

# The rehabilitation program for mr clive wearing

Psychology



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One of the most common symptoms as a result of a brain injury is impaired memory (Baddeley, A. D. , 1997). The impairment can vary from fairly mild to severe, and in case of very dense amnesia deprives a person from his past and his future, whose world consists of a moment.. Amnesia is caused by disturbance to the midline diencephalons or medial temporal lobe (Perkin, A. J. , 1996). Diencephalic injury can be caused by strokes and tumours, intra-nasal piercing head injuries or most frequently found in Korsakoff's Syndrome.

Furthermore, amnesia caused by medial temporal lobe injury has its origin in herpes simplex encephalitis, particular types of stroke, carbon monoxide poisoning, anoxia and insulin overdose (Perkin, A. J. , 1996). Memory does not consist of a single entity, but of different memory systems with different capacities for storing information. In case of amnesia, some memory systems would be severely impaired, while others remain intact. In order to understand amnesia, one has to understand major modular distinctions between memory systems.

Furthermore, STM and LTM are differently time-dependent, meaning that STM has a limited storage for information, i. e. three to five items for limited time period, while LTM is limitless with no decay (Sohlberg and Mateer, 2001). Often term used for STM is " working memory", because it suggests its active and flexible features, nevertheless " working memory incorporates the dynamic aspects of holding onto and manipulating information" (cited in Sohlberg and Mateer, 2001, p166). Short term memory system is a system that underlies consciousness and is a temporary storage system for incoming information (Parkin, A. J. , 1996).

Furthermore, the function of short term store remains undamaged in amnesia. Procedural memory also remains intact in amnesic patients, therefore it can be successfully used for rehabilitation purposes. Moreover, according to Tulving (1985), procedural memory is basically "knowing how" and involves no more than stimulus response memory. Representation is "prescriptive, it is a blue print for future actions" and increases likelihood to respond specifically to specific stimuli. The expression of knowledge is "inflexible, response is obvious and learning is in a fashion stimulus response" (cited in Pettifor, 1997, p03).

According to Tulving (1985) "procedural memory contains semantic memory as its single specialized subsystem, and semantic memory, in turn contains episodic memory as its single specialized subsystem" (cited in Pettifor, 1997, p04). Procedural memory is the memory which is difficult to describe to someone, for example, how to play a piano, how to type and so on. The information is known automatically. Furthermore, there are several coexisting theories of long term memory (LTM), which support different LTM memory systems.

According to Zola-Morgan (1991), classification of LTM is presented with two sub-systems, i. e. declarative and nondeclarative. Moreover, declarative, i. e. explicit refers to memory for facts and events, while nondeclarative, i. e. implicit refers to memory for skills and habits, priming, simple classical conditioning and nonassociative learning (Squire et al. , 1996).

According to Tulving and Schacter (1990), declarative memory is our memory for facts. To follow, Tulving (1983) distinguished two further components of

declarative memory: Episodic memory, i. e. memory for past and personally experienced events and Semantic memory, i. e. knowledge for the meaning of words and how to apply them (sited in Pettifor, 1997, p 02). Tulving (1985), proposed Monohierarchical Multimemory System Model (MMS) (Pettifor, 1997). This memory model maintains three memory systems, i. e. episodic, semantic and procedural as separate memory systems. Moreover, he notes that episodic memory is memory for "temporal events in subjective time", it is not only that subject has the memory, but can also remember the situation in which the memory was learned.

The representation for episodic memory is for events, "descriptive and rational, consciousness is auto-noetic, i. e. self-knowing, organized by time and place of occurrence, for the past, present and future". Expression of knowledge is "flexible and recollective, and access is conscious, deliberate and relatively slow" (cited in Pettifor, 1997, p03). Examples of episodic memory are: do you remember your first kiss, what you ate for breakfast this morning and so on. Episodic memory can be referred to as the "autobiographical evidence" of our lives (Parkin, A. J. , 1996).

Furthermore, autobiographical memory is a memory for events of personal importance and reference, and the self is build up from these memories (Cohen, G. , 1996). Autobiographical memories are enduring, possibly because the self-reference known as a main feature of these memories support recall (Rogers et al. , 1977 in Cohen, G. , 1996). To follow, the semantic memory is memory for "general knowledge and does not involve any event structure", the representation is descriptive, for facts and

concepts. Moreover, the kind of consciousness is "noetic, i. e. knowing and awareness apply to external and internal world".

Expression of knowledge is flexible and knowledge can be expressed in different situations from those that is learned. Access is automatic and fast (Pettifor, 1997). To remember who was the first President of the U. S. , what colour is sky and which kind of coffee you usually drink are examples of semantic memory. Moreover, amnesics' major deficits are related to a severe anterograde amnesia, i. e. not able to obtain new knowledge, meaning that a patient can form short-term memories, but not or very few new long-term memories, and retrograde amnesia, i. e. unable to remember events and knowledge obtained and learned prior to brain lesion (Parkin, A. J. , 1996). It seems that the capability to recall events differs from the capability to recall context-free factual information, therefore in retrograde amnesia a linguistic knowledge and most important personal facts are usually preserved (McCarthy and Warrington, 1990). In anterograde amnesia there is typically little or no disturbance of STM, but in case of a brain damage, such as with Clive Wearing, retrograde amnesia usually goes with anterograde amnesia (Gross, 2000).

Why the amnesics haven't impaired memory? The theories which try to explain anterograde amnesia are associated with input, storage and retrieval of information (Baddeley, A. D. , 1997). Cermack et al. , (1970), from carrying experiments with Korsakoffs concluded that the information is not processed to sufficient depth in order to be recalled. The two possible explanations are that they are not able to process it, or they are not paying

attention to the incoming information, i. e. not interested in task (Baddeley, A. D. , 1997).

Carmac and Reale (1978) forced the patients to process information into semantic depth and the information was processed, but not recalled.

Warrington and Weiskrantz (1970) suggested that interference effect cause the problem, but they rejected the interference hypothesis in 1978, when they found that amnesic and controls show the regular inference effect when the cueing effect was introduced (Baddeley, A. D. , 1997). The contextual hypothesis suggests the significance of contextual cues, meaning that amnesics do not store contextual cues, for example, where and when the information is learned, which is essential to retrieve the information.

Meudel et al. (1985) showed that amnesics rely on trace strength, i. e. if they remember one information better than other, they think that that information was presented more recently, while controls would use contextual cues in order to remember what information was presented at what time (Baddeley, A. D. , 1997). Baddeley (1982) suggests that the problem cannot rely only on context, but amnesics have problem forming associations and linking what they already know with new events, i. e. problem with semantic memory (Baddeley, A. D. , 1997).

Furthermore, confabulation is a feature of a classical selective amnesia (e. g. Mercer et al. , 1977 in McCarthy and Warrington, 1990), characterizing the patient's production of " memories" without foundation for their occurrences. In 1985 Mr. Clive Wearing, highly intelligent and talented professional musician was badly affected with herpes simplex encephalitis, a virus which

caused inflammation and consequently left him with a severe brain damage and very dense amnesia.

The sternness of his amnesia was the result of almost complete damage of the hippocampus. i. e. responsible for storing long-term memories (Bontempi et al, 1999 in Kalat, 2001), declarative, explicit memory (Squire, 1992 in Kalat, 2001), spatial memory (e. g. Hampson et al. , 1999 in Kalat, 2001) and consolidating memories (Squire, 1998 in Kalat, 2001). The retrograde amnesia was caused by the damage in diencephalon and the extensive temporal lobe damage caused semantic memory impairment. On semantic memory test (Graded Naming Test, McKenna and Warrington, 1983) given in 1992, he scored 2 out of 30 items, indicating problems with word finding and object recognition.

His wife Deborah stated in 1985 that he is not able to differentiate between which one of the few bottles and one tube in his bathroom is toothpaste. His general knowledge was noticeably impaired, his autobiographical memory was also impaired, i. e. abnormal scores on the Autobiographical Memory Interview (Wilson, 1992), although he did remember that he was and he is a musician. Furthermore, he was completely deprived of his episodic memory. On the Rivermead Behavioural Memory Test he scored 0 out of 12 items, i. e. testing memory for everyday events, which is a helpful indicator whether a patient lost his everyday episodic memory or not (Wilson, 1992). On Test of Speed of Information Processing (simple reaction time) he scored in the normal range. Apart from extensive retrograde amnesia and anterograde amnesia, he suffers from confabulation, displaying fantasy experiences about working in any place he happens to be at that moment, compensating

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for the lost memories. His musical abilities seem well-preserved, he is still capable of playing piano and sight-reading.

His working memory is intact, meaning that he is able to immediately repeat the material he is presented with, but if a delayed recall is introduced, because he can not form new memories, he would not be able to recall the material presented earlier (the whole paragraph Wilson, B. A. and Wearing, D. in Campbell, R. and Conway, M. A. , 1995, except the references from Kalat, J. W. , 2001). Before designing a therapy for the patient, the assessment of memory dysfunction has to be applied, to investigate to what extent the patient is impaired.

It would not be objective to expect from a severely impaired patient improvement of his general memory functioning, but he can acquire some new skills to help him in everyday life. Nondeclarative learning is not depend on episodic memory and patient can learn without being conscious of learning ( Sohlberg, M. M. & Mateer, C. A. , 2001). An example of nondeclarative learning is procedural learning, where the patient can gain some skills, meaning that he can learn without being able to recall the training (Sohlberg, M. M. & Mateer, C. A. 2001). One of the categories of memory management training is the use of external memory aids ( Sohlberg, M. M. & Mateer, C. A. , 2001). The patient can be trained to use a toll needed for a certain behaviour with a sound devise, domain-specific training. An example of domain-specific training is the study of Carr and Wilson (1983) with a paraplegic patient with impaired memory, who would not remember lift himself up from the wheelchair in order to allow the circulation (Baddeley, A. D. (1997). My aim of rehabilitation program for Mr.

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Wearing is to help him to identify toothpaste between several items in his bathroom, which he is not capable of doing without his wife's assistance. Considering that he cannot form new memories and severity of his impairment, one of hopefully successful methods would be operant conditioning often used in behavioural therapy (Gross, R. , 2000). Dolan and Norton (1977) carried out a study of acquisition and retention of memory in impaired subject (Miller, E. , 1984). The method used was stimulated by clinical implication of operant conditioning.

The subjects were repeatedly presented with photographs of ward staff and the questions about the ward environment. After a training procedure, one third of the subjects received a material reward for each correct answer, one third received a verbal praise, while the remained participants were only given an explanation. Those that received a material reinforcement performed better, than those who were given a verbal reinforcement. The rehabilitation program for Mr. Wearing would consist of the use of an external aid combined with the technique of operant conditioning.

The procedure will include three stages: 1. Identifying the behaviour I wish to improve, 2. To establish the baseline of the performance and 3. A combination of treatment and observing its efficiency (Baddeley, A. D. , 1997) . Mr. Wearing skill to brush his teeth is preserved, therefore he does not need training for it. Furthermore, I will assume that he knows that the bathroom is the place to brush his teeth. After observing his performance in finding toothpaste, i. e. establishing a baseline, he would be repeatedly trained to " recognise" which tube is toothpaste.

The training would be carried out every day in duration of one hour. Every time he picks up the right tube a device attached to it would play his favourite piece of music, i. e. a reward. The number of misses during the treatment would be recorded. A second step would be a withdrawal of the training in order to establish the efficiency of the treatment. After calculating the number of wrong identifications of toothpaste, i. e. misses, the same treatment can be introduced again if there is a significant improvement during the period when the treatment is applied. The same monitoring procedure would be applied.

A follow-up procedure would be applied two weeks after the completion of the last introduced training. After removing the external aid, if the number of misses is reduced to zero, that would mean that the treatment was successful (see Graph 1). If the treatment was not successful, the number of misses would not significantly differ from the period prior to training (see Graph 2). A single subject experimental design monitors behaviour before the application of the treatment, i. e. the A phase and during the treatment, i. e. the phase B (Beech, J. R. & Harding, L. , 1990).

The design used was ABAB design, therefore, the periods when the treatment is introduced and those when it is not, were compared. If the task was learned, the removal of the aid would not cause forgetting and hopefully the information would be retained (Baddeley, A. D. , 1997). In this type of a design a simple repetition was adequate for learning to occur. The Graph 1 indicates that the learning occurred only when the treatment was introduced. If ABAB treatment is not successful, an alternative can be applied, such as ABACA, meaning that C would be a second type of

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treatment (Beech, J. R. & Harding, L. 1990). One of the limitations of a single subject design is that a single subject cannot be a representative of any population, so the results of the study cannot be generalized (Beech, J. R. & Harding, L. , 1990). On the other hand, a single case design can be applied " in investigation of cognitive deficits associated with specific medical condition" (cited in Coolocan, H. , 2001, p64). Furthermore, it is cost effective, when the treatment has to be applied for a long period of time, therefore instead of one person having a treatment, others with the same impairment can be treated at the same time.