Hermann Gottschewski:

Graphic Analysis of Recorded Interpretations

Since the Seventies the analysis of and theoretical discussion about recorded interpretation have grown to become a significant part of musicological research. As far as they include detailed analyses of sound recordings, most of these studies focus on (1) the relationship between interpretation and composition; (2) the relationship between several interpretations of the same composition; (3) delineation of interpretational schools and traditions; and (4) the grammar of interpretation, *e.g.* a rule-system for "musically" realizing a score. All these approaches deal with interpretation in relation to external factors such as notation, other interpretations, tradition, or theoretical constructs. While such research leads to interesting results, it does not deal with the crucial aesthetic problems of the impression of unity, of consistency, or of formal perfection in an interpretation. These qualities rely primarily on the inner relations of the interpretation itself rather than on relations to external conditions.

In order to provide an approximation to the understanding of formal perfection in interpretational art, one must consider the recorded interpretation as a structure in itself. This is not to ignore the structure of the composition, for structural relations within the composition appear as structural relations within the interpretation and can be recognized as such. If they do not, they have no relevance to the aesthetic quality of the interpretation. There is no better way to demonstrate the structural quality of an interpretation than to transform the relevant factors into a graph. Once the principles of transformation, (*e.g.* the selection of the features to be represented) and the design of the graph are chosen, the computer is a useful aid for measuring and editing the data and for printing the graph.

"Tempo structure" means the disposition of metrically hierarchical ordered time-points over a piece. The time-points are measured at the half-bar or quarter-bar level and are hierarchically grouped in units reflecting the musical structure. In most cases these are 1-, 2-, 4-, and 8-bar groups. Figures 1 and 2 [pp. 94, 95] represent two of four graphic types which can be constructed for analyzing tempo structures. Both illustrate the tempo motion, a characteristic which is strongly related to our musical experience, simultaneously at several levels. For example, it is possible to feel a steady pulse at a two-bar level, even if the one-bar and half-bar divisions are irregular and arbitrary. The program is written for MS-DOS compatible computers and a 24-dot printer with 1/180 inch resolution.

The first type of graphic representation is particularly appropriate to illustrate short-term tempo modifications. These are displayed so that a physically steady acceleration appears as a straight line. In Figure 1 the hierarchical phrase-structure of the Mozart exposition is reflected in Reinecke's interpretation in the hierarchical disposition of three kinds of "tempo bows": (1) accelerating, opening; (2) retarding, closing; and (3) symmetrical, perfect. These can be represented as follows:

The principle of data transformation is quite simple. Horizontally there is a real-time-axis with bar numbers for orientation. In Figure 1 the bar numbers are given according to the *Neue Mozart Ausgabe*. Carl Reinecke, in his recorded arrangement for piano solo (Welte-Mignon, 1905), changes the formal disposition of the exposition to be analogous to the reprise, while he leaves it unchanged in the printed edition of his arrangement.

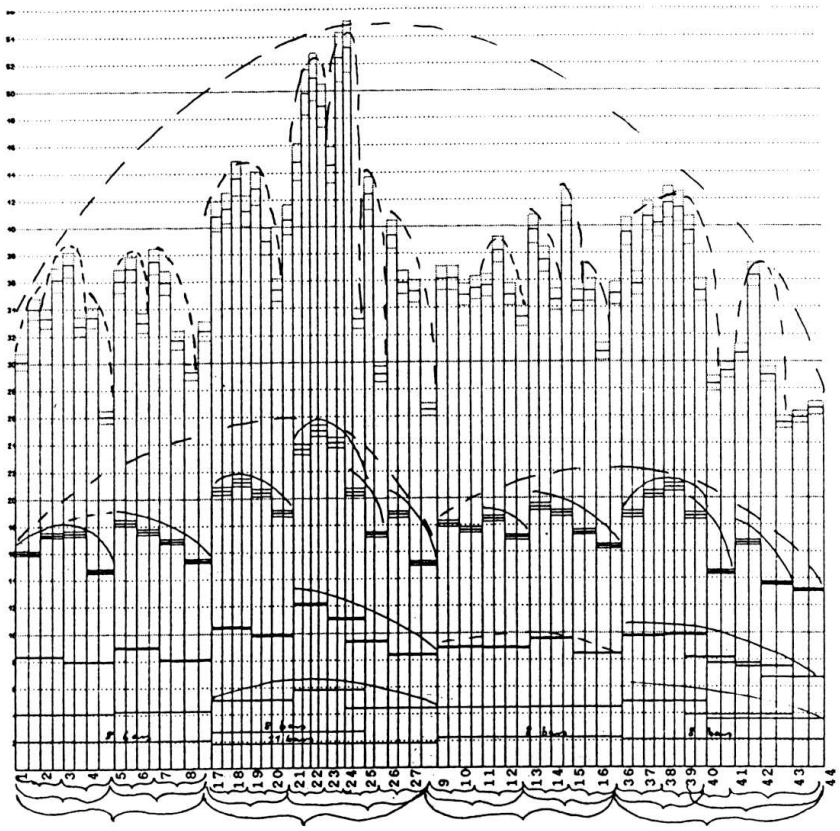

Figure 1. Carl Reinecke playing the exposition of the first movement of Mozart's piano concerto K. 537 in D Major (recorded for Welte-Mignon in 1905). Hierarchical phrase structure is shown by horizontal braces and "tempo bows" by dotted curves.

The vertical axis is a metronome scale in Figure [graph-type] 1 and a duration scale in Figure [graph-type] 2. Each relevant time interval in the tempo structure is displayed as a rectangle, standing on the real-time axis with the vertical sides at the beginning and the end of the time interval and with the height of its duration in the second case expressing the corresponding metronome value (*i.e.*, the reciprocal value of the duration in 1/minute) in the first case. All rectangles in the first graph have the same area, while all rectangles in the second graph have the same side ratio. If one would, in the second graph, choose the same scale for both axes, all rectangles would become quadratic.

Additionally in Figure 1 there are two auxiliary lines for the height of each rectangle. These mark an interval in which the true value most probably is located. This is because the data are measured from a Welte-Mignon piano-roll, where it is necessary to consider a certain inaccuracy of punching. This inaccuracy is only relevant for shorter intervals.

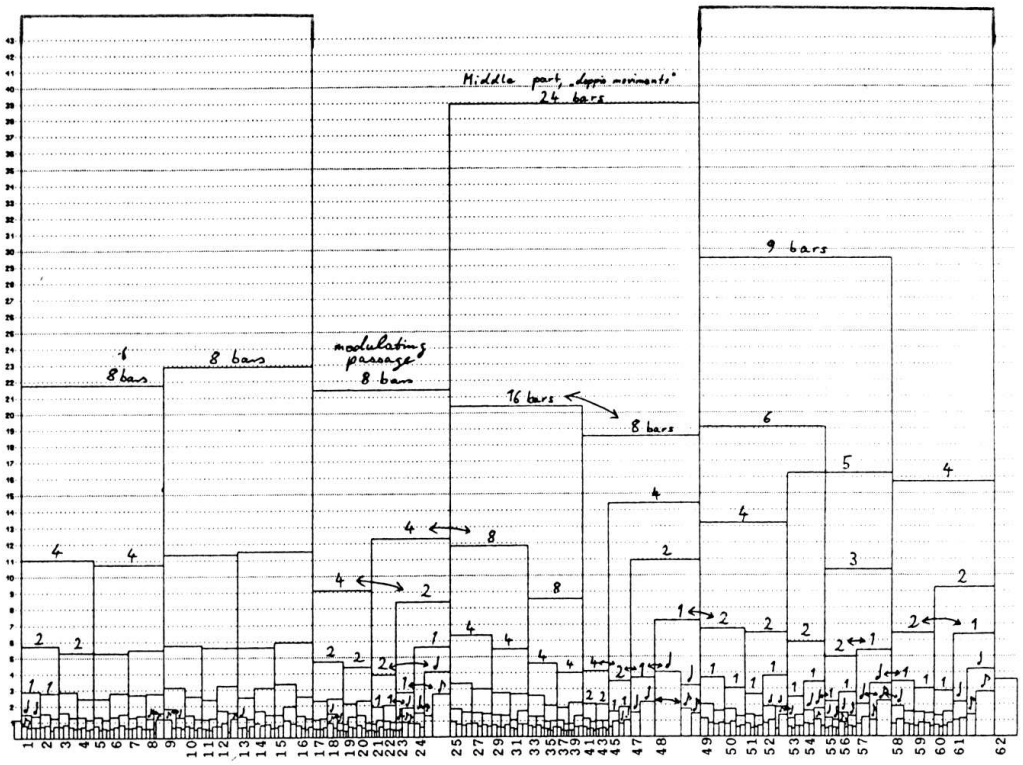

Figure 2. Saint-Saëns playing Chopin's Nocturne Op. 15, No. 2 in F# Major (recorded for Welte-Mignon in 1905).

The second type of graphic representation is useful to illustrate formal proportions and rhythmical phenomena. In Figure 2 one can see a real-time correspondence of parts with different quantities of bars at all levels: the 13-bar reprise has in real time the same length as the 16 opening bars; in the middle part the first 16 bars have nearly the same length

as the following, strongly retarded 8 bars; within this ritardando, successively four bars, two bars, one bar, and a half bar have nearly the same length in real-time. Since such correspondences occur in almost all ritardando passages of this recording, it must be regarded as a structural device to give a ritardando phrase a convincing form.

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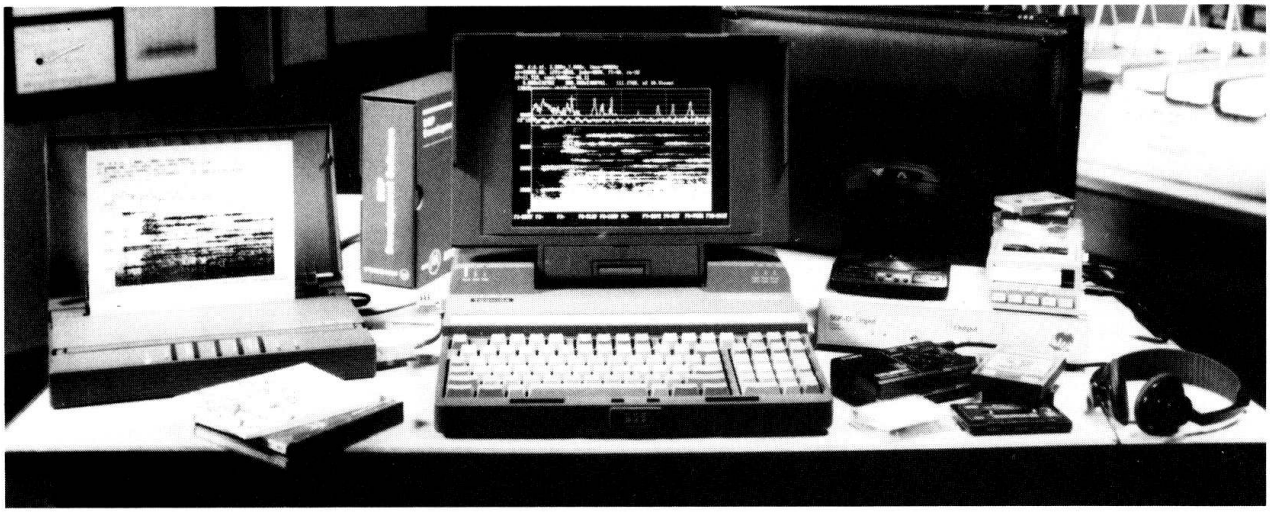
Emil H. Lubej:

A Portable Digital Acoustic Workstation in High Fidelity

Pursuit of the goal of developing portable equipment for ethnomusicological fieldwork has been enhanced by the advent of laptop computers. By connecting the laptop, if it has a suitable interface, with a digital recorder, one can store and analyze materials in the field and discuss preliminary results with the informants while still on location. This represents a significant advance over the former practice of doing the analysis at home long after the collection of data has been completed. A portable workstation combining a portable computer, printer, interface box, DAT recorder, casette recorder, and CD player was presented at the 31st World Conference of the International Council for Traditional Music, which was held in Hong Kong in 1991. A picture of the equipment is shown below. [Its modest size can be judged by comparison with the briefcase in the background.]



Photograph by Peter Cermak [used by permission]