=== ============== ==== === === === == == == == -- -- ----== == == == ==== === == == == == == = == == == == == == == == == ==== THEORY ONLINE MUSIC A Publication of the Society for Music Theory Copyright (c) 1995 Society for Music Theory +-----+ | Volume 1, Number 3 May, 1995 ISSN: 1067-3040 . +----------+ All queries to: mto-editor@boethius.music.ucsb.edu or to mto-manager@boethius.music.ucsb.edu AUTHOR: Parncutt, Richard TITLE: Response to Demske: Relating sets KEYWORDS: similarity, pc-sets, timbre, pitch commonality REFERENCE: mto.95.1.2.demske.art Richard Parncutt

Depts of Psychology and Music Keele University Keele, Staffordshire ST5 5BG Great Britain r.parncutt@keele.ac.uk

[1] Thomas Demske's thorough treatment of the similarity of pc-sets demonstrates how problematical it can be to derive a general and yet musically relevant similarity function. The essay highlights inherent weaknesses in the pc-set paradigm for post-tonal analysis, and suggests that perceptually based approaches may be more appropriate than approaches based purely on pc-sets.

[2] First, there seems to be a tacit problem of definition. What exactly does it mean for two pc-sets to be similar? If we are to speak meaningfully about the similarity of two different pc-sets, then we must first of all satisfy ourselves that one and the same pc-set is highly similar to itself. Unfortunately, even this apparently trivial condition is not satisfied. To take a simple example: A melodic statement of {01369} sounds entirely different from the same tones heard as a sonority. And different voicings (inversions, spacings) of that sonority can sound more different from each other than similar voicings of different sets. It's familiar stuff: Octave equivalence ain't always valid.

[3] \*Perceptual\* similarity may be a more promising starting point for a theory of similar pitch structures in atonal music. Demske makes several references to perception in his essay. Perceptual similarity is easy to define: It is the average subjective judgment of global similarity by a representative group of listeners. Theorists may be included as one of the groups. Of course, the results depend on musical expertise and experience -- as does the perception of listeners in the concert hall.

[4] Unlike a pc-set-based theory of similarity, a perceptual theory must account for effects of voicing, onset asynchrony, spectral envelope, temporal envelope, and so on. Consider first an isolated pair of steady-state complex sonorities of the same loudness and duration. Their global similarity breaks down into similarity of pitch and similarity of timbre. Similarity of pitch in turn breaks down into two parts, depending upon whether individual pitches are perceived to fall in the same category (chromatic scale degree) or different categories. These two parts may be called pitch commonality and pitch distance (respectively); tentative algorithms are given in my book \*Harmony: A Psychoacoustical Approach\*, Springer 1989, and in my recent article in PNM. Different listeners emphasize different aspects of pitch similarity in their responses, depending on their orientation and experience.

[5] Alternatively, we might look at the similarity of two melodic fragments. That depends on the similarity of their contours and of their underlying scales; for details see papers by Annabel Cohen, Jay Dowling, Marilyn Boltz, Mari Riess Jones, Lola Cuddy. This is quite a different affair from the similarity of sonorities, and needs to be treated independently.

[6] For an appropriate set of stimuli for a perceptual experiment on similarity, we need not look past the piano chords in Messiaen's \*Quatuor pour le fin du temps\* analyzed by Demske. A possible experimental paradigm might involve presenting the chords in pairs to listeners and asking them to rate their global similarity. Then, model the results as a linear combination of pitch commonality and pitch distance. Finally, wonder about the effect of context on similarity judgments. Analogous effects in tonal music have been studied in some detail (see Carol Krumhansl, \*Cognitive Foundations of Musical Pitch\*, OUP 1990).

## 

## Copyright Statement

[1] Music Theory Online (MTO) as a whole is Copyright (c) 1995, all rights reserved, by the Society for Music Theory, which is the owner of the journal. Copyrights for individual items published in (MTO) are held by their authors. Items appearing in MTO may be saved and stored in electronic or paper form, and may be shared among individuals for purposes of scholarly research or discussion, but may \*not\* be republished in any form, electronic or print, without prior, written permission from the author(s), and advance notification of the editors of MTO.

[2] Any redistributed form of items published in MTO must include the following information in a form appropriate to the medium in which the items are to appear:

This item appeared in Music Theory Online in [VOLUME #, ISSUE #] on [DAY/MONTH/YEAR]. It was authored by [FULL NAME, EMAIL ADDRESS], with whose written permission it is reprinted here.

[3] Libraries may archive issues of MTO in electronic or paper form for public access so long as each issue is stored in its entirety, and no access fee is charged. Exceptions to these requirements must be approved in writing by the editors of MTO, who will act in accordance with the decisions of the Society for Music Theory.