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Reactions and Responses from the Music Therapy Community to the Growth of Computers and Technology - Some Preliminary Thoughts

By Elaine Streeter [\[Author bio & contact info\]](#)

Introduction

As part of a research project I am currently undertaking here at the University of York, I have been drawing together information related to the question: How have music therapists reacted and responded to the growth of computers and technology?

My research aims to develop the design for a bespoke computer analysis software program for music therapists linked to a customised recording system. The working title for this system is *Music Therapy Interactive Logbook*. My investigations are at the early stage but some background information is emerging that I feel may be of use to others at this time.

In this paper I draw together information that may assist others in their research and pose some arguments as to why music therapists have on the whole shown a reluctance to engage with computer analysis and assisted technology.

The Historical Development of Computer Systems for Music Therapy Research

Literature on the use of technology related to music therapists' evaluation needs, rather than treatment needs, is limited. Crowe and Rio (2004) noted that as early as 1972 Parker and Graham advocated the development of an "information retrieval system" for music therapy, pointing out that at that time "Scholars in the arts and humanities have made relatively little use of the storage and retrieval capacities of the computer and musicians have practically ignored the entire area until very recently." (Parker & Graham, 1972, pp.147-155). In the same paper the writers proposed the use of the IBM 360 system, suggesting that what they meant by the term "retrieval system" was not a music retrieval system but a means by which written information could be stored and retrieved. Crowe and Rio (2004) point out that the first evidence of such a method being used by music therapists comes two years later when Eagle and Prewitt (1974) created the Music Therapy Index.

There is some evidence that music therapists were implementing computer systems for data organisation by 1981. Hasselbring and Duffus (1981) used a microcomputer to analyse the behavioural interactions between a music therapist and a 55-year old learning disabled client. This study demonstrates that early attempts were made to use computer applications in order to collect and analyse data for application in both research and training activities. In addition, the AIMSTAR charting program, although not designed by a music therapist, was being referred to in the music therapy literature (Hasselbring & Duffus, 1981), and later used in music therapy settings to train students to write goals and objectives and to graph client data using a data

organisation system. By the late 1980s Krout noted that music therapists were increasingly using computers and computer software in their clinical, educational and research settings (Krout, 1987).

By 1994 Bunt noted that computer technology and software was being used to support music therapy research (Bunt, 1994) and by 1997 measurement equipment such as the Continuous Response Digital Interface was being used by music therapists to measure various responses to music in music therapy research (Crowe & Rio, 2004). Ten years later the first prototype system to attempt complex data analysis of musical information emerged; the Computer Aided Music Therapy Analysis System (CAMTAS). CAMTAS was developed during the mid-nineties by Adrian Verity and Ross Kirk of the Music Technology Group, University of York in collaboration with Mary Abbotson, music therapist and former director of the North Yorkshire Music Therapy Service (Hunt, 1996).

It is clear that by the year 2000 music therapists had begun to make use of the possibilities inherent in developing computerized databases. Gallagher et al's (2001) pilot study involved the design of a computerized database to evaluate clinical practice with 90 patients (aged 28-84 yrs) in an inpatient palliative medicine unit. The researchers used their database to track the effects of music therapy intervention on their patients' common symptoms. The results of this research indicated that music therapy appeared to have a significant effect on common symptoms in advanced cancer patients.

It is important to note that of the two internationally comprehensive editions of music therapy research (Wheeler, 1995; 2005) the second includes two chapters devoted to the use of computer programs whilst the first has none dealing with that subject. This would seem to indicate that data management and analysis systems are becoming increasingly useful to music therapy researchers in organising and analysing their data. The use of the Statistical Package for the Social Sciences (SPSS) which is widely used in research in social science fields was particularly emphasised (Meadows, 2005). A number of writers have referred to the growing use of such data management systems for storing and organising information, particularly information related to research. (De Cuir, 2005; Musumeci, Fidelibus & Sorel, 2005). Discussion on statistical methods of analysis, (DeCuir, 2005) and software tools useful in describing music therapy qualitative research (Musumeci et al 2005) show the active role such systems now play in music therapy research.

Three software programs have recently been described as particularly useful to music therapist researchers, these are ATLAS.ti, HyperRESEARCH2.5 and Nvivo2.0 (Musumeci et al., 2005). ATLAS.ti has been found to be particularly effective for music therapy qualitative data analysis. ATLAS.ti allows the researcher to scan images of musical scores, make coded interventions onto the score itself, listen to audio tapes from within the program and code sections of the music using text or graphics. Suzanne states that her use of ATLAS.ti was particularly important to the flow of her thinking because it enabled her to "...remain as close as possible to the music - the primary data source." (Musumeci et al., 2005, p. 189). Clearly it is of interest to note the importance of the researcher remaining close to the data source - music - thus it seems likely that music therapists would regard the ability of any program to facilitate this as highly relevant.

It is clear from the proliferation of research in the field of music therapy that the ability of computers to manage information is being put to good use by music therapist researchers, although at the moment this analysis is largely limited to information retrieval systems and statistical measurement analyses. There is, however, also some evidence to suggest that music therapists in the clinical field have used computer programs to write session notes. Crowe and Rio note that specific charting programs such as EMTEK are being used to create written session notes by some American music therapists. It would therefore seem appropriate, in line with the increased use of computers for managing data by music therapists to be attempting to combine, data storage, data management and data analysis of musical and non musical information in one software package so that music therapists can have access to a bespoke tool.

The Development of CAMTAS - the Computer Aided Music Therapy Analysis System

In the mid-nineties a prototype computer system was devised to analyse aspects of musical communication recorded from music therapy sessions with the aim of yielding an analysis of quantifiable results that could be used as a measure for therapeutic effectiveness (Verity 2003). The researchers were concerned with providing improved access to quantitative

measures of musical dialogue in therapy, in order to refine the assessment of what Verity described as, "...the reflection of therapeutic development within the music." (Verity, 2003). CAMTAS was designed so that quantitative time-based profiles of the development of a client's condition could be provided, as this was exhibited in gestural activity within musical performance. A typical example of a time based quantitative analysis was to track the client's velocity profile over a section of improvisation in time and then compare this information with other sections of time based velocity profile analyses. The researchers stressed that the therapist, within the context of the clinical work, would then investigate any significances.

The way in which CAMTAS evolved appears to have been influenced by the Nordoff Robbins music therapy approach employed by Mary Abbotson, the then director of North Yorkshire Music Therapy service. Abbotson was keen to explore ways in which changes in the music of the children she worked with could be quantified and mapped out as graphs. In this respect CAMTAS was an innovative system ahead of its time, one which related back to Paul Nordoff and Clive Robbins' earlier detailed interest in tracking changes in the music created between therapist and client - their detailed hand written descriptions of musical information, called "tape transcripts" forming the basis of their published clinical case studies (Nordoff & Robbins, 1997).

The CAMTAS program was able to process synchronised data from music therapy video and audio recordings, using a Musical Instrument Digital Interface (MIDI) keyboard and acoustic instruments with sensors. Rhythmic analyses was preferred as a method of testing the system due to the fact that Thackray (1970) had earlier devised and calibrated tests that relate rhythmic ability to age and therefore the researchers were able to compare results of CAMTAS retrieved data with that of previous, earlier non-computerised tests in order to establish accuracy.

An initial music therapy field trial of CAMTAS which was undertaken in conjunction with the North Yorkshire Music Therapy Centre revealed some early problems: The amount of equipment involved, the amount of room the equipment took up, the complications involved in the setting up procedure and the time it took to set up the equipment all configured to make the first prototype CAMTAS an equipment heavy system that was likely to interfere with music therapy sessions. At this stage a computer needed to be in the music therapy space hooked up to the MIDI keyboard, the video and the audio recorder. A less complex prototype system was therefore devised in which the acquisition and review stages of music therapy data analysis were isolated - it having been recognised that each stage had its own separate requirements. The research then primarily concentrated on developing a model for music therapy analysis of "rhythmic cohesion" using the raw musical data (recorded during sessions) from electronic and acoustic instruments fitted with electronic sensors.

This second CAMTAS prototype demonstrated that it is possible to collect music data and quantify musical parameters. Using CAMTAS prototype 2, Verity tested 75 school children in a normal primary school replicating Thackray's (1970) test results of age related rhythmic ability. The duplication of rhythmic performance ability tests in a cross-sectional study and longitudinal study indicated that CAMTAS had the capacity to quantify results and it was argued that therefore these types of tests could be used for comparison both in cross-sectional population studies as well as longitudinal studies.

It could be argued that testing such a system with normal children in a school situation with connecting leads, multi-plugs, video and audio machines, electric keyboards and specially devised sensors, has little to do with the normal working practices of music therapists. However, the aim of these tests was merely to prove that CAMTAS-retrieved music data could replicate earlier tests in age related rhythmic ability and therefore it was proposed that changes in rhythmic performance as a result of music therapy could be effectively age related using CAMTAS. These test results are highly significant for the future development of a faster processing system. If age related rhythmic ability has been able to be replicated through an early version of a computer music therapy data analysis system then this suggests that a rhythmic age scale could be incorporated into an updated system, allowing music therapists access to comparative analysis of their data with learning disabled children which would be highly relevant for music therapy assessment procedures. For example, if it can be shown that rhythmic musical expression is age equivalent in a child who is functioning with severely delayed expressive speech, it is possible to argue that music therapy is a useful means of engaging that child in communication because music therapy is likely to offer an age appropriate means of emotional expression as well as stimulating communication.

It is clear from the literature that CAMTAS aimed to archive music created in music therapy sessions for future reference and research. The researchers appear to have been driven by an

understandable desire to justify music therapy as a form of treatment, rather than a desire to create a system that would benefit working music therapists. Perhaps this is one reason why the system failed, on the whole, to attract much interest from the music therapy community. Not helped by the fact that, due to the speed of computer processing at that time, music therapists using CAMTAS for data analysis would need to have spent approximately three times as much time as the original music therapy session took when using the system for analysis, CAMTAS may have left music therapists feeling that archiving material for future reference and research would be onerous and overwhelming. When would they have time to sift through it all, particularly without the help of an engineer?

An early demonstration of the system to UK music therapists which I attended at the University of York in 1997 seemed to confirm this view. It left many of us regarding CAMTAS as a complex, time consuming system that would be unlikely to be implemented in real life practice. The image of wave forms horizontally expanding from a vertical keyboard piano roll on the computer screen with a video image in one corner of the screen left some music therapists inspired but overwhelmed by the resulting complexities; would not such an analysis system produce more complexity, rather than help unravel already complex information?

Looking back it is unfortunate that music therapists were not able (or perhaps willing?) to spend time getting to understand the graphical representations of quantitative analysis that CAMTAS made available that is; line graphs and histograms derived from MIDI data. Clearly whatever system is devised next must concentrate on addressing the vital issue of user needs, providing a less time-consuming, user-friendly means of accessing quantifiable data derived from recorded music therapy sessions.

A discussion with Dr Andy Hunt, of the Department of Electronics University of York, revealed that, in line with others findings (Crowe & Rio, 2004) development work on the Computer Aided Music Therapy Analysis System (CAMTAS) stopped during the mid nineties. I was interested to know why this happened:

We stopped because at that time there was a widening gap between what was theoretically possible and what was practically achievable. We had to ask ourselves : Where is the funding going to come from? At that time computers weren't running quickly enough for what we wanted to explore. That was a particular problem; the speed of computer processing at that time. (Hunt, personal communication - November 2006)

Clearly, the technological limitations at that time, which would have needed to be overcome in order for the CAMTAS system to become widely used, put the brakes on further development: Researchers came to the natural conclusion that, unlike today's computers, there was little point in taking such a system further because computers at that time could not deal with the recorded data quickly or efficiently enough.

Music Therapy and Technology - an Unlikely Marriage?

Clearly there has been exemplary work in the field of music therapy and technology and there is evidence to suggest that in the US the use of technology by music therapists has been more widespread than in the UK (Magee, 2006). But it is questionable as to how many music therapists have had access to relevant education in this field over the last twenty years. Certainly, here in the UK at the present time even knowledge of basic music technology is not part of the Health Professions Council^[1] requirements for the training of music therapists in the UK and so the lack of exposure to music therapy technology has persisted.

It has recently been established that relatively few music therapists in the UK utilise technology in their work. According to the very useful and detailed survey by Magee (2006) on music therapist's attitudes to the use of electronic technologies, 69% of her respondents indicated they never used technology. It is clear that some of the assistive systems available to music therapists are highly relevant to the physically disabled and learning disabled clients with whom they work. Putting aside the expense of these devices, which when applied to a large number of individual practitioners may certainly be a deterrent, music therapists have been reluctant on the whole to explore this territory. Is this perhaps not reluctance but lack of confidence?

One early example of a MIDI-based assistive music making device is the MIDIGrid system developed here at the University of York (Kirk, Abbotson, Abbotson, Hunt & Cleaton, 1994). MIDIGrid allows a person to trigger pre-set musical material using hand gestures with a computer mouse: These mouse gestures are converted into pre-set notes, chords and pre-arranged melodies. Thus a player with very limited movement can initiate more complex

expressions than otherwise would be possible. It is up to the music therapist to preset the desired musical sound world.

Another assistive device is MIDICreator, (Kirk et al. 1994). MIDICreator converts a variety of MIDI signals from electronic sensors embedded in specially devised instruments, e.g. floor pads that can be activated by walking on them. Multi-media sound and image generation can be used in conjunction with MIDICreator so that a sound can be accompanied by a visual stream that changes as the sound itself changes. More recently small MIDI-embedded hand-held soft instruments have been devised. This sophisticated, yet discreet technology allows for particularly sensitive pick up of intentions on the part of the player.

It is easy to understand how functions of systems such as MIDICreator may seem daunting to a music therapist who has received no education or training in music technology. Clearly there is a certain amount of 'insider knowledge' needed and a certain amount of confidence in electronic equipment required before one is likely to be convinced that the time employed, and the expense involved, in buying into such a system can be justified. For example, the manual for MIDICreator is 78 pages long; fine for an electronics student, but for a busy music therapist, one wonders when they would get time to read it, let alone time to understand how to instigate the necessary configurations. For before one can use it, MIDICreator requires the user to install 'configuration builder software'. (**MidiCreator**) Such language suggests there is considerable work to do before one can begin to create a configuration - and before this one needs to understand what is meant by the term 'configuration'. The inclusion of a 'configuration tutorial' may well further convince the reader that there is a skill that may be beyond them. This is not like going up to a xylophone and quickly changing the bars to make a pentatonic scale; first one has to learn what a MIDICreator is, what it is supposed to do, how it should be 'set up', how to operate it and what to do if it goes wrong.

In addition to lack of confidence in using such systems, music therapists have long held the view that music therapy practise should not be limited by the use of MIDI keyboards - music therapists usually argue that they must be free to carry on using their acoustic instruments throughout the music therapy space and that, for safety reasons, the music therapy space should be kept as clear as possible from electric leads. Thus, another reason to avoid 'technology' emerges.

Another issue affecting the use of technology by a music therapist is the music therapist's personal relationship to his or her own instrument. The central focus on personal, and therefore individually different instrumental communication, plays a key part in music therapists' analysis of 'the music therapy relationship' ie, the intra-personal and intra-musical therapeutic relationship. The importance of personal communication through music is stressed in music therapy training courses in the UK, particularly in relation to two key figures in music therapy education, Juliet Alvin and Paul Nordoff, whose influence remains strong. Not surprisingly, therefore, music therapists view instruments which they perceive to offer limited sophistication in terms of resonance and personal touch, with a certain amount of suspicion, as if a barrier to their own communication rather than a facilitator. It is not surprising, given these attitudes, that as early as 1977 Hunt, Kirk and Neighbour (1997) identified "clinical practise integration" as a key area for improvement for future technological developments in this field.

Whatever the precise mix of reasons, we seem to have reached the position where the word 'technology' is a fairly rare occurrence in the current music therapy literature.

New Developments in Research and Training

There is some evidence to suggest that attitudes towards technology within the profession of music therapy are beginning to change. For example, Wheeler's second collection of chapters on music therapy research (2005), unlike her first (1995), includes a chapter on music therapy and technology.

So although at first glance it may seem that music therapists are making proportionately less use of technology now, given the amount of technological revolution that has taken place since the seventies, there are reasons to suspect that this freeze may change radically in the forthcoming years as new innovations arise.

Music therapy researchers need to create the right context in which information and training can be disseminated to the music therapy community. An example of this slow thaw is the recent emergence of a new degree programme for qualified music therapists at Indiana University which teaches use of technology in music therapy practice. This Master of Science in Music Therapy programme is designed to provide a certified music therapy training with

advanced research skills and clinical practice in music therapy with particular reference to teaching music therapists how to utilise the tools available in music technology for such purposes. It is interesting to note that their curriculum aims to; 1) facilitate the collection and analysis of data generated during clinical sessions; 2) apply compositional and improvisational techniques with patients, and 3) exploit the multi-mediated environment of the MIDI workstation where visual, auditory, and tactile senses can work interchangeably to support therapeutic strategies.

As a result of these initiatives there are reasons to believe that attitudes to music therapy and technology are in a process of realignment. It has now been established that far from indifference to technology, music therapists in the UK are on the whole open to and interested in this field: The results of Magee's study on music therapists' attitudes to technology show:

...Willingness and positive attitudes on the part of music therapists towards using electronic music technologies in their work. The profession is clearly open to applying electronic technologies in clinical work, and ready to engage in learning...(Magee, 2006, p. 8)

As technology becomes more sophisticated, more complex functions can be addressed, yet in view of Magee's findings (2006) and those of Verity (2003) it is vitally important that any new computer aided analysis system fully understands users requirements and attitudes in order that an appropriately inviting, user friendly system be devised.

Notes

[1] The Health Professions Council is the registration body for allied health professionals in the UK. Graduates of accredited UK programs in music therapy are able to register, as are applicants from other countries whose qualifications meet equivalent standards. Registration is required to work as a music therapist.

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