

Improving Well-Being and Quality of Life for the Elderly through Vibroacoustic Sound Therapy

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Abstract: A particular use of technology in ‘open-ended’ contexts lies at the heart of Vibroacoustic Sound Therapy, which has been developed in schools for profound and multiply handicapped children and in homes for the long-term care of the elderly and elderly mentally infirm. The therapy uses examples of digital music technology to improve communication skills, motor control and well-being in a non-invasive approach. Research methodologies used to date capture mainly, but not exclusively, qualitative data. Indications are positive, suggesting that the benefits resulting from this therapy are tangible and significant for various conditions associated with ageing.

Key words: vibroacoustic; sound therapy; ageing; empowerment; aesthetic resonance; music technology; elderly well-being; non-invasive.

Introduction

The focus of this paper is on elderly people within residential settings who have experienced the effects of stroke, depression, confusion and dementia, and of a study into the effectiveness of a new approach within this context - an approach called Vibroacoustic Sound Therapy (VAST).

Throughout the last century there have been significant advances in medicine and in public health. Coupled with a general improvement in hygiene and diet, there has been a general increase in longevity. As people enter their 60s it is possible for some that the quality of life will not be maintained, and when they reach their 70s and 80s there is a significant increase in the likelihood of stroke, dementia and physical and/or mental or intellectual impairment. The older we become, the more likely we are to depend on the help and caring of others.

Increase in longevity is reflected in the number of people living in sheltered accommodation, with a concomitant growth in numbers of homes for the long-term care of the elderly. These homes range in quality from the provision of rather basic care to that of high quality surroundings and more stimulating and invigorating environments. Self-contained flats can be provided within a community home, where residents may be as independent as they are able or wish or to be - and as sociable.

Working with the elderly presents particular challenges in with a therapy which depends a great deal on the establishment of both rapport and trust between therapist

and resident, and in the acceptance of, and resonance with, a particular therapeutic environment.

Greer, (1994) has clearly identified the potential for 'psychologically motivated endeavours' having a profound effect even on 'the survival chances' of the seriously ill, and also makes a powerful case against the insensitive treatment of illness. The separation of the individual from the disease can be seen to be demotivating and can produce negative emotional and psychological effects, which in turn can decrease or depress (speed of) recovery. There are numerous anecdotal reports of the variety of standards which exist both in hospitals and residential homes. Sylvia Rogers (The Guardian, 26.8.98) gives a graphic account of the carelessness and indifference which can sometimes be experienced in the hospital ward, and makes a powerful plea for every worker to be trained 'to treat every patient as an individual', one of the fundamental tenets of VAST. In the area of 'mind-body' medicine, it has been proved 'with the utmost rigorous of modern science' that we respond 'to every stimuli in global ways', (Watkins, 1997). This research supports the view that 'the health of any individual not only depends on physical health but also on the unique mental, emotional and spiritual aspects of that individual' (ibid).

An essential feature of the therapy is focus on the individual, her or his needs, and the growing interaction between 'patient' and 'therapist'. Emphasis is placed on the creation of an interactive environment for caring, in which the individual is given control. There are certain fundamental requirements crucial to our emotional and psychological well-being (Griffin & Tyrell, 1999):

- To feel a measure of control over our lives
- To give and receive attention
- To have a sense of community

The first two points are central to the objectives of VAST. There is some observational and anecdotal evidence to suggest that following therapy sessions, some residents are more inclined to socialise and become more involved with the community of the home environment.

The power and effectiveness of sound and music in enabling people to come to terms with, sometimes even overcome, disabilities has been noted by many authors (Boyce-Tillman, 2000, Critchley & Hensen, 1977, Goddard, 1996, Hamel, 1967, Innes & Hatfield, 2001, McClellan, 1991, Sacks, 1973, 1986, Springer & Deutsch, 1998, Storr, 1992, Wigram, Saperston & West, 1995). Aspects from all these areas provide the grounding for this therapy which is essentially non-invasive. An emphasis is placed on the creation of a highly controlled environment in which individuals are able to autonomously develop a range of skills through aesthetic interaction with sound. The therapy brings together aspects of different worlds which are connected to music but without depending on traditional musical skills or thought processes. A broad view of music is taken, and we move away from particular ways of organising sound towards the view of sound itself as being the most important element. Therefore, although practitioners of VAST will need to have 'open' ears, traditional musical skills such as the ability to read music notation or play an instrument are not prerequisites.

Background

Since 1992 I have been developing the techniques of VAST through a research and development project for children with severe learning difficulties (SLD), and profound and multiple learning difficulties (PMLD). This approach brings together aspects of sound (music), aesthetics, technology and creativity. (Ellis, 1994, 1995a&b, 1997, Ellis & van Leeuwen 2002).

Subsequently the therapy was introduced to a home for the long-term care of the elderly for a 30 week-long pilot study. The results were such that a follow-up project, funded by the Linbury Trust, was established in three homes for the elderly, one a residential home, and the other two homes for the elderly mentally infirm (EMI). To date more than 35 people have been involved for periods from 20 weeks to more than three years.

Research Methods

1. Exploratory methods – grounded theory

As the research was carried out in the environment of day-care centres, homes for the long-term care of the elderly and for the elderly mentally infirm, aspects of ethnographic research methods were a natural choice and participant observation, case study and video analysis of behaviour were the main tools employed in a programme of grounded theory. The application of methods to analyse the efficiency of the therapy for specific conditions focused on discovery,

‘a kind of research in which order is not very immediately attained, a messy, puzzling and intriguing kind of research in which the conclusions are not known before the investigations are carried out’, (Richardson, 1996).

For the work with both handicapped children and the elderly I devised a longitudinal video-based methodology called Layered Analysis (Ellis, 1996). In this methodology, every session of Sound Therapy is completely recorded. Subsequently, for each individual, significant moments are copied on to separate ‘master tapes’. Periodically every example of one aspect from a master tape, a particular arm movement for example, can be copied onto another tape – a ‘layers tape’ – and an extremely detailed chronological account of behaviour significant to an individual can be assembled for detailed scrutiny. For the purposes of reviews ‘summary tapes’ can be assembled. These are limited to around 10 minutes in length and so draw perhaps on one example every three months. Rather in the manner of time-lapse photography where we can view a flower opening in a short space of time, so it is possible to see significant, and frequently very moving, behaviours developing over a period of weeks, months or years.

2. Methods for measuring the effectiveness of the therapy.

Three methods of data collection and evaluation are being used at present:

i). Observational analysis of the video tapes produced through Layered Analysis can reveal changes in behaviour and response, which in turn can indicate progression and development.

ii). A small group of EMI residents have been involved in a 10 week study using the Bradford Dementia Group Profiling Scales: Well-being and Ill Being (WAIBS), which form an on-going planning and dementia mapping approach for individuals in residential settings.

iii). Nurse Observation Scales together with a mood monitoring data collection are being used for settings in which the therapy is performed by staff of a home after completing a training period. This is complemented by observation records kept by the therapist, who is also a full-time activities manager within the home.

Further details appear in 'Results' below.

Technology

Three items of (music) technology are central to this therapy, and they help define the activities of the three divisions of sound therapy sessions:

1. Interactive Communication Skills.

Sound processor and microphone to (re)develop and/or improve:

- vocal inflection (expression);
- enunciation; range of phonemes (vowels, consonants, etc.);
- expressive use of voice;
- listening skills.

A basic sound processor with microphone is used to create (mainly) three basic effects: long reverberation as in a large cathedral or cave; multiple echo patterns from a single sound; creating 'chords' from a single vocal sound. These effects often encourage vocal activity, responsiveness and active listening, including people who have lost speech through stroke. This part of the therapy gives emphasis to vocal interaction, with eye-contact and responsiveness being a focus, encouraging use of the voice and the development of enunciation and expression. The focus given here is on expressive communication through changes in pitch, volume and vocal timbre - non-verbal communication.

2. Independent physical movement and control.

The Soundbeam (www.soundbeam.co.uk) is a device which converts physical movement into sound. It emits an invisible ultrasonic beam. By moving (say) a leg, arm or hand in this beam, this movement directly generates and gives expressive control over sound. The created sounds are produced digitally and so can range from traditional musical instrument sounds (flute, trombone, piano etc.) to environmental sounds, or any electronically synthesized sound. Accordingly it is possible to have sounds available which each individual responds to. Using the Soundbeam can:

- help (re)develop physical control;
- extend/re-energise listening range (quiet/loud; high/low);
- awaken curiosity through exploration;
- enable self-expression.

All the sounds created in these first two parts of the therapy are heard via loudspeaker and/or headphones and additionally felt as vibration via a Soundchair, which provides an extra stimulus, reinforcing cause and effect (Skille and Wigram, 1995).

3. Relaxation.

The Soundchair has three acoustic areas designed to transmit the vibration of sound to the thorax, abdomen and legs. It is used in this final part of a therapy session to promote a general feeling of physical and mental well-being, and to provide a possible trigger for recollection and reminiscence.

Playing specially recorded tapes which combine gentle classical, 'relaxing', or 'content-free' music with low frequency sine tones can induce deep relaxation. This in turn can help ameliorate anxiety, stress and depression, as well as muscular aches and pains (Wigram, & Dileo, 1997). Much research has been undertaken concerning vibroacoustic techniques, (Skille, 1991, Williams, 1997). I have adopted a slightly different approach to others in the production of tapes used in the therapy, mixing sine tones of between 20 – 75Hz with the music, but allowing the music to determine the pitch of the sine tone as well as the timing of its pulsing.

Client Group

Every resident involved in VAST is treated individually, and responses to a similar stimulus can vary enormously between people. Accordingly it is not possible to say that stimulus X will inevitably result in response Y. Some residents use the microphone with enthusiasm and to significant effect whilst others may reject this aspect of the therapy. However, the Soundchair with the vibroacoustic music tapes seem to be most effective, and this part of the session is looked forward to almost without exception.

The conditions which have been encountered during the project to date include:

- Disaffection
- Anxiety
- Paranoia
- Depression *Mild*
Severe
- Terminal Cancer
- nCJD
- Senility
- Dementia
- Alzheimer's
- Stroke *Loss of speech*
Loss of movement
Cognitive impairment

Case Studies

The following descriptions are indicators of the kind of responses and effects which have been noted over a period of months, during which the residents experienced weekly VAST sessions of between 20 – 40 minutes duration.

E, aged 82, had been in a residential home for the long-term care of the elderly for a few years following a mild stroke. Her speech was not impaired, but the left side of her body was weakened and she would not use her left arm. I understood her to be very disaffected with her life in the home, and she was described as somewhat depressed and generally uncooperative.

This study lasted 30 weeks. It reveals a developing change in behaviour, interaction, receptiveness and smiling, positive responses. There are moments of fun, delight and energetic interchange with the microphone. When using the Soundbeam we see an increasing ability to interact expressively with sound, and the spontaneous and increasingly frequent use of her left arm which, prior to the therapy, had been rarely used. The final part of each session, during which she would listen to the relaxation music tapes, reveals a lady fully involved in listening and often being deeply moved. During the 30 weeks she received VAST her behaviour in the home gradually changed and she became a member of a small group, with a more positive and outgoing demeanour than at the start of the sessions.

Located in a home for the long-term care of the Elderly Mentally Infirm, N had been in care for some years and was 57 at the start of this study. Prior to living in the home he was leading a normal and healthy life, but he suddenly started to become forgetful. Deterioration was rapid and within a few months he needed institutional caring, having lost the ability of physical control and apparent cognition. He had lost most, if not all, self-help skills and was unable to walk. The diagnosis was either Alzheimer's or vCJD, but this is not confirmed.

N experienced Sound Therapy initially for a six month period. He had cerebral irritation which made him fidgety. He could not sit still and was constantly pulling at himself, never being 'at rest'. During this time the therapist found that he liked a 'droning' sensation produced using the Soundbeam, with some occasional positive responses (vocal, verbal and facially expressive indicators) to his experiences in the therapy.

After six months there was a gap in the therapy, and it was during this that N suddenly started to walk again. Both his wife and staff at the home feel there was a direct link with the Sound Therapy and this change in behaviour. He has subsequently been receiving the therapy for the past ten months and now he is walking independently around the home and is able to feed himself. According to the therapist he will frequently be somewhat agitated and non-communicative before a session. During sessions he is very responsive to the relaxation tapes. For example, the therapist often records that having put headphones on him he will gradually relax, often smile at her, and become totally still for the next 30 – 40 minutes. On return to the lounge he can often be talkative and smile. His facial expression is often very positive.

The following brief summaries are of residents in a home for elderly mentally infirm (EMI) and extend over a nine-month period.

S was 65 years of age and had dementia of the Alzheimer's type (DAT) for the previous five years. When the project started he was withdrawn, non-responsive, completely 'locked away' – a shadow of his former self. His normal posture was to keep his head tucked into his chest, and he was only ambulant with support.

After two months, S was beginning to give brief, clear responses into the microphone and occasionally sitting up with his head raised; eye contact was made and smiles exchanged. From then on it has been recorded that S has initiated touch, responded to his name, replied positively to the open enquiries at the end of the sessions, and also, equally importantly, made it quite clear when he *hasn't* enjoyed something.

The transformation in his condition is significant. He is now independently mobile, 'chatty' at times and regularly engages eye contact and is quite upright in posture. The nature of the sessions has altered over time and he is now more restless. Consequently, passive listening is considered to be the most appropriate approach to encourage him to remain seated to experience the benefits of sound and vibration.

Some of the change can be assigned to medication. However discussions with the Matron of the home have led to the view that Sound Therapy has promoted feelings of well being, which have had positive effects beyond the VAST sessions themselves.

M was 75 years old at the start of therapy sessions. She had dementia and little coherent speech, although she did make murmuring sounds. She was independently mobile, wandering about for much of the day.

Over the course of some months **M** demonstrated quite clearly her occasional uneasiness both with the microphone and Soundbeam. Because of this the sessions were limited to listening to the relaxation tapes. **M** gradually moved away from a seemingly protective pose (arms to chest) to one of relaxation. Her face, which had been frequently 'busy' with various expressions often became still and restful, and she tended to fall silent once the music started.

E was 81 years of age, and had experienced several strokes which affected her speech, comprehension and physical strength. When she first came to the sessions, she would respond predominantly by blowing into the microphone, and occasionally would copy sounds. This developed into **E** initiating song, continuing conversations, and imitating quite complex musical phrases. It appeared that what speech she did have was becoming clearer and without doubt her self-confidence increased.

Although there was no independent playing of the beam, nevertheless it has inspired her to burst into song (and in tune with the Soundbeam tones) and also provoked laughter.

A was 96 years old, and had low mood and depression. She was mobile with a Zimmer frame, quite hard of hearing and maintained as much independence as possible. It is quite extraordinary to see the transformation in her during the sessions. There were numerous episodes of infectious laughter, smiles and real appreciation of the music – both from the beam and the pre-recorded music. These sessions also caused her to reminisce - the remembrance of family and the war being very precious to her - and she obviously enjoyed the opportunity to speak about them. Many residents with a variety of conditions have reacted in a similar way following, or during, listening to the music tapes, often talking about family and experiences from their past.

D was 76 years old, with manic depression and independent mobility. She had short-term memory and obviously experienced extreme highs and lows. Her mood affected her decision whether or not to come to the sessions. She would frequently talk obsessively and until recently it would appear that she was paying little attention to the sound or music, and had no interest in playing the beam at all. However, she really enjoyed singing with the microphone.

Towards the end of her programme of VAST she demonstrated enjoyment of both the music tapes and the vibration. She has been eager to attend the sessions, and most recently has sat quietly, albeit fidgeting, for several minutes. She frequently made positive comments about her feelings at the end of the sessions.

M was 80 years of age with dementia and very little in terms of quality of life – limited sight, quite deaf, totally dependent, with swallowing difficulties, being physically 'rigid' and often awkward with the staff.

It was established quite early on that M would only benefit from the effects of the relaxation tape and vibroacoustic chair, and so this was his experience each week. Anecdotal evidence suggested that on occasions his lunch time meal was more easily accepted, and that he became relatively more alert and amenable following VAST.

Results

After therapy sessions all those involved would often seem happier and would smile more, with greater awareness of other people. This affect could last overnight and sometimes for some days. When talking with residents at the conclusion of therapy sessions they would often make positive comments, saying that they felt better, happier, generally more comfortable, and that physical aches and pains were reduced.

Careful observation of the video recordings of individual's VAST experiences extending over several months, and in some cases in excess of two years, indicates improvement in:

- mood
- level of distress
- level of depression
- level of aggression
- level of anxiety
- level of relaxation

and also has been seen to:

- encourage eye-to-eye contact;
- develop vocal communication, both verbal and through inflection;
- improve hearing ability, sometimes beyond the immediate Sound Therapy environment;
- develop listening skills;
- encourage and develop physical movement;
- provide opportunities for individual exploration and control;
- enable deep relaxation and pleasure;
- provide opportunities for cathartic recollection and happy reminiscence;
- promote a general feeling of physical and mental well-being;
- re-energise and motivate;
- develop positive self-esteem;
- produce smiles, happiness and a positive outlook which can permeate other aspects of experience.

It is possible to mark progression over time. From the tapes produced through Layered Analysis, there are often gradual changes in behaviour and response revealed, and there may be a change from *dependency*, to becoming *responsive*, leading to a more *independent* form of behaviour where the resident takes some control and initiates activity. We can trace changes over time which show this gradual process:

Progression Observed

Dependent	Responsive	Independent
isolated	aware	contributing
indifferent	reactive	expressive
frowning	smiling	laughing
crying	laughing	expressing
silent	content	receptive
withdrawn	thoughtful	communicative
inward	poised	interactive

These data are of course qualitative. By contrast, a recent short study of five residents over the final ten weeks of a series of VAST sessions was conducted by Stephen Dennet of ATH Consultancy Ltd. This study was based on the Well and Ill Being Scales (WAIBS) devised by the Bradford Dementia Group. It was a very small-scale project, partly designed to see whether this data collection methodology would further validate the therapy, and consequently the results can only be seen as indicative, although they certainly support the evidence from video analysis and day-to-day observation.

Table 1: Summarized WAIBS well-and ill being scores for five participants (average age 82) over 10 weeks in which VAST was provided.

Stage ONE (Sessions Running) Well-being Scores Summary Table

	Participant Number	Period 1 Mon	Period 2 Wed Pre	Period 3 Wed Po	Period 4 Wed En	Period 5 Frid
	1	51	59	64	38	68
	2	30	53	81	82	69
	3	21	15	25	26	27
	4	29	38	71	72	66
	5	17	24	68	72	59
Total		148	189	309	290	289

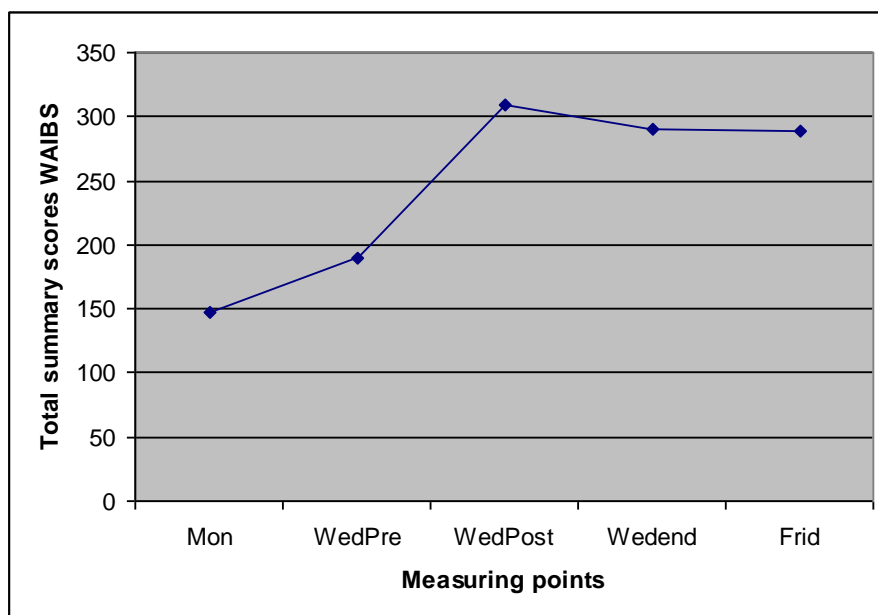


Figure1: Total of summarized well- and ill being scores for five participants (average age 82) over 10 weeks in which sound therapy was provided.

From this we can see that there was an overall increase in well-being in the hour after the sessions for all participants. There was also an unexpected indication of expectation. A reading of the total scores over the ten weeks reveals that this positive change effect remained high and only dropped off over the following days.

Further Research

From the research activity since 2000 it is clear that there are benefits resulting from a programme of VAST for elderly people with a variety of conditions. A new two-year project – iMUSE – (Interactive Multi-Sensory Environments for the Elderly) has just commenced, supported again with funds from the Linbury Trust. The target group will present a range of conditions which may include anxiety, depression, general ageing, senility, stroke, and Parkinson’s Disease. Through expanding the range and scope of VAST we aim to provide a stimulating, multi-sensory environment, so enabling greater self-expression and communication on the one hand, and also the possibility for a more receptive response to the relaxation aspect of the therapy.

1. We now have the possibility of broadening the available sound palette, so allowing for a more personal, customised, aural experience for the individual. This will be achieved by using a computer controlled sound sampler and synthesizer. It will be possible to customise sound patches for individual users and the results of the new and vastly expanded sound palette will be compared to the rather limited range of sounds used to date.
2. Software packages which produce visuals from sound input are being explored and compared. Different ways of generating visual results from audio inputs are also being investigated. This may involve the mapping of aspects of sound (pitch, volume,

timbre) onto aspects of visual stimuli (colour, density, size/shape). The effects of different mappings will be carefully monitored.

3. The addition of visual stimuli to the existing therapy may well increase motivation, physical activity and personal expression and communication. By having a computer as central controller, we aim to create an easy-to-use facility. This will further enhance the fundamental nature of VAST – the empowerment of the individual through independent and autonomous expressive interaction within an interactive environment.

4. Additional research methodologies are to be developed for monitoring and evaluating, and these will be trialled and compared with current practice.

This new project will have the a potential reaching beyond the elderly client group. The prototype iMUSE environment suggests that it will have a significant beneficial affect for children with a variety of special needs, and trials of iMUSE in a number of special schools will be an added source of information. At the conclusion of the project we aim to have a system which can be of use in this domain as well as with the elderly.

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