The teacher who mistook his pupil for a nuclear incident: Environment influences on the learning of people with profound and multiple learning disabilities.

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Whether or not the new national curriculum guidelines for pupils attaining significantly below age related expectations, or debates about the future roles of special schools or, indeed, the various types of provision available are likely to promote the inclusion of pupils with profound and multiple learning disabilities is open to question. The question with which most practitioners are confronted on a daily basis is, however, 'how might I include this particular student in the events of the day or indeed in a social encounter that is both recognisable and meaningful to them?'

Including a pupil in meaningful encounter is not a question of geography, it relies on the learner recognising that they have been included (Ouvrey 1997 Ouvrey & Saunders 1996). This can only be achieved if the learner is familiar with the situation, and that they have opportunities to assert their preferences, exert some level of control, or, be able to get involved in successful transactions with their environment.

This chapter presents a novel perspective of learning disability which is informed by an information processing perspective of the cognitive processes involved in acquiring knowledge and skill. The logic of the perspective leads the reader to consider a style of intervention or teaching based on the promotion of social cognition (eg Rogoff 1990; Ware 1994; Nind & Hewett 1994; Ouvrey & Saunders 1996; Grove, Bunning, Porter & Olssen 1999).

We live in a hugely complex environment of fluidly changing events that 'continuously and simultaneously compete for attention' (Rovee Collier 1987). Any strategy that a learner attempts causes changes to the arrangement or 'configuration' of the opportunities around them. This requires the learner to monitor, not only what changes their actions have changed, but

also how they must adapt subsequent actions to accommodate these changes. Typically, we acquire expert behaviours or skills that enable us to take advantage of events, and if we encounter a novel situation, we can usually borrow what we know from other arenas of our experience to remain involved with the flow of events (Bates et al 1979). But for learners for whom the environment changes too quickly and in too complex a manner, the complexity of the environment must be managed, if their inclusion in the flow of events is to be maintained. This chapter looks at how this fundamental level of inclusion, that of inclusion in the learning process, might best be achieved.

Background

Can we learn about the experience of consciousness of a person with profound intellectual and multiple disabilities (PMLD) by looking at catastrophic incidents in nuclear power stations? It seems a ridiculous idea, but it's not.

The Generic Error Modelling System (Reason 1990) or GEMS was developed following a decade of research into human error, and analysis of operator actions during catastrophic incidents in the power generation industry. It examines the interface between operators and the complex environments in which they work. GEMS leads to a perspective of consciousness and problem solving that appears to be very relevant to practitioners working with clients experiencing PMLD.

GEMS (Reason 1990) is a rationale accounting for how we interact with our surroundings. It is based on three levels of cognitive involvement;

- the lowest or **'Skill Based'** level of cognitive resources, represents the level at which the least amount of cognitive supervision is involved. While habitual or routinised actions involve the least amount of cognitive involvement, they also represent our most skilled patterns of

behaviour, ie when we take very little notice of what we are actually doing [eg walking or riding a bike]

- The next, **Rule Based** level, is also known as the "level of flexible action patterns" (Zapf, Maier, Rappensperger & Irmer, 1994) "The activity at the Rule Based level is to co-ordinate and control a sequence of skilled acts" or schemes (Rasmussen & Lind, 1982). Decisions are taken on an *IF <situation> THEN <action>* basis : e.g.

  if ~ the sink is overflowing *then* ~ turn the tap off.

  OR

  If ~ a possible communicative partner is close by *then* ~ attract their attention.
- The third or highest **Knowledge Based** level can be conceptualised as a theoretical knowledge resource. It is at this computationally powerful, but effortful level of cognitive involvement that active and conscious consideration of the problem 'as a whole' is attempted

Central to this approach is the principle that it is the environment which is hugely complex, and not our actions in it, and that humans can manipulate some types of information more easily than others. The fact that we can intuitively process the enormous amounts of perceptual data that allows us to drive our cars at 70 mph on a road that is hugely congested with other vehicles, but have trouble dividing 197 by 3.9 would seem to confirm this.

Rather than presenting a model of how learning is acquired, GEMS is concerned with how we use our knowledge and 'know how' to stay synchronised and involved with the events that constantly occur around us [for more detailed accounts of GEMS see Barber 2000, Barber & Goldbart 1988]

The approach is based on the notion that interactive strategies and recovery plans are arrived at through the learner monitoring what problems look like and using strategies that 'work best most of the time'. GEMS also accounts for the occasional difficulties that occur when the strategy or 'rule' that has

been intuitively chosen is incorrect, or when a dominant feature of the learners surroundings 'captures' their attention, or indeed when the execution of a strategy is waylaid, by its similarity to another frequently used repertoire of behaviour.

These problems account for the experience many of us have been through, when we set off to the shops on a Saturday morning, only to find ourselves in the car park outside our place of work, or when we go to the kitchen to check the oven, but find ourselves making a cup of coffee: GEMS predicts that whenever a periodic attentional check [at Skill Base level] is omitted, the most active (ie recently or successfully used) 'scheme' in the cognitive resource, will govern subsequent activity. The control of routine or habitual action might be compared to a "rather curious railway system where all the points are set by default to follow the most popular routes" (Reason 1987ii)

How GEMS informs us about PMLD

All very interesting, you may say, but how does this account relate to learners who experience PMLD?

Reason's account of human interaction in complex environments relies on a massively interconnected cognitive resource. Problem solving and recovery strategies are arrived at through referencing problem configurations to previous experiences in similar conditions. Our choice of strategy, problem solution or recovery is influenced by what we used most successfully (and therefore memorably) on most other occasions that looked like this. 'Feature led' searches are made within the cognitive resource, of similar situations with the same significant 'calling conditions' that are discriminated in the current 'problem', and previous successfully used strategies, so that the 'best available' match is identified.

Successful interaction in this model, relies on good information – the 'agent' must be able to discriminate the significant features of the 'problem configuration' so that a good match between problem and probable solutions may be made.

But when information gathering channels are compromised, or when the storage (or recall) of memories or schemes is incomplete, the whole system that allows the rapid management of the vast amounts of data that we intuitively manipulate, becomes 'data limited'. Inadequate information about the environment and profoundly compromised resources of interactive repertoires leads to the 'best available match' becoming the 'least worst match'

PMLD and Data Limitation

Profound and multiple learning disability (PMLD) or profound intellectual and multiple disability (PIMD) can be defined as the combination of two or more severe impairments, one of which is a profound learning disability (Ware 1994). Being among the most "difficult to teach" of students (Keogh & Reichle 1985) people with this level of intellectual disability have been characterised as functioning at the "extreme lower levels of cognitive attainment and adaptive behaviour" (Kaufman 1981). This description reflects the fact that "such children typically acquire few self care, communication, social or leisure skills. In short they are children with extremely limited behavioural repertoires" (Remmington 1996). In addition to PMLD, many of these children experience secondary sensory and physical impairments or medically debilitating conditions (Rainforth 1982). Indeed individuals with learning disabilities are up to 100 times more likely to have a visual impairment than those without (Ware 1994) and the incidence of hearing impairments in this population may well approach 70% (Bunning 2001) depending on the method of audiological assessment used.

The combination of hearing and visual impairment is a potent one, as the two senses interact with and supplement each other, providing information about important events occurring around the individual. Hearing extends our vision, allowing us to better detect significant signals that important events are about to happen – hearing a knock on a door, or the sound of the dog barking are both auditory indications that someone is about to arrive. Auditory detail could

also be said to augment the visual information we discriminate, enabling us to attribute additional detail to what we simply see (e.g. whether an object is hollow or solid). Combined hearing loss and vision impairment then, appears to be a synergetic coupling, where the effect of the combination produces a greater loss, in terms of sensory information, to the individual than that which would result from a simple addition of the two individual impairments. It is uncontroversial then, to propose that individuals who experience PMLD from birth onwards, frequently 'miss out' on much of the crucial environmental information that young learners need to make sense of the environment and the different types of events in which they become involved [Barber 1994]. In addition to the impoverished levels of information that they can discriminate and the frequent combinations of multiple sensory and motor disabilities that limit the ability to learn and acquire skilled behavioural repertoires, these people also experience profoundly compromised cognitive capacities which limit the processing, storage and recall of the information that they do perceive. (Barber & Goldbart 1998)

How GEMS relates to PMLD

The extended experience of the combination of immobility, deprivation from environmental information and limited cognitive processing can be seen to place obvious limits on the levels of acquisition of the invaluable experience of physical interaction with events. Compounding the poor levels of successful experience of physical encounters, the role of people with PIMD in social encounters has been frequently documented as developing quickly into one of 'recipient' of events, rather than one of equal partnership (Brinker and Lewis, 1982; Golden & Reese,1996; Ware, 1994), where partners negotiate the direction and meaning of an encounter "in order bring events to their preferred conclusion" (Barber 2000) see also Grove, Bunning, Porter & Olsson 1999.

By definition, individuals who experience PMLD have at their disposal extremely few behavioural responses with which to engage what is, a very complex and fluidly changing environment. Our perceptually driven, cognitive

system typically ensures that we can engage fluid events and synchronise our movements with other occurrences within the frame of elapsing time, but it requires rapid information and diverse experience to work effectively. The interconnected operation of memory and recall ensures that approaching events can be 'read', related to intellectually stored previous experience and anticipated, so that we can join in what can be conceptualised as a 'flow' of events. Reason (1987iii) expresses the ability to scan elapsing events as they approach, in order to decide which part of our surroundings to engage, as "placing one's head in the data flow (i.e. monitored ongoing events) and waiting for a recognisable pattern to occur."

<u>To someone with only a hammer, every problem looks like a nail (Reason 1990)</u>

One could conceptualise the experience of consciousness of a person with PMLD as being similar to the experience of going to meet a distant or unfamiliar relative, from a crowded, rush-hour train. Standing at the platform gate, the train disgorges its passengers, who approach you as a heaving myriad; your task is to identify the unfamiliar individual from the rest. Similarly, an individual with PMLD is faced with the task of recognising situations among the host of events around them, in which they can apply their successful behavioural repertoires. Frequently, by the time a promising opportunity to engage (eg) an approaching staff member has been identified, the opportunity has passed and the disabled individual must again wait for interactive opportunities.

Once a familiar opportunity is recognised, further difficulties occur. The logic of GEMS suggests that for someone with few interactive repertoires, the primary problem is to identify situations that their limited range of interactive repertoires may be applied to. To someone with only a hammer, every problem looks like a nail; for people who have very little experience of engagement in successful encounters, the problem of identifying a strategy or interactive scheme to match current the calling conditions of their surroundings becomes insurmountable. The few schemes they can

successfully ‘deploy’ to meet an opportunity may not correspond to the calling conditions of the current situation. A pupil who can eye point or smile, but not reach or produce controlled vocal sounds cannot effectively attract the attention of a teacher who is not looking at them (Barber Goldbart & Munley 1995). Thus, the critical issue is not the repertoires of the disabled individual, or ‘what they can do’ but whether these schemes are appropriate to the opportunity at hand. **‘It is not the flexibility of the learner’s skills that enables interaction to occur, but the flexibility of the situation that allows the inclusion of the learner** (Barber 2000).

For the majority of their day, clients and pupils with PMLD do not experience either a controllable or responsive environment (Ware 1996; Barber 1994). This is not improved by the types of interactions in which they *are* involved. The ‘social’ interactions that individuals with PMLD do appear to encounter frequently have little about them that distinguishes them from the background presence of other elapsing events that occasionally include the individual with PMLD, and distract them from internal ‘state’ awareness. The isolation from controllable events that many learners with PMLD experience for much of their waking hours has already been identified as leading to learned helplessness (Seligman,1975; Berger & Cunningham, 1983) It is understandable therefore that in the face of what must appear to be a frequently chaotic and largely unpredictable physical and social environment, that many people with PMLD orient progressively more to the sensory experiences that they can generate for themselves.

It is proposed that the distress that many individuals show when they are included in social encounters derives from the fact that teachers and therapists are frequently disturbing their clients from their controllable, predictable and pleasurable sensory experiences. Indeed the arrival of a staff member can easily be seen to be an experience of mixed emotions for the client, who cannot be sure if the approach signals that they are about to be moved into a different position, fed, changed, placed in some therapeutic equipment, or to be involved in an activity in a different part of the room, or

indeed building. From the perspective of the individual with PMLD, the agendas of staff and therapists are usually unannounced. The clients' experience may be more akin to monitoring and accepting elapsing events and waiting until they present a configuration which allows them to engage them.

The increasing requirements of the environment

When pupils do become involved with social interactions, there is evidence that the transactional requirements frequently become too great for them to successfully stay involved unless richly interpreted meaning is routinely assigned to their actions by their communicative partner [Barber 2000]. Research has periodically focused (Carpenter, Mastergeorge & Coggins, 1983; Cirren & Rowland,1985; Park 1997, Wetherby & Prizant 1992) on the characteristics of profoundly intellectually disabled learners' use of the hierarchy of communicative functions described by Bruner (1981) as initiation to regulate the behaviour of others (IBR), initiation to achieve joint attention (IJA) and initiation to achieve social interaction (ISI). A number of these studies, reflecting the progression through these communicative hierarchies note that severely and profoundly learning disabled individuals appear to have difficulties in acquiring the apparent 'critical mass' (Barber 2000) of experience that enables protodeclarative or joint attention functions to emerge (Cirren & Rowland,1985; Park 1997;Wetherby & Prizant 1992). Viewing the environment in terms of data flow could shed some light on this issue.

When an individual communicates in order to regulate the behaviour of a communicative partner, the dialogue is frequently motivated by the urge to satisfy an emerging need. This communicative function can be viewed as the use of another person to achieve a task outside of the physical ability of the communicator. An eye point to a full cup, might be interpreted as a request for a drink, might be interpreted by the viewer as a request for a drink. The typical response to this action, results in the delivery of the drink. Following this, the communicator has ample evidence that his/her attempt to control

another person was successful. The skilled partner approaches, the thirst is quenched and the cup is empty.

But when the communicator attempts to attract the attention of the skilled partner to something of interest to them (IJI), eg a sparkling piece of jewellery that catches their attention, evidence that the initiation has been successful is more subtle: The partner may approach and acknowledge the attention getting behaviour of the communicator, but realistically, because of limited signalling, or difficulties that the communicator has in directing their partner's attention, the partner may well be unsure of the focus of the communicators attention. In the absence of anything obvious (eg a drink or near by object etc) the partner will frequently assume that the communicator is drawing their attention to some other need.. We do not look for what we do not expect, but repeatedly anticipate our client's needs, based on our knowledge of them. Whether attention is successfully directed or not, the evidence for the communicator that their attempt was successful, is less obvious and therefore more complex.

To successfully discriminate that social interaction has been successfully initiated is even more difficult for someone with PMLD, as within this function there is no necessity for any physical joint focus for attention. As with the previous function, it is likely that in many cases, the meaning of the communicative attempt is not clear to the partner (see also Grove, Bunning, Porter & Olsson 1999)

Following the GEMS perspective, we do most what we do best. The selection and use of a repertoire depends on how 'active' (Reason 1990) or prominent it is in the cognitive resource. Its position, relative to other schemes, depends on how successfully it has been used in previous, similar circumstances. If there is good evidence of the success of the use of IBR, but as the discernible evidence from IJI or ISI is vague or ambiguous, the style of engagement most likely to be used in the presence of an available partner will be the more successfully discriminated IBR.

To assure its re-use, it is vital that the learner can discriminate that a rule or scheme was successful, otherwise reselection is unlikely. Placed in

the context of a diverse cognitive resource, this process typically establishes the most efficient and successful schemes to enable us to engage our fluid environment, but in the context of limited cognitive and physical resources, it further narrows interactive possibilities.

Implications

Accepting this approach, one is led to identify that the central problems for individuals with PMLD and multi-sensory impairments include

- recognising available interactive opportunities that correspond to their behavioural repertoires,
- acquiring successful interactive experience and
- maintaining and extending interactions once they have been initiated.

In the face of an unfamiliar problem, the 'data limited' [Reason 1990] problem solver is likely to compare current conditions to past encounters and pick the 'least worst strategy' (Reason 1990) or action scheme that is identified in the cognitive resource. If the fit between strategy and configuration works and involvement is achieved, the increasing complexity of the encounter leads the learner to repeat the successful strategy to achieve a recognisable event rather than varying, or trying to refine it and risk losing the anticipated environmental response. Alternatively the social response to their attempt at interaction requires further involvement, requiring responses that are not active among the learner's resource of repertoires

To enable the learner to remain involved, the environment and social targets need to be immensely flexible, responsive and available. Events need to be signalled so that the learner recognises them ie the 'features' of the encounter correspond to easily recognised features of previous successful interactions. Rather than simply *responding*, learners need the experience of *establishing* the topic of the interaction. This would allow them to perceive that events can respond to their actions in a controllable manner, rather than becoming more complex or unpredictable, or more subtle and thus, indistinguishable from the rest of the data flow. Vygotski's (1962) notion of

the skilled partner “intermentally”, supporting the learner to success by “scaffolding” the difference between what the learner can do and what success in a situation requires can be seen to have great relevance to this perspective.

Small Islands in the Chaos

This approach requires teachers and therapists to consider a number of important issues. When engaging their clients, are they more interesting than the events clients can generate for themselves? When they respond to their pupil’s behaviours or encourage them to interact with objects, are they increasing the requirements of the engagement more than the client would prefer? When we introduce new or different toys to a familiar game, are teachers just becoming unpredictable and therefore less accessible,? Accepting that a large proportion of our student’s day is beyond their control, therapists and educators should ensure that their time spent together with learners should at least be predictable, recognisable and responsive. The increasing complexity of the transactional environment presents huge problems not only to the disabled learner, but also to the ‘skilled’ partner. How, practically, does one limit the complexity of an encounter, but maintain the clients focus and motivation to interact?

A style of interaction that responds to many of the issues raised in this chapter can be used by teachers and therapists working with people who have extremely compromised cognitive and physical resources. By involving pupils in frequent, recognisable, and guided social encounters, the communicative significance of their own behaviours can be highlighted to them: Physical or vocal turn-taking dialogues can be guided into imitation, where the skilled partner’s actions respond to the behaviours of the learner, so that they perceive events that respond and vary contingently with their own contribution.

The level of social responsiveness and flexibility involved in this style of interaction has been noted to increase signs of positive affect (Nind 1993) in “hard to reach” clients and is being increasingly recognised as, when

compared to many other approaches, a “least worst” style of providing rich experience of successful social interaction.

To separate our attempts at communicating with clients from the rest of the frequently unpredictable data flow that they experience, it seems logical to identify them by sign-posting or signalling the encounter. This can be seen as carving out an ‘island in the chaos’ so that the client will recognise that for this part of the day, the encounters in which they are involved will respond to their contribution and can therefore be engaged successfully. Greetings or initiations at the beginning of encounters might involve appropriate touch, proximity or responses that are consistent and recognisable to the client. Thus, their ‘feature led searches’ are provided with clear information to activate more accurate anticipation.

Although responding to the client’s contributions, the skilled partner can usually guide encounters so that over time, games or interactive routes can be developed, negotiated and later anticipated or initiated

Constructing encounters so that they occur in response to client’s repertoires rather than in response to practitioners, effectively places a ‘ceiling’ on the complexity of the interaction. Teachers can provide social encounters that respond to the actions and perceived intentions of the client, so that in effect, their repertoires and signals correspond to the requirements of the environment. The practitioner therefore accepts the learner’s repertoires, and rather than attempting to increase their complexity, constructs interactions around them.

The skill of the teacher then, is to ensure that all of the problems that the learner will encounter during a social encounter, can be solved, or at least can be engaged, with just a hammer.

Note: I would like to thank Dr.Juliet Goldbart (Manchester Metropolitan University) for her advice during the writing of this chapter.

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