Musicae Scientiae
Discussion Forum 4A, 2007, 3-6

EDITORIAL

The concept of similarity is central to perception. It underlies processes such as object recognition, comparison, memory retrieval, classification, problem solving, and inductive reasoning, which are crucial to much of human cognitive processing. In the domain of music, similarity plays a vital role in perceptual and cognitive processes such as grouping, segmentation, musical variation, genre recognition, and expectancy. Furthermore, memory and schematization processes in real-time listening rely on the recognition of small figures, or cues, which again is based on the notion of similarity (Deliège, 2001). Therefore, it is evident that understanding of the basic processes underlying perception of musical similarity is necessary for acquiring a deeper comprehension of music perception in general.

A further, more practical, motivation for research on musical similarity comes from the field of Music Information Retrieval (MIR), which aims to develop computational methods for extracting relevant information from digital representations of music, including both audio and symbolic forms. Central areas within MIR are music classification and content-based retrieval, both of which rely heavily on the notion of similarity. Some of the models developed rely on music perception research, others are more concerned about issues related to computational efficiency. The majority of empirical work on, and computational models of, musical similarity deal with melody, due to the central role it plays in the perception and memorization of music.

There have been a few journal issues that have been dedicated to musical similarity. These include the issue Melodic Similarity: Concepts, Procedures, and Applications of Computing in Musicology (Hewlett & Selfridge-Field, 1999), and issue 18(3) of Music Perception, guest edited by Irène Deliège. The present Discussion Forum is the outcome of two similarity perception symposia organised at the 9th ESCOM Conference in Bologna in August 2006.

The first article of this issue, written by Irène Deliège, discusses the notions of internal and external musical similarity. By internal similarity she refers to similarity relationships within a single musical work or performance. In her paper, she concludes that similarity relations are central in the perception of music. In particular, internal similarity is relevant for music from the point of view of composers, teachers, theoreticians and interpreters, as it helps to enhance the homogeneity, unity, and consistency of musical works.

In their article, Zohar Eitan and Roni Granot investigate whether listeners can perceive analogies between different musical dimensions. In particular, they study the extent to which similarities between intensity contours produced by various musical parameters can be perceived. They find that such analogies can be perceived between many musical dimensions, suggesting that intensity contours may serve as musical gestures.

Eleanor Selfridge-Field raises the question of the role of social dimension in melodic

identity. She applies a model of melodic similarity that combines both explicit and implicit elements of information to members of tune families. Her observation that, according to the model, the melodies fail to show any significant intra-family cohesion, leads her to conclude that aspects related to social identity may play an important role in the formation of tune families.

Categorisation is closely related to similarity. However, according to previous research, there is no one-to-one correspondence between the two. In their article, Naomi Ziv and Zohar Eitan investigate whether categorisations of excerpts taken from piano compositions concur with ratings of perceived similarity between the excerpts. After having found some significant differences between these two, they conclude that the features that distinguish contrasting themes in a musical work create a context-dependent intra-opus field of similarities that characterises the piece.

The next articles in the present issue discuss various computational models of similarity. While most approaches to model similarity have focused on monophonic melodies, polyphonic similarity has received less attention. Kjell Lemström and Anna Pienimäki compare two categories of models of polyphonic similarity, those based on linear string representations and the utilisation of edit-distance methods, and those based on a geometric representation. They conclude that although the edit-distance methods offer computationally more efficient solutions, the geometric framework provides a more natural way of modelling music.

Within the geometric framework of similarity models, transportation distances offer a promising alternative. In their article, Rainer Typke, Frans Wiering, and Remco Veltkamp investigate the feasibility of the Earth Mover's Distance for the modelling of polyphonic musical similarity. Based on an extensive set of listening tests to establish a ground truth for perceived similarity, and a new measure for comparing different similarity measures, they conclude that transportation distances provide a viable method for the modelling of perceived musical similarity.

The next four articles of the issue are dedicated to computational models of melodic similarity. The article by Daniel Müllensiefen and Klaus Frieler investigates the consistency of experts' notions of melodic similarity. In their similarity rating experiments, they find that experts' ratings of similarity are reliable and stable, which leads them to conclude that it is justified to speak of objective melodic similarity, which can be measured. Furthermore, using methods of optimisation applied to combinations of similarity measures presented in the literature they construct models of melodic similarity that can successfully predict the experts' similarity ratings.

While most of the similarity models proposed to date assume a notion of objective similarity, there is some evidence that similarity perception is dependent on context. This is the topic of the article by Tuomas Eerola and Micah Bregman. Their reanalysis of the similarity study by Rosner and Meyer (1986) suggests that melodic similarity relations can be explained by simple features that contain the most salient variation between stimuli. This is further supported by their own experiment, in which they use a self-organising map to systematically select melodic stimuli from a folk song collection.

With the next two articles, the focus shifts from external to internal melodic similarity. In his article, Sven Ahlbäck again points out the contextuality and relativity of similarity. He presents a model of melodic segmentation that is based on principles of human cognitive processing, considers both similarity (repetition of melodic content) and dissimilarity (discontinuities on the melodic surface), and takes into account aspects of contextuality, such as those related to metrical structure and symmetry.

The article by Olivier Lartillot and Petri Toiviainen presents a model for automatic extraction of patterns based on motivic matching on both melodic and rhythmic dimensions. The authors suggest a generalisation of the multiple-viewpoint approach that enables the discovery of internal similarity relations that are more general than has been possible with previous approaches.

The articles published in this issue, although dealing with the common topic of similarity, comprise a diversity of different approaches and methodologies, and to provide a synopsis of them is an arduous task. We asked Geraint Wiggins to take on this job, and he was brave enough to agree. In his article, he compares the different approaches presented in this issue, and provides a summary of them in particular in light of crucial issues of modeling such as knowledge and data representation as well as the distinction between explanatory and descriptive models.

We hope that the articles published in this issue will stimulate further discussion on this important topic. To continue this discussion, we invite submissions for the next Discussion Forum of Musicae Scientiae, 4B. Details are to be found in the Call for Papers below.

I wish to thank Irène Deliège for her invitation to guest edit this issue. Finally, I am grateful to the reviewers for generously donating their time and expertise to make this issue possible.

Petri Toiviainen
Associate Editor

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