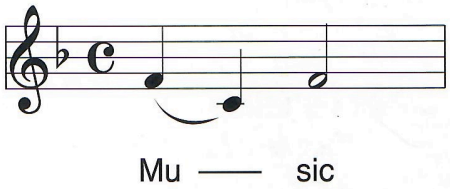
Royal National Institute for the Blind

Music *moves*



Music in the education of children and young people who are visually impaired and have learning disabilities

by

Adam Ockelford

RNIB
challenging blindness

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Preface

Music *moves* considers how music can inform the education and enhance the lives of children and young people who are visually impaired and have learning disabilities. It extends and complements the ideas presented in ***All join in!***,[1] providing a broad theoretical base from which a range of musical activities can be developed. These activities are appropriate not only for youngsters who are blind or partially sighted, but for many others with severe or profound learning disabilities, who have difficulty in making sense of visual information.

Music *moves* covers a range of topics, which will variously be of interest to:

- teachers working with pupils who have severe or profound learning disabilities (music specialists and non-specialists alike);
- teachers specialising in the needs of those who are visually impaired;
- instrumental and singing teachers;
- community musicians;
- music therapists;
- speech and language therapists, occupational therapists and physiotherapists;
- care staff and learning support assistants;
- music advisers and inspectors;
- educational psychologists;
- students of music, education or special educational needs; and
- parents.

However, many of the issues raised are relevant to people of *all* ages who are visually impaired and have learning disabilities, and the book will be of interest to their teachers, carers, therapists and advisers too.

[1] A framework for making music with children and young people who are visually impaired and have learning disabilities (Ockelford, 1996a).

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Ann Brown, Cathy Davies, Mary McDonald, Dave Wood and Sally Zimmermann;

and the staff and pupils of Bardwell School, Bicester; Linden Lodge School,

Wandsworth; Mabel Prichard School, Oxford; Ormerod School, Oxford;

Penhurst School, Chipping Norton; The Woodside Centre, Bristol;

and Whitefield Schools and Centre, Waltham Forest.

Introduction

Music, the art of organised sound, has found a place in every culture, and enhanced the lives of countless millions of people. By common consent, it is there to be enjoyed by all, irrespective of their abilities or needs. Enabling children with learning disabilities who are visually impaired to engage in fulfilling musical experiences may, however, require special resources and expertise - issues that are considered in the course of this book.

The main focus, though, is not musical activity *per se,* but the use of music in promoting wider learning and development. A number of factors contribute to music's effectiveness in this cross-curricular role. Most important is the fact that hearing typically starts to develop in the human foetus four months or so before birth. By the time they are born, babies may be particularly sensitive to sounds with which they have become familiar in the womb, and prefer them to others: their mother's voice, for example, the language she speaks, and certain pieces of music.[2] Hence those with profound learning disabilities, whose global development is at a very early stage, may nevertheless be able to process some musical and other organised sounds quite effectively. As we shall see (pp. 18ff), educators can use this ability to promote progress in other areas, such as understanding and communication.

For children who are functionally so young, music may not yet be a discrete phenomenon. It may not be perceived as a distinct strand amid a welter of other sensory stimuli, and may not even be distinguished from other forms of auditory input, such as speech and everyday noises. This has two implications. First, the fact that music tends to be part of larger experiences can be turned to advantage by using music consistently to help *structure* those experiences (see, for example, pp. 37ff). Second, since the generally accepted definition of music may be too limited to be of relevance to young people with profound disabilities, it makes sense for teachers, therapists and carers to embrace a broader concept too. In the present context, therefore, 'music' is taken to be: self-expression in sound that usually seeks to communicate (excluding speech and other formal language). It will be considered alongside other forms of organised sound.

A further consideration is that visual impairment, or difficulty in processing visual information, lends a greater significance to sound. That is not to say that auditory

[2]See Lecanuet, 1996.

perception in children who are visually impaired is necessarily more highly developed than in those who are fully sighted, although this may be the case. A study of 50 children who had been blind from birth or shortly afterwards[3] revealed a tendency for certain musical abilities to develop in an exceptional way. For example, some of the children had been able to sing accurately in tune from around 24 months, and 'absolute pitch' (the ability to recognise or sing a note without reference to any other - a skill that is rare even among professional musicians) was evident in one in three. Remarkably, these findings were true also for those in the group who had severe learning disabilities. None, however, was profoundly disabled, and it is unlikely that exceptional aural development would occur in the context of such overwhelming global delay, although it may be advanced in relation to other abilities (see pp. 44ff). The musical *needs* of young people with profound and multiple disabilities - for whom songs may function as an essential element in receptive communication programmes, for example - may well be exceptional, though.

Children who are blind or partially sighted and have learning disabilities frequently have other sensory and motor impairments too. Although these are not the central concern of this book, it should be recognised that the combined effect of disabilities may well be more than their sum. Readers should consult other specialist texts as appropriate (for example, on motor impairment) when considering how the suggestions made here may be applicable in particular cases.

Music *moves* is structured as follows. The first main section (pp. 3ff) concerns listening and responding, and considers the role that vision typically plays in the perception of sound, the importance of a rich variety of auditory experiences in early development, the impact of the environment, and the effect of music. The second section (pp. 11ff) examines how children and young people can create, cause and control musical and other sounds. The idea of music promoting wider development and learning is introduced on p. 18, followed by a series of examples: music and movement (pp. 19ff), music and learning (pp. 24ff), music and communication (pp. 31ff), and music and social interaction (pp. 40ff). There is a review of the significance for teachers and therapists of pupils who have special musical abilities in the context of learning difficulties (pp. 44ff). Finally, the issue of representing music symbolically is investigated on pp. 55ff.

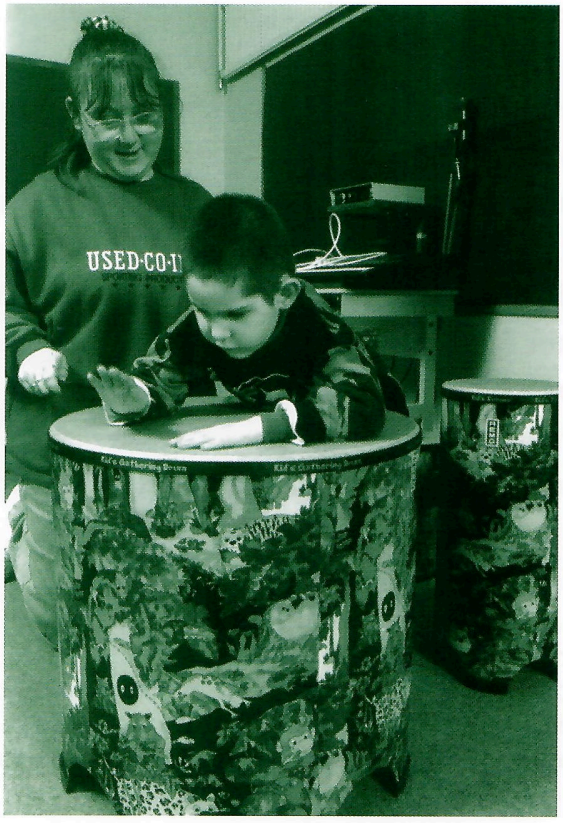
The supplement gives details of the latest publications in the field (in addition to those in the references and bibliography), an up-to-date list of potentially useful contacts, and current developments in music and related technologies.

[3]Pupils at Linden Lodge School in Wandsworth. There is no reason to think that this group was not broadly representative. (See Ockelford, 1988.)

Compensating for visual impairment

The experience of music is largely about the perception of sound, which occurs through listening and sometimes sensing vibration in our bodies. However, in working with children who are visually impaired, it is important to appreciate the subsidiary role that sight often plays in auditory perception, so that appropriate compensation can be made.

Typically, vision provides the information required to contextualise what is heard, and sometimes to make sense of it. For example, through observation we may recognise **what** is making a sound and realise **how** it is being produced. Perceptual fragments such as these accumulate over time, enabling us to formulate concepts of what soundmakers are like and how they work - something that would be impossible just by listening. Hence teachers and carers need to consider how they present objects (whatever their function) to those whose sight is impaired, seeking advice from specialists where necessary. Careful account should be taken of a child's depth and field of vision, which may well be restricted, and the lighting conditions he or she prefers. As a general rule it is advisable to avoid glare, while ensuring that items stand out from the background against which they are presented. To supplement limited visual input,



Getting a feeling for sound through the large drum

or, in some cases, to substitute for it altogether, children may be encouraged to handle or otherwise feel objects, whose shape, size, texture, temperature, weight and smell all contribute to an integrated sensory experience. Similarly, it may be appropriate to indicate verbally or through other means **who** is singing, playing or otherwise interacting in a music session (see p. 32).

As children come to relate what is seen with what is heard, so vision can warn them **when** sounds are about to occur - seeing the stick raised above the drum, for example, gives a fair indication of what is going to happen next. In the absence of such clues, many sounds will occur unexpectedly, and these may cause considerable distress, particularly if they are loud. Hence, wherever possible, alternative ways should be found of enabling pupils to anticipate what is coming. Apart from letting them know what is going to happen (through whatever means of communication is appropriate), sounds can be organised so that they are potentially predictable - by forming a regular pulse that starts quietly and gets gradually louder, for example. Over time, through a structured programme of listening experiences, some children may come to tolerate, and hopefully enjoy, an increasing range of sounds. Indeed, sound may become the principal way of establishing and maintaining their attention (cf. Longhorn, 1988, pp. 108ff).

Vision may indicate **where** a sound is coming from, and assist listeners in tracking moving sources of sound. Moreover, sight can help select **which** sounds to attend to, from the buzzing, booming confusion with which we are typically bombarded.[4] Inevitably, then, auditory location, tracking and selection present a special challenge to youngsters who are blind or partially sighted. Teachers, carers and therapists can help by planning listening activities carefully, in which the environment is designed to avoid auditory and visual 'clutter' as far as possible (see p. 12), and where sounds are reinforced, when appropriate, with other sensory input, including touch.

Finally, consider that most events are multisensory in nature, and that vision can be a significant factor in the equation of **why** children listen to sound: *seeing* something interesting may encourage them to listen to it, and exciting visual images may sustain their concentration.[5] Hence, for those who are visually impaired, exposure to a rich variety of listening experiences is particularly important.

[4]Cf. William James, cited in Meyer, 1973, p. 3.
[5]Such images can also be distracting, and, in some cases, children who are severely visually impaired may display a special interest in sound, and listen for substantial periods with sustained concentration. In the long term, this may enhance their ability to process auditory information (cf. p. 2).

A rich variety of experiences

Whatever the sensory domain, perceiving is an *active* process, through which we seek information about the world and strive to make sense of it. As we listen, for example, our minds are constantly engaged in the subconscious search for order - tracking down similarities, trends and patterns in what is heard. But more than this, perception works by *imposing* order on the sensory input that assails us; and intuitively, we divide complex musical textures into manageable streams and chunks of sound, and assign categories to notes and the relationships between them. We even anticipate what to listen out for next on the basis of what has gone before.[6]

These intricate mental processes can only evolve through experience; sustained exposure to a diversity of organised sound is required for listening skills to develop. Music, in its broadest sense, can play a large part in this development, and children should ideally be offered a rich and stimulating range of auditory experiences. To a child's ears, there is nothing more expressive than the human voice and the sounds associated with it: humming, singing, whooping, yodelling, yelling, whispering, whistling...or just breathing. Other body sounds, including clapping, clicking, tapping, slapping, scratching, rubbing and stamping, may excite attention too. The sounds available from musical instruments - acoustic or electronic - may be no more fascinating than those that can be made using everyday objects, such as rustly paper, rattly containers, saucepan lids, chains, pieces of wood and plastic pipes. Suspending some objects will enable them to resonate, enhancing their soundmaking properties.

Everyday objects may have unexpected soundmaking potential

[6]See Ockelford, 1993a.

The 'log xylophone'

Through very simple means, then, children may be exposed to sounds of all kinds: high and low, short and long, loud and soft. They may be rich in harmonics or pure, bright or dull. They may emanate from any position: in front of a child or behind, from the left side or the right, from above or below. Sounds may be stationary or moving. They may occur in isolation or be heard together, forming homogeneous blends or contrasting clusters. Streams of sound may be quickly moving or ponderous, describing flowing lines or jagged contours.

Nowhere are these qualities of sound organised with such precision and mapped out with such perceptual clarity than in pieces of music. Different forms of organisation

result in different musical styles, to which children will react in an individual way, their responses varying from one type of music to another. Hence, from the early stages, an effective music programme is likely to include exposure to pieces in a variety of styles. There are a huge number of possibilities: from ragtime to reggae, folksongs to fugues, and from symphonies to spirituals, for example; using instruments ranging from the piano to the panpipes, the drum kit to the didgeridoo, and the gamelan to the electric guitar.

Live performances may well have a greater impact than recordings; being near a large band, orchestra or choir in full flow can be electrifying. By the same token, the effect of a recording may be more telling following the experience of a live performance. If pupils are likely to disrupt others in the audience, it may be more appropriate to attend rehearsals in the first instance, or concerts especially intended for children. Alternatively, musicians may perform in school. Watching the instruments being played, and touching them, are both fundamental ingredients in the multisensory musical mix.

Experiencing music-making first hand

The environment

It is important to consider the environment in which listening takes place. Ideally, this should be an otherwise quiet area with the minimum of distractions. Children with profound learning disabilities may benefit from access to specially constructed mini-environments, such as the 'little room'.[7] Within small, largely enclosed spaces such as these, the effects of sounds are enhanced, and auditory clutter - the background noise of the classroom, for example - is reduced (see p. 14).

Rangzeb experiences sounds in the 'little room'

Perception may be affected by other external factors too. The time of day may be an important variable, for example, and the presence (or absence) of other people, particularly the person leading or structuring the interaction. Internal influences may also be significant: listening may be subject to a fluctuating medical condition, for instance, or simply a change of mood.

The experience of sound can be augmented with vibration by using a resonance board - a hollow wooden platform which amplifies sounds made on it or passed through it (using loudspeakers, for example). Children can bring a large body area into contact with the board by lying or sitting on it.

Other sensory stimulation, such as movement, light and scent, can be combined with music too, and it may be that some children respond most powerfully to an integrated approach. In fact, complex multisensory experiences are typical of everyday life - it is

[7]See Nielsen, 1992.

Group session on
the resonance board

Coordinated auditory and visual stimulation

the precise control of their individual elements that may be hard to achieve. However, environments can be specially constructed that allow the input to different sensory modalities to be managed with a high level of precision. Hence, visual stimuli, such as the colour and intensity of lighting, can be made to vary in response to changes in sound, for instance (cf. Heyes, 1997, pp. 28 and 29).

The effect of music

Fundamental to music is its capacity for affecting the way people feel. At the most basic level, for example, loud sounds tend to be arousing, while quiet ones have a calming effect; high notes may engender tension, whereas low ones foster a feeling of repose; fast tunes usually have energetic connotations, while slow ones are more restful.[8] Since

[8]See Davies, 1978, p. 106.

responses such as these are found in newborn babies,[9] it is reasonable to expect similar reactions in pupils with profound learning disabilities who are functioning at this developmental stage or beyond it. Other emotional responses to music may derive not intrinsically (from the qualities of the sounds themselves) but through association with a particular event, activity, person or place (cf. p. 32). For example, a 'goodbye' song, used consistently at times of parting, may come to evoke a feeling of sadness in its own right.

For most people, though, the emotional impact of music, while potentially embracing these two basic forms of response, involves higher level processing too. This is stimulated by music's abstract patterns in sound, which, according to one theory, set up certain expectations and tensions in listeners who are familiar with the style. Depending on how these are realised or resolved, or fail to be, different affects are created (see Meyer, 1956, 1967 and 1973). To be able to react in this way requires a subconscious understanding of how music is structured, as well as the capacity for sophisticated emotional response. It is likely that these qualities will still be evolving in many children with severe or profound learning disabilities, and inevitably, this will be reflected in the nature of their reaction to music.

In order for pupils to profit most from exposure to a range of music and other organised sound, teachers need to be *imaginative* but *systematic:* constantly seeking the best way of extending children's future experiences through scrupulous observation and recording of their present and past responses. In the absence of spoken language, these may take the form of vocalisations, movements, 'stilling' or other overt expressions of contentment or displeasure. Interpreting such signals correctly - imbuing them with the appropriate communicative intent - may take time and a special sensitivity on the part of teachers and carers. Meaning may even vary with context: the same agitated gesture that generally indicates 'I like that' may also mean 'Stop it!' on some occasions.

The key thing, particularly for children with profound disabilities, is that individual predilections and interests should inform the planning of music programmes, ensuring the best possible match between learning preferences, needs and the curriculum. So while music of any kind may potentially be used as a source of extrinsic motivation, to encourage a child to activate a switch, for example, a piece or a type of sound that he or she strongly prefers will provide a much more powerful incentive to make the move - to explore the link between cause and effect. It is to issues such as this that the next section is devoted.

[9]See Hargreaves, 1986, p. 62.

Creating, causing and controlling sound

Introduction

This section examines the ways in which children can *create* sounds, *cause* them to be produced, and *control* them.[10] It considers how these activities may be constrained by pupils' special sensory, motor or cognitive needs, as well as being limited by the availability of appropriate soundmakers and switching devices. The motivation to produce or control sound may arise from a variety of sources and be enhanced in a number of ways - issues that are discussed in some detail.

Sound and self

At the most basic level, certain life processes produce sounds, some of which, such as breathing, can be controlled consciously. Further body-sounds can be made that arise internally, such as vocalising, or externally, such as clapping (cf. p. 5). On occasion, children may indulge in soundmaking purely as a source of somatic pleasure: for instance, babies babble from time to time just for the fun of it. However, in the early stages of human development, vocalisation and other sound production often occur in response to extrinsic sensory stimulation: infants see someone they know, for example, and gurgle with glee - a reaction that may well be acknowledged and so reinforced. Typically, such interactions are replayed time and again in the first two years of life, unscripted and unremarked. In order to elicit comparable responses from children who are visually impaired and have profound learning disabilities, however, whatever their age, a more systematic and consciously multisensory approach to stimulation will almost certainly have to be adopted. Moreover, teachers and carers will need to be sensitive to the subtle and idiosyncratic responses they may evoke, constantly seeking to interpret children's personal sounds and other reactions as signals in the context of early communication (cf., for example, Ockelford, 1994, p. 3; Miller, 1995, p. 5).

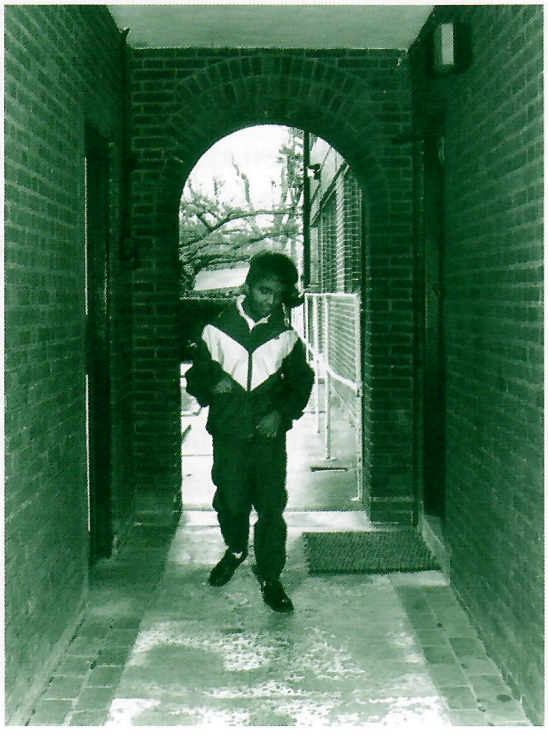
It is possible to encourage vocalisation and other sound production and, in the longer term, to foster development in these areas through amplifying, enhancing or otherwise modifying the children's efforts, intensifying the aural feedback they receive. This may be achieved electronically: increasing the volume, altering tone colours, incorporating

[10]These three elements are distinguished here in order to clarify the role that children can play in the production of sound. Examples of each include: *creating* sound through finger-clicking, *causing* sound by depressing notes on a keyboard, and *controlling* sound using an ultrasonic beam (see p. 14) to effect pitch-bends. However, things may not be as clear-cut as this: for instance, vocalising involves both the creation and control of sound.

pitch modulation, adding various types of reverberation, and repeating what is heard, are all relatively easy to achieve using commercially available equipment.

Vocalisation is encouraged using a microphone, effects unit and amplifier

Alternatively, or in addition, environments with special acoustics can be created that make the most of the sounds that children produce while reducing the impact of extraneous noise (see p. 8). Indeed, people who are visually impaired may elicit information about the space around them by making certain sounds (such as clicking, tapping or stamping) and listening for the echoes that result.



Mark stamps his feet, producing echoes that provide information about the environment and assist in his mobility

Sound and other: interacting with the environment

Many sounds are made through activities which involve physical interaction with the environment. Here, vision typically fulfils a number of functions which will need to be taken into account in undertaking soundmaking activities with pupils who are blind or partially sighted.

For example, seeing something may well provide the initial stimulus for children to reach out and touch it, and so explore, among the object's other properties, its capacity for making sounds. Moreover, vision typically informs choice, since it permits awareness of several things at the same time. The sight of a soundmaker as it resonates - for instance, a vibrating cymbal glistening in the light - may offer the ongoing reinforcement necessary to maintain a child's attention. Hence for youngsters with limited sight, objects' visual qualities and the way these are presented are both crucial, and should take account of a child's specific visual needs as well as more general environmental factors such as lighting and contrast (see p. 3).

Stimulation in other sensory domains is also likely to be important. Children may need physical encouragement and guidance to reach for possible soundmakers and investigate them through touch. Alternatively, items may be brought into contact with them for their attention. In either case, particular sensitivity is required on the part of teachers and carers. Objects should be selected not only on the basis of their soundmaking potential, but also according to their tactile qualities: it may be possible to feel them as they vibrate, and pleasing textures and shapes will encourage exploration. Finally, bear in mind that sound itself can be a great motivator, and that by hearing something they enjoy, children may be tempted to have a go at making sounds themselves.

Vision typically plays a significant role too in children's growing awareness of their capacity to influence things by dint of their own efforts, and their corresponding desire to act autonomously, through unprompted behaviour. This understanding of cause and effect in relation to self and other, which is characteristic of early development, evolves partly through chance, as a child's unwitting interactions with his or her environment produce perceptible change. For example, an unintentional flick of the hand may strike a suspended cluster of bells. If the resulting sight and sounds are sufficiently attractive, the movement may be attempted again in an effort to get the same response.

Events are less likely to unfold in this way for children who have little or no visual input to inform their actions, while for those who are, in addition, cognitively impaired, the challenges posed may be overwhelming. In such circumstances, children may have only

a limited concept of self, and - inevitably - of how they, as discrete entities, relate to their environment. They may have no awareness of the existence of things beyond those with which they have immediate physical contact. Their capacity for voluntary movement may be highly constrained. They may find it very difficult to make the link between activity on their part and its consequences, realised in the form of perceptual feedback. Hence the chances of self-initiated behaviour developing are dramatically reduced.

However, there are a number of strategies that can be adopted to foster progress towards this end. These largely concern the organisation of the environment. One guiding principle is to simplify a child's interface with the world, in particular promoting contact with that which is directly relevant to his or her interests and needs. Children's immediate surroundings should be responsive to their actions, and should have an order and consistency that is conducive to understanding. Their personal space for living and learning should be designed to enable them to exert as much control as they can. Finally, it is essential that the environment should have the capacity for change to match children's development.

Aims such as these can be met through the creation of specialised interactive learning areas such as Nielsen's 'little room' (cf. p. 8), in which the self-directed exploration of soundmakers can be encouraged. The autonomous production of sound can also be promoted through the use of sensitive switching devices such as ultrasonic beams, which can detect the slightest movement or other bodily change, and which can result in *any* sound being created and controlled through a MIDI system (see, for example, Ellis, 1996).

The Soundbeam® in action

Children typically learn how sounds are produced by watching other people make them and then trying to copy what they do. However, youngsters who are blind and in the early stages of communication will have to rely on physical contact to build up a comparable picture - by feeling the actions of others, or allowing themselves to be guided in the necessary movements. Such guidance should not compromise the evolution of self-initiated activity; indeed, it should promote its development. The intention is that those children who are able to do so build up their own kinaesthetic models of what is required, and are able to use these to make sounds independently.

As well as informing children how sounds are made, vision is often used to guide their movements. For those who are visually impaired, soundmakers will present a range of challenges according to the degree of visual input that is normally required to play them (cf. Ockelford, 1996b, pp. 57ff).

Among those that are likely to be least dependent on sight are instruments such as clusters of bells and some shakers, with which the child maintains continuous contact and is at liberty to move in any direction.

Yodi moving a shaker round and round (***All join in!*** - Song 8)

However, the direction of movement is a significant factor in playing certain soundmakers such as rainsticks, and where children find their orientation difficult to gauge, a hinge or wheel mounting may make them easier to manage.

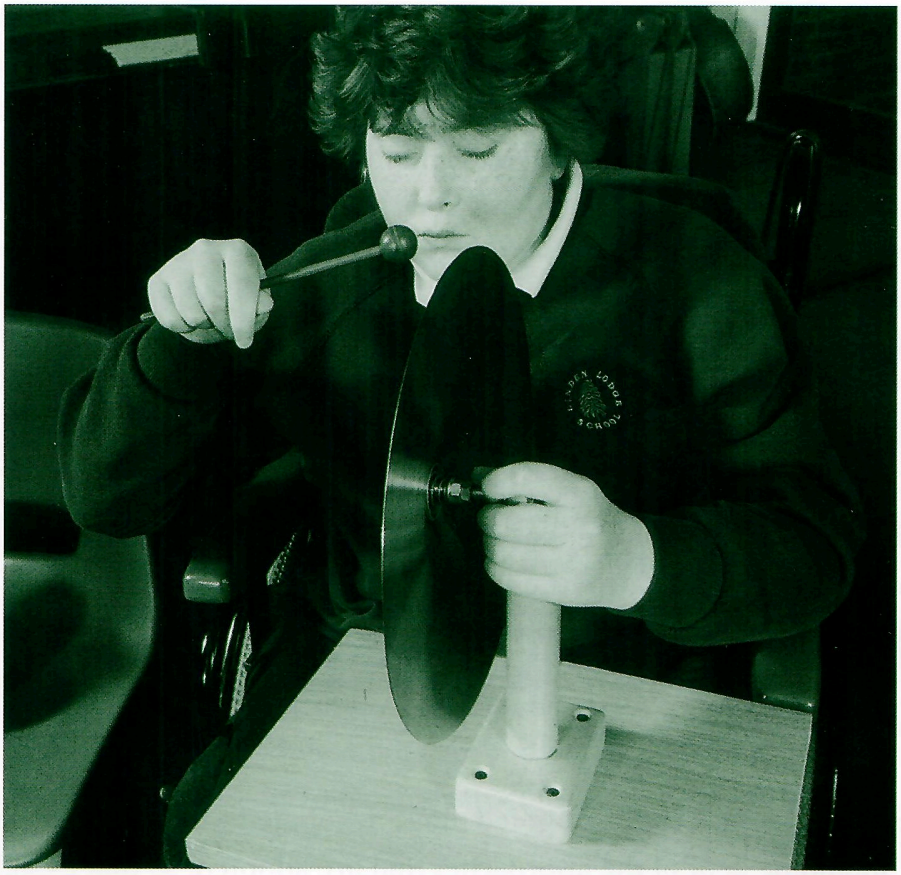
Sophie gets to grips with the wheel-mounted rainstick

Soundmakers that are struck, particularly those that function through one object making contact with another (such as a stick hitting a drum), present a greater challenge to children operating with little or no vision. Their efforts will have to be informed through touch and kinaesthetic memory, and ongoing assistance may well be required to ensure continued success.

Ben is helped to hit individual notes on the slit drum

The longer the beater, the greater the chances of the target being missed, and this factor, together with the size of the object to be struck, need to be taken into account when assessing an instrument's likely suitability for a child.

Children who are visually impaired may well find soundmakers that move when they are played particularly difficult to strike repeatedly. However, it is possible to restrict the movement of some instruments without compromising their capacity for making sounds.



Sophie explores the range of sounds
available from the spring-mounted cymbal

These visual considerations will interact with other issues such as a child's interest in particular types of sound, his or her level of cognitive functioning, other special sensory needs, and range of available motor skills - a topic that is considered in the section after next (see pp. 19ff).

Using music to promote wider development and learning - introduction

Making music is dependent upon a number of attributes in addition to the perceptual skills directly associated with the processing of sound, and musical activity can promote a wide range of learning and development. For example, performance, at any level, may well enhance fine motor control and coordination, while playing or listening engage cognitive skills such as concentration and memory. Music can offer invaluable support in the early stages of language acquisition. Group sessions potentially provide a context and structure for socialising, and participation may heighten a child's awareness of self and other, foster tolerance, and enable individuals to contribute to a larger whole. Hence, just as literacy and numeracy permeate mainstream curricula, underpinning many areas of study, so music can inform the wider curriculum of children who have severe or profound learning disabilities. A range of possibilities are worked through in some detail in the four sections that follow (pp. 19 - 43).

Using music to support other learning may require the involvement of a number of staff. This is not the daunting prospect it may seem, since to participate in musical activities of the type described here is well within the everyday capabilities of most people. The main issue is likely to be effective coordination in the planning, delivery and monitoring of cross-curricular music programmes, both within the formal school day and beyond. This may involve outside specialists, parents and, as far as possible, the pupils and students themselves.

Programmes should have clear and agreed aims, negotiated with all concerned. A careful note should be kept of the approaches that are adopted, so that as staff come and go, and situations change, the essential learning structure remains the same, and a child's musical environment is held intact. Schools and centres can facilitate this consistency by building up a bank of soundmaking resources which are carefully maintained and developed, and to which there is general access (cf. Longhorn, 1988, pp. 117ff). Children's progress will depend on systematic assessment and record-keeping, which will enable future steps to be mapped out with precision. Programmes that are responsive to children's development and evolve to *anticipate* it will be most effective in encouraging further progress.

[11]Cf. Ockelford, 1994, p. 25.

Promoting body awareness and movement through making music

Children's body awareness, and the control and coordination of a wide range of movements can be fostered through playing instruments and other soundmakers. Movement is frequently required, for example, in the fingers, hands and arms, while vocalising utilises the mouth, throat and chest - and a number of instruments demand breath control.

Ching-Ching plays the tambourine using her wrist, hand and fingers

Other parts of the body, particularly the legs and feet, may be involved in soundmaking too. Whatever the movement required, the driving force is extrinsic motivation: the will to move derives from the desire to produce a certain sound. This principle may work well for children with the necessary motor skills or potential. However, many

[12]This principle can be extended to general mobility: for example, a child may be encouraged to move around and explore an area in order to locate a CD player or keyboard.

youngsters with severe or profound learning disabilities find movement enormously challenging. For them, switching devices may provide the answer, since through these there is no direct link between the nature of the movement made and the sound that is produced - *any* movement can cause or control *any* sound.

The needs of some children may be met through commercially available technology such as keyboards and drum synthesisers.

The drum synthesiser enables a wide variety of percussive sounds to be made with only a limited range of movements

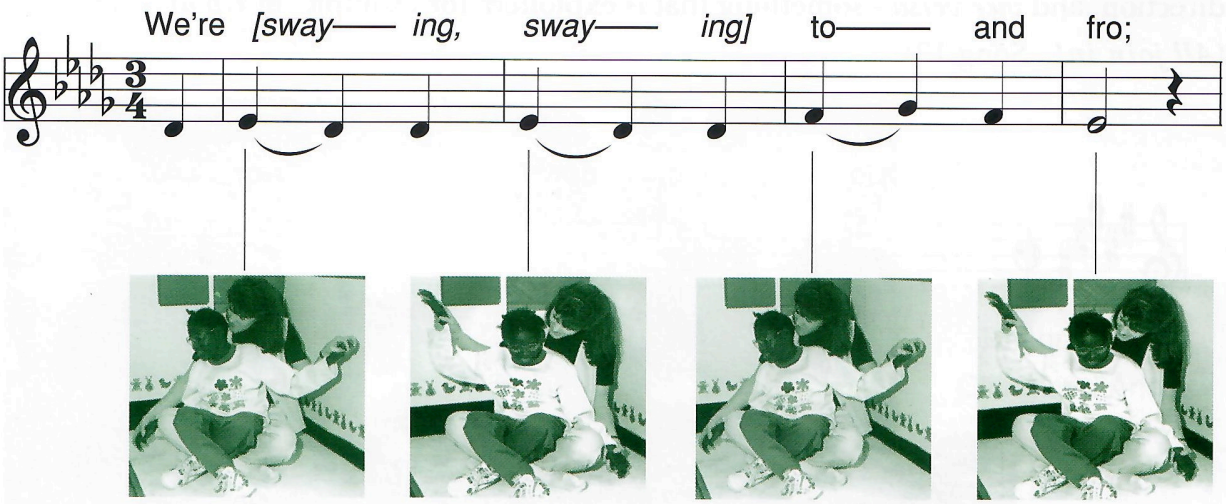
Others may need special switches, in some cases designed or tailored to meet individual requirements. These may activate a wide range of sounds, from solitary notes to entire pieces of music. The continuing value of the device that is employed may depend on the opportunities it offers a child for progression. Systems created around ultrasonic beams (see p. 14) can be particularly beneficial in this respect, since by gradually altering the switching parameters that are in operation, more extensive (or more subtle) movements may be required to obtain the same sound.

An auditory frame of reference

From around the age of six months, babies will typically move spontaneously to music (Moog, 1968/1976, pp. 56ff). Hence it is reasonable to expect the same of older children with learning disabilities who are functioning at or beyond this stage of sensory and cognitive development, and who have the necessary motor skills. The tendency can be encouraged and exploited by teachers, carers and therapists through co-active music and movement sessions. Dance offers a culturally valid context - appropriate to the interests and social backgrounds of the young people concerned - in which educational, recreational and therapeutic activities of this type may be embedded.

The movements children make in response to music may be freely expressive, or characteristics of the piece they are listening to may determine, more or less specifically, the actions that accompany it. That is, music can provide an *auditory frame of reference* for movement, something that may be particularly significant for those who have no visual model to guide them, or to clarify what may be a confusing picture of events for others who have little sight.

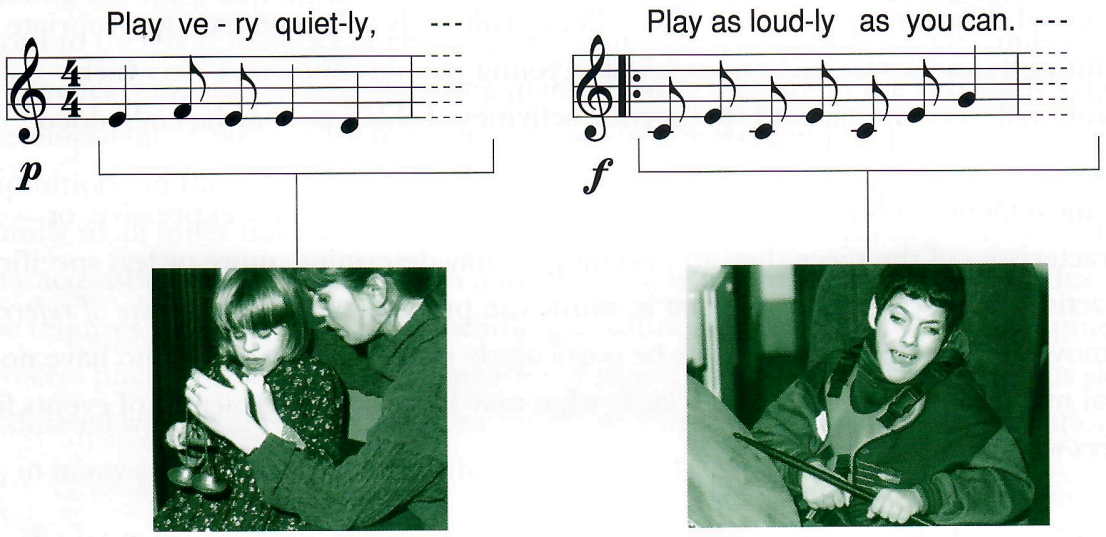
The strongest link between music and movement is found in rhythm, which sets the pace for action. For example, in *To and fro* (***All join in!*** - Song 9), the first beat of each bar alternately marks the extremes of vacillating movements such as rocking, waving, swinging, swaying and nodding (see Ockelford, 1996a).[13]



Rhythm sets the pace for action in the opening bars of *To and fro*

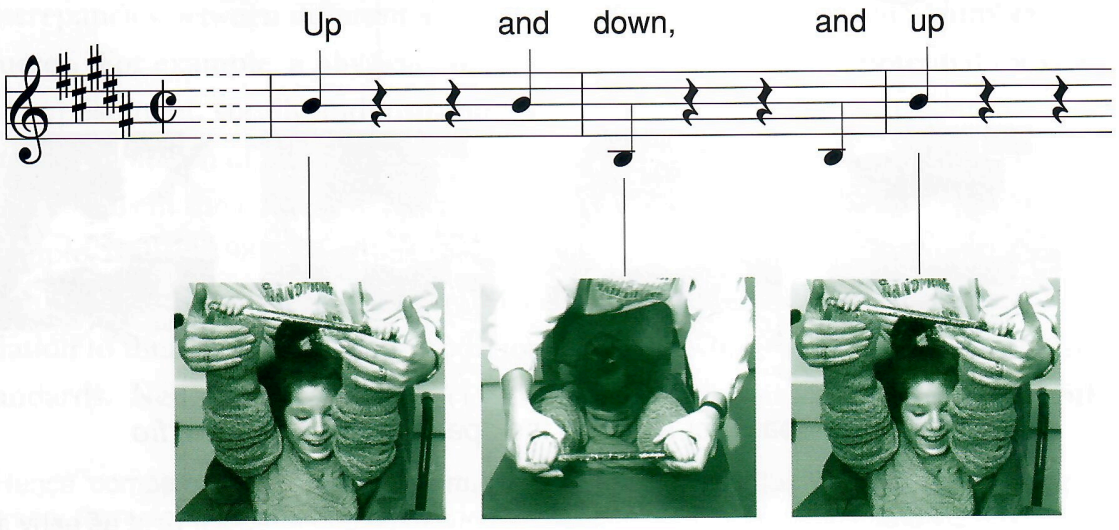
[13]Although some children show signs of being able to move in time to a regular beat as early as 18 months, it is only between the ages of four and six years that the majority display such coordination for sustained periods (Moog, op. cit., pp. 74 and 127) - a finding that should be taken into account by those working with children who have significant developmental delay.

Here there is a direct relationship between the tempo of the music and the speed of movement. Other connections are possible too. For example, loud sounds may be associated with large movements and quiet sounds with small ones. Links such as these may largely be attributed to the experience of playing instruments where there is an immediate connection between the effort that is applied and the volume of sound produced. This principle underlies *Quiet and loud*, for instance (***All join in!*** - Song 20).



Quiet and loud passages associated respectively with restrained and vigorous movements

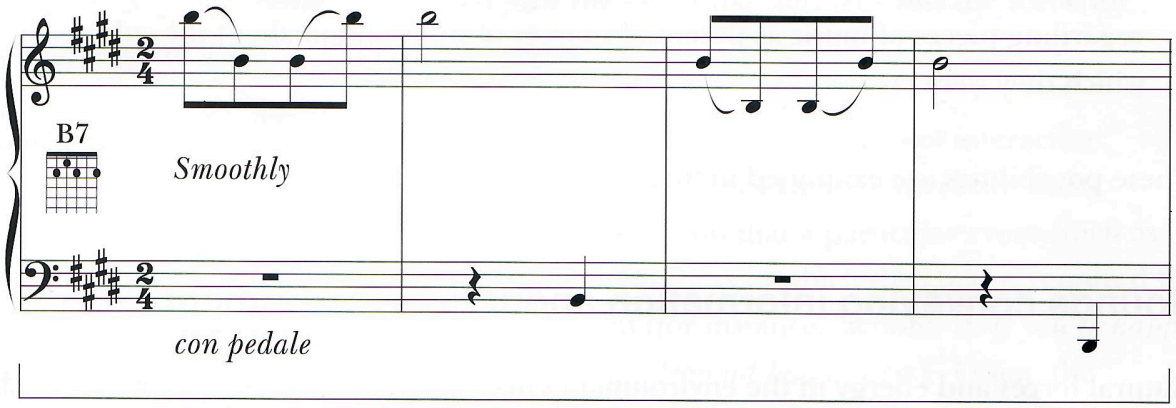
A rise in pitch is widely considered to correspond to movement in an upward direction, and *vice versa* - something that is exploited, for example, in *Up and down* (***All join in!*** - Song 12).



Pitch and movement linked

While this correspondence is generally conveyed through the more or less conscious efforts of teachers and others, there is some evidence that it also occurs as a natural part of the way thinking develops (Welch, 1991).

Whatever their root, the power of associations between sound and movement can be considerable. Hence they offer teachers, therapists and carers a potentially valuable tool in working with children and young people with disabilities. Music can add an extra dimension to physiotherapy programmes, for example: motivating children to move, and enabling them to anticipate what is coming when the same short pieces are consistently used to introduce activities as well as accompany them. All the songs in ***All join in!*** are supplied with introductions, partly to promote this special symbolic function which music can fulfil - see p. 39. For example:

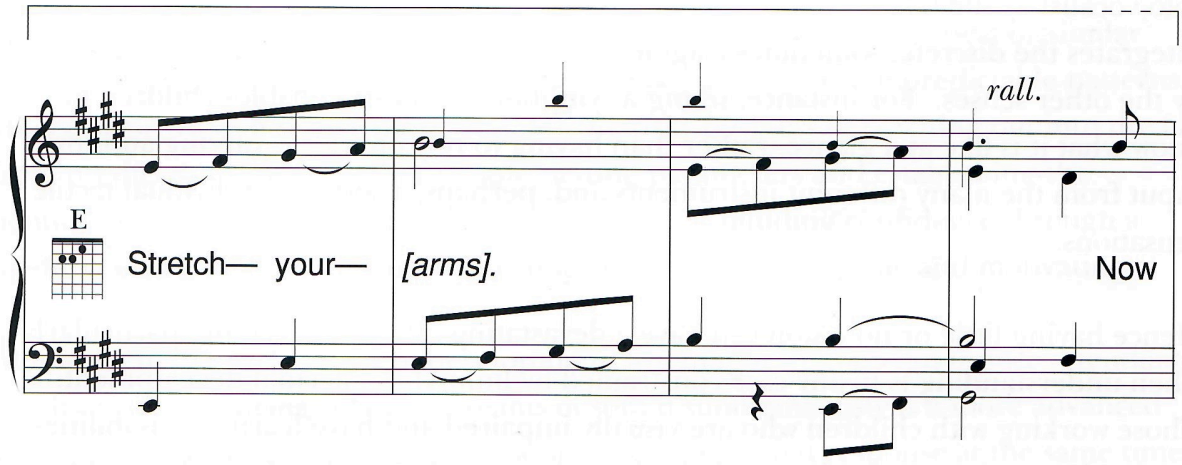


...this introduction may function as a 'sound-symbol',

Through repeated exposure...

enabling children to anticipate and so be prepared for

the stretching and bending exercises that follow.



All join in! - Song 6 - ***Stretch and bend***

Music and learning

Introduction

Music and other organised sound can be used to promote the acquisition of skills, knowledge and understanding in a number of ways. These include:

- using music and other structured auditory input to enhance sensory information obtained from the environment;
- the direct transfer of perceptual and cognitive skills from musical contexts to other spheres of activity;
- isolating selected qualities of sound and treating them as concepts to be manipulated in pursuit of educational goals beyond music; and
- regarding pieces of music as potential sources of information about the cultures in which they were created.

These possibilities are examined in turn.

Sounds conveying information about the environment

Natural forces and energy in the environment effect continuous physical change, which we typically perceive through sight, hearing, touch and our other senses. For the great majority of people, vision is the channel through which most information is conveyed. Moreover, the brain often relies on visual images to inform and direct the work of the remaining senses - confirming, for example, that those strident sounds are indeed emanating from the lead guitar, and alerting the listener to the imminent entry of the solo vocalist as she takes the mike off its stand and prepares to sing. Frequently, sight integrates the discrete, sometimes fragmented and potentially confusing data gathered by the other senses. For instance, *seeing* a symphony orchestra enables children to know what it is like at a glance, rather than having to rely on widely varying auditory input from the many different instruments and, perhaps, a series of individual tactile sensations.

Hence having little or no vision can have a devastating effect on learning, particularly when understanding is in any case constrained by limited intellectual development. Those working with children who are visually impaired and have learning disabilities need to know what can be done to help them derive sufficient data from the world around. There are several strategies that can be adopted, which may be specific to

certain situations or have more general applicability. Deciding the best approach will require careful analysis and planning, taking into account the information from the environment a child is likely to find important and interesting, and determining how he or she is going to have access to it. Sound features prominently in the perceptual landscape of many youngsters, and there are several ways in which teachers, carers and therapists can maximise its impact.

One strategy is to *simplify* the auditory environment. This process may begin by tracking pupils through a series of events in the school day, for example - listing the sounds to which they are exposed, and assessing what effect these have. Schools are often noisy places, and it is probable that children with severe or profound learning disabilities will find some of what they hear distracting or even distressing. Moreover, they may well be unable to attend selectively to the tangle of sounds which surround them.[14] Some idea of what this may be like can be gleaned by taping experiences and replaying them later. Then it may be noticeable that the noise of the tables being moved ready for lunch in the hall largely obliterated the music to which the children were intended to relax (little wonder that several of them grew *more* tense as the session progressed!). And it may come as little surprise, in retrospect, that the children seemed so inattentive during a session in class, since the noise of the motor-mower outside cut swathes through what the teacher was saying.

Based on findings such as these, workers should consider whether it would be possible and desirable to reduce or eliminate any of the extraneous sounds which have no long term place in pupils' learning programmes. If certain noises in the environment cannot be removed, it may be advisable to reschedule or change the venue of activities in which sound or music are particularly significant. Auditory clutter in classrooms and similar environments may be minimised by using partitions or other forms of screening to produce smaller, relatively quiet learning areas (cf. p. 8).

Sounds that *are* important may be enhanced or modified if necessary to make them more distinct, linked where appropriate to tactile and other sensory experiences, and explained verbally or through other means (cf. Ockelford, 1993b). These strategies may be used together: for example, in an effort to increase children's awareness of who is entering and leaving the classroom, and therefore who is present - a source of potential confusion for those who are visually impaired and have learning disabilities, whose sole source of information may be the sound of the door being opened and closed. Has someone come into the room or left it? If so, who? To avoid such

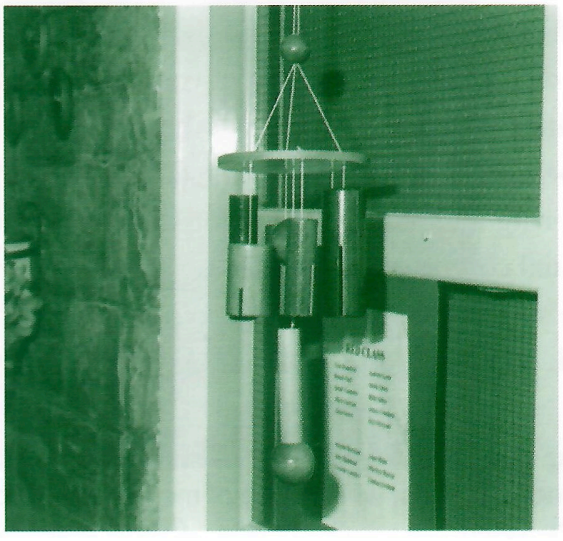
[14]Unlike those working with them, who, as mature listeners, will subconsciously suppress extraneous sounds, while those of more significance will appear relatively louder (see Vernon, 1934).

Screened-off area in class minimises external distractions

ambiguities, those entering may be encouraged to knock clearly or set some bells tinkling, before being introduced. Additionally, visitors may greet the children verbally, and make physical contact with them where appropriate. An equally systematic approach, using auditory and other clues, may be adopted when people leave.

Finally, extra sounds may be used to substitute for visual input, or to supplement it. For instance, children may be helped to locate objects if they are made to make a sound (by tapping the cup on the table, for example). Other auditory information may be incorporated more permanently into the environment. For example, a room may be identified through a distinctive set of windchimes suspended in the doorway, or areas used occasionally may be characterised by a particular type of music playing in the background.

Classroom identifed through distinctive windchimes



Some activities may consistently be accompanied by music in an appropriate style too; and individuals may wear carefully selected bangles or jangling bracelets - serving to augment their presence in sensory terms.

Physiotherapy to music
(***All join in!*** - Song 6;
Stretch and bend)

Anna's identity is augmented
in sensory terms with
a jangling bracelet

As well as information about the environment, familiar music may provide emotional security. A favourite tape at bedtime, for example, may comfort children who cannot see, in the same way that their fully-sighted friends are reassured by glancing at well-known objects as they prepare to sleep: the gently repeating patterns of notes soothing the ear in the same way that the sleepy eye is calmed by tracing familiar images on the wallpaper.

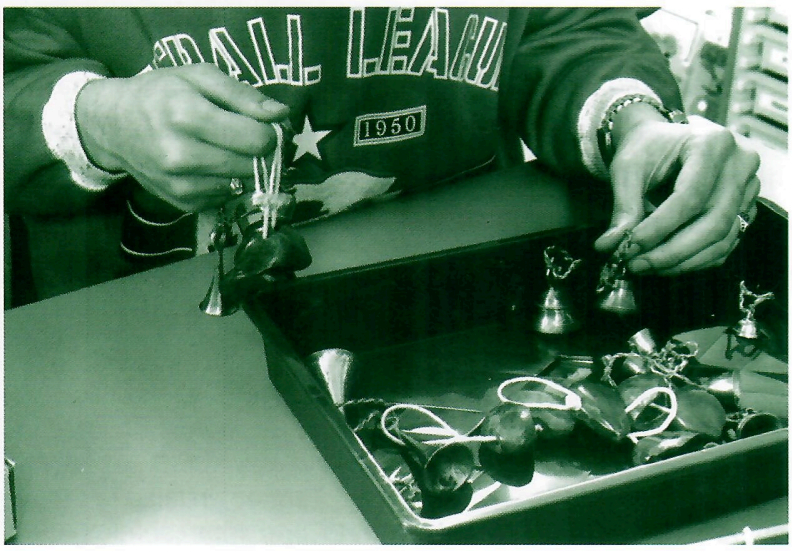
The transfer of skills

Attending purposefully to music engages a range of perceptual and cognitive functions, which usually operate subconsciously. Some, such as identifying similarities, trends and patterns among stimuli, and assigning them to groups and hierarchies, are characteristic of perception in other domains too. The development of these abilities in relation to music appears largely to be bound by that context, though, with no simple crossover to different spheres of mental activity. Cognitive attributes such as concentration and memory, however, which are fundamental to the appreciation of music, may operate in a way which is less domain-specific, and here achievement may transfer more readily to other areas of experience, particularly those which also involve listening. Bunt (1994, pp. 111ff), for example, cites an extensive study which examined the effects of music therapy on children with learning difficulties, and which indicated that exposure to appropriate musical activities could indeed help children focus their attention and increase their concentration span. As he observes (op. cit., p. 128):

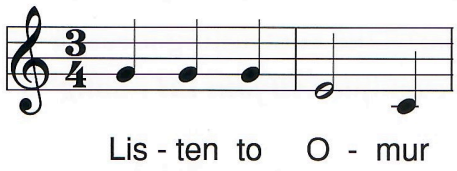
> Over time it appears that a period of music therapy can contribute to a child's increasing ability to sustain and initiate activities...

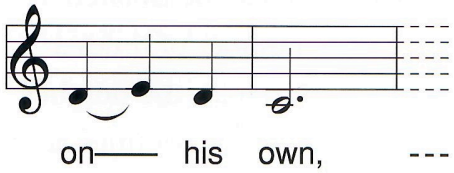
Sound concepts

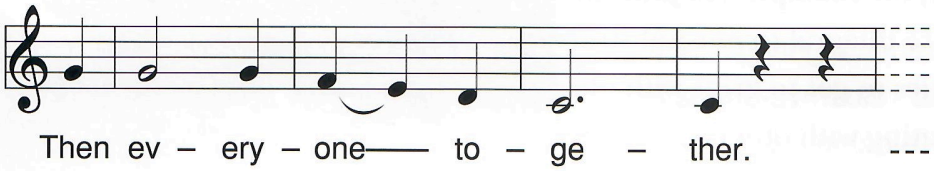
Objects can be identified through their soundmaking qualities and classified accordingly. For instance, children may be encouraged to contrast the ringing, bell-like sounds of metal with the more mellow response of wood, and to sort items on this basis. Instruments may also be grouped according to how they are played - whether sounds are made through shaking or striking them, for example.



Sorting metal and wooden objects by their characteristic soundmaking qualities







All join in! - Song 16 - *Together and alone* (see p. 30)

Other concepts can be extracted from the experience of music too. For instance, the opposing notions of 'quiet' and 'loud' can be introduced or reinforced through songs such as that cited on p. 22 (***All join in!*** - Song 20). Similarly, the contrasting ideas of 'slowly' and 'quickly' can be conveyed musically (see, for example, ***All join in!*** - Song 21).

Number features widely in music (Ockelford, 1998, pp. 308ff), and it can be isolated as a concept in several ways. For example, children can consider the number of times a tambourine is tapped in a repeating pattern - '1,2,**3**, ... 1,2,**3**, ...' (cf. p. 62); the number of beats there are in a bar, and the number of verses in a song; the number of times a chorus is repeated, the number of different instruments that are used in the course of a piece, and the number of people that are playing or singing at the same time.

General concepts such as 'start' and 'stop', 'the same' and 'different', 'together' and 'alone' (see, for example, ***All join in!*** - Song 16), 'again' and 'finished' (***All join in!*** - Song 23) are integral to musical structure and performance. Practical sessions provide opportunities to get to grips with ideas such as these, and offer a context for communicating with others about them.

Music as artefact

All pieces of music and musical instruments are ultimately products of the society in which they originated, and offer a rich source of cultural information for people who are visually impaired and have learning disabilities. Depending on their level of understanding, children's experience of pieces of music as artefacts may range from simple exposure to reasoned discussion about their construction, how this relates to the structure of other works, to other spheres of artistic endeavour, and more broadly to the historical and geographical context in which a given composition was created.

Music and musical instruments may feature as elements in a broader multisensory cultural event, including storytelling, drama, dance and religious ritual, for example, dress and scent, drawing, painting and sculpture, and food and drink. Performers may come to the school, or pupils may experience a range of outside activities, from the exuberance of street carnivals to the relative sobriety of the gamelan. This Indonesian orchestra, comprising gongs, chimes, metallophones and other percussion instruments, produces rich textures of resonant sounds that many children find appealing, and, with assistance, almost all are able to participate actively as performers. It is difficult to imagine a more inclusive form of music-making.

Music and communication

The development of communication

Vision typically plays a central role in the acquisition of language. Time and again, carers label babies' visual experiences for them: 'Look, there's the cat', 'Here's daddy', 'Those are pretty blue shoes you're wearing', ... And, time and again, young children see something that interests them, and are aware that others can see it too - a scenario that often triggers the urge to communicate, through gesture, vocalisation and, later, speech. Almost inevitably, then, many visually impaired youngsters with learning difficulties find understanding language and using it effectively particularly challenging. And inevitably, many children will require specialist intervention to help them develop the communication skills that usually evolve quite naturally, with no conscious effort on the part of carers.

Various strategies have been devised for augmenting receptive language in children with special visual and intellectual needs. These work on the principle of enhancing or replacing the spoken word with symbolic information in other domains that is accessible, both in sensory and cognitive terms. That is, children receive signals in a form that they can readily perceive and are capable of understanding. Two common approaches are signing (see Lee and MacWilliam, 1995), and the use of objects of reference (Ockelford, 1994). Methods such as these may well be employed together: those who wish to communicate opening up on all fronts in the belief that this will increase the chances of their message getting through.

In time, following a range of appropriate experiences and exposure to communication pertaining to them, most children with severe learning disabilities and some with profound disabilities may consciously try to make their own reactions, feelings and needs known to those around. This is one of several distinct stages in the evolution of expressive communication (see Ockelford, op. cit., pp. 2ff). These are of particular significance to teachers and others working with children whose development is markedly delayed.

The earliest stage is characterised by an unthinking reaction to basic needs - crying in response to physical discomfort, for example - an unwitting plea for help which may be conveyed to carers, who vest in the sounds a communicative intent, and act accordingly. This form of communication is termed **non-intentional**. Gradually, children may become aware that crying, other vocalising and particular expressions or gestures have an effect on others: the **intentional** stage. Here, children commonly draw people's attention to things by pointing, and relish the shared external interest this arouses.

Next comes a growing appreciation of **symbolic** communication, in which one thing stands for another. Flapping the hand may consistently be used to mean 'yes', for example, a humming sound may refer to the use of the hairdrier, or an object of reference such as a seat-belt buckle may indicate a desire to ride in the car. These personal gestures, sounds and symbols may eventually become standardised in conventional signing or speech, or lead to literacy in print, braille or Moon (an alternative tactile reading system). At this point, communication is said to be **formal**.

Sound-symbols

Music and other organised sounds[15] typically fulfil a range of symbolic functions in everyday life. Consider, for example, the signature tunes that are used to introduce television and radio series: just a few notes are sufficient to remind regular viewers and listeners of their favourite programmes. Other familiar sound-symbols include church bells, door chimes, fire alarms and the referee's whistle in sport. These symbols supply information about what is currently happening, what has recently taken place, or give warning of what is about to occur. They are used in preference to speech for a number of reasons: their immediate impact may be greater, for example, or they may be more aesthetically pleasing. However, it is through verbal explanation that people typically become familiar with the meaning of sound-symbols such as these.

The principle of using sound symbolically can be extended to augment the receptive communication of children who are visually impaired and have learning disabilities, and to assist them in their efforts to communicate expressively, at any level. There are various categories of day-to-day information that can be symbolised through sound, including **activities**, **places** and **people** (see Ockelford, 1994, pp. 5ff).

Sound-symbols can relate to these areas in two ways. There may be a direct link, where a sound is *integral* to a given activity, for instance, such as a small cluster of bells being used to represent a music session (cf. p. 55). Other sound-symbols work through being *associated* with the activity concerned, and so operate at a more abstract level. For example, a horn may be taken to mean 'ride the bike'. This type of connection can also be applied to places and people. For instance, the windchimes chosen to help characterise a room (see p. 26) may also be used to represent it symbolically, while the jangling bracelets or bangles worn to enhance the individuality of key figures in a child's life (p. 27) may acquire referential status too.

[15]In addition to speech.

Horn meaning
'ride the bike'

Windchimes symbolise the classroom; see ***All join in!*** - Song 4; *Where are we?*

Sound-symbols will often have tactile and visual qualities that may be exploited within multisensory communication programmes, just as some objects of reference, which are principally identified through touch and vision, have the capacity for making characteristic sounds. For example, a carved wooden rattle may be distinct and attractive visually, while a small bag of coins may make a unique jingling sound. In either case, the objects can be used in combination with other forms of communication, including speech and signing, as part of an integrated approach.

Careful attention should be given to the circumstances in which sound-symbols are used, especially in the early stages. They are not something to be learnt about in isolation, but should be introduced in everyday situations, growing naturally from children's first-hand experiences, *whenever the need to communicate arises* (cf. Ockelford, op. cit., p. 10). It is particularly important, in embarking on a communication programme, to consult widely and plan thoroughly, taking account of any strong interests or preferences a child may have.

Sound-symbols may be used first to augment *receptive* communication. They may be of particular benefit to children whose capacity for absorbing information in tactile form is limited, and who may find objects of reference physically difficult to manage. The aim is to move to a position where a sound that is typically associated with something or someone can be removed from this context, and, appearing as a stimulus in its own right, bring to mind the activity, place or person with which it was originally connected. In practical terms this may be achieved through presenting the sounding object to a child immediately before undertaking the activity of which it forms a part, or just prior to encountering the person or place with which it is associated. For example, a designated cluster of bells may be handed to a child shortly in advance of a music session, or a set of windchimes, identical to those in the doorway of the classroom, may be introduced on the way to class.

Some children may make the link between a sound and its symbolic meaning straight away, while the same connection may continue to elude others. For many, interactions of the type described will have to be repeated time and again, over an extended period, before their significance is grasped - highlighting the importance of a well-planned and consistent approach to communication. Gradually, it may be possible to separate the sound-symbol further and further in time from that to which it refers, and eventually, two or more symbols may be presented in succession to indicate a forthcoming sequence of events (see Ockelford, 1994, pp. 18ff). Some pupils may progress to using 'auditory timetables', which represent a *series* of events.

Once children have become familiar with receiving information through sound-symbols, to indicate what is going to happen next, for example, they may be encouraged to use them in an *expressive* way. Pupils may be able to choose the next activity for themselves, for instance, from a selection that is offered (see Ockelford, op. cit., p. 22).

Sound-symbols may be employed *retrospectively* too, in reviewing events that have occurred. They can also be used, receptively and expressively, in the context of make believe - giving an added auditory dimension to stories, for example, and enhancing

the development of imaginative play. The effects chosen may be representative to a greater or lesser extent, ranging from the literal use of recorded animal sounds, for instance, to a roll on a suspended cymbal, which may be used in an entirely symbolic way to indicate the sun coming out. Deploying sound-symbols like these may be particularly appropriate for youngsters who are severely visually impaired, for whom the colourful illustrations that feature in children's early literature may be neither informative nor aesthetically pleasing. One approach is to assemble and maintain a collection of objects, with various sensory qualities, that are relevant to each story in a class's repertoire.

Investigating a series of sound-symbols - an 'auditory timetable'

Telling a story with sounding objects

Music and speech

Music and words are closely linked products of the human psyche, enjoying a special relationship that, from time immemorial, has found expression in songs and chants. This affinity can be particularly useful in promoting communication and fostering its development among children who are visually impaired and have learning disabilities.

In the early stages of development, for example, exposure to music may elicit vocalisation (see Moog, 1968/1976, pp. 59ff), and those working with youngsters who have special needs may exploit this tendency to promote the production and control of vocal sounds.

At more advanced levels of functioning, music can play a significant role in motivating children to use language, through the many songs that have been especially written or have evolved over the years for their edification and pleasure. Whether nursery rhymes or counting songs, playground chants or action songs, game songs or songs that tell a story...music adds another dimension to the verbal messages presented, enlivening everyday expressions and imbuing them with extra colour and interest.

Music can also help to *structure* language. This may be particularly important for children who have learning disabilities, who may often have to contend with an unnecessarily baffling array of different words and phrases from adults who, in the face of little or no immediate reaction from those they are addressing, are culturally programmed not to repeat themselves. If at first you don't succeed in being understood, there is a strong inclination to try again, using alternative means of expression. Experience of special schools suggests that scenarios such as the following, in which an adult is addressing a child, are not untypical:

'It's time for lunch.'

[Pause. No response]

'Come and get something to eat.'

[Longer pause. Still no response]

'Aren't you hungry? - I expect there'll be something nice for us today.'

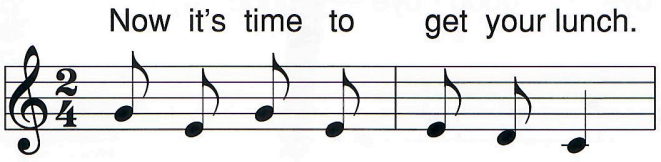
[Further pause, then, encouragingly...]

'Come on. Food! My tummy's rumbling, isn't yours?

[Final check for any response, then...]

'Ready, then? Off we go...'

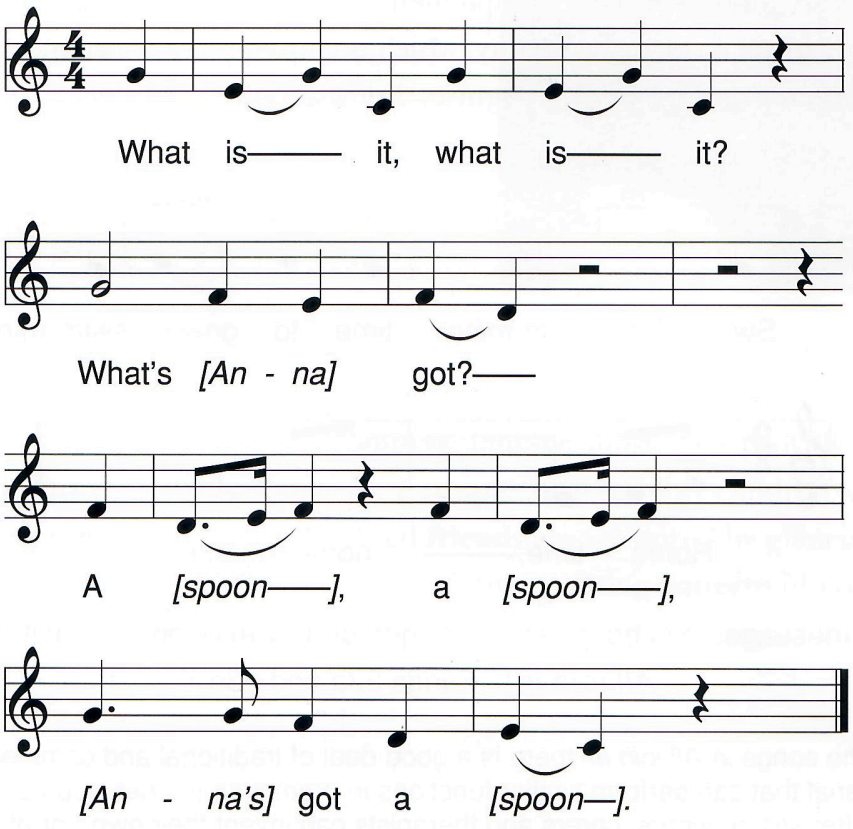
Yet what the child seeking order and regularity may need most is simplicity and consistency. Here, music can help. By setting selected phrases to characteristic snatches of melody, reinforced where appropriate with signing and objects of reference, the consistent delivery of key messages is assured. For example:



Ensuring consistency of language through setting a key phrase to music

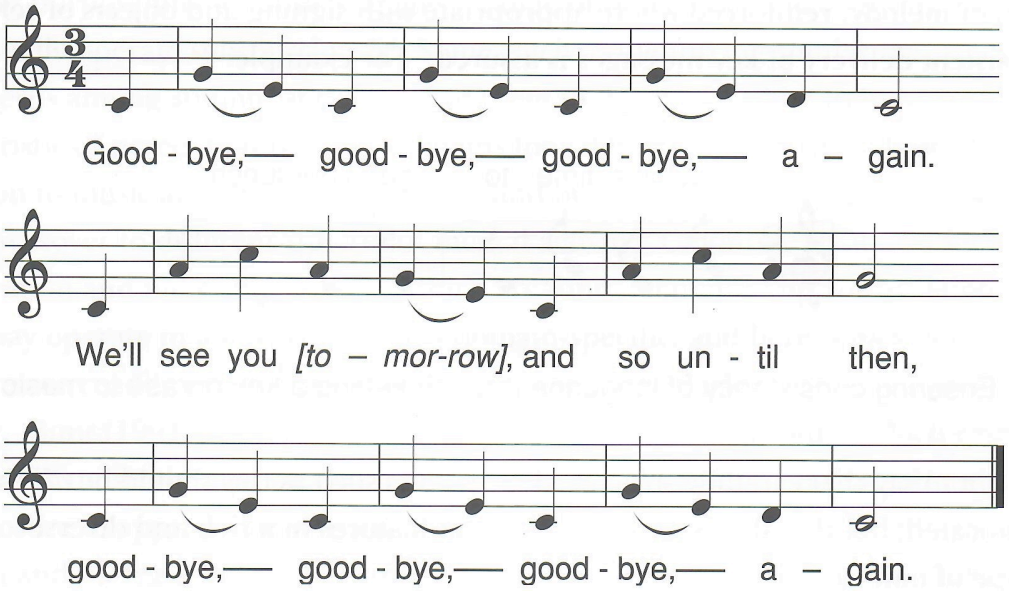
That is not to say that carefully structured fragments such as this should be *all* that is communicated, but that they should form salient features in a rich and diverse landscape of multisensory interaction.

All join in! uses music to add interest to language while structuring it tightly (see, for instance, Song 18 - *Finding/giving*). Frequently, the clarity of design is enhanced through direct repetition; common in words set to music, but rare in speech alone. For example, *What is it?* (Song 17) is structured as follows:



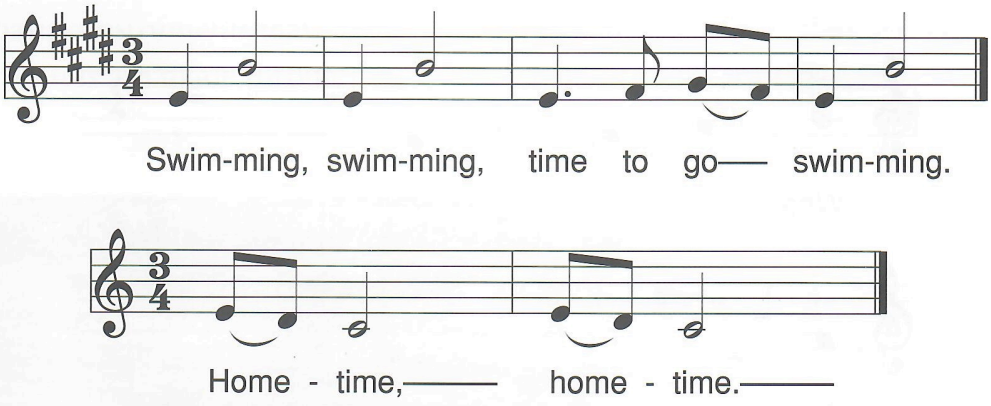
Music structures language through repetition

The melody of *Goodbye* (Song 24) relies on repetition to an even greater extent.



A high level of repetition - acceptable in words set to music - reinforces the verbal message

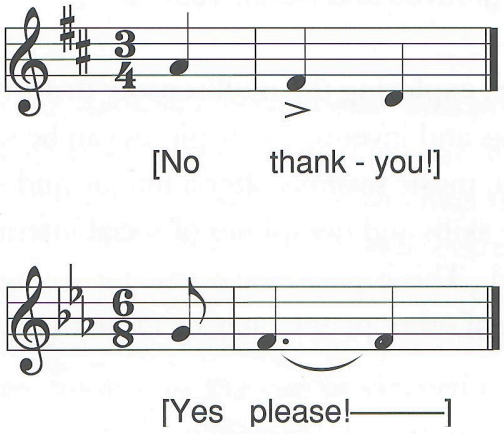
By allocating important words and phrases short tunes of their own, one form of complex auditory input (speech) is supplemented with a simpler overlay (melody). The message is given a stronger identity, which is consequently more memorable, and which children may find easier to recognise. For example:



Key verbal messages can be given a stronger identity through the addition of melody (***All join in!*** - Songs 23a and 23d)[16]

[16]Apart from the songs in *All join in!* there is a good deal of traditional and commercially available material that can perform similar functions in promoting the development and use of language. Better still, teachers, carers and therapists can invent their own - or at least adapt the words of existing songs - thereby ensuring that music and texts are relevant to the cultural backgrounds, ages and interests of the children with whom they are working.

It is even possible for short snatches of melody like these to function symbolically in their own right, both receptively and expressively. For instance, children who find it difficult to produce speech sounds accurately may be able to make themselves understood more readily by using fragments of melody such as the following.



Fragments of melody may function symbolically in their own right

Here, the rhythm and shape of the tunes hold things together, and even if individual vowels and consonants are not quite as standard, other people can understand what is meant.

Finally, it is worth bearing in mind that, since music and speech are processed differently in neurological terms, some children who are normally unable to speak, or who find verbalising difficult, may nevertheless be able to communicate through *singing* words and phrases, or at least intoning them within a rhythmic structure. For example, Anastasi and Levee (1960, p. 696), in their report on a musical savant 'S' (cf. pp. 44ff), observe that

> before he could talk, S was able to hum tunes he heard on the radio or phonograph. To capitalize on this propensity, a speech therapist was engaged and S was eventually taught to talk through the medium of lyrics. To this date, a sing-song quality is discernible in his speech.

Music and social interaction

> Music has many different functions in human life, nearly all of which are essentially social. (Hargreaves and North, 1997, p. 1)

Although listening to music, exploring the multisensory properties of soundmakers, singing, playing instruments and inventing new pieces can be satisfactory activities for children to do on their own, music sessions offer a unique and secure framework through which many of the skills and disciplines of social interaction can be experienced and developed. This is particularly true for youngsters who are visually impaired, whose awareness of other people may be more than usually reliant on the sounds they make.

Teachers, therapists and carers may provide structured opportunities for children to listen to the sounds that others are making, in a variety of contexts, and to respond appropriately to them. For those in the very early stages of development, it may well be most appropriate for such activities to be undertaken on a one-to-one basis, with teacher and pupil (or comparable combination) working in close proximity, sound featuring as one element in a broader pattern of multisensory contact. Here, there is likely to be an intimate connection between the shared activity and the relationship between client and carer; the one enabling the other to occur, and permitting it to evolve.

Relating, one-to-one, through music

In these circumstances, young people may initiate soundmaking themselves, and by offering an appropriate response, teachers and others can reinforce children's awareness that what they do can have an effect - contributing, perhaps, to their developing cognisance of a sentient 'other' out there. Alternating patterns of sounds and responses may be built up: 'proto-conversations', in which the teacher, carer or therapist reacts sensitively to the child's efforts, promoting interactive play (see, for example, Rødbroe, 1997, p. 13).

In responding to what they hear, children may produce sounds that bear no immediate resemblance to the ones with which they are presented. Teachers may nevertheless copy what their pupils do, encouraging them to do the same, both vocally and using soundmakers, through providing a model of imitation. Initially, two adults may interact in this way themselves, with children listening. Subsequently, teachers and others may act on behalf of pupils, gradually fading support as the children themselves become active participants. Song 13 from ***All join in!*** - *Can you copy me?* sets the scene for activities of this type.

Some children may be able to participate in more formal sequences of interaction, whose scripts are taken from a standard repertoire. For example, there are many nursery songs and games which set up the expectation that a particular event (such as being tickled) will occur at a given juncture, and others in which the child is required to supply certain features from a familiar selection (for instance, 'actions' in *If you're happy and you know it*; and 'animal sounds' in *Old MacDonald had a farm*). Often, the challenge for teachers is in providing material for older children that is appropriate to their age, culture and social background. Here, ***All join in!*** offers one or two initial suggestions, with songs such as *All join in!* (Song 10) and *Listen!* (Song 14).

Whatever its context and content, music is particularly effective in supporting the development of early social interaction. It is, in every sense, highly repetitive (Ockelford, 1998): pieces are generally made up of sequences of identical or similar events, which divide time into manageable chunks, and constitute predictable patterns. Hence, it provides a secure framework for the risky business of reaching out into the far from predictable world of other people, setting parameters and establishing the boundaries within which socialisation can occur, and building confidence through a medium which the great majority of young children find enjoyable and motivating.

Although, in the early stages of development, listening to sounds can induce attendant vocalisation, producing *coherent* streams of sound simultaneously is a more advanced stage, which involves listening and producing a coordinated response at the same time - or at least, switching attention rapidly between the two. However, the context of group performance can be valuable in enabling children whose music-making powers are

limited to find a satisfactory means of musical expression. For example, producing simple, repetitive patterns on percussion may have little aesthetic appeal in the long run unless they are part of a larger experience, and their combined effect can indeed be musically pleasing and motivating[17] (see *Together and alone*, ***All join in!*** - Song 16).

Particular forms of social interaction can be structured through especially designed or adpated songs. These set occasions include 'good morning' routines, for instance: see ***All join in!*** - Song 2.

'Hello' (***All join in!*** Song 2)

Here it is suggested that the group sits in a circle, singing to each member in turn. Some participants may be able to choose whom they wish to sing to next. Positions in the circle may vary from one occasion to another, or a more consistent approach may be adopted if this is felt to be particularly important. If people are away, their absence may be noted. Helpers can, of course, be included in the greeting too.

In undertaking activities of this type, it is important to remember that receptive language develops before the capacity to express thoughts and feelings, and that just *listening* is as valid a form of participation as any other - an essential developmental stage (see Ockelford, 1996a, p. 13).

In songs such as *Hello!* and Song 3, *Who's sitting next to me?*, where helpers may be singing on behalf of individuals, it will make more sense of names and pronouns, and therefore assist understanding, if only *one* person performs, effectively functioning as the voice of the youngster concerned. At other times, everyone can join in.

[17]This principle underpins art at the highest level, in gamelan music, for example (see p. 30).

Each person can use a personal soundmaker to enhance his or her presence in sensory terms (cf. p. 27), enabling members of the group who are visually impaired to establish the identity of participants who have no expressive language. Examples of sound-makers include: a little bell, a squeaker, a wooden rattle, a tiny tambourine, a miniature drum, a shaker, a whistle, a small net of pebbles, porcelain windchimes and a scraper. It may be advisable not to use conventional instruments in order to avoid potential confusion in other music sessions.

Once 'set piece' songs are familiar, it will be possible to use them in a wide range of social situations, with or without accompaniment: music can inform and enrich living and learning throughout the day.

Finally, it is worth remembering that musical activities give young people who are visually impaired and have learning disabilities the opportunity for experiencing a wide range of social situations (cf. p. 7). Music-making takes place indoors and outdoors, in concert halls and sitting rooms, with small groups of friends and among thousands of strangers. Each occasion has its own atmosphere and code of conduct to which participants are expected to adhere. Hence the kinds of extrovert behaviour that are the norm at a rock concert staged in a large arena, for example, are not likely to find favour among devotees of classical chamber music, listening in the relative intimacy of a small concert hall. The extent to which pupils and students can gain awareness of these issues will vary from one individual to another: the key thing is for teachers and carers to find ways of offering them fulfilling musical experiences - experiences which typically occur in the company of other people.

Roshni, Ching-Ching and Andrew make music together

Making music; exceptional musical abilities

Musicality; uneven profiles of development

Creating, controlling and causing sounds through the exploration of soundmakers, including the voice and musical instruments, are activities of potential relevance and interest to the great majority of children and young people who are visually impaired and have learning disabilities, including many of those who are in the very early stages of development. Competence in areas such as performance, improvisation and composition - in the sense of having the capacity to plan and reproduce series of sounds faithfully to an inner intention, in emulation of what is heard, or through instruction[18] - is characteristic of rather fewer pupils and students, however. Making music in this sense requires a cluster of abilities, including a sufficient level of auditory development to process pitch, rhythm and other qualities of sound effectively; a range of motor skills, coordinated with what is heard; concentration, memory, imagination and motivation; and, in many cases, an awareness of the presence and needs of others.

These qualities may be found in youngsters who have moderate learning disabilities, whose attainment in music is commensurate with their general level of functioning. For others, however, the situation is more complicated since the attributes that together comprise 'musicality' may, to a certain extent, develop and function independently of each other and independently of other abilities, such as the capacity for using verbal language. Hence children may well have uneven profiles of development, both within the domain of music, and when gauging musicality in the context of more general skills.

Discrepancies between different areas of attainment may arise from a number of sources. For example, a physical impairment may constrain the potential for technical accomplishment, vocally and instrumentally, while a hearing impairment may interfere with the evolution of auditory perception. Some children may develop an exceptional skill or skills in the context of learning disabilities - so called 'savants'[19] (see, for example, Miller, 1989). Treffert (1989, p. xxv) defines two levels among those with what he terms 'savant syndrome': 'talented savants', whose skills are remarkable only in relation to their disability; and 'prodigious savants', whose ability is spectacular by any standards. Nettelbeck and Young (1996, p. 52) additionally distinguish those with

[18]Hence 'competence' is a relative term, potentially applying equally to a toddler singing a nursery rhyme and an internationally renowned opera singer peforming in a Mozart opera, for example.

[19]Areas of savant skill include music (the most prevalent), art, mathematics, hyperlexia and calendrical calculation (see Rimland and Fein, 1988, p. 478).

'splinter skills', which reflect levels of competence only marginally above a person's general level of functioning. However, while these discrete categories may have a certain conceptual value, experience suggests that savants' skills are better regarded as existing on a number of continua. Consider, for example, the following brief case studies.

A (16, male, blind, with severe learning disabilities) is a technically accomplished pianist: despite idiosyncratic fingering, he is capable of great rapidity and freedom of movement around the keyboard. His vast repertoire, which consists largely of light music of the 20th century, jazz and pop, can be played with equal fluency in any key. *A* has performed extensively in public. He has an exceptional ear, which enables him to identify pitches with a high degree of accuracy whatever their source, and reproduce large clusters of notes almost instantaneously. He can handle passages of considerable rhythmic complexity. Surprisingly, *A*'s short-term memory is relatively weak, and he generally learns new material by listening to it repeatedly over a period of a week or more. During this time, renditions of pieces gradually 'come into focus' - *A*'s version eventually becoming entirely faithful to the original, before serving as a framework for subsequent improvisation. *A* has not composed original pieces, however. His knowledge of music theory is limited to the names of notes and those of simple chords. He is unable to read braille music. (See Ockelford, 1991.)

Derek: a fine jazz pianist who is blind and has severe learning disabilities

B (11, female, blind, with moderate learning disabilities) enjoys singing pop songs, which she learns relatively quickly, and performs by imitating the style of the original singers. She regularly appears in public. *B* has absolute pitch, which extends to most musical contexts. She is currently learning to accompany herself on the keyboard using basic chords, and already shows a facility for transposition. As yet, she has not improvised (vocally or instrumentally) or shown an interest in composing. She knows the names of the notes, but is unable to read music.

C (6, male, partially-sighted, with moderate learning disabilities and right hemiplegia) plays chords on the keyboard with the left hand alone, to accompany songs and other pieces performed by others. His harmonic repertoire is limited to basic diatonic combinations. His sense of absolute pitch functions in most musical contexts. His feeling for rhythm is secure within familiar idioms (largely rock 'n' roll). He usually learns pieces by listening to them several times over a period of a few days. *C* shows no interest in improvising or composing, and does not use conventional music terminology. He is unable to read music.

D (12, male, partially-sighted, with severe learning disabilities) can play the choruses of two pop songs on the piano that he has taught himself over a long period of time - a single melody line in the right hand, and the bass in the left. He can sing along as he plays, and his performances are rhythmically secure. Both songs use diatonic notes only. *D* can recognise the notes of the scale of C major around the centre of the keyboard. He currently shows no ambition to extend his repertoire.

E (14, male, blind with moderate learning disabilities) plays a number of instruments, including the recorder, clarinet, saxophone and piano. His speciality, however, is percussion, particularly the timpani, drum kit and vibraphone, which he plays to a high standard. He has performed widely in youth orchestras and bands, and has a wide knowledge of Western classical and popular music. *E* has a truly remarkable ear, with a highly refined sense of absolute pitch that functions effectively whatever the source of sound, and enables him to hear how the most complex harmonies are made up. Both his short-term and long-term memory are outstanding. For example, he was able to learn a Debussy *Arabesque* by hearing the music only once (a page at a time). However, *E* finds it difficult to reproduce what he can hear in his head on the keyboard, where his efforts tend to be rather uncoordinated. Hence having learnt the *Arabesque* aurally in a short space of time, he then spent many weeks practising it from memory, and was never able to achieve

(for him) a satisfactory standard of performance. *E* enjoys improvising and composing in a wide range of styles. He has a basic knowledge of music theory and terminology, though he cannot read music.

F (18, male, blind, with moderate learning disabilities) performs simple classical pieces on the piano and improvises fluently on the blues harmonica. His sense of absolute pitch is confined to the middle range of the piano. He has a good grasp of basic musical concepts and terminology, and can read braille music. *F* has an extensive knowledge of popular music of the last 40 years.

While these thumbnail sketches reveal certain similarities between the individuals concerned, it is clear, nevertheless, that each is quite different.[20] For example, all have 'absolute pitch' - the capacity to recognise or reproduce notes in isolation - which is very rare in the population as a whole, and uncommon even among musicians (cf. p. 2). However, the extent of this ability varies from one savant to another in terms of range, accuracy, and the types of sounds for which it functions. Similarly, the number of notes which can be detected in chords differs on an individual basis. Memory is an important factor in all the cases outlined, but only *E* has an outstanding short-term memory, the others relying on their ability to remember pieces - often a substantial repertoire - in the long-term. The savants' motor skills vary considerably, from *A*, who has an exceptional technical facility on the keyboard, to *C* who has only limited powers in his left hand. The savants differ in their musical interests, in the instruments they play (although the piano or keyboard are most usual), and in the contexts in which they prefer to utilise their skills. Some enjoy public performance, and indeed show a remarkable sense of occasion, while others are content to play for themselves. The savants show a varying sensitivity to musical structure in performance - some, such as *D*, appearing to be more 'mechanical', while others, like *B*, being capable of highly expressive performances. Some can improvise or compose, while others show little or no interest in generating new material. All learn by ear more or less effectively; only one (*F*) reads music. The savants' knowledge of musical terminology and concepts, while generally limited, varies significantly.

The six youngsters described are in many ways typical of the population of musical savants as a whole. They are predominantly male (cf. Hill, 1974, who reports a 6:1 male-to-female ratio in savants, based on accounts of 105 individuals); all are visually impaired (cf. Judd, 1988, pp. 137ff, who in his summary of 18 cases notes that 10 are blind), with a preponderance of 'retinopathy of prematurity' (cf. Ockelford, 1988; Miller, 1989, pp. 33 and 34); and all have or have experienced difficulties with

[20] Adding to the list would have confirmed this tendency.

language, frequently displaying echolalia,[21] verbalism,[22] overextension and underextension,[23] and confusion with pronouns (cf. Webster and Roe, 1998, pp. 85ff).

It has been suggested (for example, by Miller, op. cit, pp. 193ff) that the failure of language to evolve adequately at a crucial stage in a child's early development may be a decisive factor in the acquisition of exceptional musical skills. It is supposed that music, which structurally shares many of the features of language (though not its semantic content), comes to function in some respects as a proxy for verbal communication in the auditory domain. This tendency may be exacerbated by visual loss, which, particularly in combination with learning disabilities, can hinder the development of semantic understanding, while fostering, nevertheless, an attention to sound as a potentially pleasing source of sensory stimulation. Hence, where children's neurological capacity for processing musical sounds is unimpaired, there is the distinct possibility of their developing a special interest in music, which, given severe sensory and intellectual constraints, can become obsessive. This theory is supported by the findings of Rimland (1978) who charts the age of onset of musical savant abilities. Most frequently, these manifest themselves at the age of two, typically a period when expressive language begins to develop rapidly, while by the age of four, two-thirds of those who are going to be savants are already showing exceptional abilities. However, the fact remains that the vast majority of children who are visually impaired and have learning and communication difficulties do not develop special musical skills - even when music features prominently in the environment.

It may be that the overriding issue in savant development is quite simply the strength of a child's determination to make music. In the final analysis, savants are astonishing not so much in terms of what they can do, but on account of the fact that, in the vital early stages, they typically learn to do it entirely by dint of their own efforts. *A*, for example, against seemingly impossible odds - with only a very limited understanding of what he was doing, and no visual model to guide him; with no external incentive, no assistance, and no purposeful language - at the age of two began to teach himself to play the piano. By the time he was four his aural development had already outstripped that of most adults, and he could play the piano fluently, if somewhat chaotically, capable of playing by ear anything that was within the reach of his small hands.

However, in common with the majority of savants, *A* was subsequently able to benefit from appropriate music-educational programmes...and it is to the question of teaching children who are visually impaired and have learning disabilities the principles of performance, improvisation and composition that the rest of this section is devoted.

[21] Repeating words or phrases, often with little or no regard for their meaning.
[22] Using words or phrases for the sake of their sounds rather than their semantic content.
[23] Respectively, imbuing words with too many meanings or too few.

Teaching performance, improvisation and composition

Although formal instrumental or vocal lessons (which aim to teach music-specific skills beyond an elementary level) are likely to be appropriate for relatively few young people who are visually impaired and have learning disabilities, it is important nevertheless to consider what special teaching strategies they may require (cf. Ockelford, 1996b, pp. 57ff).[24] Despite the fact that their music-educational needs are likely to be just as diverse as those of any other group, some general principles can be identified, and these are outlined here.

Sometimes the difficulties posed by uneven profiles of development may be resolved in a comparatively straightforward manner: for instance, when a physical impairment limits a child's capacity to play an instrument, a technological solution may be possible. A synthesiser may be used to substitute for a drum kit, for example (see p. 20). Developmental disparities that are rooted in cognitive delay, however, will almost invariably pose teachers a greater, ongoing challenge.

Programmes of learning should take careful account of a pupil's profile of abilities and areas of need, both musically and in terms of general development. Music teachers can obtain information from the accounts of others, as a result of tests, and through observation. Bear in mind, though, that one's initial interaction with a child - musical and otherwise - is likely to be skewed by lack of familiarity on both parts. It is also important to appreciate that those who first suspected a youngster of having special musical abilities may well have made that judgement on the basis of limited relevant experience, and a pupil's skills and potential can easily become exaggerated. Conversely - and tragically - exceptional talent can be underrated, or even go unnoticed, when it springs up in the unexpected context of severe learning disabilities.

Since savants tend to be self-taught, particularly in the early stages, their patterns of learning often evolve distinctively and remain idiosyncratic. Some may have little or no concept of what it is to be 'taught' in the formal sense, nor understanding of the conventional roles of pupil and teacher, and their first music lessons may well comprise activities that *they* initiate. In these circumstances, teachers may necessarily begin simply by listening, waiting for an appropriate moment to offer comments or

[24]Conversely, those with special musical abilities, whose motivation to attend to organised sound may be unusually strong, may derive particular benefit from programmes that use music to promote wider development and learning. For example, it may be especially appropriate to teach certain concepts through music (see pp. 28ff); sound symbols (pp. 32ff) may be highly refined - particularly for pupils with absolute pitch; savants' memory for songs and other musical material may be valuable in a range of contexts (see, for example, pp. 37ff); and their capacity for performance may foster the development of social skills (pp. 41ff).

suggestions, or to communicate directly through music: playing or singing along discreetly, or imitating what is heard in any pauses that present themselves. Here, it can be beneficial for teacher and pupil each to have a similar instrument to play, since this assures an affinity in sound without compromising a child's personal space. Sharing an instrument may be an unfamiliar notion!

As teachers respond musically to their new pupil, they need to pay scrupulous attention to how he or she in turn reacts to them. Doubling the melody as the child plays may be tolerated, for example, but not deviating substantially from it. An open-minded, flexible approach is most likely to succeed, with teachers prepared to modify their input to accommodate a pupil's potentially roving musical focus. By providing an arresting model of musical responsiveness, the aim is to encourage pupils to evolve a sensitivity to the direction that others are taking, and a willingness to follow their lead (cf. p. 41). By stimulating the aural imagination of pupils - even tantalising them with novel harmonies and rhythms that are currently beyond their grasp - the hope is that they will be fired with enthusiasm to explore new and exciting musical territories.[25]

Matters of technique are likely to present a particular challenge, especially for those working with savants who have previously taught themselves, for in the absence of vision, and with limited understanding, aspects of their playing may well be unconventional to say the least.[26] For example, *A*, aged four, with very small hands but a huge determination to play the complex musical textures he could resolve aurally, used his wrists and even his elbows on occasions to play notes that would otherwise have been beyond his reach.[27] The main melodic line was typically placed in the middle of the texture and picked out with his thumbs, giving it a characteristic percussive prominence. While technical idiosyncracies such as these are ultimately neither 'right' nor 'wrong', certain methods of playing undoubtedly enable performers to fulfil their musical aims more effectively than others - indeed, some passages may even be

[25]Hence to work effectively with musical savants, teachers will need a high level of technical competence, the ability to play fluently by ear and to improvise in a range of styles, a vivid aural imagination, and a good memory...all coupled with a sensitivity to the needs of children with limited language and social skills, and, quite likely, eccentric patterns of behaviour.

[26]It is important to appreciate the effect that a visual impairment and learning disabilities are likely to have on a pupil's general awareness of how music is performed, since 'incidental' learning - the natural, day-to-day process of information-gathering which characterises the lives of children who are fully sighted - will be reduced or eliminated. For example, whereas young people typically know what a number of musical instruments are like, since they will have seen them on television, in shop windows, in the hands of buskers, and so on, children who are born blind will have no comparable knowledge in the absence of direct physical access or specific verbal explanation. Hence they may welcome the opportunity to explore instruments first hand and to be shown how they are played, giving them some indication of basic technique and typical posture (cf. Ockelford, 1996b, p. 58).

[27]Eddie, the young savant with whom Leon Miller worked, apparently adopted the same approach! (See Miller, 1989, p. 30.)

rendered impossible. However, the prospect of changing aspects of a savant's technique, which may have evolved wholly intuitively, can be daunting too. Children with severe learning disabilities may have little capacity to reflect consciously on what they do, and lack the receptive vocabulary to make description or analysis of their efforts meaningful. Moreover, the challenges they face may be compounded with physical disabilities. Hence teachers, ideally in consultation with other professionals, may opt for compromise: seeking to modify a pupil's technique only where it is judged to be essential; adopting, where appropriate, an evolutionary rather than a radical approach to change; and, in a positive way, acknowledging and accepting the effects on performance - technically, stylistically and in terms of repertoire - that a child's disabilities may have.[28]

Because of savants' visual, cognitive and language impairments, where technique is to be developed, teachers may have to rely to a great extent on demonstration (rather than explanation).[29] This may be based on seeing, feeling or listening to what is going on, or a combination of the three. Partially-sighted pupils, for example, may be able to learn effectively from visual demonstration, provided that it is undertaken at an appropriate pace, with adequate repetition, and with the observer sufficiently near at hand. In this way, he or she will have the best chance of building up a coherent picture of what is happening from what may well be imperfect or incomplete visual information and cognitive processing. Pupils who are blind or who have very little sight may benefit from feeling what their teacher does: 'hand over hand' as he or she plays the keyboard, for instance; or, from behind, getting a sense of the position and movements of the bowing arm in playing the violin. This is usually preferable to attempting coactive movements face-to-face, as sets of muscles are working together rather than in opposition. Listening, and seeking to emulate the quality of sound made by the teacher or other performers, may be a crucial factor in technical development too, since the pupil's desire to reproduce what is heard may encourage the necessary motor activity without needing conscious attention.

Whatever approach is adopted, the development of technique is likely to require many hours of painstaking work on the part of pupil and teacher alike. For example, *A* (aged five) tended to play passages of consecutive notes by jumping from one to the next using the same finger - or sometimes even a series of karate chops with the side of his hand! Despite the extraordinary dexterity this entailed, it was clear that his playing would benefit enormously from incorporating the standard finger patterns associated

[28]As the accounts on pp. 45ff indicate, the skills of some savants, such as *E*, extend naturally to two instruments or more, while the special abilities of others are more narrowly focussed (typically on the piano or other keyboard). For them to learn a second instrument may be as challenging as for any other person with learning disabilities who is visually impaired.
[29]However, musical activities may provide a motivating context in which verbal communication skills - expressive and receptive - can be practised (cf. footnote 24).

with scales and arpeggios. However, *A* had no conceptual understanding of his thumbs and fingers as distinct entities, and was consequently unable to manipulate them appropriately in response to verbal direction. The only solution, therefore, was to guide his hands physically in the necessary movements, in the hope that, through sufficient repetition, these would be internalised. *A*'s programme commenced with five-finger exercises in all keys, which were gradually extended to complete scales and arpeggios. This evolving routine ran for around 15 minutes each school day, and was sustained for three years (a total of 600 sessions). *A*'s full cooperation was assured from the outset, since he revelled in the overt musical structure of the programme, with its regular pattern of transposition, and its occurrence at the same time each day. Little by little, the need for physical prompts faded, and, although *A* never did learn to play scales entirely conventionally, standard fingering increasingly became a feature of his performances. As a result, the quality of his playing improved dramatically.

As the case studies show, savants generally learn pieces by ear. This is a complex skill, which entails building up internal musical models - aural images of pieces that are held in the mind, that are subsequently related to the physical movements and control required to play an instrument. Developing this ability is largely a process of trial, error and determined effort. Hence, contrary to popular belief, it is something that can be improved with practice, and, whatever pupils' level of achievement - no matter how unusual their talent may be - teachers can assist them in further developing in this area. For example, to what extent are a pupil's skills restricted stylistically? If she or he can process simple diatonic chords in the context of rock 'n' roll, for instance, can this be extended to the chromatic combinations and higher discords characteristic of jazz? Pupils may be able to learn melodies relatively easily in the major mode, but are they equally at home with tunes that use the blues scale? Just how good is their ability to transpose - can they play completely fluently in every key? Rhythmically, are they more comfortable with pieces in 2, 3 or 4 time than those built around 5s or 7s, and have they experienced the complex rhythms of some Indian and African music, for example? How quickly is new material assimilated? How well is it retained? Like other skills, memory may be improved through use.

A natural development of the ability to play pieces by ear is the capacity to improvise; in fact, the two skills may well evolve alongside each other. However, some savants find the concept difficult to grasp, and, on hearing an improvisation, assume (we may surmise) that it is just another piece to be learnt. Teachers can help them understand the process by playing a familar tune and then embellishing it, or by improvising fragments of melody over an established pattern of harmonies - explaining what they are doing if this is appropriate. They may then encourage their pupils to do the same, by taking it in turns to play and listen, or by improvising with them as they perform. At first, rather than producing new material, some pupils will simply copy what they have

just heard, and it may be many sessions before original ideas start to appear. Indeed, some savants never move beyond the stage of direct imitation. Others, having attained a certain competence in improvising, may be helped to refine their efforts through exposure to renditions of the same piece in different styles. Eventually, these versions may merge in the pupil's mind, and, exceptionally, re-emerge within a new idiomatic framework - a characteristic of musical maturity.

Although savants are typically self-taught, they may well need a high level of support *between* lessons for them to get the most from programmes of learning. Effective communication between the specialist music teacher and those who are supporting is essential. To this end, it may be advantageous for parents and others to attend lessons, at least in part. As well as using commercial recordings, teachers can make practice tapes for pupils, comprising simplified or modified versions of pieces. The right hand and left hand parts of keyboard music may be recorded separately, for example, played slowly, and broken down into sections to make learning easier (see Ockelford, 1996b, p. 37) Verbal instructions may be included too (see p. 65). Pupils (and their helpers) will probably need to be taught how to derive the greatest benefit from resources such as these. Managing tapes, tape recorders and other items of music technology, assembling and disassembling instruments where necessary, and ensuring that all equipment is properly maintained and is available when required, are likely to be among the key functions of supporting staff and carers. Deciding how much practice is appropriate each day may be an issue with some children whose interest in music is felt to be obsessive. Clearly, it is a question of balance: if a child's playing takes up so much time that many other forms of purposeful activity are excluded, this may reasonably be deemed excessive; conversely, to deny a child his or her principal source of pleasure and achievement would appear to be nothing less than cruel.

Savants can perform with others more or less successfully, according to their levels of musical, cognitive and social development. They may show varying degrees of sensitivity to the fluctuating dynamics of a performing group. Some may be able to conceptualise and assume distinct roles; at different times consciously accompanying, for example, or taking the lead. The individuality of other savants may mean that they will always be more suited to solo performance. Where synchronisation would normally rely on visual cueing, alternative strategies will need to be developed: discreet counting or the use of touch, for example; and changes in tempo may have to be rehearsed with particular care. But the greatest challenge may be working together and making decisions using little or no language. Even relatively straightforward instructions such as 'play the final chorus twice' may have to be conveyed in purely musical terms. For example, an additional dominant 7th harmony may indicate that more is to come, whereas a slight slowing may show that the end is approaching.

Savants may play in public - just like any other musicians - enjoying a rapport with their audience and relishing the acclaim their performances bring. There should be no ethical difficulty here, provided the person concerned is aware of what is happening, consents to it, and is not being exploited. Indeed, some savants revel in the excitement of performing to a large group of people, and it would be unethical to deny them that opportunity. However, where individuals have only limited awareness of a situation, an informed decision may have to be made by those closest to them. A number of factors will have to be weighed up. For example, while there may appear to be little short-term advantage, it could be that playing in concerts, experiencing the special atmosphere they generate, and conforming to the patterns of behaviour they require, benefit a pupil's social development over a longer period. Repertoire and context are important considerations too. While it may be desirable, in the course of lessons, for pupils to attempt pieces in a wide range of styles, it may be inappropriate for them to perform a similar variety in public. For instance, a savant whose speciality is jazz may be demeaned by unexpectedly improvising on a Beethoven sonata in the course of a formal concert of classical music. In other circumstances, however, such an exploit may be admired for its telling musicality and pungent wit. For those supporting savants, playing in concerts is likely to raise a number of practical questions, such as attendance at rehearsals, setting up instruments and getting about on stage. It is essential that these areas of potential concern are acknowledged in good time and adequately addressed. Other issues, such as facing the audience, learning not to move excessively while playing, and receiving applause appropriately may need special consideration - and rehearsal - too. A savant may find it far more difficult to raise or lower the piano stool than to play the instrument once seated!

Finally, in this section, we consider composing. This commonly arises as a natural development of improvising - indeed, it may be impossible to distinguish one from the other. Like improvisation, composition (as a concept) may be difficult to teach. One approach is for teachers to encourage pupils to share in the process of creating new pieces with them, demonstrating in sound how passages can be built up, with ideas being tested, incorporated, modified or rejected. Teachers should be prepared to react quickly and positively to any contributions that are offered. Another approach is to improvise rhythms or melodies to familiar sets of words, and then repeat them immediately, and on future occasions, to show that newly fashioned material can attain a certain permanence in the repertoire. If savants are to convey their ideas to other people - other than directly through sound - notation will be required. Exceptionally, savants may be able to manage this themselves. Otherwise, an amanuensis can be used, or appropriate music technology - with the necessary level of assistance. The issue of notation is considered in some detail in the next section.

Reflecting on music; representing sound, music and musical concepts symbolically

Introduction

Reflecting on music and the musical experience are commonplace in Western society: just consider, for example, in the field of popular music alone, the abundance of literature, the many hours of air-time on radio and television, and - we may surmise - the millions of conversations that each week are devoted to expressing views on the latest hits and the groups that perform them. Such communication is generally undertaken in everyday, non-technical language, that accords with our intuitive understanding and appreciation of music.

For a small group of specialists, however, working in certain traditions of performance, composition and music education, as well as academics, a rarefied musical metalanguage has evolved, which seeks to describe and define organised structures in sound, and listeners' responses to them. Alongside this, various methods of representing music symbolically have been devised, of which staff notation is perhaps the most widely used.

The implications of visual impairment and learning disabilities

The capacity of children and young people who are visually impaired and have learning disabilities to reflect on music will depend on the extent of their listening experience, their level of perceptual and cognitive development, their capacity to respond (see pp. 9 and 10), and, if their views are to be shared with others, their ability to communicate. These qualities may well evolve through structured opportunities for musical reflection. While conventional music notation is likely to have little relevance for many pupils and students, the symbolic representation of sound does offer a wide range of potential benefits. The use of objects of reference, for example, may assist in communicating about music, as well as offering a route into formal systems of tactile notation, including music in braille. There may be other spin-offs too, such as establishing the principle that one thing can represent another, within a context that children find motivating.

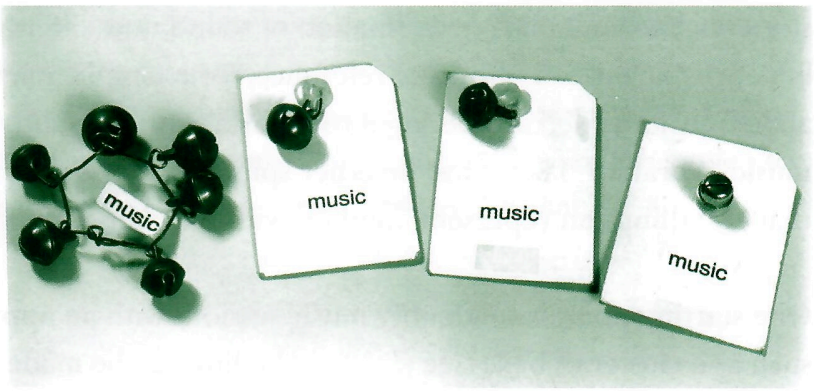
One starting point is to identify music sessions with an appropriate object of reference, such as a cluster of bells (see p. 32). The link can be made by using the bells at the beginning of each session, and subsequently using them to *anticipate* sessions (p. 34).

Here, the intention is that one feature of the activity will come to represent the whole thing (cf. Ockelford, 1994, p. 6).

Tracy is presented with a cluster of bells prior to a music session, which comprises a number of activities, the first involving the bells

Greater degrees of symbolism can be achieved in stages by reducing the cluster of bells in size, by mounting a single bell on card, by preventing this from making a sound (so only a tactile and visual representation remains), and, through further reduction or simplification, by producing increasingly abstract versions of the bell. Which is used will depend upon a number of factors, including a child's level of symbolic understanding, which may well be enhanced through exposure to a progressive system of communication such as that described.

'Music session' represented in increasingly symbolic form: through a cluster of bells; a single bell mounted on card; a mute bell; and a smaller, mute bell



Observe that these symbols are labelled in relevant media (here, large print and braille), so that their meaning is clear to everyone, and the system is inclusive (cf. Ockelford, 1994, p. 24).

Children and young people with sufficient vision may use two-dimensional representations in much the same way. Again, progression may be possible, whereby pupils and students are encouraged to move from photographs to line drawings and then to more schematic presentations where appropriate.

From a single link, whether auditory, tactile or visual in nature - or a combination of the three - the principle of representing music symbolically may be extended in a number of ways. For example, different types of musical activity, such as playing the drums, exploring the keyboards, or listening to a tape or CD may be symbolised in different ways. Like all objects of reference, these may function reactively as far as pupils are concerned (for instance, to let them know what's about to happen) or proactively (for example, to enable them to choose what they are going to do next).

Objects of reference: playing the keyboard, and listening to tapes

A further refinement is for different *pieces of music* to be allocated symbols of their own. One approach is to use a characteristic sound - a distinct *timbre* - consistently when performing a piece, so that the two become associated in the child's mind. In the case of songs, such connections may be reinforced through semantic links, by choosing soundmakers that are relevant to ideas introduced in the text. Hence, *Chattanooga Choo Choo* may be represented by a train whistle, for example; *Coconut Woman* through coconut halves; and *Daisy, Daisy* by a bicycle bell.

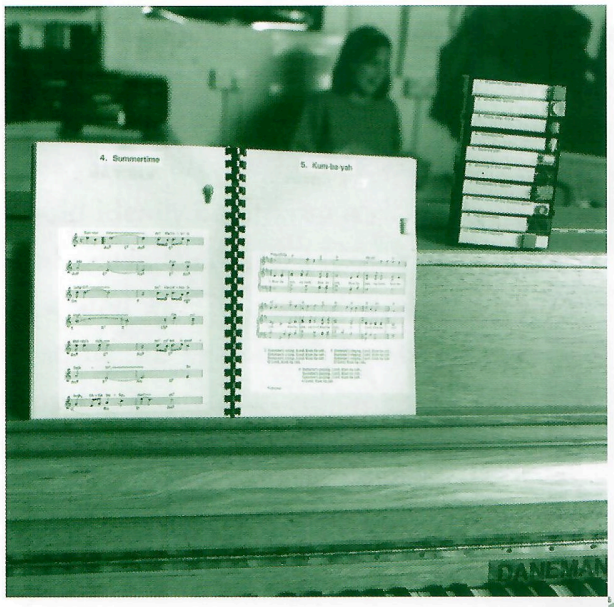
Daisy, Daisy represented by a bicycle bell[30]

The number of pieces that can be portrayed in this way, however, is inevitably limited by the availability of suitable timbres, and further constraints may be incurred by the need for certain characteristic sounds, which would otherwise have been appropriate, to act in a symbolic capacity in other contexts (see pp. 32 and 33). Hence, if a significant repertoire of pieces is to be represented symbolically, a more abstract system is essential, which does not rely on auditory links. That is, pupils and students need to move from a position of representing music through objects of reference that have, or once had, an auditory association, to using symbols that are purely tactile, with no sounding properties.

Such a system was devised for Claire, who was blind, aphasic and dyspraxic. Neither signing nor braille were options for augmentative communication. However, Claire

[30]This form of symbolism may seem unduly convoluted, since songs are typically characterised not by timbre but by melody: it is particular combinations of pitches and rhythms that give songs their individuality from a musical point of view. (For example, of the 8,000 or so opera and song themes cited by Barlow and Morgenstern, 1956/1976, over half - around 54% - can be uniquely identified by their first six pitches alone, gauged relative to a given tonic. With the inclusion of rhythm this figure would be much reduced.) Moreover, melodies can be represented isomorphically in the tactile domain: that is, the disposition of pitch in time can be mapped more or less precisely in the form of graphic scores which have been specially adapted or constructed to make them accessible through touch (cf. pp. 22 and 23; Ockelford, 1996b, pp. 32ff). However, the perceptual and cognitive demands posed by symbolism of this type - which constitutes, after all, an advanced form of notation - are likely to overwhelm many children and young people who are visually impaired and have learning disabilities. Representing pieces through association with timbre, on the other hand, where sound and symbol have a more immediate relationship, is more readily comprehensible. Here, it is songs as conceptual entities that are represented, rather than their musical substance.

showed a clear understanding of what was said to her, remembering and anticipating activities, and effortlessly following complex series of instructions (see Ockelford, 1994, pp. 28ff). Claire had an abiding interest in music, and she needed a way of indicating *her* choice of songs in lessons. Hence a series of tactile markers was developed, based on Claire's ability to discriminate and manipulate shapes and textures as small as one centimetre square, dimensions which were taken as a working minimum. The markers were attached to pages of her music book, enabling her to select pieces, and indicate her preferences to others. The same symbols were subsequently used to label her collection of tapes.



Claire's tapes and music book, with tactile markers

Claire's Touch Talker, with tactile overlay incorporating the markers from her music book and tapes, used as numbers

It soon became apparent that the symbols, which were wholly abstract, could be used in other contexts too, and so they took on the function of numbers. Eventually, they formed the basis of a tactile overlay on a talking machine which, for the first time, gave Claire a means of expressive communciation that could be generally understood.

While Claire's combination of abilities and needs was exceptional, if not unique, the strategies adopted to enable her to communicate and control her environment in the context of music have a more general applicability. For example, it may be possible for a pupil who wishes to select a favourite tape or CD from a collection to do so if the case is identified with a distinct texture, colour or shape. Once the principle is established, two cases or more may be distinguished with contrasting labels to widen the choice available.

Selecting tapes that are distinguished by contrasting textures

Textures, shapes[31] and other symbols may be used to represent different *aspects* of sound. One approach is to label the controls on tape and CD players, keyboards and other equipment with characteristic materials (such as felt or fine abrasive paper). By using these consistently, so that all volume controls are identified with Velcro, for instance, concepts such as 'loud' and 'soft' can be reinforced symbolically, and students' independence enhanced. Key-guards, which leave only relevant controls exposed, may facilitate this process further.

[31] It is worth remembering that textures are generally easier to recognise than shapes.

Operating a tape recorder with tactile labels on the controls

A further step for some children is to use the standard tactile markers which are found on specially designed tape recorders for people who are visually impaired.

Commercially available system using raised shapes

Notation can be introduced in a number of ways. For example, as part of percussion activities involving counting, cards can be produced (by staff and pupils) which indicate the number of beats to be played on a drum. In the example illustrated below, each beat is represented by a circle made from an old drum head that looks and feels the same as the one being played. The card directs pupils to play three even beats.[32]

Mark plays from a card indicating three even beats on the drum

Where materials such as these are used through touch, it is important to bear in mind the special challenges that are posed. It may not be possible to read and play at the same time, for example, in which case the directions for performance will have to be committed to memory before trying them out. In perceptual terms too, tactile exploration is more challenging than scanning items visually: through touch, information has to be gathered piecemeal and then reconstructed in the child's mind. It may be difficult to distinguish which features are significant and which are incidental, and to know when all relevant information has been obtained.

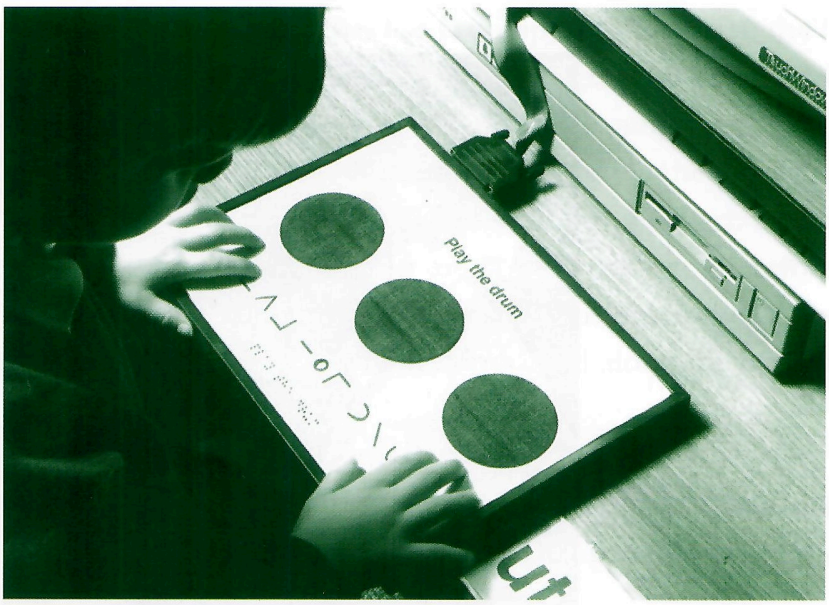
It should be stressed that the aim of introducing children to 'proto-scores' such as these may well have less to do with their immediate worth in musical terms than with their value as an introduction to symbolic representation in tactile or visual form.

[32]Rhythmic patterns such as these can be repeated to form longer sequences, and played together to form satisying larger musical textures (cf. p. 42).

Having started with a single timbre, this may be extended to two or more - by using distinctive textures on the bongos, for example.

Playing the bongos from a simple score using two textures

Some pupils and students may find it beneficial to use overlays on concept keyboards linked to suitably configured software. Here it is possible to gain an immediate response from tactile or visual symbols (or both). Hence they potentially represent an intermediate stage between score and soundmaker.



Concept keyboard with musical tactile overlay

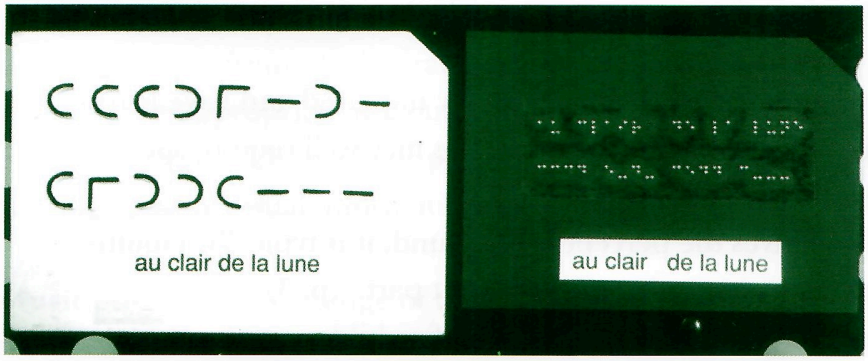
In exceptional cases, it may be possible to extend the principle of tactile representation using textures, to the domain of pitch. For example, by attaching small squares of material to the notes on a keyboard - perhaps two or three to start with - scores of simple tunes and ostinati can be constructed using further examples of the same textures attached to card. Colour may be a factor too (as it is in certain commercially available systems).

Exploring the representation of pitch through textures

For some pupils who are partially sighted, 'large letter' notation may be a possibility (see Ockelford, 1996b, p. 46). Again, relevant notes on the keyboard may be labelled to make them easier to identify. In the system illustrated below, durations beyond a single beat are indicated by horizontal lines of appropriate length.

Carole plays from letter notation

Comparable scores in tactile form can be made using Moon, a method of reading based on the raised shapes of letters in print; or braille, which uses different combinations of up to six dots, through an alphabetic system termed 'Points of contact' (see Ockelford, 1996c).



The opening of *Au clair de la lune* written in Moon and braille (cf. tactile representation of pitch illustrated opposite)

Theoretically, Moon has the potential for accommodating more advanced music-notational needs too (see Jackson, 1987; Aldridge, 1989). However, only braille offers a fully comprehensive means of representing music in tactile form, using the method developed by Louis Braille himself (see Ockelford, 1996b, pp. 8ff). Despite the intellectual complexities of this code, it is of value to some musical savants.

For those who can understand some elements of music theory, but are unable to read through sight or by touch, tape offers an alternative to visual and tactile methods of notation. For example, pieces may be recorded with accompanying explanation or instructions, including suggested fingering, breathing or bowing, and giving an account of note-names, durations and dynamics. Simplication and modification of the music (see p. 53) may well be required to avoid overloading pupils with too much data at once. Even so, two or more versions of a piece may have to be recorded, each presenting different categories of information. Alternatively, the music need not be performed at all, being replaced entirely with a verbal account - a so-called 'talking score' (see Ockelford, 1996b, p. 37). For example, the opening of *Au clair de la lune* (pictured above) may be presented in spoken form thus: "C, C, C, D, E hold, D hold, C, E, D, D, C hold, hold, hold." This is notation at its simplest. More precise descriptions are possible too, using whatever terminology and music-theoretical concepts are appropriate. Hence a series of chord-names may be sufficient for a jazz pianist to work from, whereas a Classical violinist may need to know details of nuances, phrase-marks and indications of bowing, as well as the pitches and durations to which they refer. For some, talking scores offer a transition to notation in braille or Moon; for others, they may remain the most effective way of representing music in symbolic form.

Conclusion

To conclude, salient points from each section are re-stated here.

- By common consent, music is there to be enjoyed by all, irrespective of abilities or needs. (p. 1)
- Enabling children and young people who are visually impaired and have learning disabilities to engage in fulfilling musical experiences may well require special resources and expertise. (p. 1)
- Although music largely involves the perception of sound, it is typically a multi-sensory experience, in which vision plays a significant part. (p. 3)
- Teachers, therapists and carers need to be mindful of a child's visual impairment in planning musical activities. (p. 3)
- It is particularly important for youngsters who are visually impaired and have learning disabilities to be offered a rich variety of auditory experiences, to promote both their musical and general development. (p. 5)
- The environment in which listening and other musical activities takes place needs careful consideration. (p. 8)
- Individual predilections and interests should inform the planning of music programmes, particularly for children with profound disabilities. (p. 10)
- Making sounds and listening can be crucial elements in an evolving sense of self and other. (p. 11)
- Music can be used to promote a wide range of development (p. 18), including body awareness and movement (p. 19); learning (p. 24); communication (p. 31); and social interaction (p. 40).
- Children and young people who are visually impaired and have learning disabilities may have uneven profiles of development, which may include exceptional musical abilities - so-called 'savants'. (p. 44)
- Savants need specially designed music-educational programmes. (p. 49)
- Sound, music and musical concepts can be represented symbolically to suit a range of needs in a number of ways, from objects of reference to formal codes such as braille. (p. 55)
- The music education of children and young people who are visually impaired is an under-researched area, with little dedicated literature; most relevant information appears within generic books and articles on music therapy. (p. 67)

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Dr Adam Ockelford has extensive experience of working with children and young people who have special educational needs, and is currently Head of National Education Services at RNIB; an Ofsted trained inspector; co-founder of The AMBER Trust; Secretary of the Society for Research in the Psychology of Music and Music Education; and Visiting Research Fellow at The Centre for Advanced Studies in Music Education, Roehampton Institute.

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