TIMBRE IN MUSIC AND PROSODY: COMPARATIVE AND EVOLUTIONARY CONSIDERATIONS

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It has been proposed that music and language share a common prosodic origin (e.g., Brown, 2017). Music and language have different components linked to specific acoustical properties, each of which can be associated with evolutionary functions. If these components are present in both domains as well as non-human vocal communication and share functions, they are likely to be inherited from phylogenetically older communication systems (Masataka, 2009).

In the current paper, I study the hypothesis on a common prosodic origin of music and language by focusing on the domain of timbre through a literature review. As shared components of prosody and music, so far, rhythm and pitch gained much attention in comparative language and music research (e.g., Temperley, 2022; Scharinger & Wiese, forthcoming). However, timbre, another component of prosody, received far less attention in comparative research.

Timbre has para-linguistic functions and plays an important role in speech prosody (Thompson et al., 2012). Its functions include encoding of emotion, based on, e.g., spectral energy distribution and signal-to-noise ratio (Briefer, 2012), and information about the signalers' identity based on individual characteristics of the signalers' formant structure (Taylor & Reby, 2010). Those two functions are shared with those of non-human vocal communication (Taylor & Reby, 2010).

In vocally produced – sung – music, too, timbral cues encode emotion and identity (Scherer, 1995; Erickson, 2018). Communication of emotion through timbre in instrumental music was reported in several studies (e.g., Paquette et al., 2018; Bowman & Yamauchi, 2016). Communication of increased emotional arousal and emotional intensity relies on spectral distribution (Eerola et al., 2012; Wu et al., 2014). Encoding of emotion in instrumental music has been related to perceptual features associated with timbre such as "brightness" and "softness" (Eerola & Vuoskoski, 2012; Juslin & Laukka, 2004). Relevant spectral features for this, such as Spectral Centroid and HF-LF Ratio, are also important acoustical

features for encoding arousal in emotional prosody and mammalian vocal communication (Briefer, 2012).

Timbre also plays a role in the identification of music and allows the identification of instrumental music through the individual timbral properties of musical stimuli on various levels - of genres (Casey et al., 2014), whole pieces (Schellenberg et al., 1999), excerpts of pieces (Poulin-Charronnat et al., 2004), melodies (e.g., Schellenberg & Habashi, 2015; Peretz et al., 1998) and single musical sounds (e.g., Suied et al., 2014). Thus, identity is communicated in instrumental music through the individual timbral properties of the music. This is similar to the communication of signalers' identity through individual timbral characteristics seen in prosody and mammalian vocal communication (Handel, 1995; Patil et al., 2012; Taylor & Reby, 2010).

In summary, timbre conveys emotional and identity information in speech prosody, and vocal and instrumental music through the same acoustic cues as in mammalian vocal communication. Thus, I claim that music and language share a common prosodic origin, with communication of identity and emotion as a preserved function found today in para-linguistic aspects of prosody and in music.

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