

Commentary

The Beginnings of Vibroacoustic Therapy

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When I started to work as music teacher at a special educational needs school in Norway in 1966, I observed coherence between the pupils' learning and behavior problems, and the way they behaved in the music activity settings. I received a scholarship from the Nordic Council in order to test a musical behavior observation procedure. Norway, Sweden, Denmark, and Finland were represented in the research group, and, after 3 years of work, the result was presented at the Department of Special Education at University of Jyväskylä as the Musical Behavior Scale MuBS. In the early 1970s, no Music Therapy education in any of the Nordic countries existed. Finnish psychologist and music teacher Petri Lehikoinen was the first person to have Music Therapy accepted as an academic discipline in this region, and music therapy developed in Finland from his teaching. I met Petri for the first time in Denmark in 1969, and we found that there were many self-educated "music therapists" working in institutions for mentally handicapped persons in all Nordic countries. I was also a music therapy autodidact. Sixteen years later I served as headmaster of a small institution for multi-handicapped children. The staff was almost helpless in educating or training the children - especially children suffering from Cerebral Palsy. I then remembered a meeting with Juliette Alvin in 1968 when we agreed that relaxation was one of the most general effects of Music Therapy. I needed to understand this relaxation effect, and so I started to collect equipment that was on hand in my institution.

At that time, basic questions were: if people can relax through music they perceive auditorily, what would happen if we would try transferring music directly to the childrens' body surface? Would the effect be stronger if the affected limbs were set in direct contact with the sound source?

Thinking about those questions lead to the first concept of the so-called Music Bath. Children were laid on a beanbag

between two loudspeakers. Our hypothesis was that the mattress would transfer sound vibrations from loudspeakers to as large a body surface as possible. Beginning in 1980, I promised to myself that I would use 10 years of my life to pursue this idea and realize it – I am still in the process of further developing my idea.

Developing Vibroacoustic Therapy Hardware

The development of Vibroacoustic Therapy has mostly been concentrated toward the hardware used for transmitting sound directly to the human body. If we now search for Vibroacoustic Therapy on the Internet, we find thousands of hits and over 100 different sound furniture systems including several schools or systems for composing music for body transfer. Time has shown that direct transfer of sound vibrations to any living organism seems to be effective, and mostly positive. Developing sound furniture depends mainly on defining the best transfer mechanism. When Teirich and Pontvik described the effect of sound transmission via cushion loudspeakers in the 1950s, perception of sound was limited to auditory perception. In discussing this with Juliette Alvin, we agreed that universal elements of all music are: pitch, volume, rhythm, and timbre. In fact, these are also the physical elements of verbal communication. But, are these elements of music the only parameters through which we perceive sound?

Issues of Definitions, Vocabulary, First Trials, and Quality

There are some things we cannot think because we do not know the words...

I've always felt that words and definitions in music theory and harmonics were not precise enough to describe physical elements of music and sound. A couple of questions came to my mind: when pupils in my school relaxed whilst lying in the Music Bath, what were the exact physical descriptions of sound elements that were used?

Music seemed to be much too complex in and of itself. To what extent could we reduce "music" and still observe physical effects? In that particular context, physical elements in acoustics seemed to satisfy our need of exact knowledge.

In the 1970s I met Petri Lehikoinen, Tony Wigram, and physiotherapist Lyn Weekes. We tried to construct several models of sound transfer furniture. At the same time I designed model tapes combining music with frequencies.

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International Association for Music & Medicine (IAMM).

Collaborating with SEAS loudspeaker factory based in Moss, Norway, we conducted experiments about transmission of sound from loudspeaker surface to and through my body. We found the most powerful effect appearing at 60 Hz and 80 Hz. 80 Hz was too unpleasant, but one octave below we found optimal combination of pitch and penetrating effect. The 40, 60, and 80 Hz frequencies were used to observe effects in children, staff, and parents. Together we found effects of sound transfer on spasticity (40 and 60 Hz), Asthma (50 Hz), menstrual cramps (52 Hz), neck and shoulder pains (68 Hz) and migraine headache (86 Hz).

I distributed tapes with these frequencies, both alone and combined with music on C60 tapes. My colleagues and I participated in several congresses and symposia, and in 1985 the wooden loudspeaker box was presented at the 5th World Congress of Music Therapy in Genova, Italy. In 1989 the first Vibroacoustic Chair appeared in Norway and was later re-copyrighted under the name Physioacoustic chair in Finland. It seemed that we had come toward the way's end.

However, I was dissatisfied with quality of equipment produced. There was too much sound pollution within the room during therapy sessions, disturbing other patients on the wards. Loudspeakers transferred sound from both sides of the diaphragm. In addition to sound "pollution" physical data from the Swedish Institute of Defense explained that the penetration effect of sound frequencies decreased by the square if distance between loudspeaker and receptor was doubled. Furthermore, loudspeakers were and still are constructed for best possible transfer of sound via air.

Therefore, auditory transfer of sound was ineffective for massage purposes! I had yet to find the best way of transferring sound *vibrations* to the body.

At that time I was invited to present a paper at the Scandinavian Vibration Society meeting in Sweden and there I learned about transducers. They were designed to transfer vibrations through water and solid material with a minimum of sound dispersion to air. I contacted the ACOUVE factory's president Imamura from Japan and he sent me some transducers of different sizes for testing purposes. Stephen Deuel in the USA built for me a padded cushion, inside which we put a single transducer. This cushion could be placed directly on the skin surface anywhere on the body. I started to use this vibration cushion for personal use, but also lending it to therapists who wanted to test its effects. Based on such therapists' experiences from around the world, I asked Mr. Imamura to design a 10-transducer model for whole body vibration transfer. Transducers used were effective between 30 Hz and 100 Hz covering the 40–80 Hz octave. Now it was possible to construct Vibroacoustic Therapy equipment with as many transducers as desired.

One element of VAT equipment has not yet been described: the amplifier. For the VAT Chair we assembled a

six-channel loudspeaker/tape recorder. Over the course of time while using our equipment we found that we did not need hi-fi equipment. We just needed amplifiers that could keep a stable 30 Hz frequency for at least 30 minutes without melting down the transducers. The present day amplifiers are effective even when attached to an iPhone.

Outlook

I feel that visualizing and conceptualizing the effects of direct sound transfer should make it possible to conduct research on the effects of different frequencies, as well as on the amount of power needed to access the musculoskeletal and nervous systems leading us to a better understanding of how to design safe programmes for different therapeutic purposes.

In physics, sound can be described either as a wave or as particles, just as there are light waves and photons. Light can move through a vacuum, but sound waves do need an atmosphere or solid material as a transport element. Imagine that some day we could use instruments that could "shoot" sound particles into and through the body, affecting the interior of both cells and molecules.

To arrive at that point we need more knowledge. Acquiring the vocabulary to describe such events might be a first step. At present we do not even know what we do not know, i.e. we don't even know the right questions - as in so many fields of life sciences.

Let's go for it!

Start by reading this special issue and enjoy...

Biographical Statements

Olav Skille. Born 1939 in Norway. Studied at Bergen Lærerhøgskole 1959 - 1962 to be music teacher. Specialtv studies at University of Trondheim 1972 with brain injuries AS specialtv.

Primary school teacher and head master at several schools and institutions in Norway. Pensioned in 2002. Scholarship from Norwegian dept. of education to find therapeutic effects of music education in Norwegian special schools. Grant from Nordic Council 1972 to find the prognostic possibilities of The Music Behavior Scale (MUBS) - a Nordic research team that included Sweden, Denmark and Finland education ministries.

Created the Music Bath which was renamed Vibroacoustic therapy (VAT). Participated in several international congresses. Engaged to lecture on VAT in Singapore, Colcata, Rome, London, Tallinn, Pescara, Zagreb, Ljubljana and the Nordic countries.

He is a member of the VIBRAC core group.