*Explain and evaluate the three models of memory*

- ***What are they, and how they work***
- ***Comparisons and contrasts between the three***
- ***Critically describe your own views on the models.***

Memory is a cognitive function, which we are all able to process and recall. Some of us better than others, these discrepancies between the variations in the extent to which we can recall information may be genetic, due to lack of semantic incentive or basically due to medical and health reasons, such as temporary amnesia or tumours in the brain. Memory falls into three distinctive categories; these are sensory memory, short-term memory (STM) and long-term memory (LTM). These variations in the type of memory are all combined to form the three main processes in memory; registration is the process by which sense organs detect a stimulus, this stimulus is then entered into the memory system. Storage is also important, because the degree of storage is due to many factors, such as the type of stimulus and the region of the brain where it is to be stored. Finally retrieval, probably the most important factor in the memory system, without the ability to retrieve memory from a store, and then memory is made redundant, even if the chunk of information has semantic value to the person involved. Three models of memory have been suggested, these include the multi-store model, the working memory model and the levels of processing model.

The idea of a multi-store model was put forward by Atkinson and Shiffrin (1971). They believed that this model made use of sensory memory, STM and LTM. They believed that the three were linked through procedures, which the individual is conscious of such as attention, retrieval and rehearsal. The model begins with a sensory input; this is basically the stimulus, which falls into the category of one of the five senses. Atkinson and Shiffrin believed that the attention had to be paid to this object so that it could be transferred to short-term memory, which only has a capacity of 7±2 items and information can be held for duration of upto30seconds. Once information is passed onto the STM, it is then passed to the LTM whereby it is stored with regard to its encoding, whether this is acoustic/visual/semantic. This presents us with one key idea, the more attention the individual pays to something, the more semantic meaning or relevance it will have on them, this means that it is processed in the STM for a longer period of time, and has a greater probability of being transferred to LTM. The rehearsal concept is also a key idea, central to the principles of the multi-store model. Without rehearsal, there is no semantic relevance to the associated piece of information rehearsal is a procedure by which the individual can apply meaning or association to this information, if this does not occur then it is not transferred to the LTM and subsequently forgotten. Craik and Watkins (1973) suggested that there were two types of rehearsal; they proposed the idea of **maintenance rehearsal** (for example repeating a word out aloud) and **elaborative rehearsal** in which information that is to be transferred is processed in terms of meaning. They suggested that maintenance rehearsal might be enough to keep information in the STM while elaborative rehearsal was used to transfer information to the LTM.

The next model was proposed by Baddeley and Hitch (1974), they began by criticising the multi-store model by believing that it played a much more complicated part in memory, and was not just a processor by which information was passed onto the LTM. The main theory of this model is that a central executive controls all functions of the memory, but this executive is assisted by a loop and a scratch pad. However, the central executive is much more complex, it is able to distribute information loads to the other loops, also it can process one piece of information, while holding another. It also assists in decision-making, and the filtering of information. The two loops assist in visual and audio scenarios, for instance if you are trying to remember a short piece of information you may repeat it over and over, the phonological loop (inner voice) then begins to repeat that chunk of information back to us, coincidentally if you pay enough attention to it, your phonological loop can then transfer the information from the central executive which is able to hold information for a few moments to the LTM. In this way the two models have been linked together. The phonological loop is not governed by a

capacity issue, but rather by the speed of which information is voiced or transferred to the loop, however the phonological loop does have a few downfalls, it is wholly based on sound and any interruptions, mainly acoustic will result in ineffective transfer of information. For instance if you say a phrase out a loud but at the same time listen to music, your STM or central executive will process one while the other is stored, but once both are processed there may be some confusion between the two as they are both acoustically sounding and have both occupied the phonological loop. This is an expression of concurrent verbalisation

Also there is a visual spatial scratch pad, which takes care of the visual information. It too can store small amounts of information whilst others are being processes, but its main priority is to assess a spatial scenario, which leads to uncertainty, for example going down a road numerous times, results in a "sketch" of the road on the scratch pad, this is known as familiarity. You have travelled on the road many times and therefore are able to comprehend a situation.

The final model is the level of processing model notioned by Craik and Lockhart (1972) this model is completely different to the other two whereby it believed that memory is not related to the STM or LTM, but memory is due to how deeply you process a piece of information. The main factor, which may be obvious, is that information that is processed more deeply is stored more extensively and comprehensively and then is available for easier recall. The levels of processing model, works down a gradient of sense, for instance there are three levels on which Craik and Lockhart believed that information would be remembered, they are structure, phonological and semantic. By structural we mean, you will remember things that you have physically seen, e.g. the shape of an apple. Phonological represents, acoustic information, e.g. your favourite song being played, and you being able to recall the words. This works with the other two models, the multi-store would say that you have paid attention to the lyrics and then tried to rehearse them, meaning that you have an active knowledge or memory of the lyrics. The working memory may assume that the phonological loop has a store of the lyrics, which after being repeated numerous times has been passed onto the LTM. The type of information, which will be recalled most easily, is the information that is semantically coded, such as memories of birthdays, or an experience that may have affected you. This is because it has personal meaning, and takes priority over other normal mundane things like objects and sounds.

The three models can be contrasted more than they can be compared. The multi-store model relies to heavily on the ideas of rehearsal and attention, also that the STM is the direct route to the LTM, but studies have shown that the STM can be damaged, but this can lead to no impairment in the LTM, and the LTM is still able to recall information after the damage of the STM. It seems though that none of the models take into account the nature of the information that is trying to be remembered. There is no hard evidence to suggest why people can remember the lyrics of many songs, but are unable to remember the birthdays of friends and families. This once again probably comes down to the idea of interest and participation but more psychologically, the principles of the multi-store model such as attention and rehearsal. Even though it seems that the levels of processing model differentiates between the nature of the tasks, this is not so. It only succeeds in recalling information based on their so-called semantic-importance. Also the multi-store model says that the STM is encoded in an acoustic form, but using the idea of the slave systems in the working model it shows that it too can account for visual information, by using the example of the visual spatial scratch pad (VSSP), but it has also been argued that information from the VSSP is transferred directly to LTM and does not stop at the STM or central executive.

An advantage of the Working model is that memory is seen as an active store, and an ongoing process and not something which suddenly stops when new information is to be introduced, the multi-store model does state that the STM can store 7±2 items, but only through a process called chunking. It does not state whether information can be stored at the same time, and this restricts the idea of stores in the model.

A weakness of the working model is that little is known about the central executive; therefore people assume that the central executive is similar to the STM. But this is not the case; the working model has no limitations on the size of the central executive, whereas Miller believed that the STM could only hold 7±2 items, the central executive does not have a capacity but it is governed by the speed of information coming into it.

The levels of processing model seems to be the odd one out here, because the other two models show that there is some sort of processor involved, whether it be the STM or the Central Executive, the level of processing model seems to rely on the fact that memory is due to the level of processing that occurs. This model seems to be very descriptive and tends to lack any practicality, it does not tell us where the processing takes place, where there is something similar to the STM or central executive and it fails to tell us why better processing leads to better recall. In my personal opinion, better processing is due to more attention being paid to a particular subject, and more rehearsal whether it be maintenance or elaborative. It is also hard to describe the "depth of a thought process." This means that it is almost impossible to justify this theory. But it is clear to agree with the fact that semantic information will be the most easily recalled, things such as your birthday, which have personal significance will be recalled easier than the number of letters in a certain grid. This is an example of **semantic memory.**

For example if three people were taken, and asked to learn to ride a bike, and each of them was using a different model to explain their activity. I think that the multi-store model would show the successes and failures in more detail than the other models. Even though the working model has the central executive which can make decisions, the phonological loops and visual spatial scratch pads would be made redundant because it there are not really any loops which can describe the function to the activity. The multi-store model would show **procedural memory** better than the others because, it stresses the idea of rehearsal and attention, which the others do not consider at all. Also there is a response from the STM, this could represent a minor failure, such as not being able to keep balance.

All three compare in a fashion that they can logically show how to recall and store information. Even though some tend to be more complex than others they all succeed in portraying that brain has an unlimited capacity. But in my opinion I think that I agree the most with the idea of the multi-store model this is because I think that the idea of retrieval, rehearsal and attention are all-important factors. It also shows more progression and logical than any of the other models, for instance the idea of STM being finite just seems believable (even though the idea of there being only 7 slots, is doubtful) And this can be shown by the idea of **displacement**, when you try and take too much information on-board information is displaced. First hand experience indicates that the more attention you pay to something and the more semantic meaning it has to you the easier you will be able to recall it, (when revising for examinations, I find it easier to recall something that I understand.)  But I do agree with the idea that the working model demonstrates of scratch pads and loops, which help to retain to information, there have been many incidents when I have experienced these two utilities.

The idea of the central executive being able to make decisions is also an interesting factor, but it is accepted that the attentional processes of the STM and central executive are the same. I do not really agree with the levels of processing model, it is not as comprehensive as the other two models, and basically states the blindingly obvious in stating that you will remember semantic information more easily than any other information. Another observation is that none of the other models seem to consider the idea of sensory memory, thus providing no logical idea for where the information comes from. After studying and considering all three models I believe that the multi-store seems to be the superlative, because it shows more logical progression, and it a model that has minimal criticism. Even with the use of models, memory is something that is hard to quantify it remains a mystery why some people have better memories than others; this is something, which psychology and biological sciences could determine.