Chapter 5

Memory and the dissociative brain

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The DSM criteria for Dissociative Identity Disorder (DID) includes four components (American Psychiatric Association 1994):

- The presence of two or more distinct identities or personality states.
- At least two of these personality states recurrently take control of the person's behaviour.
- Inability to recall important personal information.
- The problem is not due to substances or a general medical condition.

In this chapter I restrict myself to exploring the nature of the amnesia which is reported between personality states in most people who are diagnosed with DID. Note that this is not an explicit diagnostic criterion, although such amnesia features strongly in the public view of DID, particularly in the form of the fugue-like conditions depicted in films of the condition, such as *The Three Faces of Eve* (1957). Typically, when one personality state, or 'alter', takes over from another, they have no idea what happened just before. They report having lost time, and often will have no idea where they are or how they got there. However, this is not a universal feature of DID. It happens that with certain individuals with DID, one personality state can retrieve what happened when another was in control. In other cases we have what is described as 'co-consciousness' where one personality state can apparently monitor what is happening when another personality state is in control and, in certain circumstances, can take over the conversation.

A further feature of inter-state amnesia is that it appears to be restricted to certain kinds of material. Dorahy (2001) summarises the current research. He concludes: 'research suggests that amnesic barriers between alter personalities are typically impervious to explicit stimuli, as well as conceptually driven implicit stimuli. Autobiographical memory deficits are also experimentally evident in DID' (Dorahy 2001: 771). The focus here will be on explicit stimuli.

The Headed Records framework

In this discussion of inter-state amnesia, the distinction between *dissociation* and *repression* features strongly. The contrast between the two terms bears a family resemblance to their use in other contexts, but is specifically anchored within a particular cognitive psychological framework, that of Headed Records (Morton et al. 1985). I first describe the framework and then return to dissociation and repression.

Headed Records (HR) is a framework for describing the retrieval of individual event representations. 'Record' is the term used to describe mental representations of events. The foundation blocks for the development of the framework were Tulving's (1983) encoding specificity principle and the principles of context-dependent memory and state-dependent learning. The most important principle is that people can remember more about an episode when they are in the same context as they were during the episode itself. This context includes both external and internal factors. To take the external factors first, Godden and Baddeley (1975) looked at deep sea divers. The divers were asked to learn lists of words either on the beach or in 15 feet of water. They were then asked to recall the lists either in the same or in the opposite environment. There was no general effect of the environment, but there was a 40 per cent loss in recall if the learning and recall were in different environments. In a similar fashion, Wilkinson (1988) found that 6-year-old children remembered what had happened on a walk the previous day much better when they were out again on the walk than when they were questioned in a room at school. This also applied to material that was not directly cued by features of the environment (for example, the song they sang in a particular spot).

As an example of the effect of the internal environment, an experiment by Storm and Caird (1967) demonstrated a state-dependent effect in a serial learning task with chronic alcoholic subjects. Subjects learned a list of twelve two-syllable common nouns under the influence of alcohol or without any alcohol. Forty-eight hours later subjects were tested by having them relearn the same list again either under the influence of alcohol or not. Retention was worse in the groups whose relearning state differed from their learning state. In a similar vein, Goodwin et al. (1969) reported a decrement on a number of memory tasks if the subject's state, drunk or sober, was different on learning and recall occasions. These authors also reported examples of alcoholic subjects secreting money and alcohol when drunk, which they were unable to find when sober. However, they managed to recall the hiding places when they were on their next binge. It has also been shown that memory for events is better when the subject is in the same mood as they were at the time of the original event (J.E. Eich 1980; Teasdale and Russell 1983). Baddeley (1990) discusses the experimental work underlying these concepts.

Schacter et al. (1982) treat personal identity in a similar way to external context. They studied a fugue patient, PN, who effectively had access only to autobiographical memory of events that occurred during a period of his life when he had the nickname 'Lumberjack'. Schacter et al. (1982) invoked Estes' (1972) notion of hierarchically organised 'control elements' that can activate or inhibit specific kinds of information that are nested under them. They speculated that the name is 'the ultimate control element' that gave PN access to his 'Lumberjack' days. We can use the general principle here without the particular theory, and suppose that 'self', through the name, acted as a context in a similar way to place or mood in facilitating recall of autobiographical memories. However, while place and mood influence the likelihood of recall, the self cue sometimes seems able to act in an all-or-nothing fashion.

Retrieval and forgetting in the Headed Records framework

Normally, when we take part in an event, we encode information about the event, its context and the outcome. Such information is stored in memory. The function of these memories is to enable us to anticipate and recognise a similar event next time it occurs and plan our actions accordingly. We will also be able to produce a representation of it on a subsequent occasion (recall). Morton et al. (1985) talk about a memory *record* for each event. When trying to recall an autobiographical memory, our central processes search the set of records with some information, which, following Norman and Bobrow (1979), I will call a *description*. So, if I ask you who you were with when you last went to a restaurant, you might search with the term 'restaurant'. It is commonplace that autobiographical memories are not always easy to recall and you may have to think about restaurants you know or friends you dine out with before you get the answer. One possible reason for this difficulty is that not all the information in a record is available for searching. That which is available we term the *heading* (Morton et al. 1985). Successful access to a memory record relies on some level of matching of the description with a heading. Following such a match, the record can be retrieved and processed. The relationship between heading and description is what underlies the context- and state-dependent memory phenomena described in the previous selection. Thus, I suppose that aspects of the context and the individual's internal state are routinely represented both in the headings and in the descriptions. So, the likelihood of a successful match to the target record would be increased when the external context and/or the internal state are the same.

On a computer, headings would correspond to extended file names. Searching file names is far quicker than searching for a word or phrase in a file, as long as the file names are well constructed.

Within this minimal framework, there are a number of ways in which apparent forgetting can occur.

1 No record laid down – this would happen if the processing was interrupted before the record could be stored. This can happen following a blow to the head, and may occur as a result of mental shock, such as being threatened with a weapon.
2 Poor encoding – if attention were elsewhere, particular information may not be registered: a record would be made of the relevant event but there could be significant gaps in it.
3 The information is lost through some process of physiological decay.
4 Retrieval is blocked:
   (a) The normal operation of the retrieval system is such that successful access to a more recent memory record with a similar heading will block access to the target record. This is the principle behind the 'misinformation effect'. This is where subjects experience an event and later are presented with incorrect information about the event. This leads to erroneous recall about the event when the misinformation is retrieved instead of the event itself (Bekerian and Bowers 1983; Loftus et al. 1978).
   (b) The description is appropriate, but there is executive censorship which inhibits the search process.
5 The description does not match the heading – a particular meal you are trying to recall may be classified under the name of the person you were with. If you are searching using the name of the restaurant, there would be no match and no retrieval.
6 The record is retrieved but conscious access is blocked. In this case, the material in the record can be processed in certain ways. For example, there might be an affective response. However, there will be other ways in which it cannot be processed, for example, explicit recall. We will say more about this in the following paragraph. This kind of apparent forgetting corresponds to repression, and contrasts with dissociation, wherein the material is not retrieved at all. Dissociation would arise where conditions 4b or 5 (above) were systematic.

In Figure 5.1, I have diagrammed a simplified version of the relevant aspects of our cognitive processes. The general layout is not controversial. At the centre is a buffer store. Effectively, this is where information which comes in from the environment is interpreted in the light of our previous knowledge. The processing in the buffer store is controlled by the executive. This is responsible for formulating the descriptions, the material used to search the record system, as well as deciding what the current priorities are so far as processing is concerned. In addition, the executive will decide which of the material in the buffer store is allowed into the monitor. Effectively, only

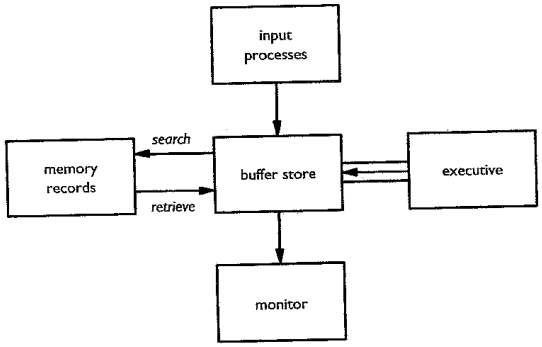

Figure 5.1 A minimum architecture for cognitive processing: the executive contains instructions for controlling the processing of information in the buffer store

material which is allowed into the monitor is available for conscious access. Thus, one of the properties of this system is that material can be retrieved from the memory records and processed in the buffer store without being available to consciousness. This would happen either because the monitor is occupied with other material which has precedence or because there are explicit prohibitions against particular material. Such a prohibition is given as an account for post-hypnotic amnesia. In one experiment, subjects are asked to produce free associations to a list of words. Then, under hypnosis, they are asked to forget about the task they have just performed, but then are given the task again. After this instruction, hypnotically susceptible subjects typically report no recollection of the first task, but nevertheless take much longer over their responses than would be expected if they had no knowledge whatsoever of the first task. In addition, they repeat the response they made the first time round far less than would be expected by chance. The conclusion is that their executive processes are trying to avoid producing the same response as before, an operation which takes time even when it is not consciously employed. Of course, they could not avoid the response unless they had retrieved it in the first place (Smith et al. 1999). This illustrates the phenomenon of repression, mentioned above. With dissociation, no material would reach the buffer store.

We are now in the position to make the bridge to DID. While discussing the effect of context, above, I mentioned the 'lumberjack' case of Schacter et al. (1982). These authors concluded that some notion of *self* could operate as a determinant in the retrieval of autobiographical information. We could generalise from this and suppose that all autobiographical

memories contain some representation of our *self* in the headings. Equally, we can suppose that there is a default representation of *self* in all descriptions when we search for memory of actions. The advantage of this is that we will preferentially retrieve autobiographical information relevant to our own experience rather than events we have observed or heard about second- or third-hand. This would be especially useful in childhood, where it might be very inappropriate to act directly in a dangerous situation using methods learned from observing a parent or reading a comic book.

The next stage is to decide how to think about the phenomenon that a particular personality state is 'in control' at any time. While some of the phenomenology is impossible to handle at the moment (it is fair to say that the 'problem of consciousness' has resisted solution in information processing terms up to now) I find it convenient to imagine an analogy with a computer which has a number of users. Only one user can be logged in at any one time, and each user has privileged access to their own files and, occasionally, particular programs. There will, however, be programs and files which can be shared by all users. The personality state in control will, then, be able to report whatever is allowed into consciousness.

From this position it is natural to postulate that, in the case of DID, alternative personality states each have their own *self* markers. Such a marker would be present in the headings of all autobiographical memory records created while a particular personality state was in control. It would also be present in any *description*, the material used to search memory. Thus, at least, there would be a strong bias towards a particular personality state retrieving autobiographical memories which had been laid down while it had been in control. In the limit, it might mean that a personality state could only retrieve such memories and no others. In this case, we would say that there is a full dissociation.

Memory in DID

This, then, is the theory. What about the actual phenomena? Personality states in many patients claim that they experience only events that occur when they are in control and seem not to be able to recall what happened when other personality states were in control. The following dialogue between me (JM) and one of the personality states of KN illustrates the dilemma they find themselves in. Note that BN is one of the other personality states, and A is KN's daughter.

JM: So, tell me . . . what do you remember about today? . . . What was the first thing you remember doing?

KN: Looking around to see where BN was. To see if she was going to take A to school. She wasn't there, then I knew I had to do it.

JM: Sometimes she is there, is she?

KN: [puzzled pause] No. I've never seen her, but I said I'd help out with A and what she tends to do is just dump A and she's gone.
JM: And leaves her with you?
KN: Yeah. I said I'd help out because, because she found it a lot to take on.

Huntjens et al. (2003: 291) argue that 'the patients' denying knowledge of stimulus material learned by another identity should be taken not as objective evidence for an episodic memory impairment in DID but rather as a representation of the patients' subjective experience of amnesia'. Within the model presented above, it could be that the material presented to another personality state is not accessed, or that it is accessed but prevented from entering consciousness. We are interested in distinguishing between these two options. If the material is accessed and is present in the buffer, then it will be able to interfere with processing, even though the event it came from, springing from another personality state, is not acknowledged in consciousness. With the right experiment we can distinguish between these two. In order to control for the possibility of feigned amnesia, it is also important that any experiment include a control group of subjects instructed to pretend to have DID symptoms.

Ludwig et al. (1972) extensively studied one patient with DID symptoms. They found evidence that material learned in one personality state influenced its processing in other states, that is, there was a practice effect across states. They also found distinct differences between personality states in the way emotionally laden words were processed in memory, although emotionally neutral material was processed similarly across states.

Silberman et al. (1985) adopted the approach of assuming that interpersonality amnesia should facilitate 'compartmentalising' memories, and thereby facilitate correctly discriminating lists of words learned by different alters. Each of two alters first learned a list of words, and then both were subsequently tested after a two-hour interval. Although their overall recall and recognition performances were similar to controls, DID subjects did no better than controls in correctly assigning learned words to the personality that had learned them; their patients reported no awareness of hearing stimuli read to a different alter. Despite the subjective experience of separateness and amnesia reported by the DID subjects, there was no evidence of highly dissociated memory operations suggesting such memories had substantially 'leaked' between alters.

The most crucial experiment is that by Huntjens et al. (2003). In this study, one personality state was first of all presented with a list of twenty-four nouns and then asked to recall them. The same list was presented twice more to the same personality state, each time followed by free recall. This is List A. Following this, the second list, List B, was presented in a similar way to another personality state who claimed no knowledge of the first one. The second part of the experiment took place a week later without warning.

It involved the subject being presented with single words and saying whether or not they thought the words had occurred the previous week. The recognition list was made up of all the words from Lists A and B and an equal number of distractor words (new words from the same semantic categories), adding up to ninety-six words. We would expect normal subjects to recognise words from Lists A and B more or less to the same extent, with perhaps a small advantage for the List B, which had occurred more recently. By contrast, very few of the distractor words would be accepted.

Now, let us consider what might happen with DID patients. We have two personality states, X and Y. In the first part of the experiment, state X will be taught List A and state Y will be taught List B. For the second part of the experiment, Huntjens et al. (2003) ran the recognition test on state Y. If the state relationship is dissociative, the subject should recognise the B words as being old but should treat the A words as being new. In other words, there should be no differences seen in the responses to the A words and the distractor words.

Huntjens et al. (2003) ran the test on twenty patients with a diagnosis of DID, where at least one of the identities was reported being completely amnesic for the events experienced by the other participating identity during the experiment. In addition, the experiment was run on fifty normal participants. Half of these were a simple control group and the other half were asked to simulate dissociative amnesia.

For our purposes, the important part of the data is the recognition performance from the second week. In particular, we are interested in whether or not the List A words are rejected, as they should be if the DID patients are fully dissociative. In fact, on average, the DID group accepted 65 per cent of the B words and 50 per cent of the A words. This compares with a mere 14 per cent of the distractor words. For the simulators, the figures were 80 per cent, 69 per cent and 18 per cent respectively. For the controls the figures were 94 per cent, 91 per cent and 22 per cent respectively. For all groups the B words were accepted more often than the A words and there were no differences among the groups in this respect.

The important result is that the level of hits on the List A words for the DID group was well above the level for the distractor words. If there had been a strong dissociation between the personality states, then the A words and distractor words would have been at the same level. It was also the case that the mean values accurately represented the individual scores. There were no individual patients who behaved as one would expect from the dissociative assumption and treated the A words in the same way as the distractor words (Rafaële Huntjens, personal communication). Equally, there was no simulator who was able to achieve the equivalent goal. The differences between the groups in the overall level of performance need not concern us.

Huntjens et al. (2003) comment:

> Our results contrast with the reasoning of Eich et al. (1997) and Peters et al. (1998), who claimed that amnesic barriers between identities do show up in explicit memory tests using neutral material. However, we wish to emphasize that the memory measures used in the studies by Eich et al. and Peters et al. should be taken primarily as a representation of the patients' subjective report of interidentity amnesia, whereas the measures used in this study index objective memory performance.
> (Huntjens et al. 2003: 295)

Nevertheless, Huntjens et al. thought that the relative lack of compartmentalisation which they found may have been due to the fact that most of the stimuli were emotionally neutral.

I have produced an English version of the first of these experiments and initially ran it on control subjects, largely from the undergraduate population of University College London. There were two groups of subjects. One was instructed about DID and were otherwise treated in the same way as the simulators in Huntjens et al.'s experiment. The second group were given instructions after the initial free recall training on List A according to a directed forgetting protocol. This is to the effect that the material just learned is to be forgotten. Such instructions have proved effective in inducing apparent forgetting in a number of paradigms. In the event, neither group was able to distinguish between the two word lists. The simulator group responded to the words in List B 61 per cent of the time, with List A 48 per cent. The distractor words were accepted only 13 per cent of the time. For the directed forgetting group the respective figures were 59 per cent, 52 per cent and 14 per cent. As in the case of the Dutch subjects, there were no individuals who were capable of performing the task successfully.

This experiment was carried out with KN. To start with I had the cooperation of two of KN's personality states, PN and BN, who denied all direct knowledge of each other (they had exchanged emails). On the first day, PN learned List A and BN learned List B immediately afterwards. No mention was made of any recognition memory test. The following week, using the Huntjens et al. (2003) design, the recognition memory test was run with BN. The data were List B 71 per cent; List A 13 per cent; distractor words zero out of forty-eight. As can be seen, BN treated the List A words very differently from the List B words and almost in the same way as the distractor words. It should be noted that this result came as a great surprise. I had no reason to suppose that the Huntjens et al. (2003) result would not generalise. However, I had the opportunity to replicate the experiment on the same individual. To start with, the following week, again without warning, PN was given the recognition memory test. Recall that she had seen the List A words two weeks previously. In the test, she behaved as though she had never seen the B words (0/24), accepting the A words 63 per cent of the time. Two of the forty-eight distractor words were accepted.

Table 5.1 Probability of accepting a word as having been presented the previous week

	Huntjens		*UCL controls*		*KN*				*Person with DID*
	DID	*Sim*	*Sim*	*DF*	*Run 1*		*Run 2*		*XY*
					BN	*PN*	*DN*	*JN*	
Target words	0.65	0.80	0.61	0.59	0.71	0.63	0.88	0.83	0.46
Non-target	0.50	0.69	0.48	0.52	**0.13**	**0**	**0.04**	**0.13**	0.58
Distractor	0.14	0.18	0.13	0.14	0	0.04	0.13	0.21	0.04

The experiment was begun a second time a week later with two different personality states who also claimed no knowledge of each other. JN learned List A and DN learned List B. The following week, again, without prior warning, DN was presented with the recognition list. She accepted 21/24 (88 per cent) of the List B words, but only one of the List A words. She accepted 6/48 (13 per cent) of the distractor words. The Christmas break then intervened and it was six weeks later before JN could be given the recognition words. She scored 83 per cent with the A words, 13 per cent with the B words and 21 per cent with the distractor words. The larger score with the distractor words could probably be ascribed to the extra time between the learning and the recognition memory test. The complete experiment was run on one person with DID, XY, who scored 46 per cent on List B, 58 per cent with List A and 4 per cent on the distractor words. Like the Dutch patients and all the control subjects, she was unable to discriminate between the two lists.

The data from this experiment are summarised in Table 5.1. It is clear that only KN has been able to distinguish between the two lists. There are two possible explanations for this. The simplest is that her individual personality states have no access at all to material presented to other states. Thus, it is as if the words from the other list have not been presented. This is a full dissociation among the personality states which were tested. The alternative explanation is that KN has a most extraordinary memory which reveals itself in this design but not in straightforward tests of memory, where she is average. Let us consider the achievement. By the time JN was given the recognition memory test KN had seen both Lists A and B six times each in the course of the free recall learning. Then she had responded twice positively and once negatively to the B words and once positively and twice negatively to the A words. All this had happened between six and ten weeks previously. In contrast, no one else has been able to discriminate the two lists just one week after the initial presentations.

It is clear from these data that KN has a deeper inter-state amnesia than anyone else who has been tested using this technique. In terms of the model presented above, the simplest conclusion is that all the patients tested apart from KN are retrieving the memory of the list learned by the other

personality state. This material is not allowed into the monitor, and so the individual reports that they have no knowledge of the learning event. However, since the material has been retrieved, and is in the buffer store, it interferes with the task. This is what I have called repression.

Kong et al. (2008) obtained similar results with a further seven DID patients. In this experiment the alter A heard a list of twenty-four neutral words. Shortly after, alter B heard a different list of twenty-four words. A few minutes later alter B saw both sets of words with distractor words in the same way as in the Huntjens experiment. The subjects all accepted a significant number of the A words as being familiar. Similar results were obtained using a physiological response by Allen and Movius (2000), who had alter A learn six words, then switched to alter B, who also learned six words. Then these twelve words and some others were presented to alter B while electrical activity in the brain (ERP) was measured. The ERP activity which followed presentation of the A words was consistent with them having been recognised, although alter B had no conscious recollection of having seen them. This last experiment differs from the Huntjens design in that the lists were very short and the time-scale was immediate, but the result is the same. In terms of the model, we would say that the A words were retrieved into the buffer store and so could exert an influence on the system, although information relevant to the event when these words were presented to alter A was not allowed into the monitor.

The words used by Kong et al. (2008) and by Allen and Movius (2000) were also neutral. Huntjens et al. (2003) speculated as to whether their failure to find dissociation in their experiment was because they had used neutral words. Huntjens and colleagues went on to explore what would happen when words with an emotional content were used in a similar experiment. These included negative words, including sexual ones, and positive words such as 'blossom'. As in the previous experiment, patients subjectively reported complete inter-identity amnesia for the material studied (Huntjens et al. 2007). As with neutral material, however, they found no objective evidence for inter-identity amnesia, treating the words presented to the other alter in the same way as the words they had learned themselves. These authors conclude that dissociators 'seem to be characterised by the *belief* of being unable to recall information instead of an actual retrieval inability' (Huntjens et al. 2007: 788, emphasis in original).

Conclusions

Personality states of DID patients appear to have no conscious recollection of words presented in a list to another alter. On the other hand, with one exception, they cannot distinguish between such words and words they had seen or heard themselves. It seems that we have to conclude, in the terms outlined in Figure 5.1, that, for stimuli of this type, the material is retrieved

from the memory records and is processed in the buffer store. Why are they not conscious of the origin of such material? As mentioned in the previous paragraph, Huntjens et al. (2007) suppose this to be attributable to the patient's belief concerning their own memory. They would need to add that the belief itself is not necessarily conscious. For example, some alters regard the whole idea of DID to be ludicrous. To attribute memory loss to belief, then, is not as simple as it sounds. To consider the matter in terms of a cognitive model is less philosophically dangerous. In introducing the Headed Records model, I mentioned that the executive was responsible for controlling the initial access to material and then for controlling whether retrieved information is allowed into the monitor, and thence consciousness. Conditions for conscious recall could have been set up well in the past, and their current operation would not resemble what we would normally regard as a 'belief'. Nevertheless, for all except one of the people with DID who were tested with various versions of the word list experiment, the material was retrieved from memory and not allowed into consciousness. For this, the appropriate term seems to be *repression*. The exception is KN. Her alters did not seem to be at all affected by material presented to others. The conclusion in this case is that the material from other alters is not retrieved into the buffer store at all. In this case, then, we find *dissociation* between alters, even with word lists.

There are two final issues to be discussed. One of them has to do with possible differences between word lists and other material. The second has to do with the difference between KN and the other DID patients. Most of the experiments described here have involved lists of words. These are fairly primitive stimuli. Huntjens et al. (2007) attempted to complicate the material by including emotional words. However, the stimuli remain simple and it is not clear that we can generalise to other material such as events which engage the individual in interaction with others. It could be that such events, with some DID patients, are unretrievable except by the personality state who experienced them. That is to say it would not be surprising to find an individual with personality states who were repressive for some material and dissociative for other material. Indeed, it is possible that we would find a graduation of such material, with the most dissociative, as it were, being memory for abuse or other trauma.

Lastly, we should consider the status of KN, who is clearly rare, but unlikely to be unique. We have seen that she is dissociative between alters for the simplest material. We might speculate, then, what kind of difference there might be between her and the other people with DID who have been tested to date. Three broad possibilities would relate to the initial events leading to the dissociation, what has happened to her between then and now and her current circumstances. To go further would involve going outside the framework of this paper. It is clear, however, that DID is a complex phenomenon that will not be subject to any simple account.

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