Claire Harvey

DISCRIBE AND EVALUATE MODELS OF MEMORY

What is memory? Memory is involved in all aspects of our lives, is it a cognitive thinking process or a way of retaining information or is it a number of connected stores or even actual information retained. According to Reber (1985), it is possibly all of theses. Memory has not been defined as a single process or fact and several theories exist about its nature, character and structure.

We have vast amounts of information stored in our memory systems which we are able to access quickly and effortlessly, this implies that knowledge stored must be highly organised to allow us to retrieve the appropriate information for a given situation. This organising will be determined by the way that information is encoded into memory. The way the knowledge is organised will determine the type of process required to access that information in the future.

Atkinson and Shiffrin (1969) suggested that memory comprised of three separate stores. The sensory memory store, the short-term memory and the long term-memory each store has a specific and relatively inflexible function. This was called the multi-store model.

There are two main memory stores short term memory (STM) and long term memory (LTM),they are studies in terms of there ability to encode, which means make sense of information, also by there capacity, how much information is stored and by duration ,how long the information can be stored.

How does the short-term memory store work? Conrad (1964) suggested that short-term memory code all information acoustically. Visual information is encoded to acoustic codes. In his experiment, He presented participants with list of consonants and they looked at them for three quarters of a second, then they had to recall what they had seen. Conrad found that errors of recall were linked to letters which had similar sounds, he referred to these errors as acoustic confusion, but

this did suggest his theory that information is encoded according to sound.

Schulman (1970) disagreed with Conrad; he thought that short term memory also encoded information but visually and according to semantics which is meaning. Schulman's research suggests that Conrad was incorrect in saying all encoding were acoustic. Schulman, presented participants with visual list of ten words. They were then asked to recall them. Recall was tested using cue or probe words. The first probe word were homonyms, words which sound the same but have different meaning, like ball and bawl. The second one of three were synonyms, different words with similar meanings for example talk and speak, the last probe word used were identical to the ones in the original list. Similar numbers of errors of recall from the original list were made for homonym and synonym probes. This suggests that semantic encoding as well as acoustic encoding occurs in short term memory.

Both Conrad and Schulman research were laboratory experiments therefore they lack ecological validity due to controlled artificial environments. The participants used were undergraduate students and do not represent the general population. The results may also have been influenced by individual or participant variables, but this research does have good reliability.

The capacity of short-term memory refers to the amount of information that can be stored at one time. Miller (1956) suggested that most people store about seven independent or discrete items in short-term memory. These may be numbers or words, miller referred to each of these as chunks; he then suggested that the capacity of the short-term memory may be enlarged by grouping items together by association or links they have with each other. Participants in miller's research were given sentences of different lengths and they were asked to recall words in the correct order given in the sentence. The more sense the sentence made the better the recall. Most participants were able to recall about seven pieces of information. This led to millers "The magical number seven plus or minus two". Criticisms of this research were because, it was also laboratory based so it lacked ecological vitality, and it may have had experimenter bias. The experiment does have good reliability but it is dated.

Bower and Springton (1970) also researched the capacity of short-term memory by presenting participants with one or two letter sequences. the first sentence contained well known groups of letters:mfi,plc,aeb,but the second contained the same letters but in a different order:imf,icp,eba.the results showed that the first sentence was definitely the best recalled suggesting that chunking according to meaning increases the capacity of the short-term memory. Criticism of this experiment is the same as miller's research.

Duration of short-term memory was researched by Brown and Peterson and Peterson (1959) and Reitman (1974).Brown, Peterson and Peterson devised a technique that prevents information from being continually repeated in the STM in order to test how long information will be retained. The continual repetition of information is referred to as maintenance rehearsal. Brown and Peterson suggested that the short term memory can store information for approximately 15 to 30 seconds if maintenance rehearsal is prevented. This suggests that information decays rapidly in short-term memory unless rehearsal occurs.

Reitman (1974) says that this short duration id due to displacement, as the new information is coming into the STM it is replacing previous information due to the capacity limits of seven, plus or minus two. Both experiments were carried out under laboratory conditions and are there fore subject to the same criticisms as before.

The evidence suggest that short term memory is both visual and semantic encoded information of seven, plus of minus two chunks that can be stored for up to 30 seconds.

Atkinson and Shiffrin(1968) suggest that information is simply rehearsed in the short term memory and if rehearsed enough will be transferred into the long term memory.

Long-term memory is studied in the same way as short-term memory.Encoding, capacity and duration.

Two types of encoding are thought to operate in long-term, declarative memory and procedural memory. Declarative memories evolves semantic memory, this is memory for meaning, and episodic memory, this concerns knowing when, where and what. It is linked to personal experiences.

Procedural memory, is memories of how to do things, this is often automatic and is resistant to forgetting.

Baddeley(1966)researched semantic encoding by presenting participants with four list to remember, list 1 contained similar sounding words and list 2 had now words of the same sounds, list 4 contained words with similar meaning and list 3 had no relevance to each other. They we re then asked to recall as many words as possible immediately after and then again after 20 minutes.Baddeley found that immediate recall was better for list 2 than for list 1 and there was little difference between list 3 and 4.
After 20 minutes he found they recalled list 4 better than list 3 and there was no difference between list 1 and list 2. This experiment showed that long-term memory tends to store information accounting to semantics rather then simply sound.Baddeley also used a laboratory experiment and can therefore be criticised in terms of ecological validity, although it has good reliability.

Capacity in long-term memory is unknown. It is impossible to measure and may be limitless. The brains ability to store information is greater than the world's most powerful computer memory.

Duration of the long term memory is thought to be permanent, for a lifetime, but it is now thought possible for some memories may be inherited and therefore last longer than a life time.

Other than the storing of information long-term memory is also responsible for the retrieval of the stored information. The information stored in the LTM is recalled and passed back through to the short-term memory. Sometimes the information is difficult or impossible to acc ess this theory is called retrieval failure. This idea is characterised by tip-of –the-tongue effect, where we know something but cannot recall it.retrival of such information is thought to be dependant on three factors, context-dependent retrieval which is when the retrival depends on the context in which the information was originally encoded. Godden and Baddeley (1975) provided evidence for this by asking participants to learn a list of words either on land or 15f t underwater. They were better able to recall words if asked to do so in the setting in which they learnt them. The second dependant is state-dependant retrieval this suggests that recall is improved if the individual is in the same physical or psychological state as when they first learnt the information. Goodwin (1969)

investigated the effect of alcohol on recall and found individuals were able to recall information learnt better when drunk if they were drunk when they first learnt the information. Other drugs seem to affect the memory the same. Lastly recall may be by the presence of cues and probes or associations. This is referred to as cue-dependant retrieval. This was investigated by Beetling and Pearlstone (1966).

As so much information is stored in the long-term memory it may become confused or combined with other information during encoding, this will distort or disrupt memories this is called interference.interferance in the long-term memory is thought to be either proactive, where old memories disrupt new memories or retroactive where new memories interrupt old memories.Mcgeoch (1932) investigated these ideas and they were found to occur when the memories are similar. This research was carried out in a laboratory thus making it ecological invalid.

An alternative to the multi-store model, looks at the workings of stm, rather than the stm being a single inflexible store, Baddley and Hitch suggested that the STM was made up of several subsystems, each having its own specialised function. They suggested that these subsystems were involved in complex cognitions in other words thought processes, including analysis and judgements about information input.Baddeley and Hitch(1974) provided evidence for this by people being able to carry out more than one task at once where both tasks at once w here both tasks involve stem functions. They studied the possibility of two subsystems in the STM.One of them termed the central executive. The central executive decides which information is attended to and in what part of the working memory the information is sent to be dealt with. The two subsystems studied were named the visuo-spatial sketchpad and the phonological loop.
The visuo-scetchpad deals with what information looks like and how it is laid out therefore it deals with visual and spatial informatio n.
The phonological loop holds spoken information for about one and a half to two seconds. Written words must be converted into spoken words to enter the phonological loop.
There is little empirical evidence to support the working memory model but the recognition of the complexity of the stm memory makes sense. However some brain damaged patients appear to suffer impairments in some functions of stm and not others, Shallice and Warrington (1974)

therefore suggested that the existence of several specialised systems within STM was probable.

Craik and Lockhart (1972) also presented an alternative to the multistore memory. This model of memory concentrates on the Ltm and the semantic processing occurring there, they accepted Atkinson and Schifrin's separate stores but suggested that encoding and processing of information in ltm was more complex. They said information could be processed or encoded at shallow, deeper or deepest levels. They suggested the deeper the processing the stronger and more durable the memory.
Craik and Lockhart used laboratory based experiments and there fore can be criticised in terms of validity and representivness.

To evaluate, the levels of processing model changed the direction of memory research. It showed that encoding was not at all simple. This helped to widen the focus on seeing the ltm as just a simple storage unit to seeing it as a complex processing system.
Craik and Lockhart's ideas led to lots of experiments, most of which confirmed the ideas of the deep semantic processing systems and led to lots of supporting evidence.
Research today agrees that STM is made up of a number of subsystems; the working memory model explains a lot more than the multi-store.

In conclusion all the research that has been carried out does not pr ove precisely how memory works.Reber (1985) according to the experiments shown is right. Memory is all three of these, a cognitive thinking process, a way of retaining information and actual information retained. Psychologists have put a lot of time into f iguring out the mysteries of memory. It is a very complex subject and I am sure they will be researching it for years to come.

Each individual person uses memory in a different way. Think of memory as a computer, the short-term memory is the ram and the long-term memory as the hard drive. As I have already said the brains ability is more powerful than the world's largest computer, more than anyone can imagine, I don't think we will ever really know all of its capabilities.