

Can Music Help Children With Autism?

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WHAT IS AUTISM?

Autism is a developmental disorder characterized by repetition and sameness in behavior. It impedes the development of personal relationships and delays language development. (Aarons & Gittens, 1992).



http://media.komohews.com/images/13032/autism_big.jpg

OUR THESIS: Music making helps children with autism improve their social skills.

SINGING AND COMMUNICATION SKILLS

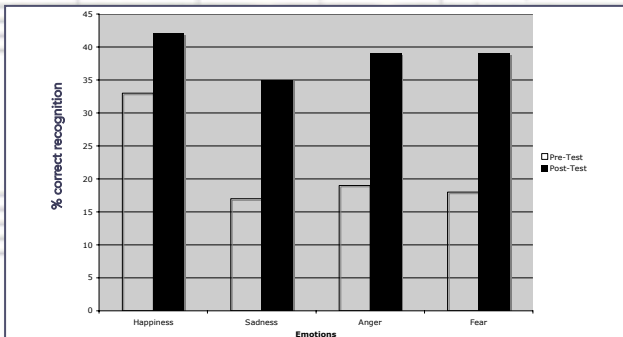
Music is recognized as a universal form of expression - as natural as speaking. Singing is a valuable therapeutic tool and often used in music therapy when working with autism. By modifying the speech motor, singing can promote speech development. It can encourage vocalization and articulation of words (Wan et al., 2010).

IMPROVISATION AND STRUCTURAL THINKING

Children with autism played with either music or toys. Music created a safer environment, especially in territorial behavior. The children took more initiatives in joint engagement and felt better understood. Music is a natural way to communicate because it consists of turn-taking, patterns and frames, and serves well as a tool for emotional expression (Kim, Wigram, & Gold, 2009).

EMOTIONS AND SOCIAL INTERACTIONS

Children with autism played in a music hut. The opportunity to engage in joint musical activities motivated them to interact with peers and families (cf. Kern & Aldridge, 2006, Simpson & Keen, 2011). In a different study, background music improved the children's emotional understanding, which is crucial to their social interactions. The music increased peer interaction and encouraged the children to be imaginative (Katagiri, 2007).



Children with autism who played with music and were exposed to background music could recognize the basic emotions (happiness, sadness, anger, fear) better than a control group (Katagiri, 2007).

CONCLUSION

Awareness and enjoyment of music is common among children with autism and they often show good musical ability. Music making promotes language (vocalization and articulation) and the development of social skills such as joint engagement, turn-taking, emotional intelligence and imagination in play. Music therapy interventions certainly has the potential to improve social skills.

However, not all individuals with autism find listening to music a positive experience. (Devlin et al., 2008)

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Influence of lower frequency sounds on dance movement

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What kind of beat makes you want to dance?

Introduction

Everyone knows the feeling of wanting to dance when we hear certain kinds of music.

What is it that makes us feel like dancing?

It seems that sounds with low frequencies, such as bass guitar or bass drum, play an important role.

Our thesis:

Dance is induced by low-frequency isochronous sounds

Definitions

- Dance induction: stimulation to dance
- Isochronous: approximately equally spaced in time



The Impact of the Bass Drum

(Van Dyck et al., 2013)

The aim of this study was to explore the connection between music and dance, and dynamic effects of different bass drum levels. A Motion Capture System was used to analyse the dance movements of test persons.

Results: Analysis revealed that making the drum louder relative to other instruments led to an increase in activity.

Conclusion and Implications

The three studies provide convergent evidence for our thesis.

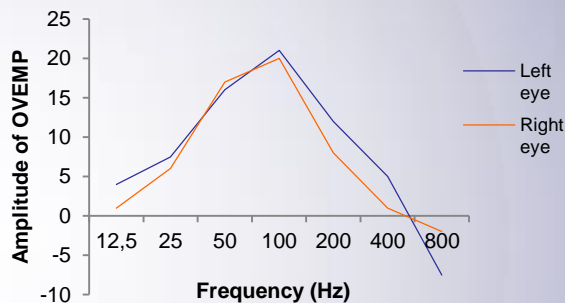
The studies are primarily about Western music, e.g. electronic dance music. Future research should investigate whether our thesis applies to non-western music traditions, and the relative importance of low- and high-frequency sounds.

Our thesis explains a phenomenon that many people regularly experience in night clubs. It could explain the important role of heavy low-frequency sounds in much contemporary club music.

The reaction of the human vestibular system to low frequencies (Todd et al., 2008)

This study investigated the response of the human vestibular system to low-frequency vibrations. A vibrating rod was placed directly on the skull of volunteers. The researchers measured eye-movement: the *ocular vestibular-evoked myogenic potential* (OVEMP).

Results: The strongest OVEMP reaction in both eyes occurred at a frequency of about 100 Hz. That could explain why and how low-frequency isochronous sounds induce dance.



OVEMP amplitude as a function of stimulus frequency, averaged over four participants (Todd et al., 2013)

The possible role of prenatal experience

(Parncutt, 1993)

Prenatal perception, association, memory: High frequencies are sharply attenuated in the womb. The fetus can perceive low-frequency sounds associated with maternal walking. At the same time, the fetus can perceive the body movements of the mother.

- Does the movement implication of low frequency rhythmic sounds have a prenatal origin?
- Can that explain why dance is induced by low-frequency sounds?

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The role of vision in music performance



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Lisa Pogatzetz, Alena Leitner, Ofir Nir

Thesis: Seeing is an essential part of music appreciation

Introduction

Why do we buy concert tickets when a better sound can be heard more cheaply and comfortably within our own homes?

Why do popular music concerts often include elaborate lighting and staging effects for what is ostensibly an auditory event?

At home the music possibly has better sound quality and studio recordings usually have no mistakes!



Michael Jackson – Smooth Criminal

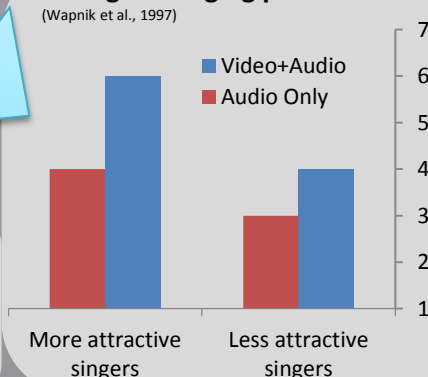
Influence of artist's facial expressions (Thompson et al., 2005)

Methods: Participants heard and saw music videos which have been judged in emotion or facial expression in 5 experiments, they had to rate in a five-point scale.

Results:

- Dissonance was rated higher for audio-visual presentations than for audio only.
- Interval size was rated higher in audio only than in video only.

Ratings of singing performance (Wapnik et al., 1997)



Performer attractiveness and musical evaluation (Wapnik et al., 1997)

(Wapnik et al., 1997)

Method: Singers' performances were rated by a visual group (sound turned off), an audiovisual group (visual + sound), and an audio group (sound only).

Results:

- Significantly higher ratings for audiovisual performances than for audiotaped.
- More attractive singers were rated higher than less attractive singers (see graph).
- More attractive male singers were rated significantly higher than less attractive singers under the audiovisual condition only.

Gestural communication of emotion in music performance (Vines et al., 2011)

(Vines et al., 2011)

Method: Participants heard, saw, or heard and saw recordings of a Stravinsky solo clarinet piece, performed in three distinct expressive styles. They then rated the emotional quality of each performance.

Result:

The relationship between the musician's expressive intentions and the listener's response depended mainly on whether the listener could see the performer.

Conclusions

- We found convergent evidence for the influence of vision on music appreciation: Emotional, technical and quality evaluation.
- Our study suggests the visual part of making music could be better taught in music academies. Young artists should learn to express themselves visually and acoustically. Choreography, costumes, facial expressions, and emotional movement should be learned alongside music theory and technique.

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Infant-directed speech

IDS is a nonstandard form of speech used by adults in talking to infants and toddlers. To help them learn to speak, it has a simpler vocabulary than regular speech. It exists in all human cultures and is probably a species-specific adaptation (Schellenberg & Hannon, 2011).

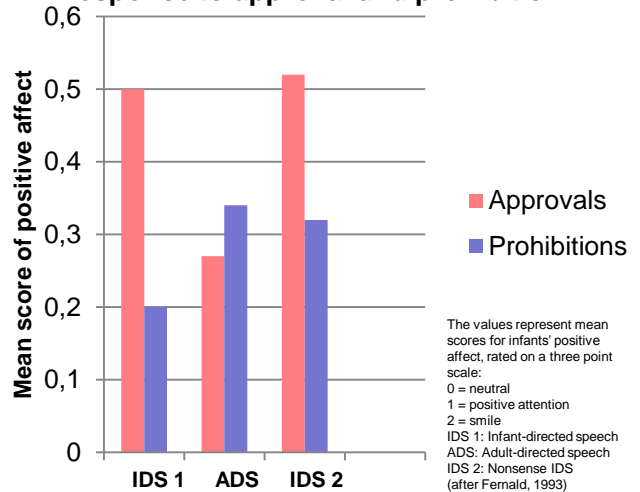
Musical features of IDS:

- higher average pitch
- exaggerated melodic intonation
- more and longer pauses
- slower or more deliberate tempo

Our thesis: Musical features of IDS support socialization.

Socialization is a life-long process of acquiring social skills - necessary for participation in community life. It is strongly influenced by the guidance and behaviour of caregivers.

Infants' positive affect scores in response to approval and prohibition



Supporting Arguments

Infants tend to focus attention on people who use IDS and see them as better caregivers (Schachner & Hannon 2011).

Depressed mothers use less IDS, which negatively influences the behavior of their infants (Hoffman & Drotar 1991).

Infant-directed vocalizations elicit more differentiated emotional responses in infants than adult-directed vocalizations (Fernald, 1993)

Conclusion

The exaggerated use of pitch contour and other musical features of IDS is part of a preverbal communication system that promotes mother-child, infant health, and infant safety. It also helps the infant to socialize, including social interaction skills and language.

The musical features of infant-directed speech are directly relevant for socialization. This is consistent with the social functions of music in adults and may even explain music's origins.

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Thesis:

Moderate stress makes music performance more creative

Definitions

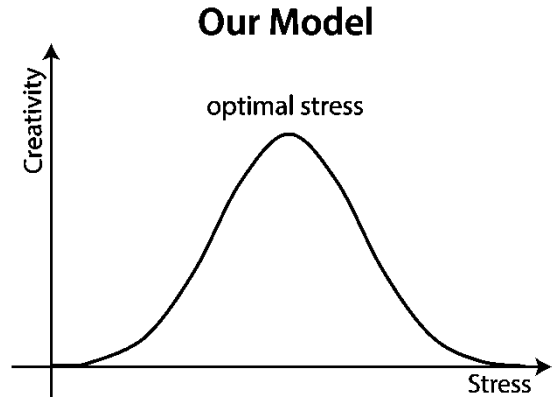
Music performance is singing or playing an instrument in front of an audience.

Creativity contributes to the quality of a performance. It includes

- alterations in melody and rhythm
- improvisation skills

Stress includes tension and anxiety. It can be produced by a competitive or threatening situation.

Performance anxiety / Stage fright is the fear of performing in front of an audience.



<http://www.wka-clarinet.org/Alexey-jury.jpg>

Creativity of competing improvisers

(Eisenberg & Thompson, 2011)

Musicians improvised on a keyboard in two conditions, one in competition with each other one without competition.

Result:

Competition led to more creative improvisation, more intrinsic motivation, and more stress.

Conclusion

Our findings suggest that stress is not a bad thing - as long as you have the right amount of it.

We should not try to get rid of performance anxiety entirely. Instead, we should develop a healthy attitude to stress.

Further research: If there is such a thing as a personal optimal stress level, how might it depend on personality, performing experient, instrument, or situation?

Stage fright of singing students in exams

(Kokotsaki & Davidson, 2003)

Singers evaluated their anxiety before and after a singing examination.

Results:

- Anxiety depended on personality and state of mind
- Women tended to be more anxious than men
- More advanced musicians performed better when anxious

The effect of competition on the quality of musical improvisation

(Papageorgi, Creech, & Welch, 2013)

Musicians answered questions about the intensity of performance anxiety at different moments of the performance.

Result: Performance anxiety had negative connotations but was also beneficial for performance.

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Absolute pitch (AP) vs relative pitch (RP)

AP is the ability to recognize or reproduce a tone (e.g. C#) without a reference tone. RP is the ability to identify a tone relative to a reference; it includes perceiving chord functions (e.g. subdominant) or singing a melody in different keys.

Advantages of AP (Parncutt & Levitin, 2001)

- Helps horn players imagine tones before playing
- Helps singers perform atonal music
- Helps theorists follow large-scale tonal structures
- Makes it easier to transcribe music

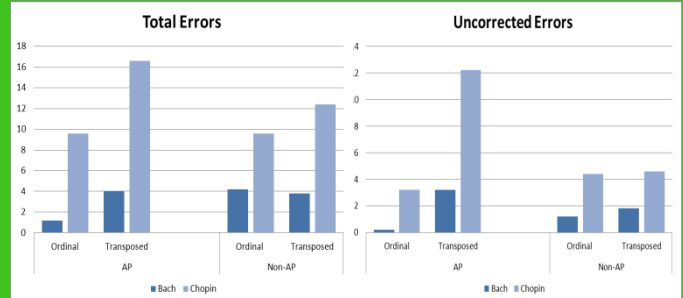
Some famous AP possessors



AP possessors may have trouble transposing! (Mito, 2003)

Method: 10 AP-possessors and 10 non-AP-possessors sight-read a few bars of Bach or Chopin. The piano was then tuned down a tritone and they repeated the task.

Results: In the transposed condition, the AP group made more mistakes and corrected fewer errors. For the non-AP group there was no significant difference.



AP possessors may not be good at RP! (Miyazaki, 1993)

Method: AP-possessors and non-AP-possessors were asked to identify musical intervals in a tonal context.

Results:

- AP possessors had trouble identifying tonal functions in different key contexts.
- AP possessors did not recognize pitch combinations as a tonal relationships.
- Non-AP possessors performed equally well in different tonal contexts.

Our thesis

Absolute pitch can cause problems in performance and perception of music



AP as a problem: An example

The night before a concert with a baroque ensemble, pianist Dietmut Köhler was told that the keyboard would be tuned to original pitch - lower than A=440 Hz. Because of her AP, she was unable to relearn the music, so she stayed at home (faz.net).

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AP and non-AP possessors categorize pitch differently (Benguereel & Westdal, 1991)

Method: AP-possessors and non-AP-possessors were asked to label microtonal musical intervals between sequential pure tones.

Result: Identification errors suggested that non-AP-possessors perceived musical *intervals* categorically whereas AP-possessors perceived *itches* categorically.

Conclusion

Absolute pitch is a remarkable ability. But it is only one of many skills of a successful musician. It may not be correlated with other musical skills, such as relative pitch, memorizing, or writing and performing music.

AP does not imply musical superiority. On the contrary, AP can cause difficulties when performing and perceiving music, e.g. when a keyboard is transposed or the same interval appears at different transpositions. Most musicians with AP use RP to identify musical intervals.

Do not worry if you are not an AP possessor!



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IMPROVE YOUR MOOD WITH MUSIC?

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People often use music to support current or induce a different mood, are you one them?

OUR THESIS: Self-chosen and liked music helps to regulate your mood.

Introduction

Have you ever had this experience? You've had a bad day or you've been feeling down for a while. You listen to a song and the negative emotions seem to vanish. You begin feeling better as soon as the song starts to play. Research shows: You're not the only one to use music in this way!

Music in Adolescents' Mood Regulation

(Saarikallio, 2007)

- 8 adolescents (14-17 years old)
- interview about their musical activities and preferences
- interview about their interaction with music

Results: Adolescents choose music to listen to based on mood, personality, age, gender, past experiences and attitudes. They use music to boost their mood and keep it in an elevated state. They find that music improves happiness, concentration, and the energy they need to solve problems. Music restores positive emotions by discharging negative ones. Listening to sad music reduces rumination about worries.



How everyday music listening affects our mood

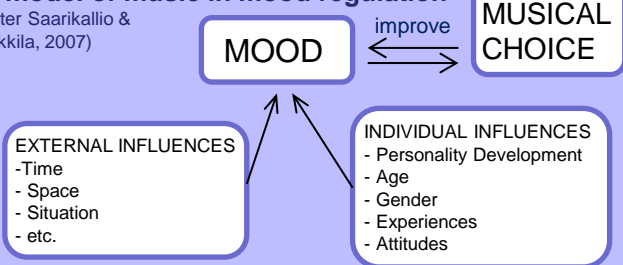
(Helsing, 2012)

- 207 participants listened to self-chosen music when arriving home from work (30 minutes for 14 days).

Reasons for listening to music included to get into a good mood, relieve stress, change a bad mood, express emotion. Self-chosen music was more effective in reducing stress and helped participants to relax. If music was also liked, the effect was stronger.

A model of music in mood regulation

(after Saarikallio & Erkkila, 2007)



Conclusions

The studies confirm that listening to liked, self-chosen music is an effective way to self-regulate mood.

Saarikallio & Erkkila (2007) and Helsing (2012) showed that everyday music listening is an effective and easy way to improve well-being, provided the music is liked and self-chosen.

Van der Zwaag (2011) showed that tempo, mode & percussiveness influence mood, regardless of whether the music is self chosen.

Which aspects of music influence our mood?

(Van der Zwaag, 2011)

- 32 participants listened to music while doing a task
- Tension, arousal and skin conductance were measured.

Emotions were modulated by the music's tempo, mode and percussiveness. Faster tempo led to increased arousal and tension; major modern songs produced more arousal than minor songs; increasing percussiveness increased skin conductance.

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