

When an everyday-phenomenon becomes clinical: The case of long-term 'earworms'

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ABSTRACT

Background

This paper is part of the symposium "Involuntary musical imagery: Exploring 'earworms'". Both Authors with a background in musicology respectively in neurology were individually contacted by a number of subjects suffering from long-term 'earworms' respectively musical hallucinations in the past. A number of studies have shown brain activation through voluntary musical imagery (Halpern & Zatorre 1999, Zatorre & Halpern 2005). 'Earworms' however, can't be investigated with brain imaging in similar ways since they are defined as double-involuntary occurrences – the first leading to involuntarily storing a music in long-term memory and the second causing its involuntary retrieval. Thus, the original interest in persons with long-term-'earworms' was the opportunity to display involuntary musical imagery using brain imaging.

Aims

Taking a closer look at the subjects in question revealed partly clinical conditions (e.g. tinnitus, hearing loss, depression, hallucinations). The aim is now to investigate these individual cases to explore the boundary between the everyday phenomenon and the clinical condition. As such, the study of long-term 'earworms' acts as a magnifying (and intensifying) glass on the everyday phenomenon (Hemming 2009). In addition, individual coping strategies and medical experiences are gathered to potentially offer help to the affected subjects.

Method

After a period of informal exchange of experiences, systematic case studies were set up to investigate the phenomena in detail. Interviews guided by a list of 19 questions were carried out in person, by telephone or video conference. Nothing was recorded, only notes were taken down. If provided by the subjects, medical information and other sources are included in the data.

Results

Subject A is male, 33 years old and a professional cook. At the time of the initial contact, he made his living working as a DJ. He then started suffering from lingering sounds after nights in the clubs. Since no medical advice could be obtained, he switched back to his original profession. This brought some relief but could not eliminate the pertaining 'earworms'. He is now under psychiatric treatment with permanent medication. He suffers from depression and has given up hope to find a cure

for his condition. Consequently, contact to the researchers has broken up.

Subject B is female, 87 years old and has worked as nursery-school teacher, graphic designer, housewife and teacher at a school for mentally handicapped children. She has a very high affinity to music and learned to play various instruments. Also, she has suffered from a weak (like traffic-noise from a distance) tinnitus for a long time. The past years brought a significant hearing impairment which makes own musical activity almost impossible. After one of these attempts at the age of 84, a specific canon kept pertaining. This can nowadays be replaced by any other melody, but cannot be stopped. Loud environmental sounds intensify the 'earworm' while concentrated tasks or being in company can help to take the attention away from it. She feels the 'earworms' are located inside the head, while the tinnitus directly stems from the ears. Medical advice suggested the use of antidepressants which she refuses since she considers herself a 'happy person'. The 'earworms' have intensified pre-existing insomnia. No effects from alcohol or medication are reported. Health-screening didn't reveal any noticeable disorders. Personal coping strategies include breathing and relaxation techniques borrowed from tinnitus-retraining therapies. She also considers it a great relief to now know "Nothing is wrong with me!"

Subject C is male, 41 years old and works in technology development which he experiences as creatively demanding, but fulfilling. He has a high affinity to music, but never learned to play any instrument. If confronted with unavoidable music (e.g. at a trade-fair stand), the music keeps haunting him afterwards. The specific piece can quickly be replaced by another one if only a slight clue is given (e.g. a newspaper reporting the death of Whitney Houston, or a sports-event), but the music can hardly be stopped. The first occurrence of the long-term 'earworm' was paralleled by a personal crisis caused by the separation from a partner and a period of personal retreat from social life. Also, a general depressive tendency is reported. Up to that time, the subject has long suffered from severe tinnitus originally caused by mal-fitting dental prostheses. A continuum between the tinnitus and the 'earworm' is reported, both located inside the head. Health-screening didn't reveal any noticeable disorders. No effects from alcohol or medication are reported. Again, personal coping strategies include breathing and relaxation techniques borrowed from tinnitus-retraining in addition to a general avoidance of 'catchy' music.

Subject D is male, 48 years old and switched from an electronic technician to social pedagogy after a personal crisis 15 years ago. He still experiences professional overload and has undergone a burnout-treatment. Since childhood, he is almost completely deaf, but attended an efficient school for the

deaf, where he also learned to play xylophone and to dance. He regrets to not have extended his instrumental skills. He learned to love popular music during youth, but nowadays avoids 'catchy' music and his preferences have therefore shifted to jazz and classical music. Also, he has long suffered from a severe tinnitus described as a strike of the triangle with long decay. Sometimes, the tinnitus is suspended for a short period of time. The subjects' long-term 'earworms' frequently occur in between sleep and awakening and last from half a day to one week. One 'earworm' follows up the previous one, but – as with tinnitus – there sometimes is a break. Accordingly, a continuum between the tinnitus and the 'earworm' is again reported, both located inside the cochlea which he imagines to be thickened. Due to high personal affinity to music, an 'earworm' can be changed or replaced by turning to a specific piece. 'Earworms' are a severe obstacle when going to sleep. The subject experienced a phase of depression 15 years ago after a separation from a partner and retreat from social life. Health-screening revealed circulatory disorders, vertigo and problems with the cervical spine. No effects from alcohol and unspecific effects from Aspirin are reported. Personal coping strategies include supporting well-being and avoidance of music which can often be realized by turning off the hearing-aid.

Subject E is male, 79 years old and had worked lifelong as an engineer in production. He has a high affinity to music, but never learned to play any instrument. His musical preferences gradually shifted from jazz to classical and nowadays contemporary art music. He exactly remembers the day when his tinnitus started 13 years ago, since it was caused by a deficient dental treatment. Anaesthetization preceding the extraction of a tooth failed which caused a pain shock and an increased dose of the anesthetic. Six years ago, he started experiencing four different, very specific musical hallucinations taking turns with each other. They overlap with the tinnitus and dominate it. While the tinnitus is located inside the ear, the hallucinations are felt to stem from the back of the head, accordingly there is no continuum. All of the pieces are loaded with strong positive or negative personal affection. As he had learned to cope with depression and personal crises in life before, he very consciously addresses the phenomenon to cope with it. Extensive medical screening didn't reveal any noticeable disorders. No effects from alcohol are reported. He eventually agreed on the treatment with initially high-dosed antidepressants to be gradually reduced in the course of one year. In combination with self-chosen relaxation techniques (yoga), this brought significant relief.

Conclusions

Current research on involuntary musical imagery has shown that music lovers and musicians actually have more 'earworms' than people who don't bother much about music (Liikkanen 2011). As such the frequency and intensity of 'earworms' might be an indication of a general affinity to music. All of the subjects described in the case-studies seem to confirm this assumption, and the frequent report of depression adds to the picture of general increased sensitivity in life. Also, sensory deprivation through hearing-loss in various degrees seems to cause autonomous activity of musical networks in the brain, similar to the descriptions given by Griffiths (2000). However,

existing definitions of hallucinations (subjects believe in the existence of a sound-source outside of themselves; Engmann & Reuter 2009) as opposed to 'earworms' or involuntary musical imagery (subjects are aware there is no external sound-source as it is felt to be located inside the head) still need to be properly applied or clarified. With regard to tinnitus, it seems its sometimes very clear physical causation (dental and cervical spine disorders) has been overlooked in favour of neuroscientific approaches (Ashton et al. 2007, Teismann, Okamoto & Pantev 2011) – possible therapies need to be taken into future account. With regard to long-term-'earworms', the application of anti-depressants seems promising (even with non-depressive subjects) since these have the potential of eliminating memory traces. Their combination with psychotherapeutic treatment borrowed from tinnitus therapy can result in significant relief of the affected subject. These findings yet need to be communicated into otolaryngology, neurology, orthopedics and possibly even chiropractics.

Keywords

earworm, inmi, tinnitus, hallucinations, hearing-loss

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