Meeting: 1001, Evanston, Illinois, SS 23A, Special Session on Mathematical Techniques in Musical Analysis

1001-22-359 **Thomas Noll*** (noll@cs.tu-berlin.de), Technical University of Berlin, Sekr. FR 6/10, Franklinstr. 28/29, 10587 Berlin, Germany. *Towards a Meta-Physics of the Musical Mind: Canonical Formulation of Weber/Fechner's Law in Application to Tonal Music.*

Our kinesthetic ability to simulate dynamics suggests to study mental activity in terms of canonical transformations of phase spaces. Monotonality - the persistence of a tonic troughout a musical piece - is seen as an abstract unchanged sensitivity. In accordance with Fechnerian psychophysics sensitivity can be added to the transformation of a stimulus as the transformation of its impuls. Our update of Weber-Fechner's Law thus relates the diagonal transformation $\begin{pmatrix} t & 0 \\ 0 & t^{-1} \end{pmatrix}$ to its infinitesimal generator $\begin{pmatrix} log(t) & 0 \\ 0 & -log(t) \end{pmatrix}$. Besides such "objective" mental acts, we study "subjective" compensations of an unchanged sensitivity in terms of triangular matrices $\begin{pmatrix} 1 & b \\ 0 & 1 \end{pmatrix}$ and $\begin{pmatrix} 1 & 0 \\ c & 1 \end{pmatrix}$. Both, in melodic and in harmonic terms there are musictheoretical oppositions which relate to these types, namely scale steps vs. chromatic alterations as well as fundamental bass progressions vs. tonal side steps (surface modulations). With reference to Chopins prelude op. 28 No 4 we discuss aspects of ambiguity between both kinds of transformation as a consequence of Weber/Fechner's Law. (Received August 31, 2004)