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A right hemisphere safety backup at work: Hypotheses for deep hypnosis, post-traumatic stress disorder, and dissociation identity disorder

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ABSTRACT

Problem theory points to an a priori relation between six key problems of living, to which people have adapted through evolution. Children are guided through the problems one by one, learning to switch between them automatically and unawares. The first problem of raising hope of certainty (about the environment), is dealt with in the right hemisphere (RH). The second of raising hope of freedom (or power to control), is dealt with in the left hemisphere (LH). Here adventurousness and ignoring the goodness of outcomes potentially create recklessness. When uncertainty rises the RH activates a *backup* with an *override* that substitutes immobility, takes over sensory inputs, but allows obedience to parental commands, and a *cut-out* that stops new work on the freedom problem. Support for the use of the backup by infants is found in the immobility that precedes the crying in strange conditions, and in childhood EEGs. The hypothesis that the backup is active in deep hypnosis imposes accord on findings that appear contradictory. For example it accounts for why observations during deep hypnosis emphasize the activity of the RH, but observations of responsive people *not* under hypnosis emphasize the activity of the LH. The hypothesis that the backup is active in post-traumatic stress disorder (PTSD) is supported by (a) fMRI observations that could reflect the cut-out, in that part of the precuneus has low metabolism, (b) the recall of motionlessness at the time of the trauma, (c) an argument that playing dead as a defence against predators is illogical, (d) the ease of hypnosis. With dissociative identity disorder (DID), the theory is consistent with up to six alters that have executive control and one trauma identity state where childhood traumas are re-experienced. Support for the cut-out affecting the trauma identity state comes from suppression of part of the precuneus and other parts of the parietal lobe when the trauma identity state is salient and a general script about a trauma is listened to. Support also comes from the ease of hypnosis. The cut-out acts independently of the override. It is linked to low metabolism at the same point in the left precuneus by evidence from all three conditions, hypnosis, PTSD and DID. The concept of dissociation is not required with any of the hypotheses.

Introduction

The central hypothesis in problem theory is based on a simple a priori logical relation between six general problems that people face in everyday life, called the *key problems* [1–3]. They involve raising *hope about* six vague targets, five of which are shown on the left of Fig. 1, and fairness, which is on the bottom right. Hope about something is regarded as its subjective probability, in other words, its expected likelihood. It is assessed as things stand that is, ignoring any fresh work that might be done on the problem.

The problems are arrived at by the successive division of the overall problem presented by life. At the top of the diagram, the overall problem presented by the world is divided into two. On the left hope is assessed from what happened during rest, or in settled repetitive conditions where attention was not given to how the activity was produced. On the right hope is assessed from what happened when one was active and attention was given to how effects were produced. Assessing hope from what happened, when settled, leads to the certainty (of knowing the environment) problem, at the top left. Assessing hope from what happened when one was producing effects and attending to how it was done leads to what is called the certainty remainder, at the top right.

Moving down to the next level of Fig. 1, the certainty remainder is divided according to whether or not the goodness of the effects is considered when assessing hope. If the question of the goodness of effects is ignored this yields the freedom problem on the left. If the goodness of effects is considered then this yields the *freedom remainder* on the right.

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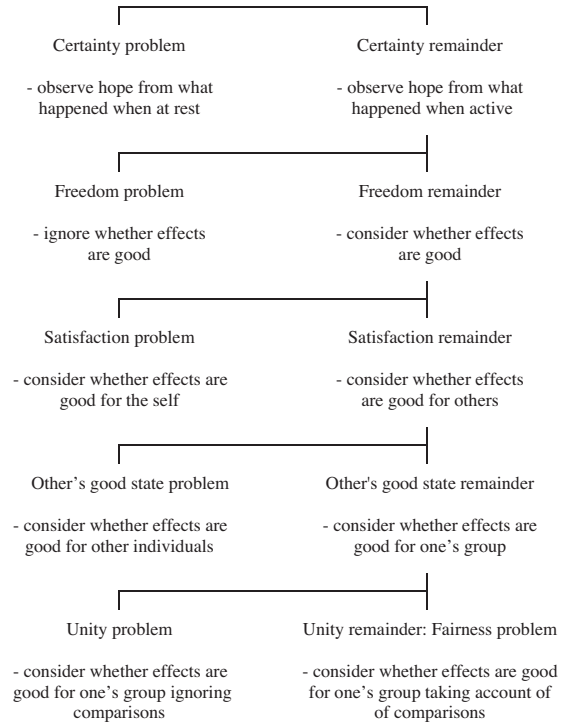

Fig. 1. The first five key problems are on the left, and the sixth, fairness, is on the bottom right. They are produced by successive subdivision of the method of assessing hope. The first subdivision is between the *certainty* (*about the environment*) *problem* where hope is assessed from what happened when at rest or in some settled repetitive activity, and the *certainty remainder* on the top right, where hope is assessed from what happened when active and when attempts were made to produce effects. The second key problem that of freedom and power to control, is arrived at by ignoring whether the effects are good, when hope is assessed, and so on. The various steps represented in the figure reflect decisions about the assessment of hope that are made by the child. (From *Human Development: Childhood, Adolescence, and Personality, in Terms of a Unifying Theoretical System*, p. 22, by G. Burnand, 1993, High Wycombe, UK: Leadership. Copyright 1993 Gordon Burnand. Adapted with permission.).

Moving down Fig. 1 again, the freedom remainder is divided according to whether the effects are good for the self or good for others. If the effects are good for the self this yields the *satisfaction problem* on the left. If they are good for others this yields the *satisfaction remainder* on the right. The remaining key problems are arrived at in similar ways.

The key problems are divided clearly from one another by changes in aspects of the method of assessing hope. The changes are simple and such that the brain might be able to guide a child through them. Hence human beings could have exploited this by evolving the requisite brain structures and predispositions. According to problem theory they have done so. The core theory has been developed further recently [4].

If the theory is true, then attention is likely to focus on the key problems again and again in different contexts. Indeed some isolated societies each appear to have been preoccupied with one particular key problem. Reports of behaviour in them were used to help in developing lists of strategies. The strategies are patterns of behaviour that are expected to help with each of the key problems. Further small modifications to the lists were made when other research areas were reviewed, as when newly created small groups were shown to work through each key problem in turn.

A review of the change of children's behaviour with age, using the strategy lists, indicated that children do work through the key problems [5]. The nature of the data did not permit establishing a level of statistical significance. However the main source of data of child development was that collected by the Gesell Institute, and a major contributor to the data was Ames [6]. She studied the review and described the fit to the main body of the data as better than that of other theories that she had considered.

Thus children work through all six problems, with 18 months on each, and then repeat the sequence at least once more. There are three phases with each key problem. First there is a *clarifying phase* where the work on the key problem, on the left of Fig. 1, and that on the corresponding remainder, on the right, are clarified. Second there is a *narrowed phase* where only the key problem receives serious attention. Third there is a *rejecting phase* where serious attention alternates between the problem and its remainder, in accord with changes in the environment. At the end of this phase the key problem is rejected, leaving only the remainder. During the rejecting phases children learn to switch between problems.

Each of the problems requires a different set of strategies, and this leads to distinct learned patterns of behaviour for each one. These have been called *schemas*, one for each problem. The six schemas are especially evident in how small groups of people change with time. These pass through the same phases as children but more quickly. Observers report that they change from one pattern of behaviour to a distinctly different one "mercurially", in unison, as if unaware of the reasons for the change [7,8].

An RH safety backup

With the freedom problem hope is assessed from what happens when the infant is active and producing effects. Goodness, which will depend on outcomes generally and requires taking account of other situations, is ignored. Hence the infant can concentrate entirely on the present situation and maximize achievement. A listed strategy is *using the freedom that one has*. This would maintain one's belief that one can behave in diverse ways and would remind other people of one's rights to do so. Yet, the resulting adventurousness, together with ignoring the goodness of outcomes, could lead to recklessness. Thus a *backup* is needed that helps to avoid this. Without it the theory would be untenable in its present form.

Work on the certainty problem derives from the right hemisphere (RH), primarily the right temporal lobe. Work on the freedom problem derives from the left hemisphere (LH), primarily the left parietal lobe. The two hemispheres can function independently, though with the RH more dominant, up to 3 years. Thus the backup is provided by the RH acting on its own. The relative dominance of the RH means that it can operate the backup for all the time that the child is working on the freedom problem [2,9–11]. It is assumed that the RH retains the ability to operate the backup in later life, whenever the freedom problem comes to the fore, as when progress is frustrated.

There is an *override* that immobilizes the infant and takes over sensory inputs, but allows obedience to parental commands. It is assumed that the override operates when the assessment of hope of certainty by the RH, specifically the right temporal lobe, falls too low, and hence stops the infant engaging in something hazardous. There is a *cut-out* that suppresses new work on the freedom problem by the left parietal so as to protect skills and avoid unhelpful coordinations.

Support from observations of childhood

The override is reflected in the well-known behaviour of infants. Thus immobility, soon accompanied by crying, occurs reliably when the infant is left alone in a strange place. If the infant is attached to some object, such as a toy or blanket that is known to be nearby, the reaction is delayed. The pattern of behaviour

continues through the freedom phase. As being in a strange place lowers hope of certainty, the immobility and crying will reflect a decision that hope of certainty has fallen too low. Although a readiness to respond to parental commands is assumed to be present, this might be obscured by the independence and negativity associated with the freedom problem at other times, where the favorite word is "No."

Evidence of the backup also comes from changes with age in the EEG as reported by Thatcher [12]. Graphs of the growth in the coordinations between pairs of sites, in the theta band, match changes in the work on the problems, as judged from overt behaviour. Thus the coordinations that were important between 18 months and 3 years reflect work either on the freedom problem or the backup. (The measurements were in terms of coherence. However they imply coordination between the sites involved and talking about this rather than coherence is more meaningful.)

Now work on the freedom problem involves activity in the LH and primarily the left parietal lobe. Thus one linked set of EEG coordinations P3-F3, P3-T3, P3-F7, and T3-Fp1 [11, p.237], varies with the changes in work on the freedom problem, according to overt behaviour. As the node, the central site, P3, is close to the parietal lobe, they can be identified with work on the freedom problem and outputs to other parts of the LH.

The coordinations T6-T5, T5-C3, and C3-C4, also vary in accord with the work on the freedom problem but do not appear to be part of it. Yet they are well placed to reflect the override. Thus C3 is close to the area controlling the right hand. Also T6 is the node of the coordinations that match overt work on the certainty problem, namely T6-T4, T6-Fp2, T6-F8, and F8-O2. This is consistent with the override being controlled from the right temporal lobe.

An inter-hemispheric coordination P3-P4 [11, p.248] also varies in a similar way in this age range. However other evidence points to the work on the freedom problem being confined to the LH. Thus this coordination might reflect the cut-out, which switches off new work on the freedom problem. As it appears to be triggered via the right parietal lobe, it is as if the RH uses the right parietal in determining when to operate the cut-out. Hence the cut-out could depend on the likelihood of useful work being done, and depend on drowsiness and the presence of distraction and could precede the override. The prominence of these coordinations implies that the backup is often called upon and plays a major part in the life of the two year old. It is as if the override and cut-out must often operate without the infant crying.

Summary of the features of the backup

The backup will only become active when the person is working on the freedom problem, either past experiences have led to a preoccupation with the problem or the present situation is frustrating and forces a temporary switch towards it. It has two components, an override that is triggered when uncertainty is high and a cut-out that is triggered by conditions that impair the activity of the parietal lobe in dealing with the freedom problem. The cut-out might be active before the override, such as in drowsiness or distracting conditions. When the cut-out and override are active there is expected to be increased responsiveness to commands or suggestions, as if from parents. The override is triggered from the right temporal lobe and the cut-out is triggered via the right parietal lobe and each involves some identified EEG coordinations.

The hypothesis that the backup is active in hypnosis

Hypnosis is regarded as a state defined by the surrender of independent thought, in that suggestions such as that an arm is weightless are acceptable. This can be expected when the override is operating. Firstly obedience to parental commands was assumed to occur and suggestions might be interpreted as commands. Secondly when the override is active the RH will then be in control on its own and can be expected to be uncritical. Thus the RH deals with the certainty problem on its own in the first 18 months. From 18 months to 3 years the freedom phases occur and the LH has control of activity. During this time the RH could, and it is assumed that it does, continue to analyze the available incoming information, building up the ability to predict the environment and an understanding of language, but without speech. It is assumed that after 3 years the certainty schema acquires speech and voluntary control from the LH during switches back to the certainty problem at times of uncertainty. Yet the RH, when operating on its own, is left with a primitive version of the certainty schema, which some understanding of language, but little speech and no critical thinking. In addition it could use the certainty strategy of *fitting in with others' requests and expectations* so as to stabilize the situation.

The induction process can be expected to trigger the override. It typically requires the participant to fix the gaze on a point such as the tip of a pencil, and the point chosen can be an awkward one to look at. In one study it was a spot on the ceiling that was "slightly strenuous" to look at [13]. In time, this will become fatiguing and frustrating and lead to a switch to the freedom problem, at least with some people, making the backup available. The assessment of hope of certainty by the RH could go down with time in the strange hypnotic situation, because the overall conditions will become less and less like anything that has happened before. This will trigger the override in people who are working on the freedom problem. The override is expected to lead to immobility, apart from obeying commands and fitting in with suggestions. Indeed people in hypnosis have been described as cataleptic. In contrast children fidget, implying that what is regarded as hypnosis with them does not involve the override [14].

The override is associated with deep hypnosis. Thus, surprisingly, when studied in terms of EEG microstates by Katayama and colleagues [15], deep hypnosis was found to resemble recurrent confusion (schizophrenia: the term recurrent confusion is preferred because the nature of the word schizophrenia distorts its usage). Microstates take account of all the EEG information at the same time and last about 75-120 msec. They are associated with different patterns of electrical potential across the scalp. A high variation in potential on one side will be regarded as indicating a high coordination there. In normal inattentiveness the microstates where both hemispheres have low coordination are long and frequent. In deep hypnosis and recurrent confusion it is the opposite.

In a previous article [8], it was argued that, in recurrent confusion, there are strong pressures to work on both freedom and certainty problems at the same time. Similarly the backup is only triggered when the freedom problem is salient and when strange conditions lower hope of certainty, so that again there is pressure for work on both problems. Hence similarity between the backup and recurrent confusion can be expected. Yet there must also be a distinct difference between them, and this could only lie in their order. It is as if the sequence of microstates rehearses the story that lies behind the present state. With the backup the sequence is (a) coordination only on the left, as with the freedom problem, making the backup available, (b) coordination on both sides, when uncertainty rises and triggers the backup, to (c) coordination only on the right from the backup. With recurrent confusion it is (a) coordination on both sides and then (b) coordination on one side or the other, so as to gain relief from uncontrolled competition between the hemispheres.

The study of microstates led to a clear distinction between light and deep hypnosis. Light hypnosis was induced using suggestions of relaxation and well-being, and the microstates resembled those of meditation. With both, microstates that implied inattention, and

ones that implied coordination only on the right, were long and frequent. It appears that that light hypnosis might reflect the cut-out operating ahead of the override, such as because of drowsiness. The cut-out will lead to failure to engage in new work on the freedom problem and this means that a strange suggestion that has not been considered before cannot be rejected. However the coordination in the RH implies that it is alert and this raises the possibility that an entirely different mechanism comes into operation, where the RH acts as a sentinel to a drowsy LH. This would allow a rapid response to some simple command from a lookout, followed by a fairly quick recovery of full abilities. Still the cut-out is expected to come into operation in sufficient drowsiness. This could lead to light hypnosis having two stages.

The distinction between light and deep hypnosis receives strong support from the study of tasks that are performed under hypnosis, using senses on one side of the body or the other. This applies to dichotic listening studies where the errors from using each ear separately are compared. With light hypnosis the LH is drowsy and the RH more coordinated and alert, whether or not the cut-out is operating, this will lead to more errors with the right ear. With deep hypnosis all sensory information is dealt with by an alert RH, so there will be little or no difference of errors. This leads to an inverted V relation between depth of hypnosis and right ear error. This means that differences in findings can be attributed to differences in the general depth of hypnosis. Thus with a generally weak induction, a shallow level leads no difference from normal behaviour, with similar errors in both ears, but a deeper level leads to light hypnosis and to more right ear error [16,17]. With a generally strong induction, a shallow level leads to light hypnosis and to more right ear error, but a deeper level leads to no difference between the ears [18], and the correlation between depth of hypnosis and right ear error is negative [19]. In a study where there were two successive experiments with the same participants, the first with music and the second with words, the induction will have been more effective with the second study, because of practice effects. Thus in the first study deeper hypnosis went with more right ear error, as for light hypnosis. Yet in the second study, where more participants would have been in deep hypnosis, there was no overall effect of depth of hypnosis on error [20].

In addition, with the override operating, one can expect greater time delays with sensory information that usually goes to the LH, because it is now diverted to the RH. Thus sorting letters and numbers by hand, with eyes closed, was faster with the left hand, in spite of being faster with the right hand normally [12]. The excess time for the right hand correlated positively with a scale of depth of hypnosis, indicating that the finding applied to deep hypnosis. In another study, 50 msec longer was needed, during hypnosis, when a task was presented in the right as opposed to the left visual field [21]. Information from the right visual field goes first to the LH, and hence it would have to travel further in the brain when the override is active. (Here the use of four questions about the effectiveness of suggestions, so as to check the depth of hypnosis, implies that the hypnosis was deep.) Consistent with only the alert RH processing all the information during deep hypnosis, the error frequency was exactly the same whichever visual field was used.

Studies of blood flow and hence the metabolic rate using positron emission tomography (PET) or functional magnetic resonance imaging (fMRI) have typically involved suggestions that are given during hypnosis. These create tasks for participants and lead to energy requirements that might obscure the effects of hypnosis itself. Indeed it has been claimed that the wide divergence between findings can be attributed to the differences in the suggestions that were used [15].

However the hypnotic state has been studied using PET by Rainville and colleagues without giving a suggestion [22]. Here only participants who scored highly on a scale of susceptibility were used, as if all or most would have been in deep hypnosis. Thus it is expected that the blood flow in parts of the right temporal lobe will be raised, and that in part of the left parietal lowered. In addition the RH uses visual imagery and employs both occipital lobes for this purpose, so that a rise in energy consumption can be expected in parts of the occipital lobes as well [2,6]. These changes were observed and later replicated [23]. The fall in blood flow in the left parietal, which is attributed to the cut-out, was located in the left anterior precuneus, peaking at −4 −64 42 on the Talairach and Tournoux system of coordinates. A close examination of some of the studies involving the precuneus [24] suggested that there is also a peak here, in the vicinity of-5 -62 31, when work is being done on the freedom problem.

The childhood EEG data described earlier linked the override to coordinations between the sites T6-T5, T5-C3, and C3-C4, as if the override is initiated from near T6 in the RH. This will mean that T5 is near a key area of the LH for transmitting control information. Now a part of the left temporal lobe had a fall of blood flow that peaked at −58 −57 2 ($p < .001$ uncorrected), and the finding was replicated [23]. This is slightly anterior to the point on the cortex nearest to EEG site T5 [2]. It appears that a fall of blood flow here must reflect the operation of the override. A fall in blood flow with similar reliability was observed at a part of the left frontal superior gyrus, as if this is involved in the override as well. There was nothing relevant in the childhood EEG data, but this might be because of the late development of the frontal lobes. (In these studies hypnosis was induced using a request for concentration on the hypnotist's voice, rather than for an awkward visual fixation, alongside suggestions of relaxation.)

Although, in accord with the hypothesis, observations that are made *during* hypnosis emphasize the activity of the RH and suppression of the LH, the hypothesis predicts that comparisons of people high and low in responsiveness that are made *outside* hypnosis will emphasize the activity of the LH. This is because the backup is available only to people who are dealing with the freedom problem and this is dealt with in the LH. Also, in accord with the listed strategy of *using the freedom that one has*, when such people are faced with the constraints of the research situation, they are likely to use their only available freedom, that of thought and imagination. Thus when people who are easily hypnotized are studied while not hypnotized, they are found to have high coordinations on the left, such as between the dorsal anterior cingulate and dorsolateral prefrontal cortex [25]. Such coordinations reflect decision making, which is involved in thought and imagination [2]. In addition, ease of hypnosis appears to go with imaginativeness generally [26]. Yet people who are especially concerned about the freedom problem will tend to be generally imaginative, again because this represents a freedom that they have and can use. This counters the suggestion that imagination might play some direct part in deep hypnosis. Instead both imagination and deep hypnosis are associated with concern with freedom and hence the availability of the backup.

Hence, although there is still some uncertainty about detail, there is strong support for the hypothesis. Nothing has been encountered that opposes it and information that could otherwise be highly discordant is successfully integrated.

The hypothesis that the activity of the backup causes post-traumatic stress disorder (PTSD)

If the backup operates at the time of a trauma, this will protect the LH and allow skills to be unaffected. Yet the RH will still be exposed itself and will be affected. Thus the cut-out might come into operation and cause some of the symptoms of PTSD. For example if someone is compelled to avoid the place where the trauma occurred then this implies that new work on the freedom problem

ceases on approaching it and that the cut-out is operating. The cut-out might lead to a state where the boundary between reality and dreaming weakens and flashbacks could occur as a consequence.

Thus an fMRI study by Geuze and colleagues of veterans who were affected by PTSD points to the cut-out being active [27]. A relative lack of activity in the left precuneus, peaking at −10 −65 34 was observed during verbal encoding [28]. This is close to the peak observed by Rainville and colleagues during hypnosis. The link with PTSD was strengthened by a substantial negative correlation ($r = -0.8$) between assessments of the severity of the condition and the activity in this part of the left precuneus.

Unexpectedly there was no sign of the cut-out in fMRI studies that confront PTSD patients with scripts and pictures referring to the trauma. As in hypnosis, where the suggestions that are given appear to dominate brain activity, what participants are required to do might mainly determine fMRI observations here. After habitual avoidance, instructions to engage with the trauma might conflict with the cut-out and facilitate new work on the freedom problem. Thus a meta analysis of several studies even indicated raised activity in the left precuneus [29].

As the override is associated with immobility, there is support for the hypothesis in recent findings that people with PTSD tend to recall that they were immobile at the time of the trauma. Thus Portugal and colleagues demonstrated a strong link between recalled immobility and post-traumatic symptoms in students. They also mention several studies that link PTSD symptoms to recalled immobility [30]. Indeed, in one such study, only the recall of immobility remained a statistically significant predictor of symptoms when confounding variables of negative affect, sex, and time lapse since the trauma, were controlled [31].

Immobility in response to threat is widespread among animals. This might have encouraged seeing it as a final defence against predators, where the immobility causes a predator to relax its grip. Yet this argument is unsound because if a predator does loosen its hold, the immobility prevents escape. Even if it was possible for animals to swiftly recover and dart away, predators would rapidly learn never to let go. A point has been reached where the prey is doomed whatever it does. The evolutionary value of the immobility must lie elsewhere, such as in the backup and its help in curbing recklessness. Indeed if problem theory is correct and human beings have evolved so as to exploit the links between the key problems, then other higher animals, with their similar, even if mostly smaller brain structures, can be expected to have done the same, at least with the earlier problems. They will have the backup as well.

It is reported that responsiveness to hypnosis is relatively high in PTSD [32], consistent with the backup becoming relatively easy to reinstate. Hence this offers further evidence that the backup is active in PTSD.

The hypothesis that the activity of the backup in childhood causes DID

The schemas that develop with each key problem have executive control in their own field of activity, but EEG evidence suggests that the switching between them is dealt with in the RH [2, 3 p.104]. This would explain why it is normally unawares. Deep hypnosis provides access to the RH, and hence access to the switching between schemas. It is also assumed that when the cut-out operates, or even briefly after waking from sleep, there can be some awareness of the world from the viewpoint of the RH, though this is normally soon forgotten. Yet in this way someone could become partially aware of what is in the RH without hypnosis.

Now although work on each of the problems is labelled when the child learns how to separate the problems and control attention to them, the labels are visual images, at least with the earlier problems, and they will be forgotten. Thus the schemas will lack identities. If they are to be told apart, they will have to be provided with identities, either by a patient alone or in conjunction with a therapist. They will then become like people with different personalities. They have been called *alters*.

There is some evidence that alters with executive control derive only from the schemas. Thus it is reported that only six or fewer alters are ever in significant executive control [33]. It has also been claimed that when the number of alters is small, there is a simple linear system of switching between them [34]. The alters can be arranged in a straight line, in their chronological order. There is switching from one alter to the next adjacent one, until the desired one is reached. This is just how children learn to switch between key problems. They go from the problem to its remainder, which is then pruned to become the next problem. Finally each alter has amnesia for memories that relate to other alters. This can be expected of alters that derive from the schemas. The alters can only be expected to recover memories about their own key problem. This is because remembering requires a progression from an attitude to specific detail, and the only available attitude will be one of dealing with the key problem on which the alter is based. Hence there is amnesia for memories that are appropriate to other alters.

The theory appears to imply that the people involved are more likely to have had low hope about the freedom problem as children, because of a restrictive early life. This will have made them prone to return to working on the freedom problem. They will have been working through the later key problems when they encountered traumatic or disruptive events that impressed on them their powerlessness. This will have lowered hope of freedom, turning attention back to the freedom problem. The backup could then become active, protecting the LH, allowing it to give up work on the freedom problem when the traumatic events are over, and permitting a switch back to the later key problem that had been receiving attention. Any memories that survive the switch will have little relevance to problems such as the other's good state and unity problems, and will be susceptible to *turning attention to facts that raise hope and away from facts that lower hope about the problem,* which is listed as a strategy for all of the key problems. The traumatic events will still be linked to the freedom problem and will tend to be remembered when the freedom problem comes to the fore, in frustrating conditions. As they will be associated with the identity of a child they can be thought to have created 'trauma identity state'. Some behaviour patterns that might come to be regarded as alters could result from a preoccupation with the certainty problem. They will be called *c-alters*. Here the childhood is likely to have been unsettled rather than restricted. The traumatic events might be ones that lower certainty, such as loss of a parent or a major environmental changes. The c-alters could come about through the use of the listed certainty strategies of *fitting in with people's requests and expectations and giving people the impression that they want or expect and the story that they want or expect to hear* so as to stabilize situations and gain others' help. Using these strategies could create a large number of c-alters each designed to fit in with particular other people or groups. These c-alters would not involve the backup at all and they need not be seen as part of DID.

The patients involved must be expected to use the strategies of the previous paragraph within the therapeutic situation. This means that it is doubtful whether there can be any way of telling when an alter is real or unreal, just from what a patient says and does. Some people could have both alters and c-alters.

Support for the hypothesis that the backup is active in DID comes from research by Reinders and colleagues that was aimed at demonstrating the reality of DID. Women in treatment for DID who were able to enter into a trauma identity state or into another alter, listened to a general script about a traumatic experience [35,36]. Only when in the trauma identity state were they reminded of their own trauma. They then had raised heart rate and blood pressure (about 10%) whereas in their other alter they did

not, nor did controls who tried to simulate DID. Observations of blood flow via PET indicated distinct differences between the trauma identity state and the other alter and differences from controls, supporting the reality of DID.

Now it must be remembered that there was no insistence that the participants had to think about the trauma. As they would be accustomed to not thinking about it, they would have been able mainly to avoid the new work on the freedom problem that thinking about it would have entailed. Hence the cut-out could have operated and its effects could have been observable. As mentioned earlier, Rainville and colleagues had found a fall in blood flow the left precuneus at −4 −64 42, and Geuze and colleagues had found one at −10 −65 34. This area ought to be affected again. Indeed, using the later reanalysis of their data [35], Reinders and colleagues did observe a fall in blood flow in a substantial area, peaking at −6 −62 30. This was alongside falls in two other areas of the left parietal. The average coordinates for the three studies are −7 −64 35. The cut-out appears to be associated with low metabolism at the same place in all three studies, in spite of the differences between them.

With the override the findings were negative. Although immobility was not deliberately looked for, there was no report of it. Accordingly there were no marked falls in blood flow at the points in the LH that were linked to the override by the data from Rainville and colleagues. Thus the cut-out appears to have been operating without the override.

Overall the data from this study offers support for the hypothesis that the backup is involved in DID and supports the activity of the cut-out being somewhat independent of the override. Finally, as with PTSD, the responsiveness to hypnosis is relatively high [32], as if the backup has been made easy to reinstate.

Conclusion

Problem theory requires an RH safety backup that involves an override that induces immobility and a cut-out that suppresses new work on the freedom problem. It leads to hypotheses that the backup is active in deep hypnosis, PTSD, and DID. With hypnosis there is consistent empirical support from varied sources. With PTSD the support is more limited but strong. With deep hypnosis, PTSD, and DID, lowered activity in exactly the same part of the brain, part of the left precuneus, points to the cut-out at work in each.

There has been no need to use the concept of dissociation.

Conflict of interest statement

There are no conflicts of interest to disclose.

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