

Earworms and Hallucinations

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Abstract

Background: There is a growing scientific interest in the phenomenon of earworms, which are melodies that are heard and re-heard despite the absence of an external stimulus.

Aim: The aim of this paper is to determine whether understanding earworms can shed light on mechanisms underlying auditory hallucinations in psychosis. Method: Using recent data sources, this report briefly reviews what is most relevant about musical hallucinations and earworms.

Results: Musical hallucinations, like hallucinated voices, are more prevalent in women. In the elderly, they are often associated with hearing impairment. They are most distressing when they first begin, with the degree of distress inversely proportional to the extent to which they can be controlled. Earworms can be provoked both by the memory of past events and by the anticipation of future events. Strong emotion can trigger earworms, but so can boredom.

Limitations: The neurobiology potentially involved in the phenomenon of earworms is not explored in this paper. The pertinence of the literature about earworms and musical hallucinations, while interesting, is of unproven relevance to pathological voices in psychotic illness.

Conclusions: The clinical relevance, while unproven, is that addressing recurring memories, as well as managing strong emotions and avoiding occupations that lead to boredom are all strategies worth trying when treating pathological auditory hallucinations.

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Introduction

An earworm is a pseudohallucination, a melody that keeps recurring and that represents a vivid sensory experience without an external stimulus. It is a ubiquitous phenomenon and, for most people, recurs frequently. It is not an actual hallucination because the absence of an immediate stimulus is recognized and no out of the ordinary significance is attributed to the content of the music. The trigger is usually identified as a recent exposure to the melody in question.

There is a growing interest and a relatively recent literature on earworms and related musical imagery (1) because nearly everyone experiences them. Though innocuous, they can be a source of distress to individuals who have previously been diagnosed with a psychotic illness because, to such individuals, they may imply a recurrence of illness.

Clinical Example

A 45-year-old patient with a history of psychosis was in supportive treatment, doing well symptomatically, but leading a relatively routine, uneventful life. To expand her social contacts and further her recovery, she was encouraged by clinic staff to join the choir of a local church. The patient had always sung in church choirs when younger and had a fine voice and a love of music. To her delight, she was accepted into the choir, made new friends at church, and began attending regularly. Within three months, however, she left the choir, and the church. The choir music from weekly practices and from Sunday services had filled her head, she said. It gave her no peace. She could not rid herself of the music in her head, and found the situation unbearable because it reminded her of the time, just before her first hospitalization, when her

head was filled with the sound of her best friend's voice.

The patient was experiencing earworms, the occurrence of an unbidden tune that sounds in the head over and over, perversely more persistent the more one attempts to block it out (2). Earworms, although they are harmless and classified as pseudohallucinations, overlap phenomenologically with musical hallucinations, which, like auditory hallucinations in general, can be symptoms of psychopathological conditions (3-6).

Motivated by the distress experienced by the patient described above, I undertook a review of the literature on 'musical hallucinations' and 'earworms,' conducting a search of PubMed and Google Scholar using those search terms. My aim was to determine whether findings in these overlapping fields could suggest therapeutic strategies that might prove useful in the treatment of hallucinations in general.

Results

Musical Hallucinations

The prevalence rate of musical hallucinations in one series of general psychiatric admissions was reported as rare, 0.16% (5), but frequently associated with other psychopathology. Golden and Josephs (6) using Mayo Clinic medical records, subcategorized 393 subjects with musical hallucinations, based on co-morbid conditions. For the whole sample, the mean age at onset was 56 years, ranging from 18 to 98, with women comprising 65.4% of the group. A preponderance of females has been noted in most studies of musical hallucinations (3), but not in all (8). Thirty-nine percent of the Golden and Josephs sample (6) had a psychiatric diagnosis; a further 25% had neurological disease, Lewy body dementia constituting the most common form, and 9% had focal brain lesions. As would be expected, visual hallucinations were more often seen accompanying musical hallucinations in the neurological group, as

compared to the psychiatric group. Hearing impairment was a common feature, in fact the association is well known (3). In the psychiatric group, the mean age was younger than in the total sample, 48.1 years, with 70.3% being female. Eleven and a half percent of the psychiatric group had documented hearing loss (a substantial but smaller percentage than in the neurologic group). Again not unexpectedly, other concurrent types of auditory hallucinations (voices) were more common in the psychiatric group than in either the neurologic or the purely hearing-impaired groups. About 17% of the psychiatric group suffered from psychotic disorders, but this was not the most prevalent diagnosis in this group. Depression was much more commonly found (6). This result differed from the findings of Hermesh et al. (8) who studied musical hallucinations in 190 consecutive outpatients with anxiety, affective, and schizophrenic diagnoses. These investigators found musical hallucinations to be most often associated with obsessive-compulsive states. Their conclusion was that musical hallucinations were not rare, occurring in at least 20% of each of their three diagnostic subgroups (8).

The type of music that is most often heard during musical hallucinations varies widely, but, shedding much-needed light on the events experienced by my patient, Gallant-Swafford and Bota (5) report that, the more religious the content, the less controllable the musical intrusions. They make the claim that musical hallucinations emerge in stages, with the quality of the first stage in particular being uncontrollably obsessive and severely distressing to patients (5).

Clinical relevance

The clinically relevant lessons are that musical hallucinations in the context of various psychiatric disorders are not rare, and need to be inquired about (which is not done routinely) because they can be distressing to patients. As in auditory hallucinations in

general, they are more common in women (9). A hearing assessment should be carried out, especially in the older population (10). A person's ability to control such hallucinations appears to depend to a large extent on their content, and it is the variable of controllability that seems to determine the distress level. My patient knew that the sound in her head was not sinister, that it was caused by repeated exposure to choir music. Nevertheless, her lack of influence over its emergence and its continuation, her inability to put a stop to it, terrified her. If Gallant-Swafford and Bota (5) are correct about stages of hallucination, had the patient not stopped attending choir, this first stage might have progressed to another level, less distressing perhaps, but also, perhaps, increasingly imbued with delusional significance, which is what the patient feared.

Earworms

Of the research work on earworms, or recurring tunes in the head, one study in particular (11) stands out. It uses grounded theory qualitative analysis to address the issue of where and when and under what circumstances earworms are most likely to make their appearance. The authors make several important observations (11):

Earworms emerge not only after recent or long exposure to a piece of music (as in our patient), but can also appear after retrieval of a memory that is in some way associated with a particular piece of music. In other words, they can be triggered by exposure to anything that awakens a memory from the past. As well, the authors suggest that an earworm can be triggered not only by the recollection of past events, but also by the anticipation of upcoming events at which a particular piece of music is likely to be played, a wedding march for instance when one plans to attend a wedding, or the Happy Birthday song when planning to attend a birthday party (11).

A third observation about earworms is that they emerge in the context of a strong emotion, positive or negative (11). According to Williamson et al. (11) the affective state that instigates earworms need not be a distressing one; it can be one of joy, or amazement, or fury.

At the same time, perhaps paradoxically, Williamson et al. (11) also found that earworms increase during states of relatively low attentiveness, during moments of idleness, monotony, or reverie, when the mind wanders.

Clinical relevance

Auditory hallucinations in schizophrenia might operate by mechanisms similar to those implicated in the phenomenon of earworms; the stimulus that provokes the emergence of a voice can be a memory from long ago that is reawakened by a chance exposure to a particularly evocative cue. Hearing the name, 'Jack,' for instance, the long ago classroom bully from Grade One, could theoretically materialize into a threatening voice heard now. Accidental circumstances, such as finding oneself in the vicinity of an elementary school, could bring the words of the threatening bully flooding back from memory. Strong emotions are known to associate with hallucinations (12), an example of state dependent memory retrieval (13). Some patients, and this is especially seen in those with schizophrenia who are described as showing negative symptoms, report that this is the reason why they deliberately try to keep their emotions in neutral gear, to ward off distressing voices. As with earworms, the emotions that provoke hallucinations in states of psychosis need not be negative ones. One can be a voice hearer when experiencing mania as well as depression (14).

The role of boredom in voice hearing is potentially significant. The emergence of hallucinations

during periods of inattentiveness accords with the phenomenon of hypnagogic and hypnopompic hallucinations, voices from the past emerging during the transitional period between sleep and wakefulness (15). It is also in accord with the occurrence of hallucinations under conditions of sensory deprivation, the Charles Bonnet syndrome (16). It is an important point to keep in mind for occupational and vocational therapists working with schizophrenia patients: monotonous routine tasks may increase hallucinations (17).

Limitations

The neurobiology of earworms and musical hallucinations has not been explored in this paper. Also unexplored is the related field of chronic tinnitus, a phenomenon of ringing or buzzing in the ears that overlaps with musical hallucinations (18). The findings from studies of these phenomena, while suggestive, have not been tested in the context of pathological conditions such as schizophrenia.

Conclusion

This mini review of earworms and musical hallucinations suggests that clinicians treating patients with voices could do well to explore the origin of memories that might be being replayed in the guise of hallucinations (19,20). It suggests the use of cognitive strategies that have been shown helpful in addressing unpleasant memories (21). Conceptualizing voices as reconfigured memories rather than as threatening alien intrusions renders them less tyrannical and less frightening. Distraction, especially verbal distraction, works for getting rid of earworms (22,23) and is one of the strategies that individuals with schizophrenia use to cope with their hallucinations (24).

While a minority of clinicians have had the experience of hearing voices, almost everyone has had,

at one time or another, an unrelenting tune that goes round and round in the brain, and refuses to go away. Earworms make auditory hallucinations easier to understand experientially and, therefore, the analogy of earworms to hallucinated voices, if it does nothing more, is at least likely to increase clinical empathy. In summary, learning from the lessons of earworms and musical imagery can improve therapy for auditory hallucinations.

Conflict of Interests :

The author has no conflict of interest to disclose.

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