



Case Study

Preserved appreciation of aesthetic elements of speech and music prosody in an amusic individual: A holistic approach



Ariadne Loutrari, Marjorie Perlman Lorch*

Department of Applied Linguistics and Communication, Birkbeck, University of London, UK

ARTICLE INFO

Keywords:

Congenital amusia
Montreal Battery of Evaluation of Amusia
Speech prosody
Music prosody
Auditory perception
Emotional expression

ABSTRACT

We present a follow-up study on the case of a Greek amusic adult, B.Z., whose impaired performance on scale, contour, interval, and meter was reported by Paraskevopoulos, Tsapkini, and Peretz in 2010, employing a culturally-tailored version of the Montreal Battery of Evaluation of Amusia. In the present study, we administered a novel set of perceptual judgement tasks designed to investigate the ability to appreciate holistic prosodic aspects of ‘expressiveness’ and emotion in phrase length music and speech stimuli. Our results show that, although diagnosed as a congenital amusic, B.Z. scored as well as healthy controls ($N = 24$) on judging ‘expressiveness’ and emotional prosody in both speech and music stimuli. These findings suggest that the ability to make perceptual judgements about such prosodic qualities may be preserved in individuals who demonstrate difficulties perceiving basic musical features such as melody or rhythm. B.Z.’s case yields new insights into amusia and the processing of speech and music prosody through a holistic approach. The employment of novel stimuli with relatively fewer non-naturalistic manipulations, as developed for this study, may be a useful tool for revealing unexplored aspects of music and speech cognition and offer the possibility to further the investigation of the perception of acoustic streams in more authentic auditory conditions.

1. Introduction

Music processing deficits can arise due to congenital neurogenic anomalies, and are commonly referred to under the term ‘amusia’ (Peretz & Hyde, 2003). Four percent of the population is estimated to manifest this disorder according to a study by Kalmus and Fry (1980). Congenital amusia has been characterised as a lifelong condition in a number of studies (e.g., Hyde, Zatorre, & Peretz, 2011; Patel, 2003; Tillmann, Schulze, & Foxton, 2009). This term, however, does not refer to a homogeneous pattern of disorder, as various aspects of music cognition may be differentially affected. Individuals with congenital amusia are found to display difficulties in the perception of melodic and/or rhythmic patterns (Peretz, Champod, & Hyde, 2003). Impaired processing of intonation has also been observed in some (see, for example, Patel, Wong, Foxton, Lochy, & Peretz, 2008).

This heterogeneity is also found in studies investigating the neural underpinnings of congenital amusia. There is evidence of abnormalities in the right secondary auditory cortex (Patel, 2008), right dorsolateral prefrontal cortex (Schaal, Pfeifer, Krause, & Pollok, 2015), and fronto-temporal connectivity (Albouy et al., 2013; Hyde et al., 2011; Loui, Alsop, & Schlaug, 2009). In general, the neural anomalies giving rise to speech and musical auditory deficits in congenital amusics remain

under debate (Chen et al., 2015; Liu, Maggu, Lau, & Wong, 2015).

Current behavioural research on congenital amusia also underscores the heterogeneity of the nature of the impairment, with studies demonstrating a wide variety of processing difficulties in terms of pitch processing and emotion perception, as discussed below. The variation in terms of the manifestations of amusic deficits calls for the use of multiple research designs that can accommodate the intricate and multifaceted nature of the disorder.

1.1. Emotional involvement in amusia and links to prosodic appreciation

The complexity of pitch processing deficits in amusia seems to go further beyond the scale, contour, and interval classification. In a meta-analysis of 42 studies involving participants with amusia, Vuvan, Nunes-Silva, and Peretz (2015) found a strong correlation between acoustic pitch processing and musical pitch processing, favouring the interpretation of a general acoustic deficit in amusics. However, closer inspection of individual cases included in their meta-analysis revealed that 9 amusics displayed compromised musical pitch processing with preserved general acoustic processing, while 17 amusics manifested the reverse dissociation.

This variation is not limited to the pitch domain and reveals an even

* Corresponding author.

E-mail address: m.lorch@bbk.ac.uk (M.P. Lorch).

more nuanced picture in the context of musical emotion. McDonald and Stewart (2008) investigated whether music appreciation in amusics is affected by music perception deficits through the use of questionnaires. Overall results showed a low self-reported appreciation for music in comparison to controls. Most amusics reported poor experience of emotional involvement in response to music but some of them shared a profile similar to controls. The existence of subgroups in congenital amusia also appears pronounced in another study of evaluation of music engagement and appreciation (Omigie, Müllensiefen, & Stewart, 2012). The authors employed an experience sampling approach in order to study a number of variables related to listening behaviour and music appreciation in 17 amusic individuals. A relatively large percentage of their amusic participants displayed a profile of music engagement and appreciation that was very close to that of controls. These findings suggest that music appreciation is not necessarily compromised in the presence of congenital amusia and highlight the variability of music deficits in amusics.

Amusics' processing of musical emotion has been also studied empirically (Ayotte, Peretz, & Hyde, 2002; Gosselin, Paquette, & Peretz, 2015; Marin, Thompson, Gingras, & Stewart, 2015). What is more relevant to the scope of the present study, however, is to draw attention to the distinction between these 'labelled' emotions and those emotions that may contribute to the appreciation of the overall listening experience. This distinction is highlighted by considering the difference between 'aesthetic' emotions that are more related to qualities such as admiration for the performer's skill and 'everyday' emotions that are closer to specific emotional labels we use in everyday life (Juslin, 2013). The two aspects appear to be relatively independent of one another. For example, one might be able to successfully judge the mood of a music piece, while, at the same time, being completely unmoved by it (Sloboda, 1991). From this standpoint, we argue that research on emotion in relation to music and speech should be distinguished from the investigation of prosodic appreciation arising from such acoustic streams.

1.2. 'Expressiveness' in music and speech

Perceptual processing of the aesthetic qualities of musical performance is an important dimension of music cognition that may contribute to further understanding, especially in regard to congenital amusia. Instrumental musical performance, in a similar way to oral spoken performance, combines established rules of tradition with unique elements contributed by the individual performer (Bowen, 1993). These unique qualities of individual performers appear as a result of multiple levels of artistic expertise. Repp (1995) studied expressive timing in piano performance, comparing graduate piano students and experts and found that students were highly consistent in terms of timing strategies, whereas the expert pianists showed great individual variation in deviations from expected timing. Performances rich in expressive features and those that lack these cues are highly contrastive in both music and speech. Being exposed to a computer performance lacking musical microstructure, which includes elements such as temporal deviations, timbre changes, and loudness variation found in human music performance, has a similar effect to being exposed to a stilted delivery of speech (Clynes, 1995). For example, expressive timing in music may be linked to phrase-final lengthening in speech (Palmer & Hutchins, 2006), and the absence of such elements in musical or linguistic phrases constitutes a qualitative difference that comes into play during acoustic processing.

1.3. Speech prosody in amusia research and terminology limitations

Speech processing has also been explored in amusia research. Speech comprehension and processing of elements of linguistic prosody in amusics have been discussed in a number of recent studies (see, for example, Hutchins, Gosselin, & Peretz, 2010; Jiang, Hamm, Lim,

Kirk, & Yang, 2010; Liu, Jiang, Wang, Xu, & Patel, 2015; Liu, Patel, Fourcin, & Stewart, 2010; Patel, Foxton, & Griffiths, 2005; Patel et al., 2008; Stewart, 2011). Emotional prosody in speech processing has also been investigated in amusic individuals (e.g., Lolli, Lewenstein, Basurto, Winnik, & Loui, 2015; Thompson, Marin, & Stewart, 2012). However, there are additional aspects of speech prosody that do not necessarily fall under the scope of linguistic and emotional prosody. For instance, the interaction of acoustic cues in the voice of a speaker in various renditions of the same text, as in dramatic performances, can be judged to be different by the listener, although there are not currently detailed enough prosodic labels at the disposal of the scientific community in order to capture what these differences are.

1.4. Towards a holistic framework of prosodic phenomena

At the same time, the question arises as to whether these aesthetic prosodic nuances are processed in isolation or holistically. Approaching the complex experience of auditory processing can be viewed through the lens of a holistic approach. This approach is well developed in the domain of vision (see Grossberg & Pinna, 2012) but it could be also fruitful in the auditory domain and, more specifically, in the area of prosody processing. In a recent study, Menninghaus et al. (2015) raise, among other things, the issue of combination of poetic devices in different renditions of spoken proverbs. The combination of these devices, including the prosodic feature of meter, was found to result in different judgements compared to cases where these features were presented in isolation. The authors note that elements of poetic speech depend heavily on context and processing them in combination does not mirror processing each of them in isolation. Audibert, Aubergé, and Rilliard (2005) studied the perception of emotional prosody in a resynthesis-based framework. They found that, although some isolated acoustic features might be more indicative of certain emotional labels, no isolated cue can fully convey all the necessary emotion information conveyed to the listener. This further suggests that as one processes emotional colouring in speech, these cues are not appreciated as features in isolation but are perceived holistically and are associated with a given emotion. The findings of this holistic effect in behavioural studies are supported by a functional magnetic resonance imaging (fMRI) study by Wiethoff et al. (2008). The authors found that processing emotionally intoned words activated neural networks that are different from those seen when investigating individual cues such as pitch, duration, and intensity in isolation, as processing appears to depend on the synergy of such features. As musical performance also displays combinations of the above features, a similar processing paradigm could also apply to the music domain. The above findings are not surprising, as individuals are normally exposed to rich acoustic streams rather than prosodic parameters in isolation. Our approach and research design have been motivated by the above evidence in a parallel effort to employ more naturally-occurring and more fully complex realisations of music and language stimuli.

1.5. Background and objectives

We selected a documented amusic individual to test her performance on more holistic aspects of music and language prosody processing. As such, our study represents a follow-up case study on the Greek amusic individual described by Paraskevopoulos, Tsapkini, and Peretz (2010). The authors of the initial study were interested in determining whether the Montreal Battery of Evaluation of Amusia (MBEA; Peretz et al., 2003), which has been widely used in North America and Western Europe, could be employed to diagnose music perception deficits in populations exposed to different musical idioms. They designed a Greek version of the MBEA (GBEA) for populations sharing the Middle-Eastern musical tradition. Results obtained by 30 neurotypical Greek individuals confirmed the importance of using culturally specific materials, as their scores were significantly lower

Download English Version:

<https://daneshyari.com/en/article/5041114>

Download Persian Version:

<https://daneshyari.com/article/5041114>

[Daneshyari.com](https://daneshyari.com)