Accounting for learning and failure to learn in people with profound and multiple learning disabilities

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This chapter contains an attempt to explore different approaches to cognition and learning, with the aim of seeing how they might help us understand thinking and learning, or failure to learn in people with profound and multiple learning disabilities. Specifically the question addressed in this chapter can be summarised as follows: “why do some pupils with PMLD seem to reach a plateau in the adaptability of their interactive skills from which they appear unable to progress? ” The background theory to all of this could take up many textbooks, and a satisfactory account is probably beyond our abilities, certainly beyond our remit for this chapter. So, we will limit the background to the level essential to understanding the applications and refer the enthusiastic reader to other sources.

We will start by briefly exploring what is meant by cognition and learning.

- Cognition deals with the ways in which we gain information about the world around us, the conversion of this information into forms of knowledge our brains can deal with, the organisation of this knowledge and its use in directing and informing our behaviour.
- Learning involves relatively permanent changes in behaviour which come about as a result of experience.

A comparison of these terms suggests considerable overlap, the extent of which, as
we will explain later, depends on the model of human behaviour we adopt. A very simple, behaviourist approach would suggest that learning is a relatively automatic process brought about by connections between events, such as reinforcement of certain behaviours (as in operant conditioning) or the linking of events in predictable relationships (as in classical conditioning). An alternative account would argue that learning is one of the outcomes of cognitive processes; a product of gaining, transforming and incorporating new information. In other words, cognitive psychologists are interested in such areas as attention, perception, pattern recognition, learning, memory, concept formation, thinking, language and intelligence.

In this chapter we will consider three accounts of cognition and/or learning and how they can help us to understand and develop the thinking and learning of people with profound and multiple learning disabilities. The first of

the three is drawn from learning theory (or behaviourism).The second is a cognitive approach based on developments in thinking from infancy through to adolescence, based on the ideas of Jean Piaget. The third is drawn from a rather more unlikely source; cognitive research on the interaction between adults and complex machinery (Generic Error Modelling System, Reason 1990).

Whether an infant touches a mobile because previous similar actions have resulted in pleasant consequences or because the sight of the mobile activates a "reaching response", depends on the vantage point from which the viewer watches events. Just as reading three accounts of a football match in three different newspapers, often leaves us wondering whether all of the reporters went to the same game! The only confirmation that they did, is that all of the reporters agree which teams were playing and what the eventual outcome was. In the same way, the intellectual processes behind individuals' decisions to act on or intervene in events occurring around them have been explained in a variety of ways. The psychological mechanisms contributing to the use of an action and the manner in which the individual progresses to the point of action, have been viewed from a number of perspectives. At first glance these perspectives may appear to be mutually exclusive. However, this chapter will attempt to draw common themes together, so that a more accessible overview of cognition and learning can be presented. This will ultimately be used to present a view of the experiences of individuals with PMLD in order to suggest strategies for intervention, teaching or therapy.

Learning Theory

As we have identified, the mechanisms that underpin learning have been described from a number of theoretical perspectives. These can provide the reader with an often daunting choice of principles on which to base their understanding. Learning Theory itself has at least two aspects: Classical Conditioning and Operant (or Instrumental) Conditioning.

- **Classical conditioning** is the process "by which organisms learn the structure of their niche and the economic relations that define it" [(Rovee-Collier 1987) Involving the repetitious presentation of a stimulus. It is the mechanism by which the learner learns "which events in nature go with which others" (Rovee- Collier1987). For example, having a feed of milk makes the baby feel comfortable. This might be demonstrated by smiling. The baby, after time, comes to smile at the sight of the mother or other carer, who provides the milk. In this example the taste of the milk is an unconditioned stimulus (or US) whose presence elicits the unconditioned response (or UR) of smiling. By repeated association with the arrival of milk the mother or carer, the conditioned stimulus (or CS), acquires reinforcing properties in her/his own right and elicits smiling (the conditioned response or CR) independent of the milk.

We know from researchers such as Hogg, Remingtyon and Foxen (1979) that many, though perhaps not all, people with PMLD can learn through classical conditioning.

 Operant conditioning may be illustrated by the increase in the frequency in the occurrence of an action associated with reinforcing consequences. For example, if vocalisation by the infant results in attention from adults, the frequency of vocalisation is likely to increase. This view of the learning process " is directly concerned with behavioural control of the environment " and " is best understood as detecting and responding to the causes of important events" (Remington 1996).

The changes in rates of responses which occur during operant conditioning come about " because the organism learns that its behaviour causes the reinforcer to occur." (Remington & Evans 1988). So, from one perspective, the operation of a reinforcer controls the occurence of the behaviour, but, as Remington (1996) observes from another equally valid perspective of this mechanism, the behaviour controls or brings about the consequence (reinforcer). The focus of the process becomes action on the environment to bring about some sort of event, whose occurence in turn increases the chances of the behaviour being repeated.

Jon, a young man with profound learning disabilities, has learned to drink from a cup independently. The teaching strategy used was based on task analysis and reinforcement. People who know Jon believe that they can infer which drinks he likes by observing his facial expression, posture etc. when he tastes the contents of a cup. To their surprise, however, Jon repeatedly accepts and drinks from cups containing drinks that, judging from his facial expression and other affective, but non-intentional behaviour, he does not like. Jon would not accept empty cups and would stop attempting to drink from a cup once he had drained it. But, when the apparently disliked drink constituted more than one mouthful, Jon would return it to his mouth to finish it off. Seen from the view of a behavioural or operant view, the action (of drinking) does not appear to have a rewarding consequence, unless strong secondary reinforcements within the experience were operating. It is also doubtful whether there was any part of the experience whose presence would encourage an increase in any of the behaviours displayed; the experience of drinking anything but unflavoured milk seemed to be one that he intensely disliked.

Some light *may* be thrown on these events when they are viewed from a classical conditioning perspective, where it may be seen that the sight or touch of a cup may have become a conditioning stimulus associated with the anticipated experience of a pleasant taste of milk. This association would certainly be promoted by the experience of 16 years of having caring people supplying him with the drink that they knew he liked. "An available cup" to Jon, was reliably linked to its regular contents. Perhaps, then, occasional failures in this "drink from any cup" protocol (e.g. when the contents were

orange juice) made the association more resistant to extinction through intermittent reinforcement.

There is a long history of approaches to teaching and learning based on this model (e.g. Farrell et al 1992). But the above example suggests that Learning Theory sometimes provides us with only a rather contradictory explanation of learning, or failure to learn, in people with PMLD. A useful discussion of this area, in relation with pupils with severe learning difficulties can be found in Porter, (1996).

Cognitive developmental theory

Alternatively, the more cognitively based perspectives view individuals' actions as attempts, made on the basis of information gained from previous attempts, to achieve repeated or improved outcomes. Piaget (e.g. Piaget & Inhelder 1956) one of the most significant cognitive developmental theorists, described the period from birth until the age of approximately two years as the "sensorimotor period". This was divided into 6 sub-stages in terms of the progressive complexity of the interaction between the infant and its surroundings.

From around the end of the first month of life, the infant is seen as having a small but increasing range of voluntary behaviours, which are performed along with reflexes in association with experiences and sensations monitored both within and in nearby the infant. As the infant accumulates experience of events and becomes progressively more able to interact with them, Piaget proposes the gradual emergence of problem solving strategies. The complexity of these strategies increases, incrementally linked to the child's increasing understanding of the nature of the objects and space. Although Piaget ruled out the possibility of planned problem solving occurring any earlier than the last stages of the sensorimotor period ie those associated with mental representation and, hence, the beginnings of language) infants at much earlier levels of development are seen to be actively involved in the business of acquiring information and understanding about environmental transactions. The infant's acquisition of repertoires of successful behavioural contributions to action sequences and the resulting growing understanding of events was seen to be derived from a process of continual comparison and reapplication of previously applied skills from past experiences to current encounters.

Central to this model of development are the concepts of schemes, assimilation and accommodation. Schemes are seen as richly interconnected and therefore immensely powerful, stored knowledge structures, responsible for governing largely predictable sequences of activity. Initially and in the early stages of their acquisition and performance, schemes make heavy demands on cognitive resources, but this effort is largely deferred as familiarity with their operation increases. (Wadsworth 1996)

Assimilation occurs when we respond to the environment in accordance with our current cognitive structures (Hergenhahn 1988). By doing so we acquire new information which fits neatly into the cognitive structures.
Accommodation, in contrast, is the modification to these structures which occurs when we have an experience that does not fit with the structures as they stand. (The incremental increase in the competence with which infants integrate their actions is clearly described in Sugarman-Bell's, 1978, account of the development of pre-verbal communication). Infants' encounters with objects and events reflect their emerging ability to integrate themselves with progressively more complex occurrences. Increasingly, the learner can be seen to be able to accommodate more factors into its world picture so that gradually, the integration of self, objects in space, and other people is achieved.

This progressive coordination of self with events, is fuelled by the almost obsessive repetition observed in infant play and leads to an accumulation of crucial competences which make possible the conceptual gains that contribute incrementally to infants' ability to understand and control their environments. The repetitive nature of the interactions provides the child with a wealth of experience relating to the encounters, and may be seen as a practice arena for the development of the perceptually driven judgements that support decision making. It can additionally be seen as activity which provides important intellectual resources needed for the recognition of future encounters and the consequences of assumptions and conjecture. At the same time, interactions with skilled others in the child's vicinity who respond to the child's actions, provide a parallel arena in which the child not only affects objects, but, when the child's actions are richly interpreted by the adult, can result in objects that were formerly out of reach being brought to within the child's range.
Control over social consequences however, is generally not as reliable as control over physical consequences; making a mobile move by hitting it is generally more reliable than making an adult appear by making a noise, but it is generally accepted (see e.g. Bates 1979) that the cognitive development underpinning activity in these the two arenas not only emerges from the same shared intellectual "software" but that each contributes to the development of the other. Indeed it may be that the intermittent nature of success in the social arena may serve to orient the child to the benefits of perseverance in the physical.

Contingency Responding

One aspect that Classical Conditioning, Operant Conditioning and a Piagetian account all seem to have in common is that repeated interaction or involvement with events promotes more successful involvement in future encounters. The effectiveness of an action on the external environment depends on its execution occurring at the right location and with the correct timing. This enables the action to be integrated into targeted local events so that the individual's intervention in the flow of events will cause the outcomes

to be closer to those desired ie. that which the action was designed to achieve. Those of us who work with people with profound and multiple disability, however, experience daily illustration that many individuals appear not to learn in an orderly or logical progression, based on the accumulation of previous experience. Although individual skills are often learned, they are frequently isolated from the more general contexts or contextual structures in which they are typically acquired. Additionally, the coordination of multiple skill sequences (e.g. successful drinking from a cup) frequently proves too complex an operation for individuals who appear to have successfully acquired relevant single sequence operations (e.g. picking up a cup).

The mechanisms in operation during encounters between profoundly intellectually disabled children and adults and events around them are often obscured by the atypical learning careers they have experienced. A report by the School Curriculum and Assessment Authority (SCAA 1996) gives a clear description of pupils with profound and multiple difficulties "who in some respects appear to be functioning at the earliest levels of development and who, additionally, have physical or sensory impairments" (p.8). Additionally, as Remington (19)and others (e.g. Ware 1994) have observed, learning or the evidence of learning is often obscured because of the extremely limited nature of individuals' behavioural repertoires. In addition to this combination of disabilities, many of these individuals also experience medical conditions [Rainforth 1982], notably epilepsy, requiring medication. Both seizure activity and some anti-epilepsy medication can have adverse cognitive effects. Thus the effects of what may become a complex matrix of disability can cause the severest disruption to the individual's ability to detect or respond to the causes of important events, if indeed the event itself is discriminated.

For individuals who experience this level of multiple disability, opportunities to engage in crucial, experimental and experiential physical play are severely compromised. Many of the major detectable events that occur in these individuals' lives will involve predominantly physical experiences including being assisted to change positions, or moving between venues and being placed in contact with equipment or people. Thus the very nature of their disability dictates that the majority of these experiences will be received rather than sought. This increasingly requires the individual to assume what can become a "recipient role" where events occur because of the uncommunicated agenda of the providers of the experience rather than the self-directed activity of the learner. The limitations imposed on possible communicative dialogues are often equally unassailable, a fact which in turn affects the frequency and spontaneity of the interactions that do occur (see for example Ware 1996)

Isolation from controllable events and traceable causes of important outcomes experienced by multiply disabled individuals contributes to what Brinker and Lewis (1982) described as 'a deprivation from contingencies'. In other words, the person has severely reduced experience of feedback from

actions on the environment, particularly their own. The effects of this type of isolation were described by Seligman (1975) in his account of "learned helplessness". He describes how the onset of depression and withdrawal from the external environment increasingly leads the individual towards orientation to internal experiences and obsessive behaviours. This may help us understand the stereotyped or even self injurious behaviours of some individuals with PMLD as a consequence of contingency deprivation. In other words, if the person cannot experience control over the external world, their actions may become increasingly self-directed. In an attempt to maintain a tolerable level of arousal they may also become stronger and self-injurious rather than just self-stimulatory.

Similarly, some experiments conducted by Skinner [] on what is known as superstitious learning illustrate the effects of dislocation from the causes of events. This phenomenon throws some light on the non-technically minded driver, who, on finding that the car will not start will open and close the bonnet and tap the steering wheel before attempting to restart the engine on the basis that [coincidentally] 'this worked last time!'. The repeated experience of being dislocated from traceable causes of events may be seen to lead the learner to search for causes, often mis-associating random co-occurrences with events rather than the true contingent relationship.

Contingent indicators of events' occurrences must also be related to the event so that, additionally, the indicators' non-occurrence also signals the associated events' non-occurrence. For example if the tape recorder playing music activates only when the switch is touched, the touching of the switch and the tape recorder's activation can be seen to have a contingent relationship. But if the tape recorder activates when the switch is touched and also randomly when the switch is not touched, then the incidence of the two events occurring together may be seen only as a co-occurrence. In the world of people with PMLD events may often occur without the control of that person. For example, the person may have a single switch with which to activate a tape player. But another tape player in the room may be under someone else's control and may go on and off in a completely unpredictable fashion, quite outside our learner's control.

It is the learners' task to monitor and learn to predict contingent events so that their conceptual construction of the relationships in the environment may be formed. It may be seen that in order to monitor events so that causes and related ingredients may be identified, the required level of familiarity with, and predictability of, the environment effectively excludes many intellectually and multiply disabled individuals. Given the amount of discernible information that is available to many individuals, it is surprising how much environmental learning *does* occur.

The importance of play in promoting learning routes that lead to the formation of goal directed strategies has already been mentioned. The repetition associated with typical infants' play in the early months and years

may be seen as the foundation on which predictions about environmental constants are built. The coordination between visual and motor activities is also developed during these marathon repetitive games, which lead the infant to combine objects, lose and find them, judge distances, amounts and weights and to manipulate and monitor all of this information for future comparison. This arena of activity, providing one of the critical building blocks of learning, provides the resource base on which later development is built. All of our views and theoretical models of development assume the presence of this activity at some point along the continuum of learning.

Views of the increasing competence of the individual within the environment all see the importance of discrimination and reaction to the causes of events. Individuals learn in an environment where many stimuli continuously and simultaneously compete for attention requiring the learner to orient to the correct indices of events. Evidence [Rovee-Collier1987] shows that young children with PMLD and those with severe physical involvement, e.g. cerebral palsy, show marked early deficits in the habituation and discrimination behaviours fundamental to early learning and, hence, early play. Additionally, they often take longer to orient to stimuli than typical learners. In the dynamic flow of events that surround an individual these factors can only add to the disparity of experience associated with PMLD, taking individuals incrementally further from predictable learning models. Thus it may be seen that, in addition to often confused and inadequate incoming information, many individuals who experience PMLD with additional motor and sensory disabilities have been unable to experience this climate of self-directed exploratory play in a predictable environment. The question arises then, is it relevant to apply learning theories associated with typical development and learning structures, to individuals whose experience has deviated so fundamentally from the typical structure?

Example

Hanna, a 15 year old with profound and multiple disabilities, can initiate social contact to a person sitting near her using reaching to touch, extended looking, vocalisation and orientation. She demonstrated her awareness of contingencies by her use of a single switch linked to a buzzer, with which she could attract adult attention. Additionally she was responsive to adult attempts to interact with her.
Hanna was assessed using Uzgiris and Hunt's Assessment with Dunst's adaptation. She was found to be exhibiting behaviours confirmed at 5 months on Scale 2: Means Ends, with the addition of locomotion. On Scale 6: Object Related Schemes her behaviours were confirmed at 7 months with possible complex behaviours bringing her up to 9 months. However Hanna did not appear to be progressing beyond the single, simple generalised intention to initiate communication and to respond to the initiation of others.

It was noted that Hanna initiated with equal frequency across many classroom settings, including towards staff in various orientations and that the overall classroom settings did not affect the rate or outcome of her attempts. However when investigation was made into whether her 'target' was attending her or not, it was noted that the rate of attempts depended on the *proximity* of the target rather than his or her orientation. In other words she was missing crucial information in her assessment of the environmental information before her. She had learned that her initiation skills were effective when her target was close, but had not learned to discriminate whether her target was attending to her or not despite far higher success rates when her target was already oriented or partially oriented towards her. It seemed that she was not changing her behaviours as a consequence of success in gaining interaction. As she monitored her surroundings and waited for the prime time at which to initiate successfully, she appeared consistently to miss the vital factor that would assure the success of her attempt.

This error, and her apparent inability to detect its presence, suggested the relevance of Bates' (1979) proposition (referred to earlier) that social and physical learning share a common heritage or underlying 'software': The development of social interaction occurs as the result of the child's learning about the effects of its actions on the environment. In order to be successful actions must be coordinated with the flow of elapsing events so that the combination of factors results in a successful outcome. This requires the competent monitoring of ongoing events pertinent to the interaction. Hanna was apparently not yet monitoring the required range of events neccessary for the successful outcome of her strategy. Additionally she apparently was not aware of a need to change strategy to gain interaction .

The Generic Error Modelling System

Issues of event monitoring and errors of strategy are the subject of our third perspective on human interaction with the environment which will, we believe, provide another plausible explanation of the learning architecture of pupils experiencing disparate and confused environmental information.

The link between the learning of individuals with PMLD and the operations of a nuclear power station may at first seem tenuous, indeed unlikely. However, analysis of the crisis management of events in industry has illuminated an interactive exchange that has close parallels with the interactive exchanges between any agent and the fluidly changing conditions that characterise our environment. In this chapter we have sought to use a hybrid view of environmental exchanges to give structure to the often confused and frequently obscured learning processes apparent in the profoundly and multiply disabled population. It accepts the relevance of other learning theories and does not seek to oppose them. Rather than being an alternative or exclusive approach, the Generic Error Modelling System (Reason

1990) can be used as a complementary view that comments on the function of behaviours. Its application and logic within special education suggests a style of educational intervention that seeks to navigate individuals through encounters, to accentuate the effectiveness of the use of appropriate recovery strategies in environmental exchanges where initial strategies prove ineffective.

This approach provides a structure through which the actions and reactions of individuals involved in social and physical encounters may be traced so that the functions of these behaviours may be placed in an interactive context. The Generic Error Modelling System (GEMS) offers a schematic way [see diagram] of following the interactive progression of an individual's involvement with ongoing events. It is based on a rationale that views the interaction between the individual and the environment as a complex relationship involving mutual modification. The individual's action interrupts and changes a current sequence of events, which in turn changes the situational requirements placed on the individual. This results in the involved person being required to perceive the change and realign strategies and anticipations to meet the new configuration of events. Realignment or recovery comes about through adjustments to notional allocations of the attentional resources that are involved in the monitoring and coordination among three levels of attentional involvement. These three levels of involvement have been described as
*a skill based level comprising skilled or routinised repertoires of behaviour,
*a rule based level comprising responsive and recovery behaviours, and
*a knowledge based level comprising theoretical and strategic problem solving skills.

Each of these domains is limited and shaped by previous learning experiences. The limits involve restrictions in available information, the need for operational speed and the fact that humans seem to prefer to avoid active problem consideration, opting more frequently for strategies based on familiarity rather than suitability. The approach views the alternation between the three levels of operational activity as being the mechanism that governs the application of attentional and intellectual resource during interaction. It is based on the different approaches to problem solving identified in research in industrial complexes and power stations (Rasmussen & Jenson 1974, Rasmussen & Lind 1982, Reason 1987). The three levels of attention relate to the styles of problem solving and error tracing that have been observed in these settings.

Rapid and skilled 'good vs. bad'_judgements are made in relation to perceived event sequences as contextually significant 'signs' are read 'from the face of the instruments'. These require the person to operate only at the *skill based*

(NB See GEMS illustration)

level, but give way to *rule based* protocols, (e.g. if condition "x" and condition "y" present themselves, then strategy "A" should be deployed) once the integrated flow of actions and events is disturbed by the occurence of a mismatch between what is happening and what is thought to be happening. When these rules prove unsuitable to re-establish the harmony, the full attention of powerful problem solving or *knowledge based* systems is employed. All 3 of these levels of strategy are limited by biases in how the problem is perceived, how the solution is selected, and then how it the solution implemented. More importantly, because of our inherent tendency to act as we have acted before [Reason1990], much of our decision making is hugely influenced by the breadth and success of previous encounters.

Example

The approach can be used to help us understand the interactions between individuals with PMLD and their environments. We can gain insight into Hanna's behaviour with clarity and relevance if we follow the elapsing sequence of events with an imaginary [<PAUSE>] button to punctuate the sequence allowing us to insert an explanation. To make this clearer the descriptions of her behaviour will be put in italics. The explanations will be in normal print.

We return to Hanna in her classroom. She is initially engaged in habitual (and therefore skill based) activity until she monitors the approach of a staff member whose attention she seeks. [<PAUSE>]

The staff member's approach activates operational memories (or schemes) associated with previous similar encounters. Although the schemes that are activated relate to this particular context (or the dominant 'calling conditions'), Reason (1990) warns that interference may occur, simultaneously, from secondarily activated schemes associated with the calling conditions of peripheral events. However, it is from this resource of activated schemes that she must choose her best 'capture the attention of a staff member' scheme.

Reason's GEMS approach now predicts the trying out of a generic 'capture scheme' that is, typically. Typically, this will repeatedly be amended in the light of its success [or otherwise] as the encounter ensues. However, this adjustment is informed by feature-led searches for relevant schemes that most closely relate to the context. When there is a large number of (intellectually) stored items, the calling conditions or retrieval cues are matched to available strategies by 'similarity matching' (Reason 1990). But, when cues are insufficient or ambiguous, or there are few stored items (ie Hanna has low expertise in this area or impoverished domain knowledge), 'frequency gambling' occurs. This type of response tends to lead the decision towards using the strategy most frequently used in the given context, most recently used or most memorably used. Of course, this is not neccessarily the

most successful strategy giving rise to a risk here of 'strong but wrong' strategies being employed, such as driving the route to our place of work rather than, as we had intended, the route to the supermarket. Hanna's most successfully used initiation strategies involve extended looking, smiling and eye pointing, which are only successful at close quarters, once interactions have been established. Nevertheless, because of her motor disabilities, these repertoires represent the dominant portion of her inventory of strategies.

Hanna intently watches the staff member, who is not monitoring her and therefore fails to notice her behaviours. Hanna waits until the staff member again approaches her and stands close by. Occasionally she will vocalise quietly. However this too proves ineffectual [<PAUSE>]

Although she has chosen a strategy that relates to the close proximity of an adult or target, she has not discriminated that the success of her strategy depends not only on the proximity of the target, but also on its orientation. Within this situation Hanna may be seen to have made a strong [ie closely contextually associated] but wrong choice of strategy. Within Reason's ( ) approach, she has made a mistake "or deficiency or failure in the judgemental and/or inferential process involved in the selection of an objective or in the specification of the means to achieve it" (p9). Because of the limitations placed on her by the paucity of previous experience (and therefore catalogue of strategies) she has no alternative or adjustment to resort to.

Hanna resumes monitoring her surroundings and makes several similar attempts. After yet another near miss in gaining a response from a staff member Hanna shows signs of frustration and the beginnings of distress and then becomes involved in stereotyped hand movements, stopping monitoring her surroundings for a number of minutes. [<PAUSE>]

It can be seen that she has discriminated the lack of success in her strategy. But, because of both her passive recipient role (Ouvrey & Saunders 1997) and the limitations of her experience due to intellectual and motor disabilities, she has little chance to gain more varied experiences in this setting. The repetitive, familiar actions that she resorts to can be seen as having a comforting function, described by Reason (1990) as having the function of dissipating stress .They are described by Seligman (1975) as being ultimately the option of individuals who have been isolated from contingency experience in the external environment. Stereotyped behaviours of this sort may also be seen to be linked to the strong unitary behaviours performed for their own sake during Piaget's "primary circular reactions" in the very early stages of development. Within Reason's approach, in this context, these cyclical behaviours may be viewed as a type of default strategy which can often be seen in undirected or unmotivated pupils in classrooms everywhere.

A staff member approaches and sits with Hanna. She responds to the staff

member's initiation with extended eye-contact and subtle signs of positive affect, encouraging continuation of the interaction with success.[<PAUSE>]

Although she can maintain or terminate the interaction, her ability to extend the range of the interaction depends on the staff member introducing new topics for shared attention or social interaction. Her socialisation and engagement behaviours have just received confirmation of their success in the engagement of the staff member, but the cause of the adults approach is not obvious to Hanna, who is likely to either (through superstitious learning) associate it with her own behaviours or accept it as yet another event in a day full of unexplainable events. In the same way, unless the staff member facilitates an accessible and [to the pupil] understandable experience, Hanna will continue to receive social contacts about which she can do little. As Ouvrey & Saunders (1996) argue, series of sensory experiences or a progression of changes in position or venue whose meaning is outside the student's understanding will do little to develop Hanna's ability to extract meaning from situations. Some measure of control is neccessary. However because of her limited physical abilities, she can not physically engage her environment and because she cannot discriminate the error in her initiation strategies, she cannot optimise her social encounters.

Intervention

Examining the cause of Hanna's apparent inability to increase her success rate during initiation attempts in terms of errors of planning and execution enables teachers, therapists and other staff to identify a new avenue of intervention approaches. The important issue ceases to be a question of Hanna's position on a continuum of cognitive development or communicative skills, but becomes, rather, a more functional investigation into her use of her current repertoire of skilled routines. Teaching through facilitating situations in which her repertoires of skills may be effective may be more relevant to Hanna than educational attempts to add to her repertoires. It can be argued that the current situation exists because she lacks the experience required to endow her current schemes with the flexibility (or plasticity) necessary for them to be of use in more complex encounters. In other words, the learning she has acquired has been accumulated in restricted circumstances and Hanna requires greater experience of their application in diverse settings. She is currently in the position where she has to wait until an event occurs whose demands match her skills, rather than being able to adapt her skills to the requirements of the situation.

Clearly, following the logic of this approach, efforts should be directed towards ‘fleshing out’ Hanna’s intellectual resources so that she will be able to interact with her environment more successfully. Typically, however, as Ware & Healey (1994) observe, those who are concerned with promoting ‘progress’ in the development of individuals with PMLD, measure progress in terms of the acquisition of new skills and “discernable movement towards an objective”. The importance of promoting demonstrable learning in relation to curriculum and assessment documents has generally been both the aim and

predominant ethic of education and therapy since the nineteen seventies, even though pupils with PMLD have been “notoriously poor consumers of [the] curriculum” (Ware & Healey, 1994). Reference to the linear sequencing of both curriculum documents and the resulting teaching styles inevitably leads to what they describe as the teaching of selected curricular highlights of socially determined areas of skills that provide[at best] “a facade of competence”

Ware and Healey point out (p.4) that this model of teaching towards increasing mastery over linear sequences of developmentally presented content (aiming towards a notional final goal) is enshrined in many curriculum documents and frameworks of expectation, including the National Curriculum itself. However, for those individuals who consistently fail to show measurable progress on conventional assessments, a different model of progress is required. It is not that these individuals cannot make progress, but we would argue that the instruments by which progress is measured do not suit the people whose abilities are being measured.

Hanna’s inability to acquire more effective interactive skills has been characterised as the product of a low expertise or impoverished domain knowledge brought about by her limited contact with accessible interactive experiences. Her cognitive resources are severely compromised by the simplicity and rigidity of her strategies . She may be seen as being in the centre of a vicious circle where she cannot engage environmental events successfully and cannot successfully acquire new strategies because of the lack of success in her attempts. Her ability to engage events depends on her achieving a threshold of interactive competence that will allow her not only to adjust her schemes but also to perceive the success or failure of her strategies. This threshold of competence appears to be dependent on her discrimination and monitoring of a critical range of environmental events and adjusting her actions to this information.

This resource may be seen to develop through experience and repeated encounters using existing strategies. To attempt to ‘progress’ through the teaching of new strategies only serves to ‘muddy the water’ and bring new and introduced complexity into the events. New learning may be assisted to develop through the facilitation of variable but recognisable settings that promote the experience of applying existing strategies in generally predictable arenas. Thus plasticity of skills should be promoted rather than the introduction of novel skills aimed at promoting linear progress along a developmental curriculum. Facilitating a breadth of experience should, logically enable learning structures to evolve through diversity of experience, in a similar if more contrived manner, to that which typical occurs.

Taking Control

A vital element in this view of learning is the issue of the individual's expectation of control over his or her environment. It is generally accepted (see eg Brinker and Lewis, 1982, Schweigert,1989, O'Brien, Glenn & Cunningham 1994, Ware, 1997) that it is crucial that the individual develops an expectation of control over his or her environment. The development of micro switches and environmental control mechanisms has brought increasingly affordable and effective equipment that may be placed under the operation of even the most severely physically disabled individuals (Barber 1990,. Brinker & Lewis 1982b, Glenn & O'Brien 1994) However, the related increase in the use of white rooms and sensory areas often misdirects users into a style of usage that promotes further passivity. The 'sensory approach' to providing experiences to individuals with PMLD often simply provides experiences that are, as Ouvrey & Saunders (1996) point out, bereft of meaning for the individuals receiving them. They argue that "Activities using this type of equipment are often carried out in situations which do not provide a meaningful context", continuing that "the sensory experiences may seem quite random and meaningless to the pupil with PMLD when provided through a subject whose meaning is outside the understanding of the pupil"[p207].

What must remain central to the use of this equipment is that it is not the *level of stimulation* that is relevant, but the *degree of responsiveness* to the user and the context in which it occurs. The systematic and sensitive use of this type of equipment can give individuals the experience of causing dramatic change to the immediate environment as well as augmenting the possibilities of communication and interaction [Rowland 1990, Schweigart & Rowland 1992, Ware 1997].

It has been mentioned earlier that the interrelationship between the learning architecture underpinning responses to social and non-social events is inseparable. The use of contingency intervention strategies in the classroom using micro switches can be reflected in social interactions within the interactions, exchanges and care routines routinely experienced by individuals with PMLD . All individuals, throughout their lives, experience regular, routine sequences of events, leading these sequences to be easily recognised and predicted. However, because of the recurring nature of these routines, caregivers and workers often become desensitised to the communicative possibilities presented by what can become such ritualised events. After all, if they have become practised to the care givers, then the chances are that the care receivers also recognise at least some of the sequences involving themselves.

Rarely conceptualised by staff members as activities rich in teaching possibilities, these daily routines often become seen as barriers to the actual job of teaching. However by giving the recipient a chance to react to a planned interruption in proceedings, not only is the individual's involvement in the sequence being acknowledged and dignified, but by acknowledging the reaction by using it to restart the sequence, the learner increasingly orients

to, monitors and contributes to events in which they find themselves involved. For example, at the end of the school day, by causing an unusual pause when the pupil is beside the transport vehicle that normally takes the pupil home, or beside the hydrotherapy pool when habitually the pupil would be hoisted, time is given for the pupil to react to the unusual break in a usually predictable sequence. This reaction is acknowledged by staff, who then restart the sequence. (see also Barber 1995, Carpenter and Ashdown 1996, SCAA 1996).

Similarly, the use of accessible signals and cues often known as 'objects of reference' may be used to indicate the impending start of a sequence of events. The use of objects that have relevance to the pupil (eg buoyancy aids/armbands to signal a hydrotherapy session) may be used to cue pupils in to events that are about to happen or to make choices (Coupe-O'Kane et al 1995). Likewise, distinct start and finish sequences can be used to give pupils information about sequences they are about to encounter or make choices about. Routines and signals can be introduced into all regular activities and encounters. It is important that the cues used carry meaning and familiarity to the pupil and will promote recognition of the event or of the availability of the imminent event. It is easy to choose items that staff identify with particular events, but often these items do not carry the same signals to the learner, and should be chosen and introduced carefully. The meaningful 'signposting' of encounters can effectively signal approaching, available, event sequences to the learner. Their presence can be seen to provide augmenting 'calling conditions' that give the learner concrete and interference free, reference points for cognitive and feature-led searches. The experience of responsive and largely familiar interactive encounters that stay predominantly within the control of the learner is one that we feel to be more in agreement with the condition in which learning evolves in more typical conditions.

Conclusion

Finally, we (the authors) are currently engaged in research that is investigating the adaptive behaviours of a number of pupils who experience PMLD. This work involves designing situations in which pupils are encouraged or provoked into changing, or deploying new strategies in their attempt recover their control over a situation when environmental conditions change or possible alternative methods of control are made available. We are seeking to investigate how best to promote more flexible strategies and to highlight for pupils the availability of alternate routes to successful outcomes. Any significant results of this research will be disseminated.

As mentioned earlier, it must be stressed that this approach is speculative and currently, relatively untested. However it does appear to share important principles with more traditional or mainstream approaches to learning and its logic suggests a style of intervention that is totally in keeping with certain recent intervention styles. The specific examples that we have encountered

are the “Routines, signals and cues” described by Ouvry & Saunders’ (1996), Jean Ware’s work on creating responsive environments (e.g. Ware 1994, 1996) and the philosophy underlying Collis and Lacey’s (1996) Interactive Approaches to Teaching and finally the use of Objects of Reference [eg McLarty 1997]

The discussion in this chapter has been developed from the original question of “why do some pupils with PMLD seem to reach a plateau in the adaptability of their interactive skills from which they appear unable to progress? ” Their problem may be likened to that of a novice driver, well able to drive in a straight line, but being completely out of their depth when a gear change or complex manoeuvre is called for. The individuals often have skills allowing them to get purposefully involved in a range of interactions, but once a point is reached in the interaction, events seem to surpass the resources that the individual has at his or her disposal. At this point the interaction collapses, the learner withdraws from the interaction, or becomes distracted by an external event or detail of their own behaviour and in order to continue the interaction. the skilled partner must start the process again.

The view of slips, mistakes and errors proposed by Reason indicates that human interaction is subject to many influences that interfere with efficient interaction with the environment . The failures that occur do so at largely predictable points during the encounters. This suggests that although the there is a seemingly limitless variety of possible reasons for unsuccessful interaction with the environment, this is derived from the complexity of the environment rather than the complexity of the psychological mechanisms at work. Within the context of GEMS, individuals move between levels of arousal or attentiveness to make available intellectual resources necessary for recovery, so that actions remain in tune with surrounding events.

Because Knowledge Based activity is characterised by active consideration of the problem configuration, it is profoundly debatable whether, or to what level, individuals with PMLD may be able to alternate among these levels. Skill Based actions are those that require very little consideration or monitoring by the conscious attention; almost certainly the type of activity in which individuals with PMLD are most involved. It is the Rule Based protocols that present the area of most interest in this work as it is this resource that represents ‘if situation x and situation y present themselves, then perform action sequence a’ . The efficient use of these protocols depends on flexibility of strategy, so that any recovery or strategy may be adapted during its operation. Teachers and therapists should be involved in intervention approaches that promote this flexibility and adaptability. Intervention, however, must also provide guidance and navigational assistance for learners so that common structures within experiences may be discriminated. At this point, the most effective method of providing ‘signposts’ is open to discussion. We feel that it is an important discussion that must take place so that more effective support and education may be provided for the individuals in our classrooms and centres.