

The Time of Spatial Analysis: On the Temporal Dimension of some Pitch-Based Analytical Models

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Abstract: Since the late 1950s and 60s, North-American music-theoretical scholarship has produced a variety of mathematically informed models of pitch organization. Analyses based on such models often depict pitch relations in suggestive spatial configurations, which emphasize the cross-domain mapping between pitch and space. The paper reflects, however, upon the temporal aspects imported to the experience of the piece as it is mediated through pitch-based analysis. It proposes a preliminary survey of the issue, from an initial composer- or structure-oriented perspective to a more listener- or process-oriented one. It argues that as spatial models tried to reconcile the systematic set-class classification of pitch materials with more flexible, dynamic and process-oriented relations, the mode of experiencing time through analysis also inflected from discontinuous, non-linear towards more linear and directed temporalities.

Keywords: pitch, time, temporality, set-theory, transformational, K-nets, neo-Riemannian, scalar theory, transpositional network, affinity spaces, music geometries.

O tempo da análise espacial: sobre a dimensão temporal de alguns modelos analíticos de alturas-de-sons

Resumo: Desde o final do anos 50 e anos 60, o trabalho académico Norte-Americano em teoria da música produziu uma variedade de modelos matematicamente informados de organização de alturas-de-sons. Análises baseadas nesses modelos frequentemente posicionam relações de alturas em configurações espaciais, que enfatizam o mapeamento entre os domínios de alturas e espaço. No entanto, este ensaio reflecte sobre os aspectos temporais que a mediação da análise de alturas traz à experiência da peça musical. Propõe, por isso, um estudo preliminar abarcando perspectivas orientadas tanto para a estrutura como para o processo da peça. O ensaio argumenta que à medida que os modelos espaciais tentaram conciliar a classificação sistemática das classes-de-conjunto (de alturas) com relações mais flexíveis e dinâmicas, o modo de presenciar o tempo através da análise inflectiu de descontínuo e não linear para uma temporalidade mais linear e directa.

Palavras-chave: alturas, tempo, temporalidade, teoria de conjuntos, Klumpenhouwer networks, teoria neo-Riemanniana, teoria de escalas, espaços de afinidade, geometrias musicais.

Since the late 1950s and 60s, North-American music-theoretical scholarship has produced a variety of mathematically informed models of pitch organization, ranging from the more traditional twelve-tone and set theories, to group and transformational theories, to more recent developments in neo-Riemannian, scale, and geometrical theories.¹ From an initial focus on twelve-tone and early atonal music, the analytical models enlarged the spectrum of the addressed repertoire, to included tonal, neo-tonal, popular and non-Western musics, and the conceptual framework modeling pitch relations saw, at least to some extent, the potential to be transferred to other musical parameters as well.

Analyses based on such models often depict pitch relations in suggestive spatial configurations, which emphasize the cross-domain mapping between pitch and space.² This paper ponders, however, how analysis of specific pieces based on spatial pitch-models shapes our mode of experiencing time as we (listener-oriented analysts) process and navigate the spatially suggested pitch relations. More simply, it reflects on the impact a pitch-based analysis imparts on the temporal experience of the piece. Do different pitch-based analyses of a given piece also suggest (to the analyst) different temporal experiences for that piece? And, in turn, how does the temporal experience of analysis shape or inform our understanding of pitch organization?

My point here is not to scrutinize the efficacy of analyses at pitch modeling, but rather to reflect upon the temporal aspects imported to the experience of the piece as it is mediated through pitch-based analysis. This paper proposes a preliminary survey of the issue, from an initial composer- or structure-oriented perspective to a more listener- or process-oriented one,³ and argues that as spatial models tried to reconcile the systematic set-class classification of pitch materials with more flexible, dynamic and process-oriented relations, the mode of experiencing time through analysis also inflected from discontinuous, non-linear towards more linear and directed temporalities, to use Jonathan Kramer's (1988) terminology.⁴

The inquiry into the temporal dimensions suggested by the analyses is guided by John Rahn's (1979) criteria for musical explanation, which focus around four sets of paired terms and conceptual areas: analog/digital, in-time/time-out, top-down/bottom up, and theory of experience/theory of the piece. These interpenetrating sets of terms, in turn, help us to

¹ For accounts on the research of the earlier history on the concept of set-class see Bernard 1977.

² For a study on the basic cognitive processes involved in cross domain mapping between music and other domains, see Zbikowski 2002.

³ The intellectual climate of the late 50s and 60s regarding the role of composer and (compositional) theory is captured by Milton Babbitt (1958, reprinted 2003) in his celebrated article "Who Cares if you Listen?" An exemplary formalist view of the "structure" of music is captured by Allen Forte (1973). David Lewin (1977, 1987) set's up a methodological shift anchored in group-theory embracing a "transformational" attitude. The formalist stance of theory-based analysis was questioned by the so called New Musicology in the 70s and 80s. Kofi Agawu (1996) discusses the subject along with music theory's reaction to those charges.

⁴ Kramer 1988.

think through the relation between a global way of hearing (a theoretical framework) and a specific way of hearing (the relations set up in the piece).⁵

The following is a sample of some representative analytical examples from various intersecting theoretical niches. Allen Forte's (1981) set-theoretic analysis of Schönberg's op. 11/1 focuses on hexachordal set-class classification, abstract inclusion and complementary z-relations. The structure of a "magical" kaleidoscope suggested by the analysis reflects a time-out, concept-driven approach, which might be experienced as non-directed, non-linear temporality. David Lewin's modeling of "directed measurement, distance, or motion" through group theory allows for a quantified, bottom-up, in-time perspective. Lewin's analysis (1987, 37–44) of Webern's op. 27/III coordinates (through a direct product of GISs) both pitch and temporal domains to render a precise, if complex, metrical experience. Lewin's (1982/83) analysis of Webern's op. 5/II, exploring the construct of a transformational graph, suggests the experience of quasi-directed time and proposes that characteristic (transpositional and inversional) gestures shape our experience of the passage. Henry Klumpenhouwer (1998) explores relations between different set-classes and cardinalities in the opening of Webern's op. 27/III through his K-net analysis. The transformational aspect of the global network suggests we experience relations between individual networks (through $\langle T \rangle$ and $\langle I \rangle$) as multi-directed temporalities. A neo-Riemannian perspective by Richard Cohn (1999) proposes we construct the tonal areas on the first movement of Schubert's Op. 960 along a map of tonal relations (*Tonnetz*). The temporalities involved suggest an analog, directed, and quasi-linear time as the analysis follows directed paths along the map of tonal relations. My analyses of the third movement of Bartók's piano sonata (2006a), the first movement of Stravinsky's *Serenade in A* (2006b), and Lutoslawski's *Postlude I* (2011) propose global scalar frameworks (affinity-spaces and transpositional networks) to sustain and organize harmonically the diversity of modal segments used in those pieces. The pieces' navigation of scalar frameworks suggests linear, and at times, directed temporal plasticities. Finally, Dmitry Tymoczko's (2004, 2011) geometrical modeling in Debussy involving relations between different scales suggests a partially linear, but at times discontinuous, time experience.

I suggest that the temporality of the various analyses surveyed here try to reconcile to various degrees what Karol Berger's (1999) refers to as music's "two contrasting modes of existence," or modes of experiencing music, i.e., "process" and "work": on the one hand an attitude of identification with the music's moment, in real time; and on the other hand, an attitude of objective contemplation, in which each individual moment has a function in the creation of the whole.

⁵ Lewin 1968-69.

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