

## Spreading of Music and Spreading in Music

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Music spreads in the contemporary society with increasing efficiency [1,2]. However, the construction of a piece of music itself also involves displacements and movements of some structures, the most elemental being the constituent tones with their pitches. The geometry of the space relevant to the pitch is by far not trivial [3]; the pitch chroma, e.g., exhibits a circular topology of the uniaxial group  $SO(2)$ , whereas the pitch height is isomorphous to the translation group in 1D, i.e. to the universal covering of the group  $SO(2)$ . Thus, the evolution of pitch combines properties of translational and rotational diffusion often encountered in molecular motions [4]. This duality has been observed in studies of human brains [5]. It also underlies acoustic paradoxes [6] synthesized nowadays with the use of electronic means. We will attempt to produce an effect of the Shepard tone [7] using piano accompanied with wind instruments. Displacements of more complex structures, such as subjects and counterpoints, occasionally transformed with symmetry operations [8], will be presented in relation with local musical traditions. A spreading of ideas in music across geographic distances and borders will be illustrated with a collection of pieces performed by the Cracow Golden Quintet [9] and associated artists of The Krzysztof Penderecki Academy of Music in Kraków.

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