APPENDIX 5

- **Een liedje leren met behulp van een CD**
- **Information over the Tomatis Sound Training**
- ***Music Ace* Reports, piano students**
- ***Creating Music* Reports, piano students**
- **Background for Sirens**
- **Center for Children and Technology, research conclusions**

Een liedje leren met behulp van een cd

Vooraf

Je hebt al een jaar lang liedjes in de les geleerd. Je oefende ze dan verder thuis. Nog nooit eerder heb je een liedje van een cd geleerd. Dat ga je nu doen.

Een liedje leren met een cd is anders dan een liedje leren in de les. Sommige dingen zijn makkelijker, andere moeilijker.

Makkelijker:

- De cd is er altijd, bij jou en voor jou. Jouw docent is er maar eens per week.
- Je kan net zolang doorgaan als je wilt. Je kan ook stoppen wanneer jij wilt.

Moeilijker:

- Als de docent voorspeelt, zie je meteen welke toetsen er worden gebruikt. De cd kan je alleen maar horen.
- De cd speelt altijd door. Ook als je een foutje maakt of hapert. (Je moet dus erg geconcentreerd zijn voordat je een track speelt. Misschien moet je het wel vaak overdoen!).
- Een stuk moet eigenlijk helemaal af zijn (in een strakke maat!) voordat je met de cd meespeelt. Want de cd wacht niet en wisselt niet van tempo.

Aan de twee rijtjes kan je zien dat het leren van een liedje van een cd dus iets moeilijker is dan van/met de docent.

Opdracht

- Neem één week om elk liedje grondig te leren. Aan het einde van de week moet je het liedje met de begeleiding (op cd) foutloos kunnen spelen.
- Wil je een grotere uitdaging? Leer dan ook de begeleiding erbij. Speel de begeleiding samen met de melodie (op cd of met je eigen rechterhand).

Ben je klaar? Dan volgen hieronder de aanwijzingen per liedje. Veel succes!

Van een Duizendpoot

Track 1

1. Luister naar het hele stuk. Kijk naar de woorden en volg de voortgang van het liedje.
2. Zing zachtjes mee. Net zo vaak als nodig is om het liedje te ‘kennen’.
3. Leg het muziekblad weg en zing het lied **uit het hoofd** mee met de CD.
4. Zing nu het hele lied in je eentje (zonder cd en zonder muziekblad).

Track 2

1. Luister naar de eerste zin. Die zin wordt vier keer herhaald. (Beginnoot en –vinger worden genoemd).
2. Stop de cd. Probeer de zin op de piano te spelen.
3. Lukt het niet, speel dan *Track 2* nog een keer en zing mee.
4. Probeer opnieuw de zin op de piano te spelen.

Track 3

Luister naar de tweede zin. Oefen de tweede zin op dezelfde manier als daarnet de eerste zin.

Track 4
1. Luister naar *Track 6:* zin 1 en 2 worden aan elkaar gekoppeld. De twee zinnen worden herhaald.
2. Stop de cd. Probeer het langere stuk op de piano te spelen.
3. Lukt het niet, speel dan *Track 6* nog een keer en zing mee.
4. Probeer opnieuw de twee zinnen op de piano te spelen.

Track 5
De derde zin. Zie hiervoor *(instructie Track 2).*

Track 6
De vierde zin. Zie hiervoor *(instructie Track 2).*

Track 7
1. Luister naar *Track 7:* nu worden zin 3 en 4 aan elkaar gekoppeld. Ook deze twee zinnen worden herhaald.
2. Oefen deze twee zinnen net als hiervoor zin 1 en 2.

*Track **1***
1. Terug naar Track 1. Luister nog een naar het hele stuk.
2. Speel nu het hele stuk op de piano.
3. Herhaal dit net zolang totdat jezelf tevreden bent.

Gefeliciteerd! Je hebt het eerste liedje geleerd.

En dan nu de proef op de som:

Track 8
1. Luister naar de begeleiding op *Track 8* en zing het lied mee.
2. Speel nu het stuk op de piano mee met de begeleiding.
3. Ga door totdat je het mooi, expressief en foutloos met de cd kan meespelen.

(Lukt het niet meteen? Oefen dan eerst weer zonder cd en probeer het daarna nogmaals).

Extra

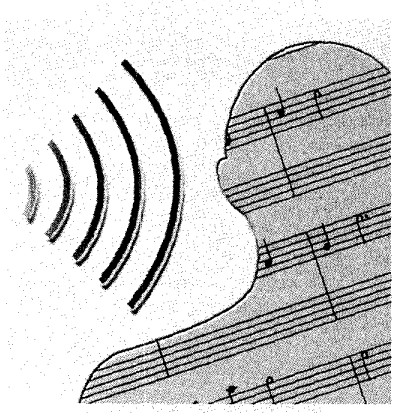
Track 9
1. Je hoort nu alleen de begeleiding. Luister ernaar en volg de notennamen op het muziekblad.
2. Luister nog een keer naar *Track 9* en ‘speel mee’ in je hoofd. Kijk naar de notennamen.
3. Stop de cd en speel de begeleiding.
4. Zodra je de noten goed kunt spelen kan je proberen het liedje erbij te zingen.

Track 10
Speel de begeleiding bij de melodie op de cd. Neem uitgebreid de tijd om te oefenen!

Eindstreep

Eerst speel je de begeleiding met de melodie op cd (*track 10)* **en** je zingt erbij.
Probeer het nu met twee handen te spelen. Volhouden tot je tevreden bent!

Gefeliciteerd! Je hebt een heel moeilijke opdracht succesvol afgerond!



The Emerging Field of Sound Training

Technologies and Methods for Impacting Human Development through Sound Stimulation

Billie M. Thompson[1] and Susan R. Andrews[2]
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Sound stimulation impacts 20th century human life in myriad ways, from sonic booms to the high-quality technological capture and delivery of music and voice through a variety of media. This article describes the emerging field of "Sound Training," which is a newly proposed name that encompasses the current and evolving sound-based technologies and methodologies. The applications of these technologies are many, with current uses in education, health, and human development. Sound training and its technology are based on the observations that 1) people of all ages can be trained to process incoming sound more effectively and that 2) many people have weaknesses or problems in their ability to process sound (listening disabilities), which affects them in a multitude of ways [1].

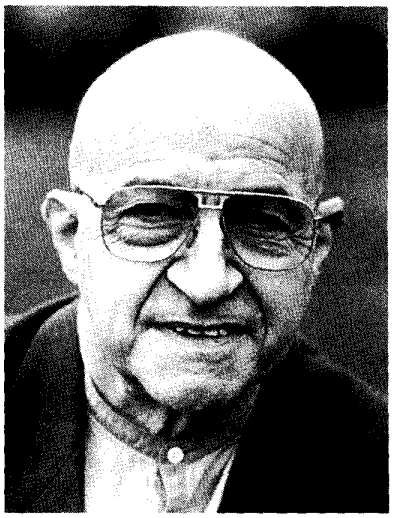
Sound-training technology consists of equipment and materials that have been designed to produce specific effects in the listener when following recommended methods. In educational, business, and clinical settings worldwide, sound stimulation is used with different types of individuals (e.g., those with learning disabilities or developmental delays, or those with a desire to learn a second language or to sing better) to achieve a host of performance goals that have listening as their foundational skill.

There is a sizable group of professionals now working with numerous methods, materials, and machines of sound stimulation. They comprise the evolving field of sound training. The field can be defined as including a group of professionals who are trained, and ultimately may be certified, to work with the technology and methods of sound stimulation for the purposes of improving or enhancing the following:

- Neuro-developmental maturation (of speech, language, motor skills, etc.)
- Communication skills (language-based, social, and business applications)
- School learning skills and abilities
- Attention and the organization of behavior
- Social relationships and self-esteem
- Foreign language learning
- Musical applications for singers and musicians
- Relaxation
- Neurological rehabilitation for head injuries, strokes, etc.

The field is rapidly growing and can be expected to develop new directions for professionals in several fields as more professionals and the public learn about the benefits of improved listening through sound stimulation or sound training.

To understand the potential impact of this field, one needs to explore its origins in the work of Dr. Alfred A. Tomatis (Fig. 1). Tomatis is a retired French ear, nose, and throat specialist who pioneered the use of sound stimulation, and whose theories and method have achieved both



1. Dr. Alfred A. Tomatis.

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controversy and acclaim. His publications, honors, and patents have been listed in the English translation of his autobiography, *The Conscious Ear* [2]. The Tomatis Method is becoming better known in the US following over a decade of access to his method in a few private centers (five of them directed by the authors) and after numerous English publications and radio, television, and conference presentations. Professionals worldwide are now creating other technologies and methods whose basis can be clearly traced to Tomatis. This article describes the Tomatis Method and the many new methods and technologies that comprise the field of sound training.

The Tomatis Method: Methods and Materials

The Method

The Tomatis Method is a noninvasive program of sound stimulation, audio-vocal activities, and consultation. It is used to enhance abilities or overcome problems that are listening-related, such as speech and language, learning, attention, and communication, among others. The method was developed by Alfred A. Tomatis over 50 years ago and has been used throughout the world with both children and adults.

A Tomatis Method program stimulates the ear, provides a supportive listening environment, and develops inner motivation to listen, correct audio-vocal control, and enhance the ear-voice relationship essential to the receiving and self-monitoring of speech and the singing voice. The components of the Tomatis Method are many and integrated, and they differ slightly for individual and group programs. The method is not *the Method* unless all components are included.

The evolution of Tomatis' theories, philosophy, inventions, discoveries, and experience is documented in some five books that he wrote over the course of his career. There are translations in several languages for most of his books. Three were translated into English (the latter two translations were edited by Thompson, a co-author of this article): *Education and Dyslexia* [3], *The Conscious Ear* [2], and *The Ear and Language* [4]. Only the third book is still in print.

The scope of this article does not allow a review of the research on the effectiveness of sound stimulation in general or the Tomatis Method in particular. For that, the reader is referred to the currently available literature for listings of the research [1, 2]. Carefully controlled studies are currently underway. Gilmor has submitted for publication a meta-analysis of significant changes on scores of standardized pre- and postinstruments of children with learning disabilities who underwent the Tomatis Method [5].

Technology Used in the Tomatis Method

The Tomatis Method includes multiple proprietary components of equipment and materials (the Electronic Ear (EE) or a machine for educational applications, special earphones for bone and air conduction, Listening Test Machine or computer-based media for giving a listening test), enhanced recordings (music tapes/CDs, including Mozart, Gregorian chant, and a variety of active voice tapes), and program protocols for machine settings and tapes to use with different types of applications and individual users.

The most essential part of the Tomatis Method is the EE. This device is con-

Table 1. Needs Addressed by the Tomatis Method by Specific Technology and Methodology

Need	Technology	Method
Restore less perceived frequencies to ear & voice to have good quality voice	Highpass and bandpass filters	Filter music and voice to provide the missing frequencies
Establish right-ear dominance for efficient feedback to speech center in brain	Right & left volume controls are separate	Gradually reduce volume output to left ear
Maintain gains of sound training	Attach microphone for voice input through EE and tapes/CDs that have one repeat words, phrases, hum, sing, or read aloud	Sufficient conditioning of hearing own voice with a good quality through EE, developing skill in memory, sequencing, and listening and self confidence in speaking
Rapidly analyze incoming sounds	Output sound through two channels with a gate between	Emphasize different ranges with each channel so ear constantly adapts
Hear higher frequency sounds gradually more easily than lower frequency sounds	Filters and channel settings set to train for the ideal slope of sound reception	Sufficient passive and active listening to ideal settings for individual's needs
Differentiate between different sounds	Gates and content of sound	Set gating and select music to train ear to differences
Prepare the ear to receive incoming sound information	Earphones with bone and air conduction used with delay between bone and air sound input	Gradually normalize timing delay between bone and air for specific application & /or language
Perceive specific rhythm and range of frequencies for a language and be motivated to listen	Channel, delay, and filter settings specific for an application (including language spoken by native speaker or by a mother for her child)	Sufficient conditioning to distinguish sounds and ranges desired and desire to tune in
Sound that helps to organize thinking, energize, relax, attend, and develop rhythm	Select music, such as Mozart, Gregorian chant, and waltzes; prepare for EE use	Provide variety of selections via a specific program designed for the person
Identify the listening strengths and weaknesses of a person	Provide listening test equipment and protocol for a person's age and goals which uses sound, observation, and laterality activities	Do assessment and consultation with person (and family if it is a child) to review results, set goals, and develop sound training program
Communicate with person doing sound training	Use a soft communication technology to reframe & provide supportive listening & learning environments	Provide periodic consultation to inform, guide, model, train to used new strategies, and recommend supportive activities

nected to a good-quality tape player or other media that allows high frequencies of at least up to 16,000 Hz to 20,000 Hz to be heard. The EE can filter recordings of music and voice, and the sound travels through two channels, with different settings. A gating mechanism alternates the sound between the channels when it reaches a specific intensity. The sound is delivered through special earphones with bone and air conduction.

The EE is designed to educate the ear to its full functions as a receptor, a mechanism to make subtle discriminations, and an energy generator. The right ear is trained to be the leading or dominant ear, to make for the most efficient processing of speech directly by the speech center in the left hemisphere of the brain. Through a microphone connected to the EE, one's ear can receive good quality audio-vocal feedback of one's voice. Table 1 summarizes the technology of the machine and methodology used to accomplish specific needs. Figure 2 displays the basic structure of how the technology works. The Tomatis Method continues to evolve as technology changes.

The Tomatis Method Methodology

The Tomatis Method begins with an initial assessment to identify listening strengths and weaknesses. The assessment, which includes completion of a battery of tests, a detailed history, observation, and consultation, typically requires one to three hours to complete. A trained professional works with the adult or family of a child to define appropriate goals and to determine the most appropriate length and type of listening training for an individual's specific needs. If an individual is unable or unwilling to complete the test battery, a decision about the appropriateness of using the Tomatis Training is made by the consultant following observation of the individual, a review of his or her personal history, and a consultation with the parents or guardians.

Individuals typically listen from one to two-and-one-half hours daily to unfiltered and/or filtered music and voice processed through the EE in order to achieve specific goals. Programs for individuals, schools, companies, and other groups are developed to meet their particular application and schedule and resource needs. While listening, individuals participate in creative activities such as drawing or painting, putting puzzles together, playing games, conversing, or simply relaxing.

The Tomatis Method is a noninvasive program of sound stimulation, audio-vocal activities, and consultation.

Many of the activities help to integrate reflex and tactile sensory systems.

The listening program has both passive and active phases provided over several intensives. One goal of the passive phase of listening is to encourage creativity and experimentation with new activities. During the passive phase, the individual listens to sounds, primarily the music of Mozart, which stimulates the development of thinking and rhythm abilities, and Gregorian chants, which possess stimulating overtones. When available, and of good quality, children hear the filtered mother's voice reading a story in order to stimulate their curiosity and reintroduce the rhythm and intonation patterns of the native language.

During the active phase, the individual speaks into a microphone as his or her voice is played back to his/her own ear through the EE. The individual may sing; hum; repeat words, phrases and chants; and read aloud with music. The conditioning of one's ear to one's voice heard with good quality is an essential part of the program. The active work can progress from basic sounds and speech for some children with developmental and learning disabilities, to the highly effective, self-monitored oral activities of professional speakers, singers, actors, musicians, salespeople, teachers, and others who routinely depend on their voice to earn a living. French actor Gerard Depardieu has described his experience with the Tomatis Method as helping him achieve his acting status [6].

A minimal program typically occurs within two or three intensives covering at least 60 to 75 hours. The length of the first intensive is usually 30 hours. Three- to six-week breaks for integration of changes separate the first two to three intensives.

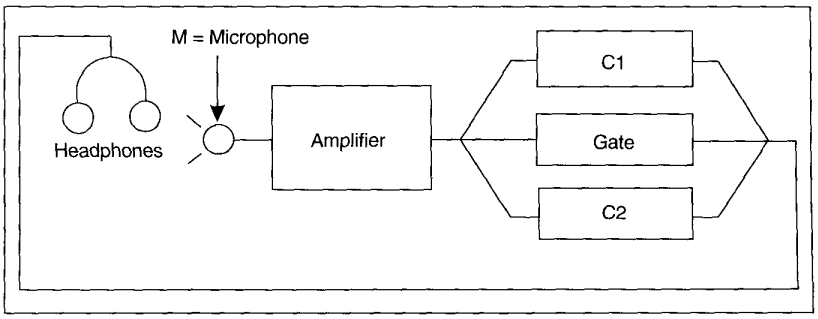
When persistent, long-standing, developmental and/or learning problems exist, longer programs are recommended, until full potential is achieved. Additional intensives of 16 to 30 hours several times a year can assist the person to further improve abilities and achieve goals.

The Tomatis Method basically trains or conditions the ear until the individual is capable of retaining the benefits without the training. The EE does not become a replacement for one's own good listening; instead, it becomes the conduit for the education, or re-education, of one's ears to their greatest potential.

The consultant provides consultations throughout the program, teaching effective communication, social interaction, and accelerated learning strategies to use with one's newly enhanced listening. Meetings with families provide effective strategies for individual support within the group and consistent structure for children so they can develop their abilities.

Assumptions Underlying the Tomatis Method

As a physician, Tomatis treated opera singers who had discovered that they could no longer produce certain sounds with their voices. Medicine failed to provide an ef-



2. Tomatis' Electronic Ear design.

fective solution. Tomatis also was treating ammunitions factory workers with sensori-neural hearing loss, and he observed similarities between their hearing tests and those of the opera singers. The sounds missing from the singers' voices were missing from their hearing as well. This led to his hypothesis that the voice could only produce what the ear could hear and to the distinction between hearing and listening. This hypothesis later became known as the "Tomatis Effect," and was independently confirmed at the Sorbonne in 1957 [7]. Two corollaries to the Tomatis Effect led to the development of the Tomatis Method: 1) if the sounds are restored to the ear, they will be immediately restored to the voice, and 2) with sufficient conditioning of one's ear to one's own voice heard with good quality, the changes can be maintained and strengthened.

The Tomatis Method is based on a number of assumptions about how people develop, process information, and learn, including the following:

1. Hearing is different from listening. Hearing is the passive reception of sound, while listening is the active motivated tuning in and tuning out at choice. Good listening results in well-organized auditory processing and vestibular control of information.

2. Listening plays the fundamental role in processing all language information, and hence all information learned through language.

3. The motivational and emotional need for communication begins with listening.

4. One role of the auditory system is to connect or relate self to self, to others, and to the environment.

5. The brain needs sound energy to enable the thinking processes and the development of intelligences.

6. Sound stimulation technology can be used as a tool by professionals with different backgrounds to assist people of all ages to improve their listening.

7. Listening is a skill that can be both lost and recovered.

8. Poor listening can begin at any age and for any number of reasons. It might result from a health problem, an accident, a major lifestyle disruption, or from stress. A checklist of symptoms of poor listening is given in Fig. 3 to provide a guideline for self-assessment.

Listening actually begins in the womb, and the ear plays a vital role in developing human potential. The mother's voice is heard by the fetus at least by the fifth month in utero, when the auditory nerve is fully functioning. (In fact, it is the only sensory system to achieve this level at this time of fetal development.) According to Tomatis [8], the filtered mother's voice reading a story can be used as a simulation of what would have stimulated the brain of the fetus before birth. Research by Abrams, Hutchison, and McTiernan [9] with fetal sheep supports the contention that normal growth and maturation of the brain depends on an intact auditory system. Research by Querleu and Renard [10] using interuterine microphones shows that the attenuation of

Receptive Listening to incoming sounds, tuning in to what is outside oneself, such as spoken requests and information given at home, work, or school.

___ short attention span
___ distractibility
___ specific sound avoidance
___ misinterpretation of questions, requests
___ confusion of similar sounding words
___ frequent need for repetition
___ inability to follow more than1 or 2 sequential instructions
___ Poor sense of timing
___ Unattuned to the rhythms & intonations of the language

Expressive Listening to one's own voice, focusing on what is within, monitoring and reproducing correctly what one hears, especially one's own voice.

___ flat and monotonous voice
___ hesitant speech
___ weak vocabulary
___ poor sentence structure
___ overuse of stereotyped expressions
___ inability to sing in tune
___ confusion or reversal of letters
___ poor reading comprehension
___ poor reading aloud
___ poor spelling

Motivation & Responsibility to lead a fulfilling life.

___ difficulty getting up
___ tiredness at the end of the day
___ frequent procrastination
___ inability to maintain focus
___ tendency toward misery and being a victim
___ feeling overburdened with everyday tasks
___ difficulty planning and organizing
___ low interest in, negative attitude toward school/work

Behavioral and Social Relationships

___ low tolerance for frustration
___ poor self-confidence and self-image
___ shyness, difficulty making friends
___ tendency to withdraw, avoid others
___ irritability
___ immaturity
___ non-collaborative problem solving

Rhythm, Motor Skills, listening to the body, its balance and coordination and development of body image.

___ poor upright stance
___ fidgety behavior
___ clumsy, uncoordinated movements
___ poor sense of rhythm
___ messy handwriting
___ hard time with organization, structure
___ confusion of left and right
___ mixed dominance
___ poor athletic skills

Developmental History, accidents, illnesses, or emotional or physical trauma that makes one want to tune out, such as the following:

___ a stressful intrauterine development
___ difficult birth
___ adoption
___ early separation from the mother
___ delay in motor development
___ delay in language development
___ recurring ear infections
___ multisensory system disorder diagnosis
___ history of stressful life experiences

3. Checklist of symptoms of poor listening.

sounds above 2000 Hz have previously been overestimated, which supports Tomatis' contention that the fetus hears high-frequency sounds. The number of nerve cells in the cochlea responding to high-frequency sounds is four times greater than those stimulated by low-frequency sounds, under 3000 Hz. Thus, human neurology alone suggests the importance of high-frequency stimulation, which also represents the overtones of music and voice. When the mother's voice is not available or for some reason not recommended for use, filtered Mozart is used instead.

The objectives for Tomatis Method training are based on his views that the human ear has at least the following seven functional capabilities, which can be altered at any age:

1. Ability to select/distinguish tonal differences and the direction of the differences between sounds. Sequenced pure tones are presented to both the right and left ears through air and bone conduction. This ability is linked to reading, letter and number confusion, sequencing problems, self-confidence, music ability, memory, and lack of access to clear information about one's past experiences. Regarding reading, poor sound distinction makes it difficult to transform sounds into symbols and symbols into sounds, and to see relationships between words that have similar sounds. On one end of this ability spectrum is someone with a partially or totally closed (nondistinguishing) ear, who cannot discriminate between some or all sounds. On the other end is someone who can distinguish between isolated individual sounds. (Some people with hearing loss who listen through bone conduction can perceive sound vibrations through the vestibular system, despite the conduction loss in the middle ear. Bone conduction bypasses the middle ear to directly vibrate the inner ear.)

2. Ability to attend consistently to incoming sounds more easily than one's own thoughts and to tune out distractions. This ability is related to problems with attention span, memory, behavior, following instructions, and relationships with others.

3. Ability to process information similarly with both ears. This relates to one's ease with comprehending incoming information, sense of organization, and rhythm.

4. Ability to identify the source of direction where sounds originate. As tones are presented to the right and left ears through air and bone conduction, the person must identify the source of the sound. This ability is related to problems with reading processing, sequencing, confusion of left and right, and spatial organization.

It was not until Tomatis that a technology-based training method was created using sound as a therapeutic and educational intervention.

5. Ability to process information so that highly energizing consonant and overtone sounds are gradually more easily perceived than lower frequency sounds. An ideal response curve is established for a good musical ear (Fig. 4). Ideal curves are also established for different languages because each has a specific frequency range and intonation pattern that is emphasized [2, 4, 11, 12]. This relates to ease of comprehending incoming information, one's musical ear, voice quality and clarity, speech clarity, thought clarity, creativity, level of energy, and sense of well being.

6. Right-ear dominance. This relates to processing timing delays, one's ability to sing on key, academic problems, and relationship problems.

7. Listening threshold within normal hearing range. Variance from the ANSI hearing norm is within normal limits. Reported in research as early as 1962, hearing loss has been correlated with lower IQ scores on standardized tests, at the rate of 5 IQ points loss for every 5 dB hearing loss [13]. If a listening problem is coupled with a sensory hearing loss, one may not use well what one has.

Historical Perspective

Development of the Tomatis Method

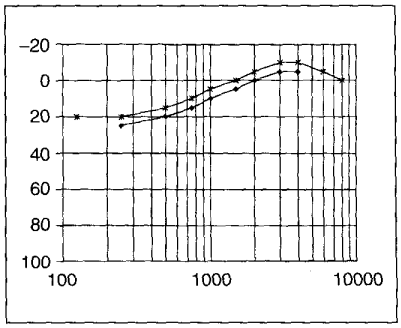
Therapeutic uses of sound in the form of music or chants have been known for centuries. The chanted hymns of the Vedas in India and the Gregorian chant of the monks have an energizing effect. Mothers sing to their children to soothe crying. Our body can feel sounds we cannot even hear, as in a very low-frequency bass rhythm. Low-frequency sound waves resonate in the lower parts of the body, while high-frequency sound seems to affect the brain and upper body.

It was not until Tomatis, however, that a systematized training method with technology as its base was created using sound as a therapeutic and educational intervention.

From his original application to help professional singers with an early model of the EE, the Tomatis Method evolved to today's multiple educational and clinical applications using a more technologically sophisticated EE. Tomatis left the medical profession at age 50 to pursue further development of the EE and of what he called the science of audio-psycho-phonology (APP). He was awarded seven US patents, as well as patents in other countries, with the patent, trademark, and proprietary rights now held by the Paris-based international organization he began, Tomatis International, S.A. (TISA). In a recent popular book called *The Mozart Effect* [14], Campbell details Tomatis' contributions to the field.

TISA and its subsidiaries and representatives in different countries provide training and credentialing programs for interested professionals who want to use the Tomatis Method. Research continues by TISA and by users in many countries to document the effects of the method in many applications, and to expand the method as new technology becomes available. Nearly 150 dissertations and theses with the Tomatis Method as its subject have been accepted by universities worldwide, including some in the US.

The further evolution of the Tomatis Method now falls to Alfred Tomatis' son, Christian Tomatis, who assumed control of TISA in 1994 upon his father's retirement. Christian Tomatis reorganized the company and its approach to worldwide



4. Ideal response curve for the musical ear on the Tomatis Listening Test (reprinted with permission from [4]).

expansion. Following discussions with the FDA regarding the many claims made worldwide by those who used the Tomatis Method as a tool, or those who benefitted from it as clients, TISA acknowledged the FDA's request to refrain from making clinical/medical claims until they could be proven using FDA-approved research designs. The authors of this article are developing research collaborations with universities and health organizations to address the clinical claims.

Extensions of Tomatis' Work

Several offshoots or extensions of the Tomatis Method have been developed by individuals familiar with the work. Table 2 presents a summary of these extensions, along with a means of comparing the methods and/or technology. Some new extensions are in development and are mentioned without full details.

One of the earliest extensions was made by Joudry [15], a former patient of Tomatis. She made four tapes from the output of an early model of the EE to play on a Sony Walkman. They are marketed, along with a book, as "Sound Therapy for the Walkman"(tm). Joudry also now markets what she calls a portable "Electronic Ear."

Another Tomatis patient, student, and colleague, Dr. Guy Bérard [16], borrowed parts of Tomatis' technology in the public domain, proposed his theory about "hearing equals behavior," developed a machine called the Audiokinetron, and applied a substantially different method. This method is called Auditory Integration Training (AIT), and many have lumped it with Tomatis, without distinction. The AIT method was researched by Rimland, Edelson, and others for its effects on autistic/PDD children [17].

Stehli reported on the success of the AIT Method to "cure" her autistic daughter [18], and she oriented the use of AIT primarily toward autistic children. This stimulated the development in the US of another AIT machine by Bill George, called the Audio Tone Enhancer/Trainer, (manufactured by BGC Enterprises, which is no longer in business). Both BGC and Bérard's manufacturer declined to pursue FDA approval following the FDA's decision that proof of clinical claims was insufficient. Stehli reports the development of a new machine [19], though claims are not yet clearly defined for it.

The Society of Auditory Integration Training (SAIT) was organized for those providing AIT using both the BGC and Bérard machines, but the organization's activities declined following a 1996 incident in Florida that resulted in confiscation of equipment and the FDA's decision to stop importation of the Audiokinetron.

Steinbach [20], a German sound engineer, musician, and teacher of music and physics, now offers training for professionals in his Samonas Sound Therapy method. He claims to have refined the "famous Electronic Ear" of Tomatis and added an "Envelope Curve Modulator" to emphasize certain ranges of sounds. His CDs are played on normal CD players and are available from professionals who are trained to use them.

Weil [21], a Harvard-trained physician who is director of the Program in Integrative Medicine of the College of Medicine at the University of Arizona, recently published CDs with acknowledgment to Tomatis' theory and philosophy.

Lowrey [22], developed a patent to work the oscillation of waves between higher and lower sounds. He claims his method is "better than Tomatis" for exercising the middle-ear muscles. His patent was recently declassified following its use in the Iraqi war in 1994, when sound was broadcast to enemy troops using his technology.

Madaule, who works with the Tomatis Method in Canada, recently announced a portable EE machine with an air conduction output [23].

Tallal has long been involved in research about auditory processing and, with Merzenich, recently co-developed the Fast Forward CD-ROM program [24]. Adaptive training exercises are presented as computer games to train young children with language-based learning im-

Table 2. Extensions from the Tomatis Method: How Others Are Similar and Different

	Tomatis	Berard AIT	BGC	Samonas	Joudry	Lowrey	Madaule	Thompson
Patented equipment	X					X		X
Proprietary equipment	X	X	X		X	X	X	X
Standard CD/tape player	X	X	X	X	X	X	X	X
Proprietary sound	X			X	X	X	X	X
Off-the-shelf CDs/tapes		X	X				X	
Mozart/Classical	X			X	X		X	X
Gregorian Chant	X						X	X
Folk songs/rock		X	X					
Passive listening	X	X	X	X	X	X	X	X
Active listening with microphone	X				Optional		X	
Claims – clinical	X	X	X	X	X	X		
Claims – educational	X	X	X	X	X	X	X	X
Claims – foreign language	X							X
Claims – musical	X						X	X
Portable	X			X	X		X	X
Air conduction		X	X	X	X	X	X	
Air and bone conduction	X							X
Listening Assessment	X	X	X	X	X		X	
Research published – peer review	X	X	X					
Research published – university	X	X						
Pursuing FDA approval for clinical	X							

Table 3. Technology of Each Method: Similarities and Differences Among the Various Technologies in the Field of Sound, Showing the Highest Levels Attained for Each						
Levels (Levels 2, 3, 4, 5 progressively are more complex, with each adding a capability to those before it)	**Tomatis EE/educ**	**Joudry tapes**	**Berard/BGC AIT**	**Samonas**	**Madaule & Joudry machines**	**Thompson**
Selection of appropriate music content by producer	X	X	X	X	X	X
1. Passive – no special equipment		X		X		
2. Passive, equalized, air conduction earphones						
3. Passive, equalized, air conduction earphones, Filtered				X		
4. Passive, equalized, air conduction earphones, Filtered, Gated		X	X		X	
5. Passive, equalized, air & bone conduction earphones, Filtered, Gated, Delayed Air Conduction	X					X
6. Portable	X	X		X	X	X
7. Microphone for active voice work	X				X	

pairments to improve their temporal processing skills.

While not directly related to the Tomatis Method or theory, the impact of sound on the entire body is fully demonstrated by Jenny's work [25], called *Cymatics*, and by Manners' therapy training, which uses these principles [26]. Jenny shows that sound, rhythm, and movement create the form of all matter, including humans. In this context, humans depend on the ear to organize and analyze sound, rhythm, and movement. Sharry Edwards [27], who has the ability to hear in extraordinary ranges of sound, created a method to identify the missing sounds in a person's voice and a machine to generate that vibratory sound in order to bring systemic balance to that person.

Finally, work at the Monroe Institute continues with hemi-sync pulses within music to balance the brain and to improve focus and learning [28]. Carefully researched sound blends, sequences, and patterns are embedded in tracks underneath music in order to synchronize the two hemispheres of the brain. Leeds [29] now also produces music with hemi-sync and promotes psychoacoustics to train people to relax and concentrate.

The Field of Sound Training Today

Over the past 20 to 30 years, researchers and clinicians have developed a wide range of applications for sound-based methods, ranging from correction to enhancement of skills. The Tomatis Method has been listed as a resource in both *Superlearning 2000* [30] and *Alternative Medicine: The Definitive Guide* [31]. In general, several levels of evolution can be observed and defined as levels of listening training, as graphically presented in Table 3.

The demand for more sound-based services in the US is increasing as individuals recognize that these methods offer a new solution for disabilities and deficits that have heretofore resisted change or been untreatable. However, just as the demand is increasing, the supply of machines and properly trained educators and trainers is decreasing.

One reason for this disparity is because of the lack of funded research to prove efficacy. For clinical claims, the FDA requires a specific type of research to prove claims about human functions that change with the use of a machine. Research needs to be done with the rigor of double-blind, placebo control-group studies, or using pre- and post-treatment analyses of change in single-subject design studies. The research must define the expected or predicted changes in defined populations and demonstrate that the device was actually responsible for the changes seen in the patients. This research also must have institutional review board (IRB) approval prior to importing technology to do the research.

While the FDA requires that clinical products be safe for the US public, educational products do not fall under its control. TISA has committed to both the FDA process for clinical claims and to establishing a distinct educational technology, methodology, and product name for educational applications. As this process unfolds, it likely will have implications in setting standards for future professional training in the field of sound training.

It is essential to explore who gets trained as well as how much training, and of what type, they receive. Historically, training has lasted anywhere from one day to several weeks, depending on the method. In general, both educational and clinical professionals who hold degrees and certifications in a field of practice have been accepted for training by trainers of the methods. Currently, there is no broad-based credentialing process that includes examination on a representative and agreed-upon body of knowledge. Additionally, franchise laws may come into effect, depending on how the person is required to pay for training, equipment, and the use of a trademark name.

Conclusions and Further Requirements

The pioneering work of Dr. Tomatis has led us to understand listening as a basic communication skill, the ear as a major integrator for the nervous system, and sound-training technology as a valuable tool for use by many different professionals. New research, theory, patents, technology, and training efforts are expanding upon Tomatis' original concepts, technology, and methods. The educational and clinical applications of sound stimulation are in their infancy yet growing rapidly, as more is learned of the brain and how we process information.

The kinds of changes being experienced with sound training do not necessarily fit within our current educational paradigm. Yet, integrating the hard and

soft technologies of sound-based training with our evolving understanding of how humans respond to sound stimulation can have tremendous impact on the ability of each individual to reach his or her own potential. To say that technology is a valuable tool goes without saying; to say the same thing about sound-training technology may go outside the comfort zone of many professionals.

Calls for more precise assessments for pinpointing auditory processing and listening problem sources are now coming from clinical and university researchers. Researchers such as Lauter, et al. [32], and Jones [33] are now recommending specific integrated auditory, speech, and brain diagnostic procedures that can further refine our understanding of the effect of sound on people and can provide specific training protocols for different needs.

Ultimately, we must thoroughly investigate how and why sound training works. Rigorous research to compare the different methods is needed as well. There is a need for evaluation of how each of the different methods works, and for assessment of the differential effectiveness of each method and technology (for example, Tomatis vs. Samonas) for different problems and different populations. The essential features of the different methods need to be identified and understood for their individual and collective component effects.

The immediate implications of sound training are simple: this evolving, scientifically based body of work presents professionals in education, health, and human development with transformative tools for developing individual potential.

Dr. Billie M. Thompson was trained by Dr. Tomatis and has worked with his techniques for over a decade. She hosted the 1991 TISA training in the US and has published and spoken widely in the US about the Tomatis Method. She edited two of Tomatis' English translations. She provides outreach educational Tomatis Method programs in addition to directing four centers. In addition, Dr. Thompson has received two patents for sound technology that may be developed to help in expanding the field to more users.

Dr. Susan R. Andrews was trained by Dr. Tomatis and has worked with his techniques for over a decade. She is a clinical developmental neuropsychologist who was initially attracted to the Tomatis Method because of her work with developmentally delayed and/or learning-disabled infants and children. Dr. Andrews also treats adults and children with neurological injury and has over a decade of experience in neurological rehabilitation for stroke and head injury. She sees a tremendous application of the field of sound to these problems. Over the years, Dr. Andrews has devoted herself to finding ways to help people reach and increase their human potential. She was among the early researchers of the Head Start Program and the Parent-Child Development Center, whose goals were to break the cycle of poverty by helping youngsters reach their potential.

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Working with Music Ace Demo – Doodle Pad
Observations: Job and Arthur
9 Feb. 2005, 13.35 – 14.35

I started the demo, and we watched the introduction song for some time. I asked them to tell me what they saw. Job explained it terms of 'an accompaniment comes in here' (when the syncope chords come in). I am not sure if they got the connection between the notes moving on the staff and what was being played. One of them said something like– "hey, the notes show up on the piano!" (The piano keys become colored as the music is playing.)

I showed them only a very quick introduction to the Doodle Pad. Then I let Job try something. He started by pulling out one note of each 'size'. (The size denotes the length of the note, but he reacted purely visually, I think). They listened to the 'piece' and appreciated it (even though it was atonal), although Arthur did ask him questioningly if he was sure he didn't want to fix it up any more. ("Wil je er niks meer aan doen??")

I then showed him an 'example' in which I placed a repeated rhythm with the marimba, a sort of melody with the oboe and a deep bass with the trumpet sound. Both of them liked this and agreed that it didn't really seem 'finished', so I added a final oboe note on the tonic. They agreed that it sounded more finished, but would not have been able to explain why.

Afterwards, Arthur (who is not my piano student) made a 'piece'. Interestingly enough, even though I had used many patterns in my example, he did not use patterns at all but made a very atonal piece, filling in all the available spaces fairly evenly. Job was giving him suggestions, such as pulling down a high oboe note because it didn't "sound good", and saying things like "why don't you put in a nice, smooth note there?" By this he meant a lower sound. I'm not sure if he was also indicating timbre (all very synthesized tone colors). Interestingly, when he said 'low', Arthur responded by putting a note 'high'. Job had to explain what he meant. I asked them if they could follow the beat in the piece, and we played it faster and slower. They could hear what I was talking about, but I am not sure if they understood the size of the notes in relation to the duration of the notes or understood what the computer was doing for them by locking the notes in a certain position (related to the beat) on the staff.

Then Job also made a piece, again not including any repeated groups of notes or any noticeable melody. Mostly he was just grouping several notes of one color. Then he would change color and move on. At some point he said "I think that it is full enough now" ("Ik denk dat hij wel vol genoeg zit.") He had randomly spaced notes over the whole writing space. They listened and made comments about what they didn't like. Arthur did not like a group of fast-playing marimba notes in the treble clef. But he couldn't really say why. He just thought it was not nice. I asked him if he thought it was 'too busy', and he said 'yeah'. Arthur did say appreciatively "It sounds like a whole orchestra" (Het klinkt als een hele orkest!") We slowly discovered that you could use the arrow to go right to reveal more empty staff. We also discovered how to add and delete measures and delete notes. We also discovered that you could not play more than about 5 notes simultaneously (the program apparently does not have the capacity). Further, I did not sense any feeling that they needed to hear a pattern or a familiar melody.

Then we moved on to see what was in the Jukebox. We played some songs that they chose. I asked them if they could tell me which of the notes (which color) was playing the melody, or the song. After one wrong guess, they picked it out, and after that they could pick out the melody line in other examples. Job discovered that you could make changes in the melody. They often seemed to like the changes that he made (Job was the most openly appreciative of his own changes – saying "that sounded good"). I gave a few tips like – "try changing that note in all the places where it shows up in the same way." Arthur also made comments that showed he could hear the changes and trace them back in the music.

To finish off, I asked Job if he could create the first four measures of 'Ol' MacDonald'. I gave him the starting note (F) and remained singing it whenever he got stuck. After a few false starts, he was able to correct his own mistakes and finish the piece. He had not finished the first phrase with a long note, and to correct this, wanted to start the next phrase with a long note. But after I sang it with an exaggeration of the finishing note, he was able to finish the first phrase and the second phrase with a long note as well.

Frustrations:

The program requires a fairly extensive knowledge of music if you would like to write anything tonal or recognizable. However, it is an extremely well-written and 'bug-free' program, doing exactly what it should

with no errors. The program is very much geared for standard, tonal music, locking the beats into place and making everything quite neat and tidy and 'notated'. The synthesizer timbre is lacking in personality.

Surprises:

Again, they showed appreciation for 'atonal' music, valuing it for what it was.

Intuitive feelings:

I have the feeling that much can be learned and discovered with only this one function. It can be a big help to learning how the staff and rhythm works with standard repertoire.

Questions:

Could children learn from this program without a teacher, given the large amount of prior knowledge required to create recognizable works?

Working with Music Ace Demo – First three lessons
Observations: Hilde and Renske
11 Feb. 2005, 17.00-18.10

I started the demo, asked them to watch it closely because I would ask them some questions about it and then left the room. I then came back, and they remarked about the notes that sing, and the colors that appear on the piano. I asked them if they thought that those notes that were singing were the notes that were actually being played and if you were to play those notes on the piano if you would get the same song. They said no, you wouldn't. I asked further, and Hilde said it was because a piano sounds different (this had synthesized piano, jazz guitar and marimba sounds). But they really thought, no, the notes that move and sing have nothing to do with the piece. Then I asked them if they played the notes that were colored on the piano in the same order if they would get the same piece on the piano, they said 'yes'. So, they equated the visual stimulation of the piano with the music, but not the notes (not surprising since neither of them read notes). Hilde began clicking immediately on the piano keys on the bottom, moving the cursor around over it to create a glissando effect.

We started with the first lesson, Introduction to the Staff. With some minor translation work from me, they answered the exercises almost flawlessly. When some notes jumped around the staff and played, Renske said "They make you all dizzy" ("Je wordt er helemaal duizelig van"). I let them complete whole exercises, taking turns (thus Renske would do a complete exercise, and Hilde would have the next opportunity). When asked to match the note, they completed the exercises almost flawlessly. The same applied to finding the note with the lower or higher pitch. They understood the system of games, Hilde noticing immediately that there were six levels (a box I had overlooked in the upper left-hand corner). They also understood the four red faces had to do with the points, and were involved in the scoring (they assumed it had to do with the length of the game, like 'lives', but that was not true). Interestingly enough, Hilde began anticipating where the note would be once she heard the original pitch. She was often correct, and would hit the note immediately upon hearing the matching pitch.

Lesson Two, Introduction to the Piano Keyboard, was too easy, so we moved directly to the games. The game where you had to hit the matching key. Hilde's style was to try to go as fast as possible, with the result that she made more mistakes due to incorrect anticipations. Renske was much more thoughtful and concerned with making sure she knew the answer before she made a choice (Hilde has had one year of piano lessons with me, Renske only one month). Hilde also was much more a random clicker, clicking on objects on the screen to see if they would do something. Renske might have done this at home, but in this situation she waited until she had a clear idea from me what the objective was. Hilde preferred to find out through trial and error. It was the first time that there was such a clear difference in the way the two 'subjects' dealt with the software.

After finishing the games, we moved to Lesson Three, playing with pitch. Here was an exercise with listening if the pitch was the 'same' or 'different'. Again they moved through the exercises fairly easily, the problem arising that Renske could not hear the difference in semitones. I began to help her, because she was becoming a bit flustered, and with every wrong answer, her score would go down. After that Hilde slid the ring to find the matching pitch. This also proved to be no problem. Later Renske did this in the Games. Although they had both agreed that this was 'difficult' (I might have accidentally prompted them to think this by a comment I made), Renske also did the pitch matching with little difficulty and no errors, which led her to say that it was, in the end, quite easy.

After this, there were no more lessons to follow, so we went to the Doodle Pad. Hilde began clicking on the piano, and soon I recognized that she was playing 'Tantes Bloes', a song she had just learned two weeks ago in the piano lesson. When I began singing, Renske said, "Yeah, I know that song, too." Then Renske played a song she had learned in the piano lesson on the digital piano. Both of them made few mistakes. I then played a glissando, and they tried it as well.

I made a short demo song with three different 'layers' of sound. Hilde said that it sounded a bit odd sometimes ("Het klinkt soms vals"). Hilde had a chance to make a piece of music. In the beginning, she was very concentrated on the sound and careful about her note choices. She would ask me if she could listen ("Mag ik een keer luisteren?"). She found the beginning a bit 'saai', and after a while she got a bit tired of the careful choices. She began clicking and dragging faster in a pattern that I recognized from Job, trying to fill the staffs with random notes in a fairly equally dense pattern. When I showed them that they could click on

the arrow buttons to move to more empty bars, Renske said "ah yes, the next page" ("de volgende bladzijde"). I found this a brilliant way of saying it using book metaphors. Hilde also discovered that you could fill in more measures than I thought possible (I thought it stopped at 12). Again, the composing seemed to take a visual emphasis with Hilde speaking in terms of color rather than instrumental sound. "I'll just add some red here." She was busy quite a long time and seemed to want to make a long work. A very nice comment was when she decided to put some notes at the end, further away from the rest "then, at the end, a period" ("dan, even achter, een punt"), using a language metaphor for the music. They both found the 'period', three long notes piled up on each other, quite funny.

Renske again worked very carefully and precisely, and very visually. Her tactic was to place a long note of each color descending on all the lines. She then placed a smaller note of the same color a bit more than an octave below the initial notes (also on a line), then she placed even smaller notes on a line in-between. She clearly did not understand the qualities of the staff, because she did not think you could place notes under the staff (thus, she did not 'get' the whole exercise about ledger lines). For her the staff seemed to be more of a place or a space, with defined borders and limitations.

Frustrations:

This was for me a very easy lesson. Everything worked smoothly, was interesting, was animated, was not too long or too short. Interestingly enough, however, the time seemed to go more slowly than with the creative work. The exercises seemed (to me) to be more tiring, creating more of a need for a break. However, that is an extremely subjective point of view.

Surprises:

They quickly worked out the system of lessons and games. They recognized which games they had already done as exercises, and were already working out that they got to try new skills by changing the order of their 'turns'. Renske also said after an exercise "the answers were alternating, left/right" (de antwoord was om de beurt links/rechts"). Again, they were more aware of details than I was, noticing when the answers followed a certain pattern, and causing then that perceived pattern to influence their anticipations of answers.

I was quite surprised when they were playing the songs from the piano lesson on the digital instrument. Both of them translated the knowledge quite easily to the different format and played the pieces with few errors (Hilde made more errors because she went faster, while Renske was again more careful.)

Intuitive feelings:

The lessons move along quite easily and naturally, but I am left continually with the question "how much is actually sticking and can be related to music or used in other musical situations?" This is the same question I have as when a student finishes all the exercises in Albert's beginning theory book and can still not play a third on the piano. I have the feeling that the training with pitch was making much more of an impact than any of the theoretical knowledge they were confronted with.

Questions:

Hilde's 'switch' to a quick click and drag method of composing was a very interesting development. I wonder if it only had to do with the fact that we were 'waiting' for her and watching her work. If she was alone, would she remain careful, listening to the sounds and making more thoughtful choices, or would she just get bored and stop altogether?

Again, what is learning? When is something actually learned, so that it can be applied in a real-life situation? Does the easy, glossy learning style actually teach you something that you can apply outside of that environment.

Working with Music Ace Demo – Lesson 1, 2, and 3
Observations: Maloe (9 Nov, 9 yrs), Mats (27 Okt, 9 yrs) and Maurits (2 July, 8 yrs.)
2 March. 2005, 13.05-14.05

There were three of them this time. I turned the Demo on and then left the room. I asked them to listen and look carefully and tell me what they saw and heard. When they had listened two times, they said 'first there was green, that one played a sort of melody. Then there was blue, and that was a sort of other hand, and then there was the purple, and that was a sort of accompaniment.' They were speaking for each other and adding on to each others ideas. They saw the colors on the keyboard and on the 'little men with their open mouths' (Maloe: 'poppetjes met hun mondjes open). When I asked, they said that they were a kind of notes. I asked if they thought that the notes were really on the musical staff where they should be, and Mats said 'Yes, because you saw them really moving, otherwise they would be just fake notes' ('Ja, je zag ze echt bewegen, anders was het nep geweest').

While the little man (for the first time I realize it is a little man with gray hair with a fake Russian accent) was explaining the notes on the musical staff, Mats started singing along with the pitches. They started laughing when the notes were singing. Interestingly enough, when the exercise came for them to first put notes on the line, then on the spaces, then on the ledger lines (they were taking turns), they very carefully tried to put one note on every line, then one on every space. There were five notes and only four spaces, so they even asked me what they should do, if it was o.k. to put two notes on the same space.

Mats responded with the correct answer in English and said proudly 'I'm English' ('Ik ben Engels!'). He would also stand up a little and swing his hands in accepting gestures every time there was applause, saying 'Come on with the applause!' ('Kom op met het applaus!') and 'They are all vibrating' ('die trillen helemaal zo'). He was clearly enjoying the interface. He was also the first to anticipate which note was the highest before it was played (although later he had the most difficult time hearing if a note was higher, lower or the same). They quickly and easily answered the questions comparing the pitches of the notes. Maurits remarked 'The faster you answer, the more points you get.' ('Hoe sneller je het doet, hoe meer punten je krijgt) I said that that was not true, but then looked more closely and realized that he was right. They easily dealt with the numbers on the screen, keeping track of what the other player was doing.

They were often helping each other with the answers, but not in a disturbing way. However, Maloe did say 'you shouldn't say the answer, you do it yourself' ('Moet je niet zeggen, moet je het zelfs doen'). Then I made the rule that they could help each other with the lessons, but not during the games. A couple of times Mats had to play a game quite a long time because percentages would be detracted if he gave a wrong answer. I noticed after a while that this created quite a pressure to answer correctly. Maurits had no problems answering even with half steps. Mats had a problem differentiating half steps. Maloe was more difficult for me, because she would often give a wrong answer while someone else was playing, but when she was playing she seemed much more accurate.

Mats clearly indicated that the computer activity was a pleasant surprise. At one point he said 'I thought that you were going to do it on your own piano. This is much more fun. Here you are learning to play the piano with games' ('Ik dacht dat je ging het op je eigen piano doen. Dit vind ik veel leuker. Hier leer je piano spelen met spelletjes.')

Again, they quickly learned the way the layout worked. Maurits was a real 'clicker', Maloe kept asking me 'what do I have to do?' while the little man was explaining things. Mats would answer a question before he was completely sure. He seemed to be enjoying the interface more and accuracy was secondary to the whole experience. It was entertainment. After a while they began to visibly squirm in their seats. However, they were still excited after an hour and gave comments like 'well, no one is at home, so it doesn't matter if I stay here for a while longer.' I told them to go outside and play in the snow.

Frustrations:

A couple of times it seemed that a correct answer was given, and the computer said that it was wrong. Perhaps the mouse had just slipped over the line when the button was clicked.

Surprises:

They noticed that there were more points given for answering faster, which I hadn't noticed. They were more clearly enjoying the interface (perhaps they were younger, meaning that they thought the jokes were funnier).

There is a song that is played at the beginning and end of each lesson. They seemed completely not interested in the song, and would click immediately to go to the games. Maybe Maurits would have listened if he were on his own. But no one said anything about waiting to listen. I had to ask them to wait at the beginning of the lesson. They clearly view the 'music' as a sort of sound-bite and not as a valuable part of the lesson.

Intuitive feelings:

They seemed to start wiggling at a certain moment. I had the feeling they had reached their saturation point. However, although I thought that they had had enough, they were still enthusiastic and wanted to go on.

Questions:

Does the computer encourage children to progress beyond their saturation point? Would Mats have found it as interesting without the 'audience' of other children who also helped him find the right answers? (Then he would have been forced to think more about the educational aspect (content) rather than the entertaining interface.) Are the children trained by computer games not to listen to the opening music? (get as fast as possible to the action...)

Working with www.creatingmusic.com – Musical Sketch Pads
Observations: Renske and Daan
30 Jan. 2005, 14.00-15.10

I gave Daan (arrived five minutes before Renske) a brief run-through of all the functionalities of the Musical Sketch Pads. I was struck by the fact that he almost immediately understood and could use all the tools. (Later I learned that he had already been busy with the site, something I failed to ask, but with another area of it.)

He tried a few things out and then Renske came. Daan explained the basics to her. She was also competent within a matter of minutes.

I decided to prompt them on relating the visual to the auditory. Both did not make the relation themselves, or at least could not explain what was happening on the screen in relation to what they heard.

After a little prompting, they could relate the left and right motion to noise in time and high and low to pitch (squeaky and deep, with the electronic sounds).

We did an exercise 'together' in which we tried different things – long lines, dotted lines, and dots randomly over the screen. Then we listened slow and fast.

After that, I let each make a 'piece' for us to listen to. I was struck with how precise they worked. The 'sketches' were very visually exact. Not pictures, but patterns.

Daan produced dotted lines of the piano on the highest and lowest 'pixels'. Next to that (toward the inside, high and low) one long line of trumpet. Within this 'frame' he made two wavy lines of clarinet and drums.

When I asked Daan if the sound was what he had expected, he was able to indicate something which I had also noticed, which is that the lines of clarinet and trumpet were long and piercing (he made a comparable sound), and he related this to the long lines on the screen. You could not hear the rhythmically interesting piano anymore. But this was a problem with balance that could not be corrected in the program.

Renske produced perfectly diagonal lines starting from each corner, first with piano, then with clarinet, connected by a line of trumpet. She was very exact and had the idea to copy everything in the end (we could not listen to this because Quicktime wasn't working, see below).

This took some time, because of the 'technical problems' so I was not able to do as much as I had planned on getting feedback from them regarding their compositions – how they would like to change them or if what they heard was different from their expectations (do they have expectations?).

Further we looked at the Cartoon Conductor. Renske produced amazingly beautiful effects (if I can gain enough objectivity to compare it with what I had 'achieved'). She had a slow, dreamy way of moving through the landscape that worked quite well with the visual/acoustic design. I noticed elements that I had not before – such as certain objects moving in different areas of the screen. I became more interested in the psychology of the motivation behind the moving objects. Is the intention to guide the 'Conductor'? Daan was more like me – he was interested in moving objects and hearing the sound – quickly, creating a jumpy, more broken affect.

Frustrations:

Quicktime (or Java) was not responding at all toward the end of the compositions, so both students had to redo their entire (very precise) composition, costing much waiting time.

This part of the program is stimulating composing in which you do not get immediate sound feedback. In some ways this does prompt you to make a pre-conception of 'what it will sound like' - especially frustrating if you do not get the response from your audio. (This could also be good – because they are left with only their imagination.)

Balance: within the Musical Sketch Pads you cannot control the dynamics of the instruments. So an interesting conception may sound bad because the layers do not fall into the desired auditory dimensions.

Surprises:

I was amazed at how fast they picked up the concept and were able to handle the tools with remarkable precision and agility. This confirms my preconception, but was still a nice surprise.

They worked very carefully and exact when they were asked to 'compose' a piece. No wild scribbles (perhaps more to do with their nature). They were focused and persistent.

Intuitive feelings:

After a little more than an hour, we were all tired. I felt immediately that something was not completely 'healthy'. We were all sitting, staring at the screens, using minute hand movements. The concentration was high and the physical release was low. The balance of energy use was perhaps too concentrated on the brain and not enough on the body. Perhaps my presence made it all too 'serious'.

Questions:

How much do the visual ideas translate into a conception of sound. (This was difficult for me to ascertain, because of not having the appropriate questions or a way of transferring their silent thinking into something apparent for me.) Is this something that would develop over time, just like on the piano.

Should I prompt them to make this inner conception of sound?

Will the human body adapt to this kind of highly-mental, small movement activities? And remain healthy?

Working with www.creatingmusic.com – Musical Sketch Pads
Observations: Maloe and Marlinde
8 Feb. 2005, 10.05-11.10

Maloe and Marlinde arrived together and were here while I turned the computer on and went online to www.creatingmusic.com.

This time we looked under Musical Sketch Pads: Sketch Pad with variations. I first made a simple melody, (with the drums), giving them a quick overview of the functions. They quickly understood the pitch relationship to the vertical level of the 'dots', and soon started calling the dots 'notes'. They also understood the horizontal position of the dots in relation to the passing of time. What was less clear was why you (in this part of the program) could not put two 'notes' on top of each other. The program only allows for the making of a melody, and not for polyphonic or harmonic relationships. This is because the program then generates five different variation forms (overlapping or not), canon and extended canon, plus an imitation of the way Copland manipulated his *Common Man* melody (called 'Copland' in the pull-down list).

They quickly understood the concept of Canon, as well, and how that was visually represented on the screen. In fact, Marlinde said "I could follow (or listen to), the top one (the top box with the melody) all the way." I was surprised that after the first hearing, she was already trying to listen 'analytically', thus following the lines separately.

I allowed Marlinde to go to work first. She first was surprised at the fact that she got 'purple' dots. Maloe pointed out that she was now in the 'keyboard' mode. She made a random pattern of dots spread over the screen, starting more in the top left and 'finishing' in the direction of the bottom right. Although the short melody was atonal and rather random, both she and Maloe liked it. (In other words, they gave noises of surprise and appreciation for its complexity, I think). When I asked her if she would like to change it, she clicked on another instrument and expected to hear that instrument play the same melody. I had to explain that she needed to click on the dots with the new instrument to change them one by one (they change color and thus the instrument sample changes). (Maloe began intervening with ideas and directions, which I tried to curb, because otherwise I would not in any way see Marlinde working with the program.) Marlinde (with Maloe) came up with the idea of changing various dots to different instruments until all the instruments were represented fairly equally. Again, both of them appreciated the fairly complex melody that did not resemble anything like a song. I asked her if her melody was 'finished' or if she would like to change anything. It was 'finished', she said.

Then she moved to the variations. She immediately went to 'canon', perhaps because it was the most easily understandable. After we listened, Maloe said 'that's nice how the notes go down in a row' (the melody ended with four descending notes, thus in canon you had eight). It seemed to me that changes were made with a visual rather than a musical result in mind. For example, 'thick' lines were made 'thinner' and vice versa (harder and softer). Then she tried out other variations and made adjustments with the same changing of the visual elements more in the foreground as guiding her decisions. She did not seem interested in creating her own 'form' or cohesive piece with the variations. I gave instructions like, you can do two more things with your melody (explaining that a 'thing' could be many changes that were then listened to and evaluated).

Next was Maloe. Interestingly enough, she followed the pattern already set by Marlinde. First, she made a random, atonal pattern. Slowly she changed random notes to other instruments. Then she listened and thought it was rather funny. She was 'finished'. Then she (also) tried first the simple canon. With the other variations she began to diverge, making changes more quickly, but also visually "I'll put them all on the side and leave that one alone." She also made the link with this and the auditory result. She was expecting it to be 'funny' when you would think the piece was over and then you still had that one little group of notes that would come up after the pause. Interestingly enough, she forgot this effect later, and was indeed surprised when suddenly the three notes sounded after some silence. This made her laugh.

Maloe wanted me to do it for them. I decided to do something tonal (to make the variations more easily followable) and put in the first four measures of 'Ol' MacDonald'. Then we listened to all the variations, unchanged. They found mostly a stretto-effect (faster, shorter), funny. Further I did not ask them to make any aesthetic judgements concerning the different variations.

Then we looked at the puzzle, which is putting the four balls in the correct order to reproduce a four bar musical phrase. I did the first silently, and then Maloe and Marlinde followed with the other two. Both of

them figured a way to listen and check before making their decisions. Maloe discovered that the answers for the three puzzles were the same (orange, red, green, blue), and we decided that this was a bit silly. Plus, we thought it was too bad that there were only three examples.

Afterwards, we did a very quick run-through of the 'Games' section in which I made a quick sweeping line up and down. I let them listen to major, minor and pentatonic. Maloe said it was 'just like' the other Sketch Pad with variations. I did not take the time to respond properly, and just said "no, it is not, because there you could not hear it in major and minor." Then I showed them the 'same' and 'different' games (easy). They immediately saw the difference in the visual representations and really didn't need to hear the music anymore. So, I changed to 'difficult' where there are no visual representations. We played one game, and they easily answered questions concerning slower and faster and lower. 'Reversed' was more difficult, maybe because my 'melody' was so symmetrical. We did not hear it 'Inverted'.

Then I quickly showed them the Cartoon Conductor and said they could try it at home.

Frustrations:

When the soundbites are starting, you get a loud, crash of sound at the beginning. This was both shocking (we all jumped once or more) as well as disturbing. You could not hear the first tone, plus it took a while to get over the auditory shock. We found out that when you moved the notes away from the left 'wall' in the variations, this crashing stops.

The 'Puzzles' section has only three songs, and the answers are the same each time (orange, red, green, blue)! Maloe pointed this out. I would not have probably ever noticed. Children can be more aware of details as abstractions of the whole. Also, if you create a mistake and would like to listen to your mistaken version, this is impossible. For children who do not speak English, the feedback – a quick YEAH or WHOOPS with no sound effects – is not understandable.

Surprises:

Both children were able to handle the tools and the functions with little explanation.

They made more comments in relation to their own 'analysis' of the sound than I was expecting. Two comments were "I could follow the top line" and "It is nice how the sound goes down, boom, boom, boom, to the end" (she pointed to the last four notes of each melody in canon).

They also quickly saw the visual grouping as a 'whole' and related this quickly to the auditory input (longer lines were immediately seen as playing longer, or 'slower').

Maloe, who is generally strongly self-directed, inquisitive and experimental, followed the same path as Marlinde before diverting off with her own idea. Why? Did she want to try some of the same things her own way to see how that might differ, or did it feel 'safer' and more familiar to start with the same procedures?

Intuitive feelings:

We stopped while the children were still having a good time. Because they rotated more frequently, they seemed to be fresher. They were less focused on 'getting it right' and more on experimentation.

Questions:

Would children be able to do something cohesive with the variations? Or is it too difficult for them to place the melody and varied segments in a position where some sort of musical form (tonality?) occurs.

Are there any rewards for creating a tonal piece, or is the more complex atonal material just as interesting?

Working with CreatingMusic.com – Rhythm Band and Sketch Pad
Observations: Job (30 Sept 12 years) and Sterre (13 Sept 10 years)
3 March 2005, 19.50-20.50

We started later, so everyone was a little tired, including me. I decided to show them the rhythm band first. I did a quick demonstration and then let Sterre start. I'm not quite sure if she understands the concept. She begins putting dots all around, colors randomly spaced. We listen. They give almost no feedback. I realize that the height of the dot does not change the pitch and ask them if the higher dots will give a higher note. Job says he doesn't think so. They start recognizing clear patterns, like a group of notes, one after another. I ask them which sound stands out the most, and they say the 'koeienbellen' which is the sound that I also perceived to be the most obvious.

When Job starts, I ask him how he thinks you could make it sound like in a band 'dum – dum – dum' (with a regular beat). He says that you should space them with a little distance between ('een beetje uit elkaar'). I start making comments like 'I'm curious how this is going to sound' and 'Do you have an idea of what this is going to sound like' to try to orient them more toward the sound and less toward the visual effect. Job was trying to count the dots in a row. My screen is fairly bright (a new, bigger one), so it was fairly difficult, my eyes were crossing. When Job starts pulling things out of his fairly busy composition, Sterre starts saying things like, 'it should sound different now' and 'there is quite a bit of silence' (Het zou wel anders klinken', en 'het is een heel stuk rust').

Sterre makes another composition, also with 'too many' long lines of continually sounding percussion. I ask her to take them out and see how it sounds. The other percussion were being covered.

We switch over to the Sketch pad and I let Job begin after showing them a quick demonstration and letting them hear the difference between a solid line and a broken line (a long note, several shorter notes in a row). Sterre says 'it is a piano, but like this', and she makes a counter-clockwise motion with her hands, apart. At first I don't understand what she means, but then I realize that, yes if you rotate the keyboard 90 degrees and hold it vertically, the tones will sound as they are positioned on the screen. I realize that she has a mental map of the sound that is being mapped out on the sketch pad. Eventually Job says a bit tiredly 'I'm going to draw something' ('Ik ga iets tekenen'). Sterre looks and asks 'Is it a rabbit?. . . Is it a dog?' Job says 'I don't know.' and then 'It's pretty difficult to make music that sounds nice.' ('Het is best wel moeilijk om muziek te maken dat mooi klinkt'). Sterre starts covering her ears when the piece plays, I think because there are some quite piercing high notes. She is also quite sensitive to noise and jumps incredibly when the sound blares out in the beginning (fortunately I had discovered that you just need to move the dots a bit away from the left-hand wall). Job says finally 'It is actually quite a nice drawing' ('Het is best wel een mooi schilderij').

Sterre then makes a structure and listens to it. She has three notes ascending, two together, four along the top and then two together, and then three descending. It is symmetrical, and she is happy with it. She moves it away from the wall (having to erase everything and start again). then she makes two others after it, exactly like it but in different (tone) colors. They speak in visual terms 'Its going to rain on the mountains. What are that? Little figures' ('Het gaat regenen of de bergen. Wat zijn dat? Poppetjes') The three 'poppetjes' which are three 'chords' of three different instruments, sounds very nice. I give an indication of what the high drums are going to sound like, and they are both happy and surprised when they hear that it does sound like that.

Although he seemed very tired (he had had the flu), Job wanted to try again after Sterre. He made a spread-out chord. Sterre said, 'you need big hands for that' I said 'or you play it with two hands' ('daar heb je grote handen voor nodig' 'of je speel het met twee handen'). Job suddenly began to erase it without listening, maybe because of what Sterre and I said. I said 'you can always listen before you erase it' ('jij mag altijd even luisteren voordat je iets wis'). He made big curves down and up again, four curves in four colors. Sterre zei 'stalactites' and 'caves', and 'you haven't used the yellow yet – the clarinet' ('De geel heb je nog niet gehad – de klarinet'). And 'it looks very nice, in any case' ('Het ziet er mooi uit, dat in ieder geval'). There was the feeling that even if it sounded very strange, it was a consolation if it looked good.

After he was finished, I started making 'Vader Jacob', and Sterre recognized it by the fourth measure. Job was amazed and impressed that she recognized it (she has been reading notes much longer than he has). The rhythm was not good, so we spent some time trying to correct. Placing the notes exactly was very time-consuming and rather frustrating. Afterwards I showed them a few more parts of the program. Both of them indicated that they wanted to try it at home. Sterre was very explicit about this when her father picked her up.

Frustrations:

The sound, like the flat sketch pad is so two dimensional. You can do nothing with the timbre, no articulation. You are dependant on the sound samples and finding interesting combinations of sound. It is very tedious to make changes in the piece. You must go to another screen to correct errors and then go back. This gives me the feeling that the program is designed for non-exact work, more quick, expendable sketches rather than thought-out constructs.

Surprises:

Sterre again worked very exactly, precisely, creating identical figures.

Intuitive feelings:

Job was less positive and we were all more subdued because it was in the evening.

Questions:

Does the program push them more in the direction of being very careful and exact or more free? If you want to create something that sounds familiar, you are forced to think very carefully and take a long time mapping it out. How could you create something with nice colors that doesn't force you to go back and erase too many times?

Working with CreatingMusic.com – Playing with Music, Playing with Scales, Rhythm Band, Sketch Pad
Observations: Mats and Marlinde (3 May, 9 years)
5 March 2005, 11.00-12.00

Playing with music:

Marlinde and Mats came in while Sanne was still busy with the Beethoven Sonata. I let her and Mats manipulate the speed and dynamics for a while. Marlinde made thoughtful decisions. I asked Mats to place the marker on the spot where he thought it sounded the best. Hard and fast. Then we moved on to the place where you could make it play backwards and forwards, hard and soft (four options – indicated by different colored circles within a box). Mats made changes regularly – making the comment that it was nice music (something to that effect). Again, he seemed to spend more time in the fast, forward section which sounded the most like the original recording. Marlinde got a turn. At first she just moved the mouse around very quickly, but after a while she slowed down and made more deliberate changes. I could not tell if she was following the phrases or not. I asked myself what the 'reward' was for this exercise, as it was never 'finished', and the piece playing backwards was not very interesting.

Playing with Scales

I showed them a quick demonstration. Then I let them choose. Marlinde chose a major scale with clarinet and a fast rhythm. The problem is that there is a half-second delay between when you push the button and the sound. Any notes you play within this half-second do not sound, and you start distorting the rhythm. Because it is really designed to be 'play-along', this makes no sense and frustrates the whole experience. Mats chose a xylophone, minor, slow rhythm and managed to make quite a nice swinging improvisation despite the delay.

Puzzles (the balls)

It took them a while, especially because of the problem that the sound clips do not end well. Further, they seemed to enjoy it, and they were listening intently. I had to give Mats a little help by asking him to listen to the beginning of the piece and then to his first ball (he kept trying to solve it with the wrong ball in the beginning).

Rhythm band

I tried to explain that the vertical position of the dots did not change the pitch. However, Marlinde began immediately putting the dots up and down. I asked her to listen and see if a dot higher sounded different than a dot lower. They concluded that it did not sound different. Her random patterns sounded great. Mats had the fast click technique and just made stripes across the screen. He did not seem very interested in making a pattern (he had a fever the night before, so it was another sick child – very different from when he did Music Ace). He didn't seem to mind the incessant drumming and liked it fast as well (machine-gun effect).

Sketch Pad

Unfortunately the program stopped reacting a couple of times while Mats was working. He did not understand the connection at all with the visuals and the auditory, and he did not seem at all interested in hearing my explanation. He started making a house with lots of circles around it. Further we listened, but I do not know if he understood what was happening.

Marlinde created four boxes of sound close to each other, then three curves and afterwards a sort of loop of drums. She also sprinkled a few random dots around. It sounded fantastic to me. Afterwards she started putting more curves around her shapes, with the effect, however, that you no longer heard the three ideas clearly. I made the comment that I found this a pity, because you could no longer hear the differences, and she 'agreed' (just to please me?) and took the big circles out again.

Cartoon Conductor

I included this as a sort of dessert at the end. Mats was clearly trying to find something. I had said 'move the mouse over the image'. He said 'I don't think there is a mouse'. I still don't know if he was trying to find a mouse in the image or not. Marlinde moved the mouse very quickly. Again, she was not really interested in listening. She was interested in making fast movements and fast sound changes. Neither of them, it seemed to me, were really listening intently.

Frustrations:

The problem with the 'play-along' with the scales was a real disappointment. Otherwise it would have been very fun and probably more of a learning experience.

Surprises:

Mats was much less enthusiastic than with Music Ace. Was this because he was sick, or did he really not understand what was happening at all. Marlinde made some very nice sounds with the Sketch Pad.

Intuitive feelings:

This program requires much more intrinsic motivation and creativity than Music Ace. The rewards come mostly through the musical sound and not from points, applause or high scores. This makes a clear difference for some students who like more structured programs.

Questions:

Would it be good if the program provided more feedback, more external motivation, or is that the strong point of the program, that the music is the feedback and the motivation?

Working with CreatingMusic.com – Puzzles, Games, Melodic Contours, Playing with Music
Observations: Hilde and Sanne
5 March 2005, 10.05-11.00

This whole exercise seemed geared to find the bugs within this program.

Puzzles:

What Sanne noticed (she did number 2) was that the first and third measures were hardly distinguishable from each other. The sound bites are sometimes cut off at the end so that you do not hear the last note or two. This makes it difficult to distinguish slightly similar measure from each other. She also commented that it is not so nice with all the gaps in sound between the measures ('stoppen doorheen'). Hilde answered incorrectly, got the very quick Whoops (which she translated correctly as feedback that it was not correct). Then the song changed, so that we had to search through the examples again to get back to the song she had (which then appeared suddenly under number 3 again). I asked them if they found it interesting, and Sanne said yes, because you had to keep listening and then go back and play it again, and that was rather challenging.

Games:

We played the 'Same or Different' games in which you have to first make a melody. I made a quick line going down and then up. Then I made it 'minor'. Hilde said 'oh, it's like..' and then she put her hands over her head and did a sort of belly-dance like movement. Then we made it pentatonic, then chromatic (which doesn't change anything). Then I made it major again, but it stayed in pentatonic, because the intervals for major did not put it into another position. I found this irritating, because I wanted my original input back, and that was no longer possible. Then I showed them some things you could do with the melody (invert, reverse, harder, softer...) Hilde began making a melody scattering them across the page. Then she hit the eraser, and everything disappeared (in the edit function, you can use the eraser to delete one or more notes at a time). So she started again. I tried to intervene to get her to make more step-like form in her melody. She made a nice one with alternating trumpet and keyboard and then a run downwards. We then started playing the game. The easy version was way to easy. So we went to the more difficult 'same and different'. Although they were talking, they heard one answer better than me (the example began the same, but then changed). I told them to listen again because they weren't paying attention! They answered the rest easily.

Then Sanne had a turn, and she said 'what I find a little funny is that you hear the piano sound, even if you have chosen the trumpet' ('Wat ik raar vind is – je hoort de piano klank, ook als je de trompet speelt'.) At some point I slowed down the speed of the mouse, because it was going too quickly over the screen, and she didn't have much control. That helped, and she could work more precisely. She made a melody, also with an alternating instrument on one note idea and with a rising end. We went to the editing section, and she put it forward and backward. There was a nice variation which sounded swinging and a falling end. I asked which one they liked the most, and they said that one, although it might have been because I also made a sound of approval. Then we used that to play the game. They could answer the questions while talking about something else, like the fact that we have ergonomic keyboards (most children comment on our strange keyboards). She answered a question wrong (it was reversed instead of inverted), and then when it started again, she tried to put the right answer, but we learned that you get a new one instead of repeating the one you got wrong. So, she ended up getting 60% instead of 100%. Sanne said 'English is irritating' ('Engels is vervelend'). She tried again, and again got 60%. It seemed to her to be important to get 100%, so she did it one more time and got 100%.

Melodic Contours

They asked questions about the flowers and what that was for. I told them to start making changes and listen. After playing around for a while, making changes, Sanne said 'It's stupid that the song stops (has gaps), you can't hear the song in one piece' ('Het is stom dat 'ie stopt, je kan het liedje niet achter elkaar horen.') This is apparently also frustrating for children. At one point Hilde said 'up the hill, down the hill' ('bultje op, bultje af'). I asked her 'which one makes the best ending?' She said, 'the rising one' then they tried it. Then they tried the descending one. In the end we all agreed upon the one that has darker green patches and looks like a skyline. It is a closing cadence. When they chose segments of different styles, they said 'it's like a lot of different little pieces'. In the end, Hilde said 'can we go on, this is a bit boring.' They did not try to make one piece out of it, and I didn't prompt them. There was no reward for doing this, because the sound bites were so badly edited and synchronized anyway.

Playing with music:

We had a few minutes to play with the tempo and dynamics of Beethoven's piano sonata, op. 31 no. 3. The controls were a bit difficult because they start sliding when you are in the neighborhood. You cannot click on them to get them to stay in one place. I had to leave the room to let the next students in, and when I got back Sanne said 'see what I found out, it's really neat' then she just clicked play and started swinging her mouse back and forward across the controls as fast as possible. You got this sort of distortion and swaying that was interesting. They were definitely not interested in taking the time to try to manipulate the piece in a way that conformed to some 'normal' performance interpretation. They wouldn't even know how.

Frustrations:

The gaps between the sound clips seemed to really bother them, and I think it made them take the idea of making a nice piece less seriously. The crash of sounds at the beginning is still there (I wonder if the program runs better on a Mac. I have Netscape.)

Surprises:

They were very sharp with picking up the less-than-ideal aspects of the program. They were not so enthusiastic as I had hoped, and the program was much more 'difficult' than I had realized. I am still not sure if they grasped the connection between the dots on the screen and the music. And I am quite sure that they did not understand what was happening with the major-minor switch, although Hilde did indicate that she heard the 'Arabic' part of it.

Intuitive feelings:

Hilde is a bit 'cool' which means that she does not quickly show her enthusiasm. She likes to do things quickly and act a little like she is bored. This might have had an effect on Sanne.

Questions:

Will they be motivated to work more with the program at home? Would they gradually get the connection with the visuals and the music?

Working with www.creatingmusic.com – Games, Puzzles, Playing (with) Music, Playing with Scales, Melodic Contours, Rhythm Band
Observations: Renske and Daan
6 March 2005, 16.00-17.05

Games

Renske started and made a melody (she tended to keep the line going) with three notes ending on the 6th degree (la – la – la). We looked at the games to see all the variations that could be made with her melody (within this program). Then Daan made a melody, beginning with a pattern, alternating do-re, do-mi, do-fa, etc, up to the high mi, then a line going down. It seemed as if he was working from an idea of the sound, and he was seeking the 'do' to finish the piece (although he finished the piece with the drum, which made it a 'weaker' ending as the drum has a less definite pitch definition.)

Unfortunately we needed to start over because of the crashing noise (even though we avoided the left-hand wall), and I asked Renske to try to reproduce what Daan had done. Even after that there was a remaining crash. They were able to hear almost everything except for inverse and reverse, which I helped them with. Finally, Daan said that it was playing backwards. I had the feeling that with a little more practice they would also be able to identify the inverted and reverse.

Puzzles

Daan solved the first with no errors. Renske started on the third, and then judged it as too difficult and moved back to the second, which she answered correctly with no help from me despite the fact that the first and third measures have similar melodies and different harmonies.

Playing with Music

Beethovens first Piano Sonata (digital version – this is not a live pianist!). After about half a minute Daan had had enough and put the mouse down and looked at me. Renske was more 'into it', listening closely to what was happening. I discovered that if you sit in the upper left-hand corner, letting the music go backwards, once it has reached the beginning it starts over again. Neither of the students was interested in hearing the entire piece.

Both of them were good at using the controls for the dynamics and tempo, making changes that showed musical 'taste' and sensitivity.

Playing with Scales

Renske started doing something very deliberate, using the number pad. Then she looked at me and smiled 'that was my telephone number' she said. Renske worked well with the delay, waiting until a not sounded to play the next. But you never reach a real 'playing together'. Daan started swinging with the catchy rhythm. He tried to go faster, however the notes within the delay do not sound and much of the rhythm falls away. Interestingly enough, I could 'hear' when he was finished with his improvisation which he rounded off in a musical way.

Melodic Contours

The children were again fascinated with the presence of the flowers and their disappearance and what that might mean. ('Hier heb je bloemetjes en hier weer niet.') I tried to give more guidance with them, leading them to choose parts of one style and then try to make a 'song' out of it. However, this never really works because of the gaps between the sections and the lack of complete endings (it sounds as if the last note is cut off). I asked them what they thought of it, and Daan said 'wierd, spooky, and a little like a fairytale' ('gek, eng, een beetje sprookachtig'). I was surprised and asked him if he meant the girl running up and down the hill, or the music. He said the music (the one with patches of darker green).

Rhythm Band

Renske was to tired, however Daan wanted to try and made a nice random pattern of notes. Interestingly when you have a line of snare drum, for instance, punctuated by snare drum on another line, it makes a great accented rhythm. His was unmetered, which made it very interesting.

Frustrations:

The crash and the lack of smooth transitions between the musical segments was problematic again.

Surprises:

They were able to control the tempo and dynamics of the sonata music quite well.

Intuitive feelings:

Questions:

What is the point of this sonata backwards and forwards?

A discussion of the Concept, Ideology and Technological interaction involved with creating Sirens: Prelude and Poetry

Concept

I was drawn to the Sirens as creatures of pleasure, the moment, play, luring the protagonist to stop his forward momentum. They halt him, 'transfix' him and tempt him to remain in the moment, in the sunlight and the sparkling surface, ripples and salt, to listen to them, to feel what they feel as ultimately sensual creatures. Ulysseus fights this with all his power because this means death to him: death to his narrative, death to his struggles that bring him closer to the gods, death to his tale of supremacy. He must fight them, because if he listens, he will abandon his battles, his search for dominance. On the one hand, this is a struggle that has informed our conceptions of masculinity and femininity. On the other hand, this is a battle we perhaps all experience, when we look out the window at the last rays of sunlight, see the blossoms drifting slowly off the tree, and we long to lose ourselves in looking, smelling, feeling, being. But we must go on, ascending, transcending, filling our ache to have a story worthy of eternity. I run the risk of sounding moralistic here: stop and smell the roses, or something like that. However, it is a deep and personal struggle I face. I have always been, as are most people I suppose, deeply sensual, completely overwhelmed by the senses, especially when experiencing nature. And I do experience pain in cutting myself off from this desire enough so that I can have a 'career,' a life-work, a life-story 'worthy' of narrative.

Ideology, Technology and Creativity

As I took part in this process, my first work with recording music and molding it on the computer, two issues struck me. The first was that I was more than ever inspired by the fact that I had a moment and a certain ideology to express. I was given the unique opportunity to create a work, for a group of women, with the express purpose of exploring and expressing my own ideas of eros and pathos in an artistic way. Combined with the amazing, provocative literature of Lourde, Irigaray and Cixous, I was completely on fire with the desire to act. I ask myself how can I create the same environment for my own piano students, regardless of their skill level.

The second was how the technology stimulated and in some ways guided my creative attempts. The fact that I could record other women and myself and use the sound material as building blocks for a musical experience was very motivating. Once I had mastered the software, I spent hours and hours listening, changing, manipulating, reworking, enjoying the possibilities and outcomes. When dealing with the practicalities of creating and performing my own musical 'work', I found it helpful to realize the relationship between imagination and action. When you imagine, you are in control and you will produce something wonderful and perfect, perfectly expressing what you imagine. When you create, you are also guided by the materials, in this case a music software package. They take hold of you and lead you. Other messages come out and the audience may come to completely different conclusions. I ask myself how I can use creative music software with my own piano students, to inspire their musicality. I ask myself who is developing the software and if it can be made user-friendly for Dutch children.

Me and the Software: Magix music studio 2004 deluxe.

After preparing all the materials, the actual 'assemblage' required concentration but was not agonizingly difficult. There was, however, one hurdle to be jumped, and that was to become familiar with and adequately skilled in the use of computer software that would do what I needed to have done. As I did not have a large amount of time, and I was

familiar with a software package used at the conservatory, I decided to buy the package myself[1]. It was delivered two and a half weeks before the performance date on the 15th of June. The package is clearly not marketed to a female audience. Look for yourself at www.magix.com. A sort of heavy-metal logo (boxy like Metallica and round like racing bike logos) appears in black and silver. Dialog boxes represent the world of amplifiers, tuners, mixers, various sound equipment that I am not familiar with. As Green points out, this is also a 'problem' of gender. From her numerous interviews conducted at British schools, she comments, "Girls are seen to avoid the manipulation of technology, but boys feature noticeably in the realm of technology, which is often, but not always, associated with 'popular' music.[2]" So I was left in the situation of maneuvering within a digital world that tries to reproduce acoustical effects of technology that have been developed for the music industry over the past century without being familiar with the 'real-life' models in the first place. I was left to rely on my intellect to work out the various possibilities rather than on instinct developed by dealing with real electronic equipment. In some ways this may be negative, but I also see it as a positive. Because I am not 'loaded' with expectations, I was not necessarily disappointed by the digital results, and maybe through trial-and-error and experimentation, I came up with non-traditional or original results.

Regardless of the effort it takes to become involved in technology after ignoring it for many years, I think it is necessary. Having attended a few concerts by student composers and seeing the possibilities, I think that a contemporary composer must become fluent or at least familiar with technological advances in music to compete on any sort of level, conceptually as well as technically. I keep trying to put my finger on the sore spot in the female/technology combination. Why do the female students doing my degree complain so peevishly about using IT? Why can I not bring up the patience to systematically work out a computer program in the same way I read an article or prepare musical performance? In some ways it requires a sort of willingness to play, to work out, to tinker around that is not commonly a female attribute. Are we trained to be so serviceable, to be so utilitarian in all our environments, that there is no space for us to 'tinker around'? Sometimes I ask myself if one must really think 'logically' to work out a computer program. Is it not rather a question of accepting the limitations of working in a constructed environment, an environment that dictates either this or that, but does not always make possible the in-between fantasies in your head? An environment primarily created by males for male career or leisure-time activities? In that sense, I am not considerably disadvantaged, having grown up with one of the earliest PC's as the daughter of a computer programmer/analyst, as a woman interested in math and programming. But still, sometimes I just can not work up the interest to do simple things like learn how to program the VCR. But once I do work up the interest (i.e. patience), it is never too difficult.

In the end, I used the work required for the collage of voices to acquaint myself with Magix and its potentialities. All in all, when dealing with the practicalities of creating and performing my own musical 'work', I found it helpful to realize the relationship between imagination and action. When you imagine, you are in control and you will produce something wonderful and perfect, perfectly expressing what you imagine. When you create, you are guided by the materials, in this case a music software package. They take hold of you and lead you. Other messages come out and the audience may come to completely different conclusions.

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[1] Well, to be completely honest, my partner looked it up and bought it for me.
[2] Green, Music, gender and education, 175.

From the website Center for Children and Technology
Girls and Design: Exploring the Question of Technological Imagination

Author(s): Margaret Honey, Babette Moeller, Cornelia Brunner, Dorothy Bennett, Peggy Clemens, Jan Hawkins
Published: August 1991

Describes our investigation of a range of issues around gender and technology

The research presented here began several years ago when a group of us set out to investigate a range of issues around gender and technology. As part of that research, we speculated that the activity of design was a promising way to support alternative pathways for girls into the world of technology.

METHODOLOGY
To test this theory and unpack issues that surround how technology is perceived and used by gender, we devised a paper- and-pencil projective task in which men and women and boys and girls were asked to imagine futuristic technological devices. Our purpose was to explore the symbolic aspects of technology by asking individuals to elaborate on their less-than-conscious associations to technology. Specifically, the adults were asked to write a reply to the following scenario: If you were writing a science fiction story in which the perfect instrument (a future version of your own) is described, what would it be like? The task was modified slightly for the adolescents, and read as follows: If you were writing a science fiction story about the perfect school computer (a fabulous machine), what would it be like?

The sample for these studies consisted of 24 adult technology experts (13 women and 11 men) and 80 early adolescents (41 girls and 39 boys) who were not particularly sophisticated about technology. While we found evidence suggesting an overlap between the genders, there was a definite and characteristic difference in the way adult men and women in our sample fantasized about the relationship between humans and machines (Brunner et al., 1990).

KEY FINDINGS
Women commonly saw technological instruments as people connectors, communication, and collaboration devices. Their technological fantasies were often embedded in human relationships, and they served to integrate their public and private lives. The men, in contrast, tended to envision technology as extensions of their power over the physical universe. Their fantasies were often about absolute control, tremendous speed, and unlimited knowledge.

The results of our studies with adolescents were congruent with the results of the adult subjects (Brunner et al., 1990). The difference in technological imagination points in the same direction as the adult fantasy material. Girls' technological fantasies tended to be more about household helpers, contact bringers, machines that offer companionship, or devices with which they could broaden their social and personal networks. On the other hand, boys fantasized about extensions of instrumental power, often thinking up tools that could make other technological objects overpower natural constraints.