

Dedicated Applications

Antiquities

Deciphering the Ugaritic Musical Notation

David Halperin of Tel-Aviv University reports that he is currently working on the decipherment of the Ugaritic musical notation. [Ugarit is the oldest known site of human habitation in Syria. Its civilization, which can be dated back to the fifth millennium, reached its peak in the fifteenth and fourteen centuries B.C. Poetic works of the Canaanites are recorded in Ugaritic.] The earliest known written music is that found in the excavations of the Royal Palace at Ras Shamrah. The notational "words" are Hurrian adaptations of terms known from Mesopotamian cuneiform tablets which deal with music theory. In the Mesopotamian tablets, the terms which parallel the Ugaritic ones are names for pairs of strings, or possibly for the intervals formed by pairs of strings.

The realization of the Ugaritic-Hurrian "words" (be they notes or tablature) in modern notation remains problematic. All decipherments so far made have been unsatisfactory, some even to their own authors. These attempts all assume that phonetically similar terms have semantically similar meanings—an assumption which requires proof, when one considers the separation in space and time between the Ugaritic and the Mesopotamian civilizations [the boundaries of Mesopotamia are included in modern Iraq]. It would be of value to have an objective and independent confirmation or rejection of the connection by the use of a quasi-cryptographic method, which ultimately generates what is known to statisticians as a seriation.

The "words" are assumed to be names of notes. These notes are assumed to have an underlying re-entrant order, which is the Ugaritic scale. The literary texts accompanying the notation are assumed to have no influence on the pitches of the scale. And the crucial assumption is that the notated melodies will tend to show a preference for conjunct motion.

Eleven different "words" are first listed in some arbitrary order. This list is then subjected to all possible permutations; as there are eleven different "words," some 40 million (factorial 11) are available. For each permutation, the distance for each pair of "words" is determined from a metric which is a function of the linear separation between the two "words" involved within the current permutation. Then, for each permutation, a calculation is made of the total "distance" found between adjacent "words" in all of the tablets and fragments. Finally, that permutation which yields the smallest total distance is chosen as being the one which represents the order of the notes in the Ugaritic scale.

The scale thus determined provides no indication as to which is the ascending direction, but the additional assumption of a tendency to prefer a descending melodic line can compensate for this lack. Also undetermined is the intervallic content of the scale, for which the method used has no answer. Nevertheless, an experimental transcription

of the complete hymn-tune found in one of the tablets produces a melody which seems to make sense.

The ordering produced by the procedure turns out to be essentially the same as that found in certain of the Mesopotamian instrument-tuning texts. The affinity thus demonstrated appears to justify the assumptions made; and the scale order found can therefore serve as a starting point for future attempts at decipherment.

Renaissance and Baroque Music

The Madrigals of Luca Bati

A critical edition of the madrigals of Luca Bati, a late-Renaissance composer from Florence, is currently being prepared by Piero Gargiulo at the Florence Conservatory using *SCORE*. The works will be published by the firm of Olschki in Florence in 1991. A small number of cantatas by Alessandro Scarlatti have also been input in Teletau code.

Thematic Cells in German Lute Music

In an ongoing series of research projects related to the automatic transcription of German lute tablatures from the sixteenth century, Hélène Charnassé and Bernard Stepien are seeking to identify thematic cells in the development of the lute pieces. This follows their previous work, at ERATTO/C.N.R.S. in Paris, on the reconstruction of free counterpoint and *in imitatio* entries. A program written by Stepien in PROLOG detects similarities relatively easily but confronts the musicologist with some false results. For example, some cells that are indeed similar are not actually thematic cells, and the concept itself seems to want further definition.

Results can be printed on dot matrix and laser printers using Michel Wallet's *Euterpe*. A proof copy of Hans Newsidler's "Disant adiu madame" is shown in the following illustration and may be readily compared with an edited copy, in which unisons and non-calculable rests have been added, on p. 105.

The Notation of Baroque Music

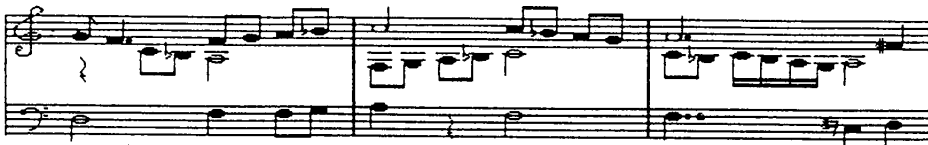
A graphic lexicon of Baroque musical notation is being developed by electronically scanning selected portions of early manuscripts and editions and storing the scanned images, with documentation and commentary, in a fully indexed data base. Sorted output of images and other data is obtainable, under arbitrarily chosen headings. The project, directed by Graham Pont at the University of New South Wales, has been funded through 1990 by the Australian Research Council. Custom software by Nigel Nettheim is used.

3. DISANT ADIU MADAME

HANS NEWSIDLER, 1536



| | | | | |
|---|---|-----|-----|---------------|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |
| 2 | 2 | o o | p p | k p k 5 o 5 n |
| | | c c | 4 4 | n |
| | | f C | C C | 2 |



| | | |
|---------|---------|-----------------|
| 6 | 7 | 8 |
| | | |
| f o n c | o 5 k p | 9 p k 5 |
| 3 | 2 g | k |
| 2 | 2 | n c n c 3 g 3 t |
| | | 2 |



| | | | |
|-----------|-----------|-------------|---------|
| 9 | 10 | 11 | 12 |
| | | | |
| 5 | 5 9 | 9 p k 5 k o | c p p p |
| 1 g g g 1 | n n o 3 g | 3 2 l f 1 c | C c g g |
| 1 | 1 | 2 | 1 |



| | | |
|-----------|-------------|-----------------------------|
| 13 | 14 | 15 |
| | | |
| 5 5 9 | 9 p k 5 k 5 | 5 o 5 o i o g o i 4 o i 4 i |
| n n c 3 g | 2 l n 1 | 3 |
| 1 1 1 2 | 2 | f |

VERSION IMITATION ET RESTRUCTUREE PROLOG 02-03-1990

Transcription and intabulated representation of Newsidler's "Disant adiu madame."

The *International Inventory of Villancico Texts*

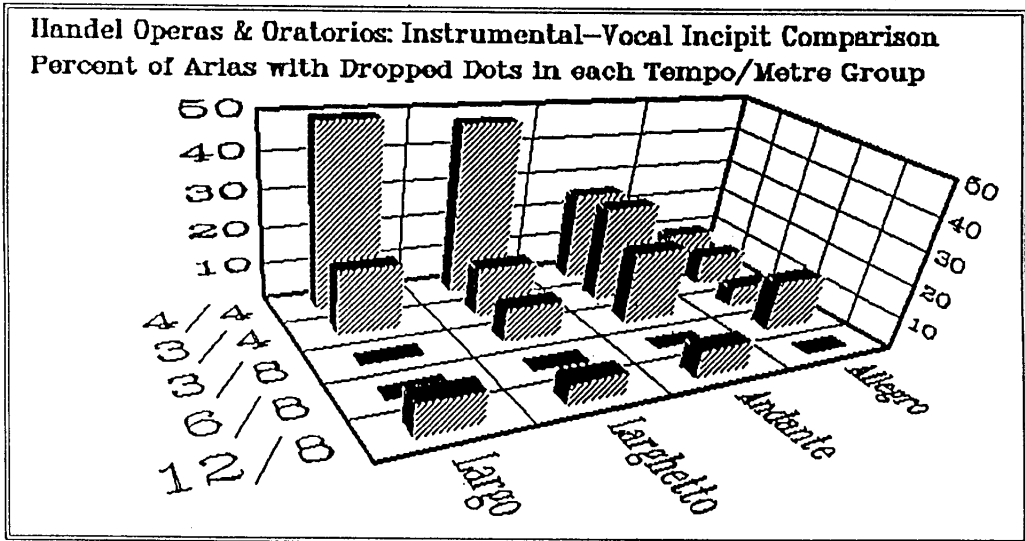
An *International Inventory of Villancico Texts* was initiated recently at the State University of New York (SUNY) at Binghamton. More than 3000 examples of *pliegos sueltos*, or text booklets, each with multiple entries, survive in libraries and archives, and thousands of villancicos are preserved in manuscript in Hispanic archives. The Inventory will provide linked files for the text booklets, the manuscript sources, and the text incipits. For information on access contact Paul D. Laird, Dept. of Music, SUNY-Binghamton, Binghamton, NY 13902-6000.

A Grammar of Legrenzi's Arias

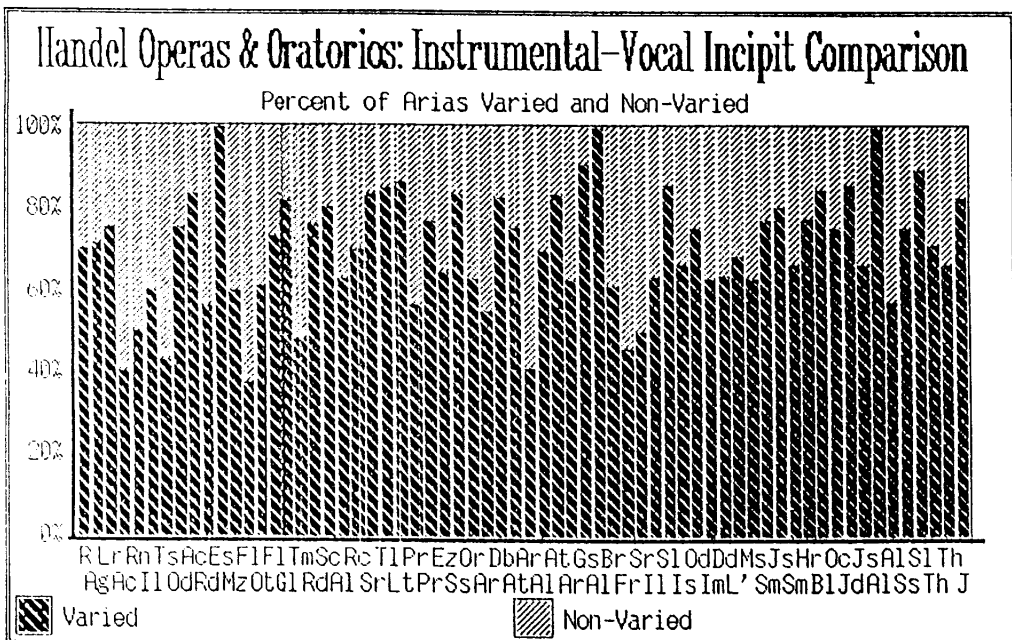
Since 1986 Mario Baroni and his collaborators have been investigating the arias of the seventeenth-century composer Giovanni Legrenzi with a view towards establishing a grammar for the works. This research, which is reported in "Relationships between Music and Poetry in the Arias of Giovanni Legrenzi (*Music and the Cognitive Sciences: Proceedings from the Symposium, 14-18 March 1988, Centre Pompidou, Paris*, ed. Stephen McAdams and Irène Delège as Vol. 4 [1989] of *Contemporary Music Review*), forms part of a larger project on the theory of European melody. The Legrenzi research has been carried out by Baroni, Rosanna Dalmonte, and Carlo Jacoboni.

Handel's Inconsistencies

Variations of note length are often found between otherwise corresponding instrumental introductions and vocal entries in the arias of Handel's operas and oratorios. In a computer analysis of incipits from 1043 arias, Graham Pont [see above] has shown that it is far more common for dots to be dropped from the vocal entries than added. This is more common in slow arias than in faster ones [Graph 1], except in 12/8, where the phenomenon is more uniform at different tempos. Pont maintains that the differences of instrumental and vocal note values in Handel's arias form part of a larger pattern of systematic variation. Vocal entries with notes of variant duration occur in 70% of the arias surveyed [Graph 2].



Graph 1. Profile of note-length discrepancies by meter and tempo in Handel's operas and oratorios.



Graph 2. Profile of note-length discrepancies by work. This is a chronological survey. Abbreviations for opera and oratorio titles given at the bottom should be read in zigzag fashion.

Classical and Romantic Music

Non-Musical Markings in Mozart's Autographs

Jane Perry-Camp has been constructing at Florida State University a data base and index of information concerning non-musical markings in Mozart's autographs. The meaning of these markings is thus far unexplained. In on-sight research, Perry-Camp has examined 330 autographs in the US and Europe with a view toward identifying consistent patterns, or layers of patterning, in the occurrence of these markings. A better understanding of these markings could provide insights into the habits of early copyists and the reliability of early copies, in which the markings were sometimes replicated. The flavor of the work is suggested by the profile of the string quartet K.417B shown in the following illustration.

| MVMT | MARK TYPES FOUND | TOTAL MARKS | KIND OF MEDIUM | INK MATCH CNTXT | INK NOT MATCH CNTXT | INK AMB | % INK MAT |
|-------------------------|------------------|-------------|----------------|-----------------|---------------------|---------|-----------|
| 1 | ---34567-9101112 | 27 | 01 | 9 | 15 | 1 | |
| 2 | ---34-6--9--12 | 13 | 01 | 5 | 4 | 1 | |
| 3 | -----6--910-- | 4 | 1 | 3 | 1 | 0 | |
| 4 | -----9-- | 2 | 1 | 1 | 1 | 0 | |
| 5 | ---34567-9101112 | 21 | 012 | 9 | 8 | 0 | |
| 5 (TOTAL MVMTS IN WORK) | | 67 | | 27 | 29 | 2 | 47 |

SUMMARY OF MARK TYPES FOR KV 417B - 1

| | | |
|----------------------|----|-----------------------|
| ACUTE-ACCENT-SHAPED | 6 | = 9 % OF TOTAL MARKS |
| GRAVE-ACCENT-SHAPED | 6 | = 9 % OF TOTAL MARKS |
| HYPHEN-SHAPED | 3 | = 4 % OF TOTAL MARKS |
| DOT-SHAPED | 11 | = 16 % OF TOTAL MARKS |
| APOST.&VERT.-SHAPED | 4 | = 6 % OF TOTAL MARKS |
| MISCELLANEOUS | 23 | = 34 % OF TOTAL MARKS |
| PROB MOZART-MADE | 7 | = 10 % OF TOTAL MARKS |
| PROB INK SPLATTERS | 3 | = 4 % OF TOTAL MARKS |
| PROB IN PAPER ITSELF | 4 | = 6 % OF TOTAL MARKS |

67

| MATERIALS SURVEYED FOR KV 417B - 1 | NUMBER OF ENTRIES |
|------------------------------------|-------------------|
| AUTOGRAPH | 134 |
| FIRST EDITION, NO. 1 (PARTS) | 585 |
| HAND COPY, NO. 1 (PARTS) | 30 |
| FIRST EDITION, NO. 2 (SCORE) | 194 |

Non-musical markings in the autograph and early copies of Mozart's String Quartet in D Minor, K.417B.

Thematic Attributes of Schubert's Music

At the University of New South Wales in Australia Nigel Nettheim is studying compositional gestures in the themes of Schubert's music. He is building a data base of single thematic phrases encoded using *SCORE* and custom software for its interrogation and analysis.

Edvard Grieg: A Digitized Data Base of Documents

The Grieg collection in the Public Library in Bergen, Norway, includes 25,000 hand-written manuscripts by the composer and a voluminous correspondence. A data base of these documents is currently in preparation as part of the MusikkFUNN project [see p. 137]. For musical materials, the current aim is to capture as much information as possible in grey-scaled bit-mapped images. Every effort is being made to preserve differences of contrast resulting from the use of pencil and ink. For this purpose, most documents can be scanned successfully at 300 dpi. The resulting quantity of data is enormous, however, and numerous methods of data compression are being considered. For text documents such as correspondence, a modern transcription is also provided [see the following page].

It is hoped that corresponding data in different media can be made available simultaneously. Thus an interested observer might be able to see the sketch of a piano work and hear Grieg himself perform it in an original recording or to read Henrik Ibsen's letter concerning *Peer Gynt* [illustration following] while seeing a transcription of the work. The documents will be classified and catalogued according to the NORMARC-format. Distribution by electronic mail, CD-ROM, and optical disk is intended. Further information is available from Dagfinn Bach, Western Norway Research Centre, PO Box 142, N-5801 Sogndal, Norway.

Dresden den 3^{de} Marts 1875.

Kære herr Grieg!

Som svar på Deres venlige brev kan jeg idag gøre Dem en meddelelse, der, efter hvad De oplyser om Kristiania theaters orkester, neppe vil være Dem uvelkommen.

Jeg kan nemlig sige Dem at Peer Gynt's ides påregnes til opførelse i denne spilletermin. De vil altså have hele foråret og den største del af sommeren til Deres rådighed. Jeg beder Dem indstændigt, ikke at gøre indrømmelser lige overfor dårlige orkester-tilstande. Instrumentér Deres musik efter en ideal målestokk og lad så dem deroppe sørge for at få den udført. Alt andet vilde være en mand, som Dem, uværdigt og dessuden til skade for os begge.

I midten af April måned forelægger jeg min bolig til München, inden den tid kommer jeg rimeligvis på et par dage til Leipzig i literære forretninger. Kært skulde det være os om vi her i Dresden kunde have den fornøjelse at se Dem og Deres ærede frue forinden von afrejse. - Med mange hilsener

Deres venskabeligst forbundne
Henrik Ibsen.

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Deres venskabeligst forbundne
Henrik Ibsen

Letter from Henrik Ibsen to Edvard Grieg concerning *Peer Gynt* in Ibsen's hand (left) and in an electronic transcription (right).

American Music

Godey's *Lady's Book*

Julia Koza (author of a Ph.D. thesis on "Music and References to Music in Godey's *Lady's Book*, 1830-77," University of Minnesota, 1988) managed much of her thesis information on a data base management system called *Notebook II* (originally from Pro/Tem Software; now published by Oberon Resources), which places no limits on field size and enables every field to have text field properties. In addition to making the hardcopy version of her thesis available through University Microfilms International, she is able and willing to do searches and sorts of her data on request.

Music for Children's Choirs

Kathryn Smith's data base in Microsoft *Word* of choral works commissioned for children's choirs is available on disk or in print from the author at Webster University, St. Louis, MO 63119.

African and Afro-Latin American Rhythms

Emilio Mendoza is attempting to create a machine-readable data base of selected African and Afro-Latin American rhythmic ensemble music excerpts at the Latin American Center for Graduate Studies in Music at the Catholic University of America in Washington, D.C. Through analysis of the material collected, he hopes to develop a rhythmic and temporal grammar. He is using custom software with *Finale* on a Macintosh.

Gershwin's Piano Rolls

From 1916 to 1926 George Gershwin supported himself as an arranger of music recorded on piano rolls. When his own compositions began to reach a large audience, he curtailed his involvement with piano rolls. The rolls provide important documentation of his early development as a composer and contain much music not hitherto available in transcription.

For two years Artis Wodehouse of Palo Alto, CA, has been heading a project to generate printed scores from these rolls. In the roll technology of the 1920's, air was pumped by bellows through holes in the paper to depress notes of the player piano. Currently a video roll reader designed by David Quinlan for Micro-W in Butler, NJ, converts light emitted through these holes to machine-readable information from which synthesizer output can be generated. The synthesizer output is, in turn, converted to printed notation via *Finale's* Enigma file format, with some fine tuning for this project.

Micro-W plans to market the Gershwin rolls for synthesizers and the Yamaha Disklavier. Wodehouse is creating editions of the previously unedited music. These will appear under the imprint of Warner Publications, Inc. Recordings of the works from new performances on a pneumatic Pianola player will appear on the Nonesuch recording label. Micro-W is located at 1342B Route 23, Butler, NJ 07405.