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Cover page

Thinking Allowed – use of egocentric speech after Acquired Brain Injury (ABI)

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Abstract
This paper explores the use of thinking aloud made by young people who have sustained a severe acquired brain injury (ABI). The phenomenon is compared with the concepts of egocentric speech and inner speech before the form of thinking aloud by pupils with ABI is examined. It is suggested that by using thinking aloud this group of pupils is able to engage in internally persuasive dialogue and is therefore enabled to take part in classroom learning.

Key words:
Acquired Brain Injury, inner voice, internally persuasive dialogue, classroom learning

Introduction
Acquired Brain Injury
Advances in acute medical treatment technology have led to an increase in survival rates of children with an Acquired Brain Injury (ABI). Increasingly young people are returning to mainstream schools after a severe injury, but teachers do not necessarily have the required knowledge and skills (DfE 1994, HIRE 2002). Johnson (1992) states that there is no evidence that the further development of the brain proceeds normally after injury. Teachers cannot assume that, by approaching a learner with ABI as they would a younger pupil, learning will proceed without hindrance. It is the interaction between recovery and normal development, along with the memory of pre-injury abilities and behaviour, which makes ABI unique, and therefore demands separate research. So far, research into the impact of ABI on learning has been in clinical settings, mostly using quantitative methodologies. There is an urgent need to examine how this group of pupils engages in learning in the mainstream classroom.

An Acquired Brain Injury is the result of an illness or injury which occurs after birth. A childhood injury arrests the development of the brain. When development restarts a pattern of difficulties may be observed which depends on the developmental age of the child at injury, the time since the injury and the current age of the child or young person as well as the site and type of injury. There are frequently significant changes in personality (D'Amato & Rothlisberg 1996; Telzrow 1987; Hawley *et al.* 2004), underlying skills, such as memory and attention (Begali 1992; Ewing-Cobbs *et al.* 1998; Jones & Johnson 1994; Mateer *et al.* 1996; Semrud-Clikeman 2001; Telzrow 1987; Ylvisaker & Skezeres 1998) and subsequent ways of learning.   Difficulties controlling impulsivity frequently follow an ABI (Glang et al. 1997,) but these could be provoked by attention problems (Mateer et al. 1996, Middleton 2001). However impaired social communication may be the most pronounced consequence of ABI (Blosser & DePompei 2003; Dennis & Barnes 1990; Ewing-Cobbs *et al.* 1998; Ylvisaker & Gioia 1998; Ylvisaker *et al.* 1995) and frequently leads to behavioural and educational difficulties (Clark 1996; Ewing-Cobbs *et al.* 1986; Hawley *et al.* 2002; Ylvisaker *et al.* 1998a).

Most young people make a rapid physical recovery, which then creates expectations in parents and schools for adequate cognitive and behavioural functioning, but a normal physical appearance can mask underlying cognitive deficits (Lord-Maes & Obrzut 1996, Johnson 1992). Teachers, generally, are happier to accept medical and physical disabilities into the classroom than Emotional and Behavioural Difficulties (EBD) (Avramidis *et al.* 2000). ABI presents as a medical problem but teachers quickly discover the behavioural problems, either internalising or externalising, both of which cause their own difficulties to the teacher in charge. It is not just that older children with ABI act like the younger controls (Dennis *et al.* 1996, 1998) but these pupils seem to engage with learning in a different way from other more typical pupils or those with developmental brain disorders.

The move towards inclusive education in the 1990s coincided with an increase in the survival rates after ABI and a reduction in secondary damage due to new intensive-care regimes. Increasing numbers of young people are returning to mainstream schools after a major life-changing event, but they are not necessarily met with an approach to teaching and learning which is inclusive.

Inner Speech

Piaget's concept of egocentric thought (Piaget 1959) formed the stage between autistic play and directed (reality orientated) thought, only becoming realistic under social pressure. Intended only for the self it arises out of a solipsistic understanding of the world. Echoing Janet's ideas, he asserts that monologues serve to accompany, reinforce or supplant action (not communicate or direct) as the child learns to command external objects. The young child talks continually to neighbours but rarely shares their point of view. The child disregards the precise shades of meaning in things and emphasises assertion over justification. Such speech is full of pronouns and demonstrative articles and is incomprehensible outside the context.

Piaget noted that the frequency of monologue is in proportion to that of imaginative play, as reality is assimilated to the ego. Hence he asserts that the function of monologue is to bring the world to the person, while work, games and rules are not accompanied by monologue but engender socialised (adult) speech as the children pursue common enquiry.

However Vygotsky argued that egocentric speech is a bridge between the external and the internal. The child is not externalising thoughts, but internalising external verbal interactions. Such speech is presumed by the children to be understood by others, and increases when faced with a problem (Emerson 1996).

> 'the child…..has few inhibitions about speaking aloud to express, amuse or direct himself when the urge arises, whether he is alone or in company. His speech is audible to himself and may be either clear or inaudible (or unintelligible) to others who are present as it is unconstrained by the transmission requirements of interactive talk.' (Garvey 1984 p207)

 The Soviet school does not divorce the practical, external activities from internal (Leont'ev 1979, Wertsch & Stone 1985), but the process of transfer forms the internal plane of consciousness. The child does not completely appreciate the new internal speech function so temporarily uses overt self-regulative speech, but as it is mastered egocentric speech disappears. It does not atrophy as Piaget has it, but it goes 'underground' (Wertsch & Stone 1985).

> Egocentric speech is a functionally and structurally distinct form of speech. However while it is emerging it is not definitively separated from social speech from which is has all the while been developing……Even if we could record inner speech on a phonograph it would be condensed, fragmentary, disconnected, unrecognisable, and incomprehensible in comparison to external speech' (Vygotsky 1956 in Wertsch & Stone 1985 p172-173)

Two things are fundamental to internal, or mental, activity: it is 'instrumental', i.e. tool-like, and it is social, i.e. intermental (Leont'ev 1979). It is impossible to transmit means and methods to carry out a process in anything other than external forms, in an action or in speech. Higher mental processes can only be acquired through interaction with others. Intelligence is not 'accumulation of skills mastered' but a dialogue with

the future and an address to the external world. It is how you seek help and utilise the environment which shows true intelligence (Emerson 1996).   Hence Vygotsky asserted 'consciousness is co-knowledge' (Leont'ev 1979, Vygotsky 1979) as consciousness is produced by society.   As actions begin to be carried out independently by the learner, the external forms are converted into intrapsychological processes and the very form of the mental reflection of reality changes.   When internalisation begins egocentric speech drops off and the child is able to have a conversation with himself/herself.   But the inner speech which results can be internalised creatively only if questioned and challenged by outside voices.   Hence inner speech is quasi social; it is inner dialogue, an internal collaboration with oneself (Wertsch & Stone 1985).

This inner speech is not merely identical to external speech without vocalisation (Tharp & Gallimore 1998), it is reorganised and reconstructed, becoming elliptical through its economy.   This is then the contradiction – it is quasi social, but it is quite distinct from social discourse in form. In this study it was seen that after Acquired Brain Injury (ABI) pupils use egocentric speech . Whether its use is the same as with much younger children is the subject of this paper. The key feature is whether the utterance is part of an external social process or whether it is quasi-social, partially internalised, individual activity, a new tool with which to think.

Method
A qualitative study was undertaken observing pupils with ABI in their normal classes in mainstream secondary schools, which formed part of a PhD thesis (reference omitted). Table 1 gives details of the 17 pupils (pseudonyms have been used to preserve anonymity) all aged 11-16, who formed an opportunistic sample recruited as they joined Supporting Head Injured Pupils in Schools (The SHIPS Project),from mainstream secondary schools in the South West of England within a 5 year period. They were observed for between 5 and 24 hours within their normal classroom settings, which may or may not have been with the support of a teaching assistant.

Name	Age(KS) at injury	Age(KS) at observation	Type of injury	Cause
Ruth	5mths(Pre)	11(KS3)	TBI	Non-accidental
Nasser	2 (Pre)	11-12(KS3)	TBI	Falling masonry
Carl	7(KS2)	11(KS3)	TBI	Fall
Adam	10(KS2)	11(KS3)	TBI	RTA
Simon	9 (KS2)	11-12(KS3)	TBI	RTA
Ian	11(KS2)	11(KS3)	non-TBI	tumour
Vicky	10(KS2)	11 (KS3)	TBI	Quad-bike
Owen	9(KS2)	14(KS3)	TBI	RTA
Ben	9(KS2)	16 (KS4)	TBI	Bike
Louise	13(KS3)	15-16(KS4)	TBI	RTA
George	12(KS3)	15(KS4)	TBI	RTA
Darren	13 (KS3)	14 (KS3)	TBI	Fall
Evan	13(KS3)	14(KS3)	Non-TBI	Tumour
Jade	14(KS3)	15/16(KS4)	TBI	RTA
Harry	14(KS3)	15 (KS4)	TBI	Fall
Mike	14(KS3)	15-16(KS4)	Non-TBI	Hanging
William	15(KS4)	15-16(KS4)	Non-TBI	Viral infection

Key: Table 1
TBI = Traumatic Brain Injury; RTA = Road Traffic Accident

All the pupils sustained severe traumatic injuries, or were in intensive care for a significant amount of time where the injury was non-traumatic. Data was collected by the first author through free fieldnotes sitting close enough to the pupil to hear what they were saying, but far enough away so that they did not have to include the observer in their reasoning. Interpretivist analysis was undertaken using iterative coding within NVivo (www.qsrinternational.com) as a tool to develop inductively-derived themes using 'constant comparative method' (Glaser & Strauss 1967),until each category was 'theoretically saturated' (Strauss & Corbin 1990). The analysis was neither content nor discourse analysis per se, but, having noted that most pupils after ABI tend to 'think aloud', a search was made for the form and conditions for its use, developing common themes among the pupils observed.

Thinking aloud after ABI

Vygotsky (1979) proposed that as a young person matures, external speech becomes internalised through the use of an 'inner voice', as interpersonal interactions become intrapersonal. But for the pupil with an ABI externally voicing thoughts, or thinking aloud seems to be a necessity.

Most thinking aloud by ABI pupils is grammatically complete and sounds like intermental communication. Such 'thinking aloud' does not appear immediately after injury, but generally once the young person has returned home and re-started lessons, possibly because they need the experience of having the language of learning modelled for them by the teacher.

Vygotsky pointed out that although this 'inner speech' is fully understandable when used by 3 and 4 year olds, it becomes inscrutable by the time the children are aged 9 years. Piaget argues that such language is 'egocentric thought'. Certainly after ABI young people do have continuing difficulties with understanding the point of view of another which may lead us to think that complete utterances would also continue. But as Simon's mother commented:

> Mother: I can't always understand what Simon says … He doesn't expect us to notice.

However condensed utterances appear several years after ABI and later in recovery young people appear to allow their thoughts to 'go underground', perhaps as the young people retrace the stages of their development.

Thinking aloud	R	N	B	O	S	L	G	A	I	V	M	W	H	E
Keystage at injury	Pre	1	2	2	2	L3	L3	2	2	2	U3	4	4	U3
Current keystage	L3	L3	4	U3	L3	4	4	L3	L3	L3	4	4	4	U3
Years from injury	10	9	8	5	3/4	3/4	2	1/2	1/2	1/2	1/2	1/2	1	1
Complete utterances	3	3	3	3	(3)	3	3	3	3	3	3	3	3	3
Condensed utterances		3	3	3	(3)	3		3						

Key   Table 2

3   shows evidence of, in brackets where reported but not witnessed by the authors

Table 2 is organised by time since injury and shows that the pupils further away from injury use more concise utterances, at least at times. Thinking aloud seems to be a cognitive tool. Evan commented:

> [1]E: When you say it in your head it doesn't sound like the right words but when you tell someone you get the right words

Without thinking aloud, pupils may fall into previously learned procedures which are not appropriate.

> During a cover lesson for Maths the task was a sheet of mixed questions taken from exam papers
> *Question 4 had a diagram showing a number of playing cards and coins.*
> L: probability
> *She worked out the various probabilities of getting single cards and single coins without writing them down. She then read the question silently. It said* If the card shows '2' and the coin shows 'heads', the outcome can be written as (2,H) (a) List the possible outcomes.
> L: How can I do that? The card is ¼ and the coin is ½.
> SR: You are asked to do outcomes
> L: But we only know the card and the coin. What does it mean 2 H? I can't do that. I know the card is ¼ and the coin is ½.
> SR: We're not asked about the probability yet, that'll come later, first we have to list the outcomes, what it is possible to get
> L: But 2H what's that?
> SR: You could get a 2 on the cards and a head on the coins
> L: Oh
> *She wrote out the whole answer systematically and very quickly*

Louise did not read the question out loud and did not register that she needed to find outcomes. Instead she fell into a previously learned routine for tackling probability questions. It may be that thinking aloud helps her to organise her ideas, before telling someone about them. She did not look at the observer when she asked the first question. At the time she was looking intently at the worksheet. Although other ABI pupils have poor eye-contact, Louise is very sociable, particularly with adults who are helping her. If what you are saying is not helpful she will look away. At the time the second comment seemed to be a request for assistance, but it is more likely to have been a voiced thought, as it has four distinct ideas, one on top of another. By her third utterance she was looking at SR while speaking, and the question is much more clearly directed outwards. It also repeats the same information as if the observer were not supposed to hear the previous utterance. According to Vygotsky, thoughts are first addressed outwards and then inwards, as the learner takes the ideas underground, and external support fades away but with these pupils it seems to work the other way around.

It may be suggested that teachers could vicariously act as the inner voice, but thinking aloud seems to need to be done by the individual pupil.

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[1] In this paper, the pupil is identified by their initial. SR is the observer, T is the teacher, TA is a teaching assistant, P1,P2 etc are other pupils

> In art, the task was to choose a painting and write about it. She had
> written several lines, struggling over some of it and I had helped her.
> L: Is that it?
> *I read the board framework.*
> SR: Have you included all that?
> *Louise nodded, but she had not*

It was not enough that the instructions were read out. It may have been better to ask Louise to read aloud the framework and check that she had completed the task, so that she would have had to deal with the information herself. It is difficult to make meaning with multiple part instructions after ABI (Rees 2007) and it may be that by reading aloud, the material is automatically chunked and more understandable. Alternatively, she may have been saying that she had had enough of that task and wanted to move on.

Form of thinking aloud

Different forms of thinking aloud are encountered in the classroom. Pupils read aloud, rehearse their thoughts and act, tracing in the air or on a screen what they will have to do later.

Reading aloud

Both Adam and Mike have asked if they can read the questions aloud, having first read them to themselves and not known what to do. Nasser always reads aloud, but his teachers put this down to his poor reading ability. We suggest that this may be a partial explanation.   In a normal classroom there is usually a murmur of noise and therefore the space for the ABI pupil to talk themselves through the problem, but not in exams.

> Louise had a sheet of maths questions to revise some work she had had
> difficulty with in a previous lesson.
> *Louise read out every question aloud. I asked if it helped. She replied*
> *in the affirmative.*
> SR: What about in exams?
> L: You just mutter under your breath

Even in the silent exam hall Louise knows that she will need to 'voice' the instructions she is given, and just does it as quietly as possible.   She is far more aware of her needs and strategies to fulfil them than many authorities on ABI would credit her (e.g. Glang *et al.* 1992, Walker & Wicks 2005).

Rehearsal

Pupils post-ABI frequently think aloud to initiate actions,

> Evan had partially done his homework. The task had asked
> 'Describe at least four things that you think are good about Brazil.
> Write a paragraph'.
> *Evan had written a list and the teacher had pointed out that a paragraph*
> *was required. He did nothing.*
> SR: Start with 'In Brazil…'
> *He did nothing*
> SR: Think about what you want to say.

> *Evan said, then wrote:* Brazil has some great beaches and hotels which is great for tourism.
> *Then without having to hear it aloud, he wrote:* They can make some good money.
> *The next task was a cloze passage. He read it out and inserted all the missing words with no problems.*

It may have been that Evan was already thinking about his response, but he did not tell me so, and he usually did if I interrupted his thoughts. However, modelling a start to the sentence did not help, he seemed to need to gather the whole phrase together and hear it. The second sentence then appeared without being spoken aloud first. It seems that once he had focused on the task he was able to plan internally. My suggestion was authoritative and did not give space for Evan to bring in his own ideas.

When George had an opportunity to think aloud he was able to take part in a class discussion:

> At the start of an English Class George's teacher wrote on board 'I could of done that'.
> T: What's wrong with that?
> P1: Could
> T: No
> *General hubub of its ok, nothing wrong*
> G: Could (spoken to himself)
> T: Hands up if you think it is wrong
> *George put his hand up*
> T: George, why?
> *George put his hand down*
> T: Changed your mind?
> *More general discussion followed during which George was muttering*
> G: Miss is the word could wrong?
> T: No
> She then asked other pupils and explained correct response.

George may have heard and copied P1's contribution, but at this point he did not seem to be focused on the discussion, but on what was written on the board. Hawley (2005) noted that a pupil in her study also raised his hand and then could not answer. It could be that George does not know what raising their hand in class means. They may be unaware of the particular social rules of the classroom, but given time, and the opportunity to mutter, George is able to add his contribution. It is more likely that he needs time to rehearse. Muttering could have allowed him to vocalise and therefore rehearse his response. Therapists warn teachers that pupils with an ABI need time to think, but they also need time to organise and possibly to rehearse their response. Barnes (1992) suggests that exploratory talk should precede class talk. But difficulties encountered when working in groups or dyads does not necessarily mean that asking the pupil to discuss ideas with a friend before sharing with the class would be beneficial. This may be an area where a sympathetic TA may be able to support learning by allowing the pupil to rehearse their answer aloud (as if to the adult) without seeming 'immature' and losing face with peers.

Action as thought
Pupils also use action as a mode of thinking, to reinforce understanding,

> Evan's task was to ascertain if certain shapes were symmetrical.
>
> Evan put his hand on the diagram
> E: If I put it that way no symmetry
> He looked at me
> W: Can I just shade it now?
> SR: Yes
> He did

It was very clear when Evan was talking to himself and when he was talking to others, as he always had eye contact with his listener. Initally here he had his head down, clearly talking to himself, then he lifted his head and spoke to the observer. Touching the diagram to emphasise the information given as part of the question, possibly performs the same function as speaking out loud, externalising a thought.

Ruth adopted a different approach, miming the action which was expected to carry a microscope correctly, while Owen moved his computer mouse to trace what the teacher asked them to do later, despite having been told to turn off his monitor. When asked about this he told the observer that it helped him to remember. William was in a class where a diagram of the structure of a leaf had been projected on the wall; the projection was not clear and the teacher gave out paper copies of the diagram. As she started talking about it, William touched each part of the diagram she mentioned. Later William was able to engage with the task of annotating his diagram.

Teacher benefits
Thinking aloud can assist teacher monitoring:

> In Louise's maths class a problem had been set which involved a cumulative frequency graph but the class were clearly not managing it. The teacher converted the lesson to bar charts.
> L: (Hand up and shouted out) Sir do I put the frequency up the side?
> *The teacher moved to the board and explained what he wanted, answering her question to the whole class.*
> L: *(muttered)* I think I'll go 1, 3, 4, 5, 7, 7, 9
> SR: Hang on, look at the board, he's included a 2 and left it empty
> *She then wrote the numbers horizontally*

Louise's utterance allowed SR to monitor what she was thinking, and try to offer assistance. It was later realised that she was reading out the grouped frequencies, but then wrote them where the class intervals would usually be placed, having asked if she should write them 'up the side'. It seems that she has perhaps muddled terms, or orientations or both. But she was clearly at the limit of her ability here (her ZPD) although the teacher in presenting the work felt that it was appropriate for the class. Her intention, however, was not to let an adult monitor - but to direct her own actions.

Pupil benefits
Authoritative discourse refers to those forms of language use which present themselves as unchallengeable orthodoxy, formulating a position which is not open to debate (for example, religious dogma); it is 'the word of the fathers' which 'demands our unconditional allegiance' (Bakhtin 1981 p342-343). Internally persuasive discourse, by contrast, acknowledges the primacy of dialogue, the impossibility of any word ever being final, and for this reason it has the capacity to generate new meanings not previously formulated by either speaker. In Bakhtin's words (Bakhtin 1981 p346; original emphasis):

> The semantic structure of an internally persuasive discourse is not finite, it is open; in each of the new contexts that dialogise it, this discourse is able to reveal ever newer *ways to mean*.

There is a close similarity at this point between the view of consciousness implicit in Bakhtin's work and that developed independently by Leont'ev in his work on Activity Theory. For Leont'ev, consciousness is co-knowing, in the sense that 'individual consciousness may exist only in the presence of social consciousness and of language that is its real substrate'. We might compare Bakhtin's view that 'consciousness awakens to independent ideological life precisely in a world of alien discourses surrounding it' (Bakhtin, 1981: 345).

This may remind us of the key distinction made by Barnes (1992) in the context of classroom discourse between exploratory speech and final draft speech. In exploratory speech, the student is engaged in a sharing of the self; the teacher replies in kind and assists in the development of the student's understanding, encouraging the use of a hypothetical mode of thinking. By contrast, in final draft speech, the teacher's replies assess the student's contribution and embody a judgemental role, the tone of the interaction encouraging an expository mode of knowledge-display, rather than the tentativeness characteristic of exploratory talk. In a similar vein, Cazden (2001) distinguishes between the teacher-led recitation of traditional lessons, and responsive teaching, in which teacher and student discourse is reciprocally influencing, and teacher interventions are open to interactive influences, producing a more dynamic mode of interaction as a result of 'in-flight' decisions on the teacher's part. These considerations suggest the possibility that thinking aloud by pupils with ABI may be fulfilling the role of a dialogue with the self, which is often carried on silently by other pupils. Here the external, voiced nature of the dialogue seems to allow pupils with ABI to develop that flexibility and reflexiveness of thinking which is necessary for independent problem-solving. It reveals the two-sidedness of internally persuasive discourse, which is always 'half-ours and half-someone else's' (Bakhtin, 1981: 345).

Peer dialogue as an opportunity for thinking aloud
The question must be posed; can external forms of speech in group-work be developed to foster full participation by ABI pupils alongside others?

Peer group dialogue is under-represented in the observations, with only seven examples (two each for Ruth and Evan). Simon and his group were required to design an advertising campaign for a new drink.

English lesson, developing an advertising campaign for a new drink. Working on advertising campaign in groups. Cover teacher introduced lesson by talking about teamwork and eliciting qualities of teamwork. Sat in groups of four, four activities per team. They looked at the sheet provided by the teacher

P1: What do you want to do?

S: [very quick response] I'll do a questionnaire

Simon started to work on it. P2 and P1 discussed the shape of the bottle, the other two were silent. A few minutes later P1 tried to get Simon's opinion

P1: Do you think that would be right for the design of the bottle?

He pushed his book towards Simon. Simon ignored him and carried on with his questionnaire

P1: Simon

Simon looked quickly then said yes

Simon produced six questions on his own without having any involvement in the group decision-making. At one point Simon looked over at P3's work, making no comment. Others did elicit opinions, but Simon chose not to be included in this. P1 tried to include Simon, but his overtures were rejected. Simon gave the impression that he felt the work should be done in silence and that the others were 'breaking the rules' by talking, despite the introduction to teamwork. Very few lessons employed teamwork and Simon was clearly not used to it. It may be that group work broke one of his personal rules, but it is more likely that he was unable to cope with it and so avoided it. His school had optional activities on Wednesday afternoons, such as team games, drama, dance or other co-operative activities, but Simon chose to go home, as he explained, 'to be with my mum.'

Nasser is also unable to share in a task, either he has to take over or he follows completely what others are doing. He seems unable to negotiate his participation in a group and tends to stand on the outside. When moving from class to class he walks on the outside of the group, perhaps to give him more room, but does join in the chatter, even though he butts into conversations. However in the classroom he rarely contributes verbally, and takes over in practical tasks. Currently he is missing the general chatter between lessons as he has been allowed to leave classes early and walks alone to the next lesson.

Likewise Adam found it difficult to refer to his group and initially did everything, but later when others took part as well he was prepared for them to do all the work. However Evan became the focus of the attention in his group (it was the first tutor group he had attended after his absence), but he was unable to pick up on points made by others and interrupted their contributions. This is suggestive of difficulties with social interactions inhibiting the participation of the young person in this type of classroom learning technique, but with so few examples it is difficult to draw firm conclusions. However, later he showed he could work with others, as in this example.

Evan was in a French lesson

P1: How do you say I went?

SR: Je suis allée…

P1: Je suis allée au centre commerciale. J'ai achetée les pantalons noirs

E: C'etait ennuyeux

SR: ..parce que..

> E: How do you say I don't like?
> SR: Je n'aime pas
> P1: le shopping

It could be interpreted that Evan interrupted because he was unable to allow his friend to have the limelight, on the other hand this could have been part of a genuine collaboration. The session continued in a similar fashion, with gradually less and less input from me as they created joint utterances. This then became a paired scaffolded session, as my props were gradually removed and the two pupils took over more and more of the responsibility for composing the French phrases. However the social pressures here were less as he was only working with one other. Teachers frequently asked pupils to 'talk about it with your partner', and while the rest of the class chatted to their neighbour, pupils with ABI tended to sit silently, as if the talk was too vague to know where to start. This was particularly so when the topic was new to them. Even when the task was more concrete partners did not always speak as when Ruth and her partner were working together in Maths

> Ruth's Maths class was asked to pair up with a calculator between them.
> T: I want you to find how you could get 0.5
> *Ruth took over the calculator from her partner, placing her body between the calculator and her partner.*

Ruth became dominant in the relationship and the other girl was frozen out of the activity. There was a buzz of conversation in the room, as the rest of the class approached the task as a joint problem, making suggestions and taking it in turns to try out ideas. However when an activity only asked the pairs to practise a skill, rather than involving them in problem solving or developing their ideas, Adam was able to take the initiative and involve his partner.

Ruth was given some tuition in what was expected in partner work and guidelines to follow. Subsequently she was involved in an informal discussion

> Ruth's teacher had just asked for volunteers to talk about how their school visit had made them more independent. Her trio were chatting while the teacher prepared the activity.
> R: Independent means when you were abseiling, you have to go down on your own
> P1: Its… You are away from Mum and Dad... you're away from home
> R: Independent means doing an activity on your own

Ruth is given the opportunity to think aloud about the topic the class will be discussing. Whether she listened actively to her talk-partners is not clear as she does not incorporate their contribution into her response, but she did not talk across them, as she had done previously.

The matrix below shows which pupils experienced the different forms of interaction in the classroom and their reactions to it.

Participation	R	N	A	C	S	I	V	O	D	J	L	G	E	M	H	W
Keystage at injury	Pre	1	2	2	2	2	2	2	L3	L3	L3	L3	U3	U3	4	4
Current keystage	L3	L3	L3	L3	L3	L3	L3	U3	U3	U3	4	4	U3	4	4	4
Teacher led Q&A	✓	×	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	×	✓	✓
Open class discussion		✓									✓	✓				✓
Group discussion	×	×	×		×	×					✓×		×			×
Dyadic discussion	× (✓)	×	✓	×	×								✓			

Key   Table 2
✓ coped well, after tuition in working together if in brackets
× did not cope

Conclusion

The widespread use made of the technique of thinking aloud by this group of pupils is given in table 4:

Form of thinking aloud	R	N	B	O	S	L	G	A	I	V	J	M	W	H	E
Keystage at injury	Pre	1	2	2	2	L3	L3	2	2	2	L3	U3	4	4	U3
Current keystage	L3	L3	4	U3	L3	4	4	L3	L3	L3	U3	4	4	4	U3
Years from injury	10	9	8	5	3/4	3/4	2	1/2	1/2	1/2	1/2	1/2	1/2	1	1
Reading aloud		✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rehearsal	✓	✓	✓	✓	(✓)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Action as thought				✓		✓						✓	✓	✓

Key   Table 3
✓ - needs to use, at least at times, in brackets if reported but not witnessed

This seems a very important strategy employed by all the pupils with ABI. Only Simon appeared not to use thinking aloud at school, although he did at home. Further away from injury pupils do not seem to need to use the technique all the time, or are able to find the form(s) which are most useful to them rather than using all the forms which happen earlier after injury. Early in the recovery process all reading needs to be vocalised, and instructions need to be repeated by the individual pupil, even when spoken aloud by another. If teachers try to prompt an answer by giving the first couple of words to a pupil with ABI, this is rarely successful – although in the more relaxed context of a conversation pupils with ABI can use this to develop their thinking. Once the pupil is engrossed in the task then they may be able to rely on inner speech to plan what they will write. Action may be used to back up vocalisation.

Thinking aloud in fully formed utterances seems to begin some time after injury, once formal learning has restarted. Initially when used by a pupil this very personal speech takes a fully social form and many parents report that they have to learn not to answer, and let the young person work out their own solution. These utterances become more concise at a later stage as they are transformed for internal use, as

      'Internalisation transforms the process itself and changes its structure
      and functions' (Vygotsky 1979 p165)

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Vygotsky observed this phenomenon in younger children following a typical developmental pattern. He also argues that structure and function of inner speech is different from external speech. The external use drops off, generally between 3 and 5 years post injury. This move from external to internal seems to form that bridge which allows each pupil to move from the social (intermental) to the personal, (intramental) where inner speech becomes a tool for thinking, that it is, it becomes 'instrumental' (Leont'ev 1979).   Wertsch & Stone argue that the process of internalisation brings control over external sign forms. For pupils with an ABI this may assist in combating the impulsiveness which tends to follow such injuries, allowing thought to control action.

Our study produced only a limited amount of evidence regarding the challenges that pupils with ABI face when attempting to participate in group-work activities in the classroom. Further research is needed to ascertain whether the forms of thinking aloud spontaneously used by these pupils can be harnessed and built on to enable them to take part more effectively in collaborative work with their peers in the absence of teacher intervention. However, the study has shown that, in individual and plenary work under regular classroom conditions, pupils with ABI frequently have recourse to a type of egocentric speech; and that, if they are allowed and encouraged to verbalise their thinking in this way, it can help them talk their way into a firmer understanding of the learning task with which they are confronted, and avoid impulsive responses which are inappropriate to the task in hand. It is possible for pupils to use seemingly appropriate communication without realising its full significance; pupils use acceptable forms of speech but not in the way their peers are using them, which may then cause a breakdown in communication. There is an agreement on reference to an idea or object, but it is not an agreement on meaning. Busy teachers overhearing a question may be tempted to answer and deprive the pupil of an opportunity to construct their own knowledge. For the inclusion of pupils with ABI in mainstream classes to go beyond their co-presence in the regular classroom, it is important for educators to provide the opportunity for them to verbalise their thought processes more fully than might be expected of other students. Parents and teachers have to learn to let the young person answer their own questions and let them know that thinking is allowed.

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