Checking the list –
Can a model of Down syndrome help us explore the intellectual accessibility of heritage sites?

Jonathan Rix
Lecturer in inclusion, curriculum and learning
Faculty of Education & Language Studies,
Open University, Walton Hall, Milton Keynes, MK7 6AA
j.r.m.rix@open.ac.uk

Abstract

There is currently a lack of provison for, and research into, the intellectual accessibility of heritage sites. This paper explores some possible ways forward. It examines recent research with people described as having Down syndrome and uses the syndrome's identified characteristics to create good practice guidelines. It assesses these guidelines against an audio tour written for people with learning difficulties. In conclusion the paper suggests that drawing upon a generalised model of Down syndrome and these good practice guidelines will allow sites to identify some potential barriers and enablers to intellectual accessibility, but that to fully appreciate the effectiveness of their provision they must still institute site-specific research by people with learning difficulties.

Keywords: Intellectual access guidelines – Heritage – Disability – Inclusion – Down syndrome

Introduction

Heritage sites in many countries now make provision for people with a wide variety of physical and sensory disabilities. There is still a lack of provision for people described as having learning difficulties, however. Some sites offer audio tours, others have occasional targeted tours or one-off projects while a number have accessible signage, but there is no clear picture of current provision and little analysis of the intellectual accessibility of sites. Whereas a number of organisations offer advice on how best to provide access to sites and their artifacts, and carry out audits of physical and sensory access, there is little to assist with intellectual access. An exploration of the The Museum Learning Collaborative archives (2003), for example, reveals nothing in this area. The National Endowment For Arts' Design For Accessibility, (Goldman, Lesser, Lincer, Parks, & Salmen, 2003) has 12 pages on physical and sensory access and 1 page on cognitive disabilities.

Advice is often general, encouraging sites to consider whether people can access their information and to consult and involve new audiences in the production of exhibitions. Such an approach is evident in the Inspiring Learning for All website (MLA 2004), where there are generalised statements about considering under-represented groups and different learning styles. Some advice can be quite worrying too, when considering the lack of research in this area. In Audits (Delin, 2003), for example, it is stated that "A professional consultant, whether disabled or non-disabled, should be able to cover all areas of impairment, including those in which they have no personal experience." (pp16).

Where there are specific directions they tend to offer limited assistance. The advice from The Disability Directory (Resource 2001) recommends the use of plain english, supporting pictures, short sentences, clear print, and step by step learning opportunities. All of these seem excellent strategies but it is made clear that their final form depends on their appropriacy to audience. Futher advice encourages the use of active sentences without complex qualifying clauses, the use of attention-grabbing, human-story information, but without distracting background audio effects. This

will be appropriate for many people described as having learning difficulties, but not all. People described as having autism, for example, may find an empathetic human-story far less enticing than a detailed description, and a person described as having profound and multiple learning difficulties may best gain access with minimal stories and a range of audio effects. Herein lies one of the fundamental discincentives to all sites, are organisations supposed to assess every individual's response to the site and their comprehension of the information provided?

The factors outlined above may be seen as barriers to the development of inclusive provision. They exacerbate the barriers that already exist, such as physical, sensory, intellectual, attitudinal, cultural, social, financial, technological and so on. These barriers are now widely recognised by Heritage sites, echoing the take up of social model (Oliver, 1983) since the 1980's in all areas of public provision (Barnes, 2002). It is must be welcomed that policy makers and service providers now focus on environmental and social barriers which exclude disabled people from mainstream society, but the next step forward has to be the overcoming of those barriers.
"Access and inclusion can be improved by identifying the barriers which prevent participation and developing strategies to dismantle them…By dismantling these barriers museums, libraries and archives can become places of enjoyment, learning and inspiration for many more people." (MLA 2004 p4)
To dismantle barriers, disability researchers and policy makers advocate that providers create learning partnerships with their audiences, so that they can effectively respond to their views. But this will only be achieved if sites understand the nature of the audience and why their provision creates barriers. In coming to this understanding they must develop an appreciation of the impairments their provision fails to address. There is a fundamental tension in this however. People with learning difficulties will often find it harder than most to explain in depth why something is a barrier. Heritage sites need assistance in asking the right questions in the right way.

Museums and Heritage sites might feel enabled if they had a range of broad descriptors to call upon when considering intellectual access issues. Despite there being over 200 identified aetiologies of organic learning difficulty (Burak, Hodapp & Zigler 1988), it would be relatively straightforward to provide a list of traits and strategies for the most common aetiologies. To assess the effectiveness of this approach, this paper will consider the traits of people described as having Down syndrome, the most prevalent syndrome and "among the most language handicapped of the learning disabled population."(Bower & Hayes 1994 p. 49). There is a tension here too however. By building on this research we risk invoking the medical model, suggesting that the barriers to learning are due to these traits rather than the ways in which society works with them. This paper would clearly not support any such assumption. The intention is to suggest possible best practice based on this research and examine its possible value for enabling and analysing access. This examination will involve the analysis of a Basic Language audiotour of Westminster Abbey (Rix, 1998), produced for people described as having learning difficulties. The paper will suggest that guidelines based on researched traits provide a better starting point for creating and assessing provision, but that sites still need to institute site-specific research involving a wide variety of people described as having learning difficulties.

A model of Down Syndrome
The following description of the Down syndrome aetiology is based upon research mainly carried out in research settings. Its subjects are generally not people who have been educated inclusively or benefited from many of the ways of working prompted by this research (Rondal and Comblain, 1996; Buckley 1993B). In addition, across time, all individuals will find that there is a change in their physical, sensory and intellectual capacities. This description doesn't take into account health issues that could impact on individuals, but attempts to identify aspects of the aetiology that would seem most relevant to issues of intellectual access. The research therefore represents a mark in the sand rather than a fixed position. There are many people described as having Down sydrome who

would not recognise the following ideas as a description of them. In addition, there may well be issues not discussed here that different sites may feel need consideration in relation to their setting.

People described as having Down syndrome commonly have some form of visual impairment, and will tire more quickly when looking at items.(Pueschel and Gieswein, 1993). Many individuals will have focus problems, creating difficulty with colour & shape differentiation (McGinnis, 2001). Both mild and severe hearing loss are also commonplace, though it is often intermittent in nature, reducing auditory self confidence. There is a tendency for higher pitched sounds to be disabling and for greater volume to be enabling. In addition there is commonly a reduction in comprehension if a synthetic voice is used or a word is followed closely by sudden noise (Marcell, 1995).Those with mild hearing loss will find it harder to differentiate brief and quiet sounds and short words and a lack of strategies to counteract this will reduce comprehension further. (Hugo, Louw & Kritzinger 1999).

Issues of short term memory also exist. Typically the mean length of utterance (MLU) is half that of a typical 16 year old, though this is not an attention or concentration problem. There is commonly a short term memory delay in recall, and there are suggestions of reduced sequential processing and rehearsal mechanisms, including poor subvocal rehearsal (Broadley & MacDonald 1993, Hulme & Mackenzie 1992). There is potentially an operating speed reduction, reduced store, and unusually fast decay of information (Jarrold, Baddeley & Phillips 2000).

It is possible that there is slower processing of sound, as well as a slower response to auditory stimuli (Davis, Sparrow & Ward 1991, Chua, Weeks and Elliott 1996), and slower move initiation following auditory stimuli (Elliott, Gray & Weeks 1991). Actions are also carried out with increasing inappopriacy when length of sequence and instruction increase, though there is usually a faster, more accurate response with visual stimuli (Chua, Weeks and Elliott 1996) Visual stimuli generally enables learning (Buckley 1995). though overuse of non-target cues reduces differentiation (Bijou 1977, Schilmoeller & Etzel 1977).

Expressive language skills are around those of a typical 3-5 year old, generally below cognitive test score levels, showing poor morpho-syntax but with effective pragmatics, and a reasonable lexicon (Buckley 1995). Typically, in speech, simple sentences are used with reduced production of pronouns, auxiliary verbs, subordinate clauses, conjunctions, negative sentences & passive sentences (Chapman, Schwartz & Kay-Raining Bird 1992, Jenkins 1993). There is commonly ambiguous use of referential forms with more than 2 characters involved, with thematic subject restraint often reversed (Moore, Clibbens & Dennis 1998), suggesting store and recall limitations.

There is difficulty in learning new words and a limited level of word recall, which is effected by word form, length and familiarity (Marcell, 1995, Comblain 2000).The motivation of indiviudals is important too. There is a hesitancy to use new skills, and a tendency for avoidance strategies in complex situations (Wishart and Duffy 1990), as well as difficulties with endings (Chatterton & Butler 1994). Complex extra-linguistic context also increases language and comprehension difficulties (Rondal and Comblain 1996).

It is still unclear if comprehension levels are equivalent to production levels or above. Comprehension is described as that of a typical 5 years old, with about 50% of common objects and actions being correctly named, and with information and topics being followed with consistency, though typically there is poor recognition of verbal inflexions (Comblain, 1994). Individuals seem to demonstrate a difference to ordinary peers in relation to perception of time and space (Miller 1987), and in their ability to use number and numeracy skills (Nye, Clibbens & Bird 1995, Porter 2000). Comprehension of emotions, however, as well as social skills and behaviour, are good in

relation to developmental age (Baren-Cohen, Tager-Flusberg & Cohen 1992) as is the ability to empathise (Buckley & Sacks 1987).

TABLE 1

Removing barriers on site - Putting the model to use
Defining the in-person deficits of people means we make limiting assumptions about their capabilities. The paper will now try to apply that knowledge, alongside other examples of good practice, to create guidelines that may help to break down barriers created by museums and heritage sites and our assumptions.

It will be important for users to feel familiar with any equipment and its usage. Knowledge of equipiment and site prior to the tour would be valuable, as will the effective introduction of equipment use. Explanations of procedures should occur with minimum distractions. Staff may also find that explanations are more effective if they use slow, passive modelling demonstrations (Biederman, Stepaniuk, Davey, Raven & Ahn, 2000) and errorless learning techniques (Duffy and Wishart 1994). The appropriacy of volume levels of personnel and/or equipment should be carefully checked. Equipment should have visual cues, large buttons and be simple to operate (Perlman 1993). There should be handouts and signs to explain use of equipment, routes and artifacts. All signage should bear in mind a hierarchy of information, text form, label positioning, as well as format, style and materials. Signs should be easily identifiable, have a clear definition, strong primary colours, with visual cues and simple, large letters and numbers (Rayner, 1998).

The slower speed of response increases the chance of an individual focusing on an item when the narrator or educator has moved onto another matter. User's attention needs to be focused appropriately or staff need to respond appropriately to the user's focus. There will need to be clear, obvious points of reference, using objects not identified by colour (except perhaps bold primary colours) nor requiring technical knowledge to be recognised. Many users will quickly tire of looking at detail, so there should be regular activities or narratives that do not require detailed visual inspection. The references regarding an item that is not the focus of attention either physically or narratively should be limited too, as should the need to switch focus. This controlled use of reference points will be important to both physical and conceptual referential items. It will be important to limit the number of concepts, names and so forth used at any one time. The difficulty experienced by individuals when recalling narratives involving more than 2 characters, suggests the limit should be this this low.

There is a clear need to maximise comprehension and recall of information. The establishment of names, terms, number, directions and other concepts may be encouraged by use of repetition (Broadley and Macdonald 1993, Bowler 1991, Hulme and Mackenzie 1992, Laws, MacDonald & Buckley, 1996). The clustering of names, terms and concepts (Herriot and Cox 1971), and the use of small steps to explain information (Morss, 1984, Broadley and Macdonald 1993) will assist in both recall and comprehension. Comprehension will also be aided by the use of short, simple sentences, that avoid the passive and negative form, and contain familiar, short words. One clause sentences will enable more people than those with two or more, as will words of one or two syllables with single consonants. Defining familiarity will be complex however, for example seemingly familiar words such as 'Above' and 'Below' can cause difficulty for some people described as having Down syndrome (Buckley 1993). It is easy to overlook possible alternatives meanings for words too. Rayner (1998) talks about an audio tour that failed to reinforce through repetition that a Canon was a religious man, causing disappointment at the lack of big guns.

To assist with word or concept clarification alternative words or text in nearby sentences can explain or reinforce meaning through context, as can reference to visual stimuli. Sometimes new

words or concepts will need a clear definition, and reinforcement through repetition. Sites need not avoid the use of any words or concepts as long as they are clearly explained, reinforced and relevant. There should be particular sensitivity to the explanation and use of concepts of time, space and number.

It seems sensible to use repetition of sentence structures as well. A consistency to phrases used in particular situations may reduce pressure upon the phonological loop (Baddeley and Hitch, 1974, Baddeley 1986) triggering a recall of context, and increasing familiarity with the learning situation. For example, a template sentence such as; "This painting is called … It was painted by ….', could help clarify what it is expected from the listener and what they can expect to find out about.

The verbal and acoustic delivery of information will also be important. Spoken text should be delivered at a relatively slow pace, in a readily understood accent, at a consistent volume level appropriate to audience needs, with clear and precise enunciation. Attention should be paid to clarity of delivery of words with short stop consonants, placing slight natural pauses after them if possible. It will be beneficial to have clear switches between stimuli, concepts, characters, narratives and so forth, slowing down and clearly marking the transitions between them. Natural pauses in speech can be used at transition points, but these switches should not be marked by vocal inflexion alone. Sound effects (FX) used to mark transition points should not be too close to the conclusion of a sentence. Sound effects may potentially be a distraction, but it is possible in certain situations that they could reinforce ideas. If FX are used they should be simple, familiar and relevant to context, but not very short. Generally FX should not be used under speech, but if essential should begin before the text does so as to become familiar and less of a distraction.

It is important that people are not expected to carry out more than one activity at a time, such as walking and listening, or listening and searching for an item. It would also seem sensible to focus on only a few items of interest at each stopping point, and for narrative to be delivered through a series of small steps building up to the whole.

TABLE 2

Background to audiotours
Audio tours playing an increasingly significant role in the lifelong learning function of museums and heritage sites. They are presented using a variety of technological media, including portable tape recorders, CD players, programmed handsets, and laser triggered headsets or handsets. Each institution, audience and medium produces a different set of artistic, operational and pedagogic considerations which must be mediated through the text of the tour. The first audio tour for People with a Mental Handicap (sic) was produced in 1989 for the Overlord Embroidery at the D-day Museum. This tour was called a Basic Language audio tour, and was produced using criteria identified through discussion between the author and the education department of MENCAP. The pilot script was trialled by a young person described as having Down syndrome accompanied by their mother. These original criteria served as guidelines for the majority of Basic Language audiotours produced in subsequent years.

The criteria stated that the intended audience would have little background conceptual or factual knowledge, but would enjoy uncluttered, clearly structured information. They would have difficulty relating pictures to reality, would not have rapid recall of previous statements and instructions, and would become easily confused. They would often have hearing problems and their language ability would be that of a typical 5 year old. It was important to maintain a clear and concise overview of site and story, giving clear and simple directions and descriptions using obvious landmarks. Precise details, images and stores should be picked out, avoiding abstractions, jargon and historical and chronological minutiae, and allowing for some sections to be dealt with very briefly. The tour

should maintain a gentle pace, avoid making users walk and listen at the same time, pointedly tie sound effects with verbal descriptions, and keep voices and effects in the mid frequency range of hearing.

The Westminster Abbey Basic Language Tour is one of three English language tours produced for the Abbey. The basic banguage tour followed on from a main tour (Davies 1997) and became particularly popular with overseas visitors. Because of the popularity of the simplified format a simplified version of the main tour (Rix, 1999) was produced to run alongside the other two. This next section will use the good practice guidelines to assess the text of the Basic Language audiotour. The assessment will not consider the quality and form of site personnel assistance, signage, equipment, voice or FX. All the coding was carried out by the author alone.

Method
A concordance analysis was made of the three different scripts to compare length of overall text, words, sentences and paragraphs. An analysis was also made of the number of words that appear in isolation as compared to those that are duplicated within the text. The intention was to examine whether there was comparitive simplification of text in the Basic Language script.

Each sentence was coded according to the number of clauses and the number of items that could be perceived as being referential. This latter process did not merely code for actual references but also for those that could be seen as isolated points of reference. For example the Queen of England may be seen as having two conceptual points that need to be identified and recalled even though they refer to one person. This dual construction could have a potential impact on storage within the phonological loop, and could also effect focus. Rather than assume comprehension of such phrases they have been treated as potentially problematic and coded as two referential items. Passive and Negative sentences were also identified.

There was a broader coding of sentences, paragraphs and script sections too. This considered whether the text required carrying out two actions or more, and the form of actions, whether visual stimuli or additional auditory stimuli were present, and the degree to which visual reference points were repeated. Word form was also considered in context too. New words were coded if they were directly explained, repeated or if an implied alternative existed in the text. Site specific terms, words with potential multiple meanings and likely unfamiliar words were identified. Similarly repetition of concepts, instructions and sentence structure were identified, as was the use of clustering and small steps. Because of the significance of historical items and dates within the context of the Abbey items that drew on the concept of change across time were coded as were those that implied a fixed point in the past.

Results
The lexical and grammatical structures of the three scripts becomes increasingly simple. The Basic Language tour is the shortest of the three. Both words and sentences are shorter in the Basic Language tour. Sentences are an average 13 words longs and 63% of words being 4 characters or less. There is no great difference in word length between the three scripts. The Basic tour is delivered, however, at a slower speed. The length of the newer main tour and Basic Language tour when recorded will both be at around one hour, but the word rate in the former is around 150 per minute as opposed to 130 per minute in the latter. The script is divided into 23 Narration sections of Just over a minute in length to just over 5 minutes, with an average if around 2½ minutes.

Of particular relevance is the number of different words used. The Basic Language tour uses just over 50% of the number used by the main tours and only 6% of its words are used just once. The form of the words used just once is considerably different too. In the main tours these words are generally adjectives, technical terms, dates, uncommon nouns, older english or terms that are

knowledge and context specific (particulary church and arts). In the Basic Language tour the words in isolation are people's surnames, verbs with different endings, alternative words for a word that is the main focus, and the occasional site specific term.

TABLE 3

Nearly 70% of sentences have 1 or 2 clauses, and involve 3 or less potential referential items. This means however that over 30% have 3-5 clauses and involve 4 or more potential referential items. There are 2 negative sentences and 26 passive sentences, but the latter are mainly used in the context of a person being crowned or buried. Sentence structure is not often repeated, however, occuring only 7 times in the text. There are 9 occasions on which people are expected to walk and listen and 39 occasions when they have to search for something as it is being described within the text. On 17 occasions listeners have to remember to carry out one action after another. All instructions are repeated at least once however, over 75% being repeated twice or more. Similarly new ideas are consistently repeated, 50% more than twice. New, possibly unfamiliar words are not often explained directly, but more commonly there is an implied meaning within the text, 45% of the time there are two or more implied meanings offered. The new words are often repeated. There are however, 27 potentially unfamiliar words that are left unexplained or without an implied alternative.

There are many examples of practices that should assist response, recognition, recall and comprehension. 18 visual reference points are used more than once, and visual stimuli support the text on 75 occasions. There are 38 FX but 23 of these are used to mark the end of a section. All 15 FX link to the text content. There are 30 examples of clustering and 19 of small steps. The small steps are mainly used in directions, but not in narrative, while the clustering commonly co-occurs with historical concepts. 45 sections involve concepts of change across time with 28 point in time references (Dates are not used). There are however a number of examples of stories and ideas which exist in isolation and are not repeated directly or indirectly.

Discussion

Compared to the good practice guidelines this Basic Language audiotour seems to have a number of strengths and weaknesses. It is unquestionably simpler than the main tours on offer, using a more appropriate lexicon of commonplace, slightly shorter words, delivered at a slower pace. The length of sentences is however of some concern. At around 13 words a sentence this could potentially put too much of a strain on the short term memory. The same can be said for the structure of many of the sentences. Nearly one third of sentences involve complex structures with many potential points of reference. Though there was no specific analysis done on pronoun use, there were occasions when there were three or four characters within a narrative. Based on the model presented above, such a high percentage of complex sentences must threaten the motivation and self-confidence of the audience.

There is potential for confusion too because people often have to carry out more than one task. However, often the talk while someone is searching for an item is a repetition of the directions, and talking while the user is walking is largely dictated by the nature of the space. The majority of the walk and listen occurs in the Cloisters, where there are few clear points of reference. The script attempts to mitigate against this through the use of repetition. The frequency of concepts related to points within and across historical time is also potentially problematic, but the use of clustering and repetition (not part of the original advice) may go some way to overcome difficulties. This would be significant, because history is so fundamentally interwoven with the Abbey.

The use of repetition appears to be very much a strength of this text, using alternative meanings and sentence forms whilst moving the narrative forward, though it is a pity that small steps are not used

more within narrative. The tour makes much use of repetition to help focus the listeners attention in the appropriate place. The repetition of an FX as demarkation of section endings also assists with focus, providing a clear end point for those who may not be fully prepared for an ending.

The script seems to make good use of visual stimuli, both as a point of reference and to enable learning. It does not overuse inappropriate visual stimuli, and gives people a chance to listen without having to look at artefacts in detail. The tour does commonly discuss more than two items or artefacts per commentary section, however, and there must be some concern too, that there are stories which are not repeated. Both factors risk losing the focus of listeners.

TABLE 4

Conclusion
The application of these good practice guidelines to this text offers some valuable insights. It reveals a number of areas of concern about the effectiveness of the tour as a tool for intellectual access, as well as potential strengths. It is not possible to know in isolation whether these concerns and strengths would represent the experience of listeners described as having Down syndrome, of course. To be certain of this we would need to carry out more traditional museum research. This research would be offered a clear, more manageable focus however, by the application of this first stage evaluation of the text. From this point of view the guidelines offer a useful tool. This tool can be easily adapted to explore other forms of provision too.

The analysis of this audiotour is retrospective, of course. It examines current provision, rather than framing the creation of provision. The guidelines demonstrate the need for heritage educators to ask many more questions than current official guidance suggests. Having a more definitive list should help the focus on those questions when in production. The guidelines produced in this paper, and subsequent guidelines based on the identified traits of aeteologies other than Down syndrome, clearly cannot be the whole answer though. To be fully effective sites need to build upon another aspect of current advice and genuinely involve a broad range of people with the full range of descriptions of learning difficulty when creating provision. Such an approach is likely to throw up even more questions and possibilities that will be to the benefit of all heritage site users. Out of this can grow the next stage of good practice guidelines, that enable staff to view their site from a still wider variety of more inclusive perspectives.

Bibliography

Baren-Cohen S, Tager-Flusberg H & Cohen D (Eds) (1992) Understanding other minds: Perspectives from autism, Oxford University Press

Barnes, C (2002) Emancipatory disability research: project or process? Journal of Research in Special Educational Needs, 2,1, doi:10.1111/j.1471-3802.2002.00157.x

Biederman GB, Stepaniuk S, Davey VA, Raven K and Ahn D (1999) Observational learning in children with Down syndrome and developmental delays: The effect of presentation speed in videotaped modelling, Down's Syndrome Research and Practice, 6:1 pp12-18

Bijou SW (1977) Practical implications of an interactional model of child development, Exceptional Children, 44, pp6-14

Bower, A and Hayes, A (1994) Short-term memory deficits and Down's syndrome: a comparative study. Down's syndrome: research and practice, 2, pp47-50.

Bowler D (1991) Rehearsal training and short-term free recall of sign and word labels by severely handicapped children, Journal of Mental Deficiency research, 35 pp113-124

Broadley I and MacDonald J (1993) Teaching short-term memory skills to children with Down syndrome, Down Syndrome Research and Practice, 1:2 pp56-62

Buckley S & Sacks B (1987) The adolescent with Down syndrome: Life for the teenager and for the family, Portsmouth UK: Portsmouth Polytechnic

Buckley S (1993): Language development in children with Down Syndrome: Reasons for optimism. Down's Syndrome: Research and Practice. 1: 1 pp3-9

Buckley, S.J. (1993B). Developing the speech and language skills of teenagers with Down syndrome. Down Syndrome: Research and Practice. 1:2 pp63-71

Buckley, S (1995) Improving the expressive language skills of teenagers with Down syndrome, Down Syndrome Research and Practice, 3:3 pp110-115

Burak, JA, Hodapp, RM, and Zigler, E (1988) Issues in the classification of mental retardation: Differentiating among organic etiologies, Journal of child psychology and psychiatry, 29, pp765-779

Chapman R, Schwartz SE & Kay-Raining Bird E (1992) Language production of older children with Down syndrome. Paper presented at the 9th World Congress of the International Association for the scientific study of mental deficiency. Queensland, Australia, August 1992.

Chatterton S & Butler S (1994) The development of communication skills through drama, Down Syndrome Research and Practice 2:2 pp82-84

Chua R, Weeks DJ, & Elliott D (1996) A functional systems approach to understanding verbal-motor integration in individuals with Down syndrome, Down Syndrome Research and Practice 4:1 pp25-36

Comblain A (1994) Working memory in Down syndrome: Training the rehearsal strategy, Down's Syndrome Research and Practice, 2:3 pp123-126

Comblain A (2000) The relevance of a non-word repetition task to assess phonological short-term memory in individuals with Down syndrome, Down Syndrome Research and Practice, 6:2 pp76-84

Davies, S (1997) Westminster Abbey Audio Tour, Dragoman Sound Guides

Davis W E, Sparrow WA & Ward T (1991) Fractionated reaction times and movement times of Down syndrome and other adults with mental retardation, Adapted Physical Activity Quarterly, 8, pp221-233

Delin, A (2003) Audits: Resource Disability Portfolio Guide 4, Resource, London,

Duffy LA & Wishart JG. (1994) The stability and transferability of errorless learning in children with Down syndrome, Down Syndrome Research and Practice, 2:2 pp51-58

Elliott D, Gray S and Weeks DJ (1991) Verbal Cuing and motor skill acquisition for adults with Down syndrome, Adapted Physical Activity Quarterly, 8, pp210-220

Goldman, C., Lesser, A., Lincer, M., Parks, S., & Salmen, J., (2003) Design For Accessibility: A Cultural Administrator's Handbook, National Endowment For Arts, accessed at http://arts.endow.gov/resources/Accessibility/DesignAccessibility.html

Herriot P & Cox AM (1971) Subjective organisation and clustering in the free recall of intellectually subnormal children, American Journal of Mental Deficiency, 75pp702-711

Hugo R, Louw B,& Kritzinger A, (1999) Development of a scale for the evaluation of listening behaviour of children with Down syndrome, Down Syndrome Research and Practice, 5:3 pp138-142

Hulme C & Mackenzie S (1992) Working memory and severe learning disabilities, Lawrence Erlbaum Associates

Jarrold C, Baddeley AD, and Phillips C (2000) Down syndrome and the phonological loop: The evidence for, and importance of, a specific verbal short-term memory deficit, Down Syndrome Research and Practice, 6:2 pp61-75

Jenkins C, (1993) Expressive language delay in children with Down syndrome, Down Syndrome Research and Practice, 1:1 pp10-14

Laws G, MacDonald J and Buckley S (1997) The effects of a short training in the use of a rehearsal strategy on memory for words and pictures in children with Down syndrome, Down Syndrome Research and Practice, 4:2 pp70-78

Marcell, MM (1995), Relationships between hearing and auditory cognition in Down Syndrome youth. Down Syndrome Research and Practice 3:3 pp75-91

McGinnis (2001) Special Advisor to MENCAP, in discussion with Dr Margaret Woodhouse, Department of Optometry and Vision Sciences, Cardiff University.

Miller, J F (1987) Language and Communication characteristics of children with Down syndrome in Pueschel, S, Tingey, C, Rynders J E, Crocker AC and Crutcher DM (Eds) New Perspectives on Down syndrome, Paul Brooks Park and Co

MLA (Museums, Libraries, Archives) (2004) Inspiring Learning for All Website http://www.inspiringlearningforall.gov.uk/ - accessed 5/3/04

Moore L, Clibbens J & Dennis I (1998) Reference and representation in children with Down syndrome, Down Syndrome Research and Practice, 5:2 pp63-70

Morss JR (1985) Early cognitive development of the Down syndrome infant: Difference or delay? In Stratford B & Lane D (Eds) Current approaches to Down syndrome, London, Holt, Reinhardt and Winston.

Museum Learning Collaborative (2003) http://www.museumlearning.com/

Museums, Libraries, Archives (MLA) (2004) Access For All Toolkit: Enabling Inclusion For All, accessed at http://www.mla.gov.uk/documents/access_mla_tk.doc

Nye J, Clibbens J & Bird G (1995) Numerical ability, general ability and language in children with Down syndrome, Down Syndrome Research and Practice 3:3 pp92-102

Perlman, LG (1993) Making Technology Usable – Keeping the Interface Simple – Consumer Needs Assessment Project Year Five, Electronic Industries Foundation Report.

Oliver, M. (1983) Social Work with Disabled People, Tavistock, Macmillan

Porter J (2000) Learning to count: a difficult task? Down Syndrome Research and Practice 6:2 pp85-94

Pueschel, SM & Gieswein, S (1993) Ocular disorders in children with Down syndrome, Down Syndrome Research and Practice 1:3 pp129-132

Rayner, A (1998) Access in Mind: towards the inclusive museum, Intact (The Intellectual Access Trust)

Resource (2001) The Disability Directory, Resource: The Council for Museums, Archives and Libraries 15

Rix, J (1998) Westminster Abbey Basic Language Audio Tour, Dragoman Sound Guides

Rix, J (1999) Westminster Abbey Audio Tour, Dragoman Sound Guides

Rondal JA & Comblain A (1996), Language in adults with Down syndrome, Down Syndrome Research and Practice, 4:1 pp3-14

Schilmoeller KJ & Etzel BC (1977) An experimental analysis of criterion related and non criterion related cues in 'errorless' stimulus control procedures. In BC Etzel, JM LeBlanc and DB Baier

(Eds), New developments in behaviour research: Theory, method and application. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Wishart, JG & Duffy, L (1990) Instability of performance on cognitive tests in infants and young children with Down syndrome British Journal of Educational psychology, 59, pp10-22

TABLE 1

A model of Down Syndrome traits relevant to intellectual access		
Visual Functioning • High frequency of ocular disorders • 50% short sighted • 20% long-sighted • Many have additional focus problems • Visual stimuli help learning • Overuse of non-target cues reduces differentiation • 15% tire more quickly when looking • Reduced colour & shape differentiation Auditory Functioning • 40% mild hearing loss • 15% severe hearing loss • 12% restrictions above 4000hz • Higher decibel level required • Distortion of sound • Muffling Effect • Fluctuating Condition • Reduction in sharpness • Hearing decreases with age • Possible slower processing Response to stimuli • Slower response to auditory stimuli • Slower move initiation with auditory stimuli • Usually a faster response to visual stimuli • Increasing inappropriacy of action with increasing length of sequence & instruction	Short Term Memory • Average MLU of 3 – 5 • Short term memory delay in recall • Not an attention or concentration problem • Reduced sequential processing • Reduced rehearsal mechanisms • Poor subvocal rehearsal • Potential operating speed reduction • Potential reduced store, • Potential unusually fast decay of information Language Reception & Production • Language skills below cognitive test score levels • Expressive language skills of typical 3-5 yr old • Effective pragmatics • Reasonable lexicon • Some suggestion of reasonable comprehension • Poor morpho-syntax • Limited word recall • Simple sentences used • Reduced production of pronouns & auxiliary verbs & subordinate clauses & conjunctions & negative sentences & passive sentences • Complexity of extra-linguistic content & context correlates with language difficulties • Reduced definition of short stop consonant words • Difficulty comprehending a synthetic voice • Two syllable non-word with consonant clusters poorly recalled • Repetition effected by word length & familiarity • Word definition reduced by close following noise • Difficulty learning new words • Difficulty for those with poor hearing to differentiate brief & quiet sounds & short words	Referential performance • Ambiguous use of referential forms with more than 2 characters involved • Thematic Subject Restraint is often reversed Motivational Factors • Tendency for avoidance strategies in complex situations • Hesitancy to use new skills Numeracy skills • Difficulty of number sequences in short term memory • Difficulty writing numbers above 10 • Difficulty with subtraction & addition • Tendency to miss out numbers when counting • Difficulty entering number chain at random points Level of Comprehension • Unclear if comprehension equals production levels • Comprehension may be slightly above production • Typical comprehension at around 5 years of age • A sample of adults & children with down syndrome correctly named 50% of common objects & actions • A sample of adults & children followed information & topic with consistency • Social skills & behaviour good in relation to developmental age • Comprehension of emotions good in relation to developmental age • Poor recognition of verbal inflexions • Empathy is good in relation to developmental age • Poor hearing can reduce comprehension • With age there is deterioration in hearing & processing speed & ability to extract information & to follow directions & to discriminate words • Comprehension is better in familiar circumstances • There are difficulties with endings

12

- Potential difference in perception of time & space

13

TABLE 2

	Suggestions For Best Practice	
Establishing the purpose and process of visit or tour • Encourage key workers and listeners to discuss nature of site and subject • Enable and encourage key workers and users to gain experience of equipment prior to arrival • Encourage regular use of sites and equipment • Train staff to introduce equipment effectively • Encourage staff to use slow, passive modelling demonstrations and errorless learning • Make available handouts and signs to explain use of equipment and routes • Signs should be easily identifiable and reachable. • Signs should bear in a hierarchy of information • Use signs with a clear definition & strong primary colours • Use signs with visual cues and simple, large letters and numbers. • Use equipment with visual cues & large buttons & simple operation • Explain procedures with minimum distractions • Establish volume setting is appropriate before starting the tour **Establishing a method for maximising recall of information** • Encourage subvocal rehearsal through repetition in the text • Use repetition to establish names, terms, and concepts • Use repetition to establish numbers and directions • Use contexts to reinforce information • Use repetition of sentence structures reflecting context • Use visual cues to reinforce information • Define clear, obvious points of reference • Recognising points of reference should not rely on technical knowledge • Do not define objects by colour unless they are bold primaries • Avoid excessive commentaries on detailed aspects of objects • Sometimes use narrative not requiring study of visual stimuli • Encourage recall through clustering names, terms & concepts • Encourage recall and comprehension through the use of small steps to explain and inform	**Establishing appropriate lexicon choices and sentence structure** • Use short sentences – one clause better than two • Use simple sentences • Use familiar words - but define familiar with care • Use words of one or two syllables • Try to use single consonant words • Define possible new words • Reinforce new words through repetition so they become familiar • Reinforce the most significant words • Use alternative words to explain meaning through context • Use alternative words to reinforce meaning through context • Consider possible alternatives meanings for words -eg Cannon/Canon • Attempt to use accurate & site specific word forms and definitions • Do not use the passive form • Avoid the negative form **Establishing use and form of referential material** • Limit the number of concepts, names etc discussed per commentary • Attempt to have a maximum of two referential concepts, names etc per narrator section • Use the proper noun to refer to the key person or item within an entry • Anticipate possible misunderstandings through pronoun use • Limit references regarding an item that is not the focus of attention either physically or narratively • Limit the need for switching focus • Limit items per commentary to be described to 2	**Establishing criteria to mitigate against processing, response and auditory deficits** • Make clear switches between stimuli & concepts & characters & narratives. • Slow down transition between stimuli & concepts & characters & narratives • Do not use walk and talk • Use FX & narrator changes to mark transitions • Do not rely upon vocal inflexion for marking switches • Reduce items of discussion • Balance narrative through the use of small steps • Clearly mark the end of sections with an FX • Leave slight pause between spoken text & FX • Do not use very short FX • Use simple & familiar FX beneath spoken text • Introduce FX that will be beneath spoken texts before the text begins • Allow FX to become familiar before starting spoken text • Spoken text should be delivered at a relatively slow pace ($\cong$130 wpm) • Natural pauses should be placed by narrators at transition points • Narrators should speak with a readily understood accent • Spoken text should be delivered at a consistent volume level • Spoken text should be delivered with clear and precise enunciation • Attention should be paid to clarity of delivery of words with short stop consonants • Slight natural pauses if possible should be placed after words with short stop consonants

TABLE 3

	Comparison of the structures of 3 Audiotours		
	Main Tour – 1	**Main Tour – 2**	**Basic Language Tour**
Characters	34927	38284	32028
Words	7801	8626	7451
Sentences	435	485	567
Paragraphs	166	181	158
Mean Word Length	4.47 characters	4.43 characters	4.29 characters
Mean Sentence Length	17.93 words	17.78 words	13.14 words
Mean Paragraph Length	46.99 words 2.62 sentences	47.65 words 2.67 sentences	47.15 words 3.58 sentences
Number of different words	1872	1819	1052
Duplicated words (% of text)	777 – 85%	768 – 88%	620 - 94%
Unmatched words (%of text)	1095 – 15%	1051 – 12%	432 – 6%
Number of Duplicated words	6706	7575	7019

TABLE 4

Questions for site to explore further
Is there a negative impact on focus, motivation and self-confidence of the audience when listening to: • Sentences identified as over length? • Sentences identified as over complex? • Sentences identified as having too many characters? • Sentences identified as having too many artefacts? • Tasks identified as potentially confusing? • Directions identified as hard to follow?

15