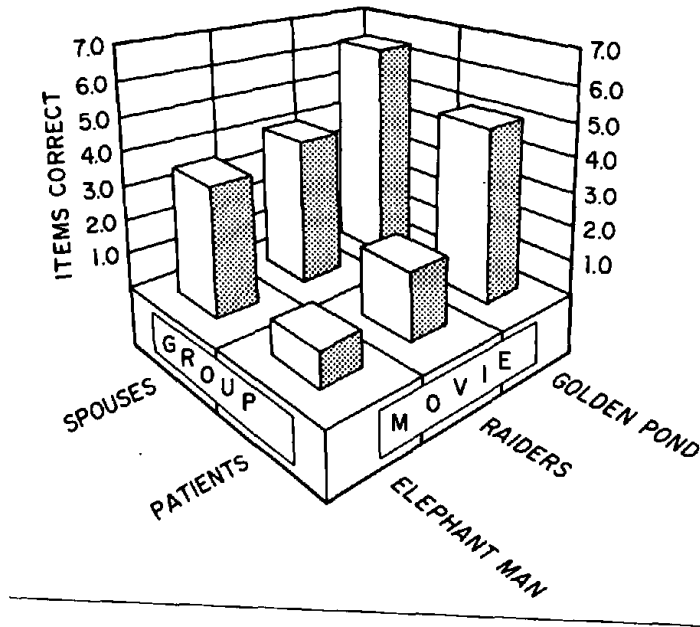


FIGURE 5. Recall of facts from five minute clips from videotapes. Sample size is eleven for "Golden Pond" and "Raiders" but only four patients and spouses viewed "Elephant Man."

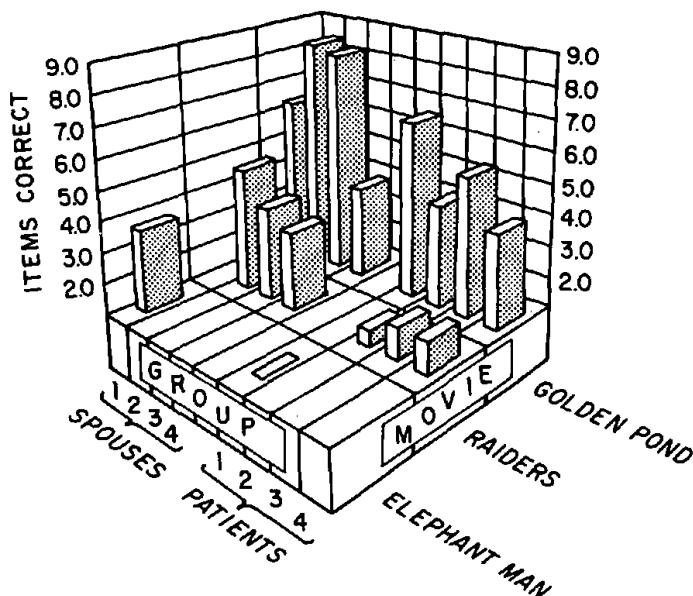


our study was difficulty remembering names of acquaintances. With the effortful procedures of rehearsal and engagement of "automatic" processes, the AD patients were able to learn and recall the names of new acquaintances.

Learning or encoding new information requires more effort especially as we age (Brown & Kulik, 1977). Our variation of the PQRST strategy (Seron & Deloche, 1989), emphasized effort in rehearsal and "deep processing" of memory for names. In addition to the patients "homework" of rehearsing, they focused on interests and hobbies of their new acquaintances. Recall may have been facilitated because a network of associations was generated that connected new information (group names) to established "automatic" processes not vulnerable to decline in AD (Nebes, Martin & Horn, 1984).

A second common complaint of AD patients and their spouses was the inability to remember what they have just read or just watched on televi-

FIGURE 6. Recall of facts from movies for each cohort of patients and spouses separately. It is evident that all groups of patients recalled most from "Golden Pond."



sion. In our program, AD patients benefitted slightly from rehearsal of information. However, highly significant improvement was observed when encoding of information was modified by requiring preparation of an objective ten item test. Even though they were not aware that they would be tested with another test, their performance improved several-fold. Learning with "extra effort" produced performance in the AD patient that was equivalent to the spouse operating in "normal" conditions. Clearly, the high effort condition of the spouse is much better than the patient's, but the purpose of this procedure was to develop conditions in which patients improve. Generating conditions that produced memory in the AD patient comparable to "basal" spousal conditions was an unexpected outcome.

Emotional events may be most easily remembered. "Flashbulb" memories are those vivid images of significant events that we carry forever (Brown & Kulik, 1977; Levin, 1990). For instance, we often recall with extraordinary detail the events of the day we heard that John Kennedy was shot or the day that Pearl Harbor was attacked. Twenty-five year old

details can be easily recalled but events of two nights ago or even what we had for breakfast today may be forgotten. Brown and Kulik (1977) provided strong laboratory support for the significance of salience in recall of *context*. These investigations discovered that memory was superior for provocative or unusually presented words among lists of neutral target words. They concluded that unexpected events illuminate context and give rise to flashbulb memories. Our Significant Event Technique (SET) exploited this observation and tested its utility in patients with AD. We noted that even if patients initially failed to recall the facts, they retained a memory of the emotion, then used the emotional memory to associate the fact. For instance, on his SET day, one patient did not recall his dinner but did recall that he enjoyed it very much. From this emotional memory, he was able to recall that he had eaten halibut, a recollection of fact that astonished his wife.

The significant event technique (SET) was indirectly suggested by a patient who exhibited an extraordinary memory for detail following an unusual excursion. A similar anecdotal observation was reported by Brinkman et al. (1982) in their drug study. Brinkman et al. (1982) observed improvement in memory in one AD patient whose husband unexpectedly arrived for a visit (a significant event) during control procedures. This anecdotal observation coupled with the selective recollection of facts for "Golden Pond" in the present study is consistent with the results of the SET. The long term utility of the SET in AD patients is unknown (Berrol, 1990; Levin, 1990) but the short-term effects reflect the greatest improvement we are aware of with this patient group.

This SET approach may be especially important because it is quite different than traditional treatment of the AD patient. The usual method for "managing" AD patients is to establish a regular routine. A regimented lifestyle often avoids placing demands on memory because every day is almost the same. However, the similarity of each day's routine could blur differences among days, weeks, months and years and ultimately contribute to impaired memory. The SET required variety and greatly improved recollection of everyday facts.

Findings that environmental stimulation improve cognition in AD patients are consistent with reports of brain plasticity throughout the lifespan (Black et al., 1987; Greenough, Juraska, & Volkmar, 1979; Greenough & Juraska, 1986). Unlike enrichment in immature organisms, enrichment in adults is event specific; unique to the brain among organs of the body (Black et al., 1989; Juraska et al., 1980) and reflects information storage (Cotman et al., 1990). The hippocampus is a target site for enrichment intervention because it is one of the most "plastic" areas of the brain

(Greenough & Juraska, 1986; Black et al., 1989). Moreover, it is an area that is vulnerable to age-related diseases such as AD (Coleman, Higgins and Phelps, 1990; Squire & Zola-Morgan, 1991) and it is central for information storage and memory (Grafman, 1984). Programs of enrichment, such as the one described, should primarily influence functions resident in the hippocampus such as memory because the brain structure is most sensitive to stimulation (Cotman et al., 1990; Coleman, Higgins & Phelps, 1990). Preliminary evidence from the memory rehabilitation intervention suggests that enrichment may improve memory although the persistence, functional and structural significance of this approach is unknown.

Our procedures are consistent with the proposal that even though it may be difficult to change the cognitive resources of patients with incurable or degenerative diseases, performance can be enhanced by alteration of the environment (Renner & Rosenweig, 1987). The most effective procedures in our program (i.e., SET) occurred when the environment was altered. Although improved memory was a shared goal among patients, spouses and professionals, the patients engaged in activities during the SET without regard to memory. The purpose of the SET as the most significant memory device was an explicit assumption only of the instructor. Thus, as Hirst (1988) suggests, "If you want to improve people's memories . . . involve the individual with the to-be-remembered material in ways that facilitate memory but do not create memorization as a goal" (p. 241).

BIBLIOGRAPHY

- Baddeley, A. D., & Warrington, E. K. Memory Coding and Amnesia. *Neuropsychologia*, 1973, 11, 159-165.
- Berrol, S. Issues in Cognitive Rehabilitation. *Archives of Neurology*, 1990, 47, 219-20.
- Black, J.E., Greenough, W.T., Anderson, J.B and Issacs, K.R. Environment and the aging brain. *Canadian J. Psych.*, 1987, 41, 111-130.
- Black, J.E., Sirevaag, A.M., Wallace, C.S., Savin, M.H., Greenough, W.T. Effects of complex experience on somatic growth and organ development in rats. *Develop. Psychobio.* 1989, 22, 727-752.
- Brinkman, S. D., Smith, R. C., Meyer, J. S., Vroulis, G., Shaw, T., Gordon, J. R., & Allen, R. H. Lecithin and memory training in suspected Alzheimer's Disease. *Journal of Gerontology*, 1982, 37(1), 4-9.
- Brown, R., & Kulik, J. Flashbulb memories. *Cognition*, 1977, 5, 73-99.
- Cermak, L. S. *Improving Your Memory*. New York: McGraw-Hill, 1975.
- Coleman, P.D., Higgins, G.A. and Phelps, C.H. (Eds). *Molecular and cellular mechanisms of neuronal plasticity in normal aging and Alzheimer's Disease*. Elsevier Press, 1990, New York.

- Cotman, C.W., Geddes, J.W., Ulas, J. and Klien, M. Plasticity of excitatory amino acid receptors: implications for aging and Alzheimers Disease. In P.D. Coleman, G.A. Higgins and C. H. Phelps (Eds). *Molecular and cellular mechanism of neuronal plasticity in normal aging and Alzheimer's Disease*, Elsevier Press, 1990, New York.
- Craik, F. I. M. (1989). On the making of episodes. In H. L. Roediger, & F. I. M. Craik, *Varieties of Memory and Consciousness*. Hillsdale, New Jersey: Erlbaum, 1989, 43-58.
- Craik, F. M., & Watkins, M. J. The role of rehearsal in short-term memory. *Journal of Verbal Learning and Verbal Behavior*, 1973, 12, 599-607.
- Cutler, N. R., Heston, L. L., Davies, P., Haxby, J. R., & Shapiro, M. B. NIH Conference: Alzheimer's disease and Down's syndrome—new insights. *Annals of Internal Medicine*, 1985, 103, 566-78.
- Goodnick, P., & Gershon, S. Chemotherapy of cognitive disorders in geriatric subjects. *Journal of Clinical Psychiatry*, 1984, 45(5), 196-209.
- Grafman, J. (1984). Memory assessment and remediation in brain-injured patients: from theory of practice. In B. A. Edelman, & E. T. Couture, *Behavioral Assessment and Rehabilitation of the Traumatically Brain Damaged*. New York: Plenum, 1984, 151-189.
- Greenough, W.T and Juraska, J.M. (Eds). *Developmental Neuropsychobiology* Academic Press, New York, 1986.
- Greenough, W.T., Juraska, J.M. and Volkmar, F.R. Maxe training effects of dendritic branching in occipital cortex of adult rats. *Behave Neural Bio.*, 1979, 26, 287-297.
- Hirst, Improving Memory. In: *Perspectives in Memory Research* (Gazzaniga, Michael). Cambridge: MIT Press, 1988, 219-244.
- Howard, D., & Patterson K. Models for Therapy. *Cognitive Approaches in Neuropsychological Rehabilitation*, 1989, 39-64.
- Howes, J. L. Effects of experimenter and self-generated imagery on Korsakoff patients memory performance. *Neuropsychologia*, 1983, 21, 341-9.
- Hulicka, I. M., & Grossman, J. L. Age group comparisons for the use of mediators in paired-associate learning. *Journal of Gerontology*, 1967, 22, 46-51.
- Juraska, J.J., Greenough, W.T., Elliot, G., Mack, K., and Berkowitz, R. Plasticity in adult rat visual cortex: An examination of several cell populations after differential rearing. *Behave Neural Bio* 1980, 29, 157-167.
- Kovner, R. M., S., & Pass, R. Some amnesic patients can freely recall large amounts of information in new contexts. *Journal of Clinical and Experimental Neuropsychology*, 1985, 7, 395-412.
- Levin, H. S. Cognitive rehabilitation: unproved but promising. *Archives of Neurology*, 1990, 42, 223-4.
- Lorayne, H., & Lucas, J. *The Memory Book*. New York: Ballantine, 1974.
- McKhann, G., Drachman, D., Folstein, M., Katzman, R., Prize, D., & Stadlan, E. M. Clinical diagnosis of Alzheimer's Disease: Report of the NINCDS-ADRDA work group under the auspices of the Department of Health and

- Human Services Task Force on Alzheimer's disease. *Neurology*, 1984, 34(7), 939-44.
- Miller, E. Impaired recall and the memory disturbance in pre-senile dementia. *British Journal of Social and Clinical Psychology*, 1975, 14, 73-9.
- Minninger, J. *Total Recall—How to Boost Your Memory Power*. Pa.: Rodale Press, 1984.
- Moffat, N. Strategies of memory therapy. In B. A. Wilson, & N. Moffat, *Clinical Management of Memory Problems*. Rockville: Aspen, 1984, 63-83.
- Morris, R. G., & Kopelman, M. D. The memory deficits in Alzheimer-type dementia: A review. *The Quarterly Journal of Experimental Psychology*, 1986, (38a), 575-602.
- Nebes, R. D., Martin, D. C., & Horn, L. C. Sparing of semantic memory in Alzheimer's Disease. *Journal of Abnormal Psychology*, 1984, 93(3), 321-330.
- Patten, B. M. The ancient art of memory: Usefulness in treatment. *Archives of Neurology*, 1972, 26, 25-31.
- Peabody, C. A., Thiemann, S., Pigache, R., Miller, T. P., Berger, P. A., Yesavage, J., & Tinklenberg, J. R. Desglycinamide-9-arginine-8-vasopressin (DGAVP, Organon 5667) in patients with dementia. *Neurobiology of Aging*, 1985, 6(2), 95-100.
- Penn, R. D., Martin, E. M., Wilson, R. S., Fox, J. H., & Savoy, S. M. Intraventricular bethanechol infusion for Alzheimer's disease: Results of double-blind and escalating-dose trials. *Neurology*, 1988, 38, 219-222.
- Perlmuter, M., Adams, C., Berry, J., Kaplan, M., Person, D., & Verdonik, F. Aging and Memory. *Annual Review of Gerontology and Geriatrics*, 1987, 7, 57-92.
- Poon, L. W., Walsh-Sweeney, L., & Fozard, J. L. Memory skill training for the elderly: Salient issues on the use of imagery mnemonics. In L. W. Poon, J. L. Fozard, L. S. Cermak, D. Arenberg, & L. W. Thompson. *New Directions in Memory and Aging: Proceedings of the George A. Talland Memorial Conference*. Hillsdale, New Jersey: Erlbaum, 1980, 461-84.
- Poon, L. W., Fozard, J. L., & Treat, N. J. From clinical and research findings on memory to intervention programs. *Experimental Aging Research*, 1978, 4, 235-53.
- Rabinowitz, J. C. Aging and recognition failure. *Journal of Gerontology*, 39(1), 1984, 65-71.
- Reding, M. J., & DiPonte, P. Vasopressin in Alzheimer's Disease. *Neurology*, 1984, 33(12), 1634-5.
- Renner, M.J. and Rosenzweig, M.R. *Enriched and Impoverished Environments*. Springer-Verlag: New York, 1987.
- Robertson-Tchabo, E. A., Hausman, C. P., & Arenberg, D. A classical mnemonic for older learners: A trip that works. *Educational Gerontology: An International Quarterly*, 1976, 1, 215-26.
- Schacter, D. L., Rich, S. A., & Stamp, M. S. Remediation of memory disorders: Experimental evaluation of the spaced-retrieval technique. *Journal of Clinical and Experimental Neuropsychology*, 1985, 7, 79-97.

- Seron, X., & Deloche, G. *Cognitive Approaches in Neuropsychological Rehabilitation*. Hillsdale, New Jersey: Erlbaum 1989.
- Smith, A. D. Age differences in encoding, storage and retrieval. In L. W. Poon, J. L. Fozard, L. S. Cermak, D. Arenberg, & L. W. Thompson, *New directions in memory and aging: Proceedings of the George A. Talland Memorial Conference*. Hillsdale, New Jersey: Erlbaum, 1980, 23-46.
- Squire, L.R. and Zola-Morgan, S. The medial temporal lobe memory system. *Science*, 1991, 253, 1380-1386.
- van der Linden, Martial and van der Kaa, Marie-Anne. Reorganization Therapy for Memory Impairments in (eds) X. Seron and G. Deloche. *Cognitive Approaches in Neuropsychological Rehabilitation*, Hillsdale, New Jersey: Erlbaum, 1989, 105-158.
- Wilson, B. A. *Rehabilitation of Memory*. New York: the Guilford Press, 1987.
- Zarit, S. H., Cole, K. D., & Guider, R. L. Memory training strategies and subjective complaints of memory in the aged. *The Gerontologist*, 21, 1981, 158-64.

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