

THE HAND AND THE ART OF MEMORY*

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The relation between music and rhetoric has attracted the attention of musicologists ever since 1908, when Arnold Schering published his pioneering essay on the theory of musical figures in the seventeenth and eighteenth centuries.¹ The majority of those who studied this relation concentrated on the theory and practice of the Baroque period, though already in the 1930s Schering's students extended research to include also the sixteenth century.² But there have been very few attempts, thus far, to investigate connection between rhetoric and music during the Middle Ages.³ Already in 1944 Wilibald Gurlitt invited such an investigation, writing: "the question of the common ground of music and rhetoric, which arises especially from their common older terminology, leads deep into the content and conduct of teaching in the medieval Latin school" ⁴ In the present paper, I venture to take up Gurlitt's invitation in an attempt

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¹ "Die Lehre von den musikalischen Figuren," *Kirchenmusikalisches Jahrbuch*, XXI (1908), 106–14. For a useful bibliography of this subject, see George J. Buelow, "Music, Rhetoric, and the Concept of the Affections: a Selective Bibliography," *Notes*, XXX (1973–74), 250–59.

² See especially Heinz Brandes, *Studien zur musikalischen Figurenlehre im 16. Jahrhundert* (Berlin: Tritsch & Huther, 1935) and Hans-Heinrich Unger, *Die Beziehungen zwischen Musik und Rhetorik im 16.–18. Jahrhundert, Musik und Geistesgeschichte*, Berliner Studien zur Musikwissenschaft 4 (Würzburg: Konrad Tritsch, 1941).

³ Among the few studies touching upon this question, see in particular F. Alberto Gallo, "Pronuntiatio. Ricerche sulla storia di un termine retorico-musicale," *Acta musicologica*, XXXV (1963), 38–46 and Rudolf Flotzinger, "Vorstufen der musikalisch-rhetorischen Tradition im Notre-Dame Repertoire?" in Theophil Antonicek, Flotzinger, and Othmar Wessely, eds., *De ratione in musica. Festschrift Erich Schenk zum 5. Mai 1972* (Kassel: Bärenreiter, 1975), pp. 1–9.

⁴ "Die Frage der Grundlageneinheit von Musik und Rhetorik, wie sie besonders aus der Gemeinschaft ihrer älteren Begriffswelt hervorgeht, führt tief in den Lehrgehalt und Lehrbetrieb der mittelalterlichen Lateinschule" "Musik

to throw some light on the possibility of a rhetorical background to a device which was indeed close to the very center of the content and conduct of medieval music teaching, the so-called "Guidonian" hand. But it will first be necessary to study the theoretical expositions of the hand between the late thirteenth century (when it reached its fully developed form) and the mid-sixteenth century (when new developments in music theory started to erode its prestige), and to explain the hand in the terms it was introduced to a music student of the period. To be sure, the terminology of the period was not so uniform as it may appear in this paper, which will choose those terms most commonly used. It will moreover be necessary to follow the emergence and early development of the hand in the treatises from the late ninth to the early twelfth century, in order that we may better understand the aims of its inventor.

It should be emphasized that the term "hand" as used in this paper preserves its ambiguity in the Middle Ages and the Renaissance, when it stood both for a representation of the human left hand with certain symbols inscribed on it, and for the content so represented. The latter was of course the more important of the two. Johannes Tinctoris at the very beginning of his treatise on the hand, written in or after 1477, explained:

"The hand is a short and useful teaching, briefly displaying the qualities of the steps of music. It is called, however, the 'hand' as the containing for the contained, since any hand . . . contains that teaching in the tips and joints of its fingers."⁵

The commonly used steps were organized by the theorists of the late Middle Ages and the Renaissance into a structure normally referred to as the "hand" (*manus*) but occasionally known also by other names, especially as the "scale" (*scala*). The hand was so fre-

und Rhetorik. Hinweise auf ihre geschichtliche Grundlageneinheit" in Gurlitt, *Musikgeschichte und Gegenwart. Eine Aufsatzfolge*, ed. Hans Heinrich Eggebrecht, Beihefte zum Archiv für Musikwissenschaft 1, vol. I (Wiesbaden: Franz Steiner, 1966), p. 65.

⁵ "Manus est brevis et utilis doctrina ostendens compendiose qualitates vocum musicae. Dicitur autem hic manus ut continens pro contento, namque manus quaelibet . . . doctrinam istam continet suorum digitorum summitatibus et iuncturis." *Expositio manus* in Tinctoris, *Opera theoretica*, ed. Albert Seay, *Corpus Scriptorum de Musica* 22, vol. I ([Rome:] American Institute of Musicology, 1975), p. 31. For a chronology of Tinctoris's treatises, see Rudolf Schäfke, *Geschichte der Musikästhetik in Umrissen*, 2nd ed. (Tutzing: Hans Schneider, 1964), pp. 236ff., n. 1.

quently described, or presupposed, by the theorists that we may safely assume it was the most fundamental conceptual equipment shared by all musicians of our period. Its content and structure may best be learned from Tinctoris who devoted a whole treatise to its exposition,⁶ using terms employed most frequently by the theorists and defining them with the precision befitting the author of a dictionary of musical terms.⁷

Some common synonyms of *manus*, such as the already noted *scala* (used, for instance, by Adrian Petit Coclico)⁸ or *gamma* (used by Tinctoris, among others),⁹ clearly indicate that the hand is the direct ancestor of the modern gamut or scale; that is, a set of steps (pitches taken not in absolute terms, but relative to other steps in the gamut) arranged in an ascending order and representing the tonal material of music. The hand, however, provides more information than the modern gamut, as we shall see shortly. The steps of the gamut in the hand are represented in a letter notation by the twenty “clefs” (*claves*),¹⁰ Γ, A-G, a-g, and aa-ee, which indicate the whole tones and semitones (diatonic and chromatic) between the successive steps.

The letter notation was to provide not only a neutral means of representing the gamut but also information on the gamut’s structure. The use of the same letter for steps an octave apart indicates their

⁶ *Opera theoretica*, vol. I, pp. 31–57.

⁷ *Terminorum musicae diffinitorium* ([Treviso: Gerardo de Lisa, ca. 1473]).

⁸ “He will . . . apply himself to learn . . . the musical hand or scale” (“Dabit . . . operam ut . . . Musicalem manum sive scalam perdiscat”) *Compendium musices* (Nuremberg: Ioannes Montanus and Ulricus Neuber, 1552), fol. Bijr, trans. Albert Seay, Colorado College Music Press Translations 5 (Colorado Springs: The Colorado College Music Press, 1973), p. 6.

⁹ “And this teaching hand is called by another name, ‘gamut,’ from that letter Γ which is called gamma by the Greeks, not without cause, for a naming is made from a most appropriate element; but that which comes first is seen to be more appropriate. Therefore, since gamma, that is, G, comes first in the hand, from this it is correctly named gamut.” (“Atque manus haec doctrinalis alio nomine Gamma dicitur ab ista littera Γ quae apud Graecos gamma vocatur, nec sine causa namque a digniori fit denominatio, sed quod praecedat dignius esse videtur. Ergo quom in manu gamma, id est G, praecedat, ab eo manus gamma recte nominatur.”) Tinctoris, *Expositio manus*, p. 32, trans. Albert Seay, “The Expositio manus of Johannes Tinctoris,” *Journal of Music Theory*, IX (1965), 201.

¹⁰ For an excellent discussion of this term, see Fritz Reckow, “Clavis” in Hans Heinrich Eggebrecht, ed., *Handwörterbuch der musikalischen Terminologie* (Wiesbaden: Fritz Steiner, 1971).

essential equivalence. Since the steps of the gamut are pitches taken not absolutely but only in relation to other steps, it must follow that the steps of identical patterns – and such are the steps an octave apart – are essentially equivalent. The anonymous *Dialogus* written near Milan around 1000 and attributed since the twelfth century to an Abbot Odo¹¹ is the earliest surviving treatise in which the clefs (here called “letters” [*litterae*]) from A to aa were used as “notes” (*notae*) representing the steps of the Greater Perfect System with the *synemmenon* tetrachord transmitted by Boethius (with an additional step represented by Γ added a whole tone below). The author explains that the reason “why the same letters are used both in the first and in the second part” (that is, octave) is that “both parts so agree with each other that whatever letters form a tone, semitone, diatessaron, diapente, or diapason in the first part will likewise be found to do so in the second part.”¹²

The letters were a very imperfect notational means since they indicated only the steps and left out all other information provided by the neums. A notation to combine the information provided by the neums with a precise way of indicating the steps by means of letters was described for the first time by Guido of Arezzo in a prologue to an antiphoner written around 1030.¹³ Radically transforming and improving a device present in an embryonic form already

¹¹ On the author and date of the *Dialogus*, see Michel Huglo, “L’auteur du ‘Dialogue sur la musique’ attribué à Odon,” *Revue de musicologie*, LV (1969), 119–71. The text of the treatise is in Martin Gerbert, ed., *Scriptores ecclesiastici de musica sacra potissimum*, vol. I (St. Blasien: Typis San Blasianis, 1784), pp. 251–64; partial translation in Oliver Strunk, *Source Readings in Music History* (New York: Norton, 1950), pp. 103–16.

¹² “. . . cur eadem litterae in prima et secunda parte fiant . . .” “. . . adeo inter se utraque pars concordat, ut quaecumque litterae in prima parte tonum vel semitonium, vel diatessaron vel diapente vel diapason faciunt, similiter et in secunda parte facere comprobentur.” Pseudo-Odo, *Dialogus* in Gerbert, *op. cit.*, pp. 254f., trans. Strunk, *op. cit.*, p. 108.

¹³ Guido Aretinus, *Prologus in Antiphonarium*, ed. Joseph Smits van Waesberghe, *Divitiae Musicae Artis A.III* (Buren: Frits Knuf, 1975). I follow the chronology of Guido’s treatises presented by Claude V. Palisca in *Hucbald, Guido, and John on Music*, ed. Palisca (New Haven: Yale University Press, 1978), pp. 50f. Guido lists the types of information provided by the neums at the end of his prologue. For a study of Guido’s notation, see Joseph Smits van Waesberghe, “The Musical Notation of Guido of Arezzo,” *Musica disciplina*, V (1951), 15–53. Guido’s relation to Pseudo-Odo is discussed in Hans Oesch, *Guido von Arezzo. Biographisches und Theoretisches unter besonderer Berücksich-*

some hundred (and perhaps as much as hundred seventy) years earlier in the anonymous *Musica enchiriadis*¹⁴, and allowing a spatial representation of the gamut by notating the metaphorically “lower” or “higher” steps on the literally lower or higher horizontal “rows” (*ordines*, the term used by Guido) on the parchment, Guido fashioned the staff which is still in use. It employed as rows both the lines and the spaces separating them, with the ascending order of the rows representing the ascending steps of the Pseudo-Odonic gamut now extended to *dd*, and with the letters of the *Dialogus* (as well as the subsequently abandoned colored lines) used as clefs identifying the rows.

The staff is the very first element of the hand which Tinctoris explains in his *Expositio manus*. The hand contains twenty “places” (*loca*) defined by Tinctoris as the sites of the steps¹⁵ and identified as the alternating lines and spaces of the staff. Thus, Tinctoris’ “place” is Guido’s “row” (change of terms a possible significance of which will be explored shortly). The places are marked by the clefs,¹⁶ the place of the lowest clef, Γ , being always a line. The number of places corresponds, of course, to the number of clefs. One clef suffices to define all the places of the staff in notation.

The gamut and its notation constitute only one part of the information contained in the hand. The other part consists of a network of relations between the steps of the gamut. This is probably what Tinctoris has in mind when he defines the hand at the beginning of his treatise as “a short and useful teaching, briefly displaying the qualities

tigung der sogenannten odonischen Traktate, Publikationen der Schweizerischen Musikforschenden Gesellschaft II/4 (Bern: Paul Haupt, 1954), pp. 71–100 and in Lawrence A. Gushee, “Questions of Genre in Medieval Treatises on Music” in Wulf Arlt, Ernst Lichtenhahn, and Hans Oesch, eds., *Gattungen der Musik in Einzeldarstellungen. Gedenkschrift Leo Schrade*, vol. I (Bern and Munich: Francke, 1973), pp. 404–10.

¹⁴ Gerbert, *op. cit.*, pp. 152–73. The much discussed question of the provenance, date, and authorship of this treatise has been recently summarized in Lawrence Gushee, “Musica enchiriadis” in Stanley Sadie, ed., *The New Grove Dictionary of Music and Musicians*, vol. XII (London: Macmillan, 1980), pp. 800ff. There can be little doubt that Guido was familiar with the treatise. See Huglo, *op. cit.*, pp. 131 and *passim*.

¹⁵ “. . . a place is the site of the steps.” (“. . . locus est vocum situs.”) *Expositio manus*, p. 32.

¹⁶ “. . . a clef is the sign of the place of the line or space.” (“. . . clavis est signum loci lineae vel spatii.”) *Ibid.*, p. 37.

of the steps of music.”¹⁷ The qualities of, or relations between, the steps of the gamut are indicated by means of the six “syllables” (*voces*) – ut, re, mi, fa, sol, la – which name the steps of the ascending hexachordal series called the “deduction” (*deductio*), with only seven deductions to be found within the hand, starting on Γ , C, F, G, c, f, g, respectively. The system of the seven deductions serves to demonstrate the “affinities” (*affinitates*) between the individual steps of the gamut. The corresponding steps of different deductions are related in quality since, within the range of their deductions, they are surrounded by identical intervallic patterns.

At the same time, the system of deductions serves as an aid to a method of sight-singing known as “solmization” (*solfisatio*).¹⁸ Once the student remembers which syllable or syllables are associated with each step of the gamut and can sing the hexachord, he will be able to read any melody at sight by substituting syllables for steps. When a melody goes beyond a deduction, a “mutation” (*mutatio*) into another deduction has to be made on the step which belongs to both deductions by mutating the syllable of the old deduction into that of the new one.¹⁹

While the fully developed system of the seven deductions seems to have appeared only in the second half of the thirteenth century,²⁰ its basic elements were suggested by Guido of Arezzo. In his *Micrologus*, written probably between 1026 and 1028, Guido demonstrated the affinities between D, E, F and the steps a fourth below (or a fifth above), respectively, by indicating that the intervallic patterns around

17 “. . . brevis et utilis doctrina ostendens compendiose qualitates vocum musicae.” *Expositio manus*, p. 31.

18 “. . . solmization is the pronouncing of the syllables by their names in singing.” (“. . . solfisatio est canendo vocum per sua nomina expressio.”) *Ibid.*, p. 52. For other forms of the term used during the Middle Ages and the Renaissance, see Georg Lange, “Zur Geschichte der Solmisation,” *Sammelbände der Internationalen Musikgesellschaft*, I (1899–1900), 541f.

19 “. . . a mutation is the change of one syllable into another.” (“. . . mutatio est unius vocis in aliam variatio.”) Tinctoris, *Expositio manus*, p. 48, trans. Seay, “The *Expositio manus* of Johannes Tinctoris,” p. 218.

20 It is present in the writing of Elias Salomon (*Scientia artis musicae* in Gerbert, *op. cit.*, vol. III, pp. 16–64; written in 1274), Hieronymus de Moravia (*Tractatus de musica*, ed. Simon M. Cserba, *Freiburger Studien zur Musikwissenschaft* 2 [Regensburg: Friedrich Pustet, 1935], pp. 46–55; written between 1272 and 1304), and Engelbert of Admont (*De musica* in Gerbert, *op. cit.*, vol. II, pp. 287–369; written between 1276 and 1325).

the corresponding steps were identical so long as one compared the patterns within the ranges C-a and Γ -E (or G-e). The demonstration justified the placing of the same mode at different but corresponding steps, protus at A, D, or a, deuterus at B, E, or \natural , and tritus at C, F, or c.²¹ Guido further observed that when b was used instead of \natural , G sounded as protus, a as deuterus, and b as tritus.²² Thus he indirectly suggested one more range within which the intervallic patterns could be compared, F-d with b instead of \natural .²³

In his last surviving treatise, *Epistola de ignoto cantu*²⁴ of around 1032, Guido introduced his final invention, a method of singing an "unknown chant" at sight, without the help of the monochord. Instead of reading the steps first on the monochord and then repeating them vocally, the singer should fix the steps in his memory, learning by heart a melody the consecutive phrases of which start on consecutive steps of the gamut. Guido provided such a melody²⁵ for learning the steps from C to a and the text he associated it with could yield the corresponding syllables from ut to la. Whether Guido himself used the syllables to name the steps, let alone to solmizate, must remain a matter of conjecture, but the use of the syllables to name the steps of the hexachords starting on Γ and C, a rudimentary solmization and mutation, can be documented already in the second half of the eleventh century.²⁶

The seven deductions do not exhaust the content of the fully developed hand as described by Tinctoris. In addition, the deductions starting an octave apart are considered to have the same "property"

²¹ Guido Aretinus, *Micrologus*, ed. Joseph Smits van Waesberghe, *Corpus Scriptorum de Musica* 4 ([Rome:] American Institute of Musicology, 1955), pp. 117-21.

²² *Ibid.*, pp. 124f.

²³ The steps which led to the development of the concept of the deduction have been convincingly reconstructed in Richard L. Crocker, "Hermann's Major Sixth," *Journal of the American Musicological Society*, XXV (1972), 19-37. For an earlier attempt, see Walter Wiora, "Zum Problem des Ursprungs der mittelalterlichen Solmisation," *Die Musikforschung*, IX (1956), 263-74.

²⁴ In Gerbert, *op. cit.*, vol. II, pp. 43-50.

²⁵ See Carl-Allan Moberg, "Die Musik in Guido von Arezzos Solmisationshymne," *Archiv für Musikwissenschaft*, XVI (1959), 187-206.

²⁶ See Joseph Smits van Waesberghe, *Musikerziehung. Lehre und Theorie der Musik im Mittelalter*, *Musikgeschichte in Bildern* III/3 (Leipzig: VEB Deutscher Verlag für Musik, 1969), pp. 116f.

(*proprietas*) or quality, since they maintain the same relationship with the surrounding deductions.²⁷ While the system of the seven deductions is designed to demonstrate that the corresponding steps of different deductions are related in quality, the system of the three properties shows that different deductions of the same property are related in quality.

In sum, the hand is precisely the described correlation of the forty-two syllables of the seven deductions with the twenty clefs and places of the staff. This content of the hand was commonly summarized in a diagram of the type represented by Figure 1.²⁸ The clefs and places provide knowledge of the content and structure of the gamut and a method of notating all its steps. The syllables, deductions, and properties provide knowledge of the network of the affinities between the steps and a method of reading the steps from the notation. To know the hand means to know all the steps commonly used in music as well as their relationships and to be able to write them down and to read them.

For this knowledge to be fully operative the student must fix the whole structure firmly in his memory. In particular, if the system of the deductions is to be a truly effective aid to sight-singing, the student must be trained to associate automatically particular clefs with the appropriate syllables. In order to facilitate the teaching and memorizing of the whole structure and especially of the individual clefs with their corresponding syllables, they were often (though by no means always) inscribed on the finger tips and joints of the inner surface of the left hand from the tip of the thumb down in a spiral course; since there was no tip nor joint left for the last clef, it was inscribed on the same joint as the penultimate clef (the third joint of the middle finger) but on the reverse of the hand (a fine point usually misunderstood today, since on the diagrams representing the hand this highest clef appears, for obvious reasons, above the middle finger). (See Figure 2.)²⁹ The name of the whole structure

²⁷ *Expositio manus*, pp. 44f.

²⁸ Figure 1 comes from Ms. Ghent, Universiteitsbibliotheek, 70 (71), fol. 108r (copied in 1503–04) reproduced from Smits van Waesberghe, *Musikerziehung*, p. 119, fig. 56.

²⁹ Figure 2 comes from Ms. Ghent, Universiteitsbibliotheek, 70 (71), fol. 108v reproduced from Smits van Waesberghe, *Musikerziehung*, p. 143, fig. 82.

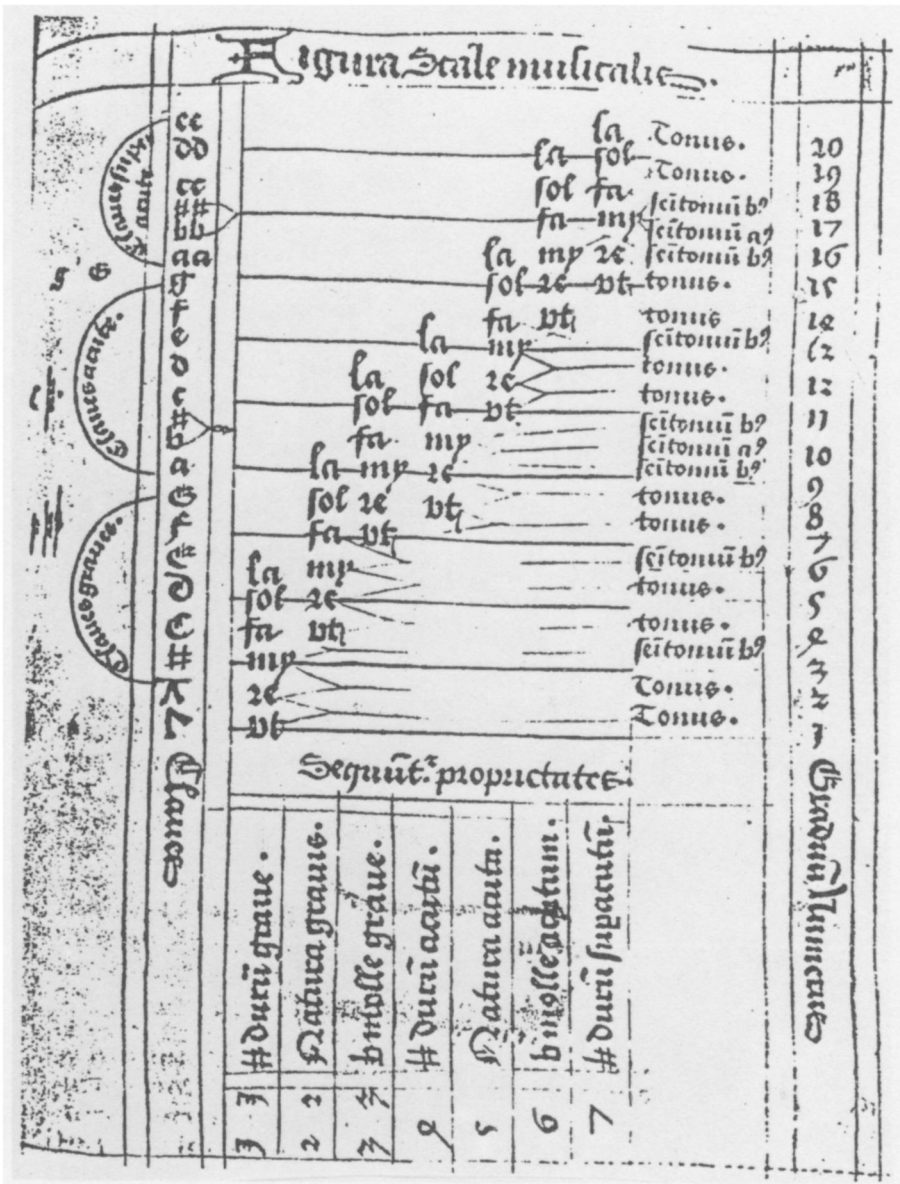


Figure 1

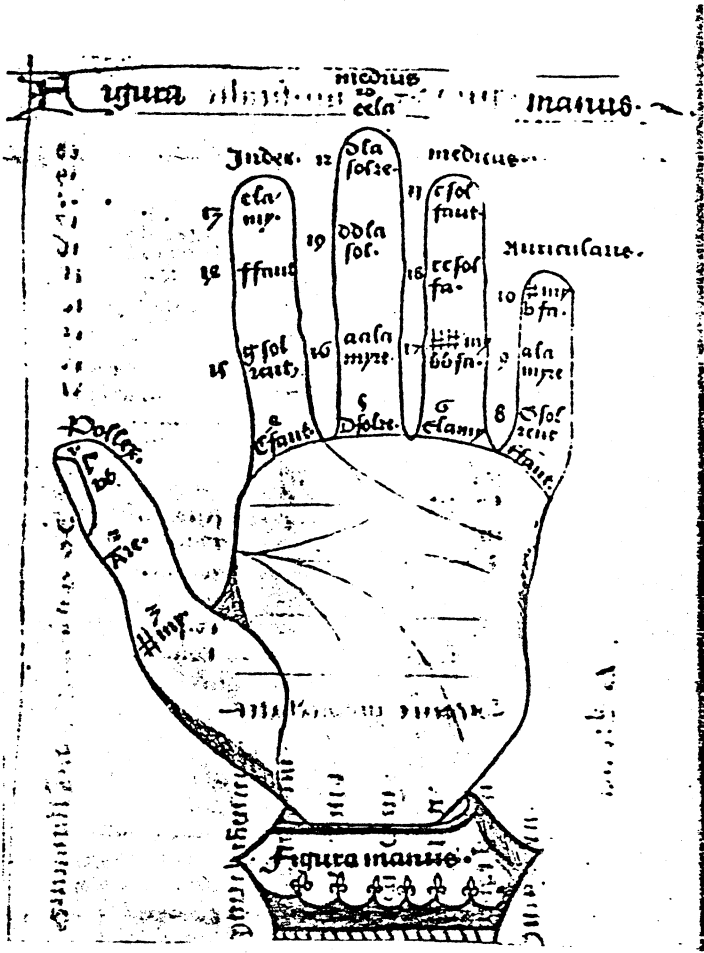


Figure 2

derived, obviously, from this particular method of representation. The hand-diagram was both a mnemonic and a pedagogical device. The association of a clef and its syllables with a specific place on the hand helped memory and provided the teacher with a convenient method of demonstrating and practicing the steps and intervals of the gamut. When discussing the question why the left hand was chosen for the device, Tinctoris characteristically explained that “. . . the places in that left hand are more easily indicated by the index finger of the right, even though some people most aptly indicate the places on the thumb of the left hand with the index finger of the same hand and the places on the other fingers similarly by the thumb of the same hand; wherefore they may use only one hand, that is, left, in the instruction of this particular kind of lesson.”³⁰

While the mnemonic function of the hand-diagram is common knowledge, the possibility that the diagram may belong to a venerable tradition of such mnemonic devices has been generally overlooked by musicologists and by historians of the mnemotechnics alike. Joseph Smits van Waesberghe, who made the most comprehensive study to date of the early history of the hand-diagram,³¹ correctly stressed the ancient and medieval pre-Guidonian use of the hand and fingers as a didactic and mnemonic device to be the tradition from which the musical hand developed, but he neglected the history of the mnemotechnics altogether. The historians of the *ars memorativa*, on the other hand, pay no attention to its musical application.³²

³⁰ “. . . indice manus dextrae loca in ipsa manu sinistra aptius indicantur, licet nonnulli loca pollicis sinistrae manus indice eiusdem et loca caeterorum digitorum pollice similiter eiusdem aptissime indicent. Quo fit ut unica manu, scilicet sinistra, in traditione huiusmodi doctrinae utantur.” *Expositio manus*, p. 32, trans. Seay, “The *Expositio manus* of Johannes Tinctoris,” pp. 200f. Similar explanations may be found, e. g., in Prosdocimus de Beldemandis, *Tractatus plane musicae*, Ms. Lucca, Biblioteca Governativa, 359, fol. 58r and Domingo Marcos Durán, *Comento sobre Lux bella* (Salamanca: [Juan de Porras,] 1498), p. 64.

³¹ *Musikerziehung*, pp. 120–43. See also his earlier treatment of the topic in *De musico-paedagogico et theoretico Guidone Aretino eiusque vita et moribus* (Florence: Leo S. Olschki, 1953), pp. 114–23.

³² See Ludwig Volkmann, “*Ars memorativa*,” *Jahrbuch der kunsthistorischen Sammlungen in Wien*, Neue Folge, III (1929), 111–200; Helga Hajdu, *Das mnemotechnische Schrifttum des Mittelalters* (Vienna: Franz Leo, 1936);

And yet, knowledge of the tradition of the artificial memory in Antiquity and the Middle Ages may throw an interesting light on certain aspects of the hand.

It is understandable that the art of memorizing, of propping the natural memory with artificial devices, would be important in the centuries before the invention of printing greatly increased the availability of copies of texts and made the task of memorization less urgent. The ancient form of the art, which – like so many others – was invented by the Greeks, reputedly by the poet Simonides of Ceos (*ca.* 556–468 B. C.), is known to us from three Roman textbooks of rhetoric, the anonymous *Ad. C. Herennium*, written between 86 and 82 B. C., Cicero's *De oratore*, finished in 55 B. C., and Quintilian's *Institutio oratoria*, published in 96 A. D. Rhetoric, the art of constructing a discourse, systematized in these treatises had five divisions of which "memory" (*memoria*), which taught how to memorize a speech, was the fourth. (The other four were "invention" [*inventio*] of the subject matter of the speech, its "disposition" [*dispositio*] or orderly arrangement, "diction" [*elocutio*] or style, expressing the subject in appropriate words, and "delivery" [*actio*] of the speech with suitable voice and gestures.) When in the late Antiquity the number of the liberal arts, studies worthy of a free man, had been fixed at seven and were organized into the standard sequence which, thanks to the authoritative description of Martianus Capella (*De nuptiis Philologiae et Mercurii*, written between 410 and 439), was adopted in the Middle Ages as the basic organization of knowledge, rhetoric became the second of the arts, after grammar and before dialectic (the three eventually taken collectively as the

Paolo Rossi, "Immagini e memoria locale nei secoli XIV e XV," *Rivista critica di storia della filosofia*, II (1958), 148–90; *idem*, "La costruzione delle immagini nei trattati di memoria artificiale del Rinascimento" in Enrico Castelli, ed., *Umanesimo e simbolismo*, Archivio di Filosofia (Padua: CEDAM, 1958), pp. 161–78; *idem*, *Clavis universalis. Arti mnemoniche e logica combinatoria da Lullo a Leibniz* (Milan: Riccardo Ricciardi, 1960); Frances A. Yates, *The Art of Memory* (London: Routledge & Kegan Paul, 1966); Herwig Blum, *Die antike Mnemotechnik*, *Spudasmata* 15 (Hildesheim: Georg Olms, 1969). To be sure, both Volkmann (p. 141) and Hajdu (p. 53, n. 32) mention the use of the hand as a mnemonic device in music education, but they do not go beyond stating this fact. My summary below is indebted in particular to Dr. Yates's stimulating study.

trivium), arithmetic, geometry, music, and astronomy (the Boethian mathematical *quadrivium*).³³

For our purpose *Ad Herennium* is by far the most important of the three rhetorical treatises mentioned above. It is the only one to give a complete exposition of the classical art of memory, and it played the key role in transmission of the art to the Middle Ages (the other two treatises, if not entirely unknown, were not in general circulation until the fifteenth century). It was often copied and imitated from the ninth century on. Thought to have been written by Cicero himself, it was often referred to as his “Second” or “New Rhetoric” (to distinguish it from his “First” or “Old Rhetoric”, *De inventione*).³⁴ Thus, it is in *Ad Herennium* that we shall find the basic elements, not only of the classical, but also the medieval mnemotechnics.

There are three such elements: First, what is to be remembered, second, how to remember it, third, in what order. The orator may choose to memorize “things” (*res*), that is, objects, notions, or arguments that are the subject matter of his speech, or he may want to remember “words” (*verba*), literally, all the words of the oration. Thus, there is “memory for things” (*memoria rerum*) and “memory for words” (*memoria verborum*). In both cases, what is to be remembered is represented by means of “images” (*imagines*) or “notes” (*notae*) of things or words:

“An image is, as it were, a figure, a note, or portrait of the thing we wish to remember. . . . Since, then, images must resemble things, we ought ourselves to choose from all things likenesses for our use. Hence likenesses are bound to be of two kinds, one of things, the other of words. Likenesses of things are formed when we enlist images that present a general view of the matter with which we are dealing; likenesses of words are established when each single noun or appellative is notated in memory by an image.”³⁵

³³ For an introduction to the system of liberal arts, rhetoric, and their relevance to the medieval learning, see especially Ernst Robert Curtius, *European Literature and the Latin Middle Ages* (New York: Pantheon Books, 1953), pp. 36–78.

³⁴ For the transmission and diffusion of the ancient memory treatises, see Yates, *op. cit.*, pp. 66ff., and bibliography cited there.

³⁵ “Imagines sunt formae quaedam et notae et simulacra eius rei quam meminisse volumus Quoniam ergo rerum similes imagines esse oportet, ex omnibus rebus nosmet nobis similitudines eligere debemus. Duplices igitur similitudines

Images should be of such kind that they may be firmly imprinted in memory and that, once recalled, they may automatically bring out by association whatever they were supposed to represent. Thus, the preferred images are striking and unusual. But other types of images can also be of service. In discussing the memory for words, in particular, the author of *Ad Herennium* mentions the Greek practice which may have possibly involved the use of shorthand symbols or *notae* as images.³⁶

The order in which images or notes are to be recalled is provided by a system of "places" (*loci* or *loca*). The orator should keep in his imagination a series of places (of rooms in a house, for instance) which he can visit, one after another, in some natural order. When memorizing his speech, he stores appropriate images in particular places. Then, as he delivers the oration, he walks in his imagination from one place to the next and, encountering images, is reminded of the things he wants to discuss. The most common system of places is a building but other places can also be used. The author of *Ad Herennium* explains that by places he means "such scenes as are naturally or artificially set off,"³⁷ which indicates that the places may be created by nature or by human hand. The orator may use really existing places (and this is the normal practice) or he may prefer places created by his imagination: "Hence, if we are not content with our ready-made supply of places, we may in our imagination create a region for ourselves and obtain a most serviceable distribution of appropriate places."³⁸ Since the function of the system of places is to provide an order to whatever is stored in them, the places should form a natural series which one could enter anywhere and traverse in both directions:

esse debent, unae rerum, alterae verborum. Rerum similitudines exprimuntur cum summatim ipsorum negotiorum imagines conparamus; verborum similitudines constituuntur cum unius cuiusque nominis et vocabuli memoria imagine notatur." *Ad C. Herennium*, III.xvi.29; xx.33. All quotations are from the Loeb Classical Library edition of the text (Cambridge: Harvard University Press, 1954), trans. Harry Caplan. The translation has been slightly changed to ensure terminological uniformity.

³⁶ See Yates, *op. cit.*, pp. 30f. and 40.

³⁷ ". . . eos qui . . . aut natura aut manu sunt absoluti . . ." *Ad C. Herennium*, III.xvi. 29.

³⁸ "Quare licebit, si hac prompta copia contenti non erimus, nosmet ipsos nobis cogitatione nostra regionem constituere, et idoneorum locorum commodissimam distinctionem conparare." *Ibid.*, III.xix.32.

"I likewise think it obligatory to have these places in a series, so that we may never by confusion in their order be prevented from following the images — proceeding from any place we wish, whatsoever its place in the series, and whether we go forwards or backwards — nor from delivering orally what has been committed to the places. . . . So with respect to the places. If these have been arranged in order, the result will be that, reminded by the images, we can repeat orally what we have committed to the places, proceeding in either direction from any place we please."³⁹

The places are, of course, constantly re-usable, since any set of images may be stored in them. When we need them for another speech, we simply replace the images. Consequently, the art of memory is like imaginary writing, with the system of places being used as an erasable wax tablet and the images — as letters:

"Those who know the letters of the alphabet can thereby write out what is dictated to them and read aloud what they have written. Likewise, those who have learned mnemonics can set in places what they have heard, and from these places deliver it by memory. For the places are very much like wax tablets or papyrus, the images like the letters, the arrangement and disposition of the images like the script, and the delivery is like the reading."⁴⁰

Moreover, "the images, like letters, are effaced when we make no use of them, but the places, like wax tablets, should abide."⁴¹ Still Hamlet, when bid by the ghost of his father to remember him, answers:

"Remember thee?
Yea, from the table of my memory
I'll wipe away all trivial fond records,
All saws of books, all forms, all pressures past

³⁹ "Item putamus oportere ex ordine hos locos habere, ne quando perturbatione ordinis inpediamur quo setius quoto quoque loco libebit, vel ab superiore vel ab inferiore parte, imagines sequi, et ea quae mandata locis erunt edere posimus. . . . item in locis ex ordine conlocatis eveniet ut in quamlibebit partem quoque loco libebit, imaginibus commoniti, dicere possimus id quod locis mandaverimus." *Ibid.*, III.xvii.30; xviii.30.

⁴⁰ "Quemadmodum igitur qui litteras sciunt possunt id quod dicatur eis scribere, et recitare quod scripserunt, item qui mnemonica didicerunt possunt quod audierunt in locis conlocare et ex his memoriter pronuntiare. Nam loci cerae aut chartae simillimi sunt, imagines litteris, dispositio et conlocatio imaginum scripturae, pronuntiatio lectioni." *Ibid.*, III.xvii.30.

⁴¹ ". . . imagines sicuti litterae, delentur ubi nihil utimur; loci, tamquam cera, remanere debeant." *Ibid.*, III.xviii.31.

That youth and observation copied there,
 And thy commandment all alone shall live
 Within the book and volume of my brain,
 Unmixed with baser matter."⁴²

The structure, function, and terminology of the mnemonic system described in *Ad Herennium* may be easily recognized, I believe, in the musical hand. The hand-diagram is a device for teaching and memorizing the gamut, the network of affinities between its steps, and methods of notating and reading them, in general, and the device for memorizing the clefs with their corresponding syllables and what they stand for, in particular. The clefs and syllables (and in some hand-diagrams also notes on the lines or spaces of the staff) function as images of the mnemonic device; they represent what is to be remembered. As a type of images they resemble most closely the *notae* or shorthand symbols, the use of which in the memory for words was suggested by the classical textbooks of rhetoric. Since the clefs and syllables function as images or notes, it is worth mentioning, perhaps, that Quintilian uses the term *vox* to define *imago* ("By images I mean the words [*voces*] by which we note [*notamus*] the things which we have to learn by heart . . .")⁴³ and that Pseudo-Odo refers to his clefs as "letters or notes" (*litterae vel notae*).⁴⁴ I hasten to add, however, that these terminological resemblances may be entirely accidental and that my argument does not rest upon them. The use of letters in the function of mnemonic images during the Middle Ages and the Renaissance is well documented. A particularly interesting example, since it involves the hand used as a system of memory places, is Thomas Murner's device of 1511 which helps to memorize the rules of prosody (see Figure 3).⁴⁵

The hand itself, its finger tips and joints, function as the system of

⁴² William Shakespeare, *Hamlet*, I.v. 97–104.

⁴³ "Imagines voces sunt, quibus ea quae ediscenda sunt notamus . . ." *Institutio oratoria*, XI.ii.21. The quotation is from the Loeb Classical Library edition of the text (New York: G. P. Putnam's Sons, 1922), trans. H. E. Butler. For terminological reasons, the translation has been slightly changed.

⁴⁴ *Dialogus*, p. 252.

⁴⁵ *Ludus studentum friburgensium cum prophetia mirabilis in fine* (Frankfurt: Beatus Murner, 1511), fig. 2, reproduced from Volkmann, *op. cit.*, p. 141, fig. 136. On the use of letters in the art of Ramon Lull, see Yates, *op. cit.*, p. 177.

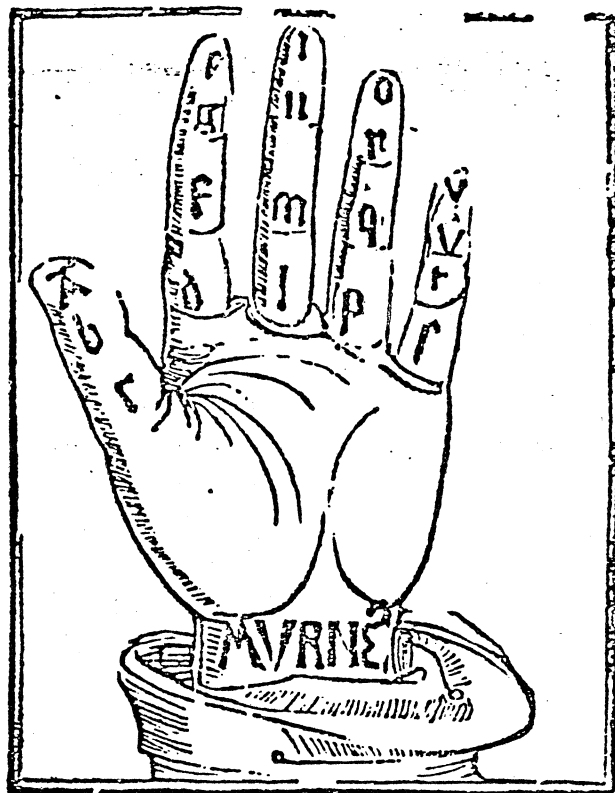


Figure 3

places providing an order to the images located within them. The function of a finger tip or joint is equivalent to that of a line or space of the staff and the term *locus* as used by Tinctoris and other music theorists refers to a place both on the staff and on the hand-diagram.⁴⁶ In both cases, the function of the system of places is merely to provide the order (not temporal, of course, but – metaphorically – spatial) to the steps located within them. The specific intervals between the places are in principle indefinite and variable and clefs are necessary in order to define them. Thus, for instance, about two adjacent places we know only which one is lower and which higher and that they are adjacent. The interval between them will be known only when specific clefs are located in the places. In other words, the function of the system of places is exactly the same in both the musical and the mnemonic theories. It is, of course, also striking that

⁴⁶ See *Expositio manus*, pp. 32–36.

both theories employ the same term, *locus*, in the same function.

As a system of places, the hand-diagram has all the requisite features prescribed by the art of memory. We have learned from *Ad Herennium* that such a system may be a human or a natural creation and, while the classical memory treatises offer very few specific examples of place-systems, the use of the human body as a system of places is documented in the post-classical texts on mnemonics.⁴⁷ Moreover, the hand itself was used as a system of mnemonic places already before Guido's time in teaching matters other than music, namely, the ecclesiastical calendar⁴⁸ and it still continued to be employed as a device for memorizing non-musical subject matter in the seventeenth century when a treatise by a Calabrian Friar Minor Hieronymus Marafioti, *De arte reminiscendae per loca et imagines, ac per notas et figuras in manibus positas* (first issued in 1583), enjoyed numerous re-editions.⁴⁹

Another feature of the places mentioned by the author of *Ad Herennium* was that they may be real or imaginary. Quintilian, when discussing the process of creating such imaginary places, uses the verb *fingere* (to feign)⁵⁰ and specific systems of *loca ficta* are described in some post-classical treatises on memory.⁵¹ This distinction between real and fictitious places offers tantalizing but probably illusory vistas to the student of *musica ficta*.⁵² The analogy between the uses of the term *ficta* in the arts of memory and music works in so far as the "true music" (*musica vera*) is contained in the system of real places, the finger tips and joints of the hand, while some steps of the "feigned music" (*musica ficta*) may be imagined in the places outside of the regular hand. But the analogy is far from perfect, since other steps of the *musica ficta* may be represented by feigned syllables in

⁴⁷ See Yates *op. cit.*, p. 129. Numerous illustrations may be found in Volkmann, *op. cit. passim*.

⁴⁸ Smits van Waesberghe, *Musikerziehung*, pp. 120f.

⁴⁹ Volkmann *op. cit.*, p. 171 and figs. 191–92.

⁵⁰ *Op. cit.*, XI.ii.21.

⁵¹ See Yates, *op. cit.*, pp. 24, 38, 117f., 122, 316f.

⁵² For the definition of *musica ficta*, see especially Margaret Bent, "Musica Recta and Musica Ficta," *Musica disciplina*, XXVI (1972), 73–100 and Andrew Hughes, *Manuscript Accidentals: Ficta in Focus, 1350–1450*, *Musico-logical Studies and Documents* 27 ([Rome:] Amercian Institute of Musicology, 1972).

the real places of the hand. All that is necessary for a step to be considered feigned is that its syllable be feigned. "Feigned music is the putting of some syllable in a place where it is not by itself," says Ugolino of Orvieto⁵³ and his understanding of the concept is encountered so often throughout our period that we may safely take it to be representative. *Ficta* in music theory refers to syllables and steps rather than places. Consequently, it is unlikely that the use of the term in memory treatises influenced its use in music theory, even though we cannot exclude this possibility out of hand.

The hand answers perfectly two other specifications of *Ad Herennium*. It provides a series of places which can be entered at any point and traversed in both directions along the spiral, up and down the gamut. And, like Hamlet's "table of memory," it functions similarly to an erasable wax tablet or slate. It has already been mentioned that the student used the places of his hand to memorize not only the gamut but also other matters, such as those connected with the computation of the calendar. He could, in other words, imagine various symbols within the places. This aspect of the hand was particularly important for musicians. In their imagination, they could substitute syllables which are "truly" there on a joint with different, "fictitious," ones, the possibility which – as we have just seen – was fundamental for the theory of *musica ficta*.

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EXCURSUS: The use of the hand in the computation of the liturgical calendar and the connection between this use and the musical one deserve a fuller study than I can provide here. Nevertheless, a brief excursus on this subject is in order.⁵⁴ The monastic curriculum which was the backbone of secondary education throughout the period when the musical hand was invented and developed was prescribed by Charlemagne in *Admonitio generalis* (Section 72) of 789 which directed that those educated in the monastic and cathedral schools should know liturgy (*psalmi*), reading and writing (*notae*), singing

⁵³ "Musica ficta est alicuius vocis in loco ubi per se non est . . . positio." *Declaratio musicae disciplinae*, ed. Albert Seay, *Corpus Scriptorum de Musica* 7, vol. II (Rome: American Institute of Musicology, 1960), p. 45.

⁵⁴ Yet another connection between *cantus*, *computus*, and memory, the singing of mnemonic verses supporting the computations of the calendar, is studied in Wolfgang Irtenkauf, "Der Computus ecclesiasticus in der Einstimmigkeit des Mittelalters," *Archiv für Musikwissenschaft*, XIV (1957), 1–15.

(*cantus*), the computation of the liturgical calendar (*computus*), and grammar (*grammatica*).⁵⁵ Thus, the same clerics and monks who learned *cantus* also learned *computus* and they continued to learn it through the end of our period, since Charlemagne's requirement was still common at the time of the Council of Trent: "They will learn the teaching of the grammarian, of singing, of the ecclesiastical computation, and of other good arts."⁵⁶ Richard L. Crocker pointed out that "there is a striking parallel between the problem of establishing a standard calendar out of all the conflicting methods inherited from antiquity and the problem of establishing a standard scale. In the 7th- and 8th-century monastery, these problems lay on the desk of the same man – the cantor-teacher-librarian."⁵⁷ One is tempted to add that very soon the same man will be using the same device – the hand – to teach and memorize both the calendar and the gamut. It was probably a common knowledge among musicians throughout our period that the uses of the hand in singing and in *computus* were related, since as late as 1550 Loys Bourgeois wrote concerning those who learned the gamut by means of the hand that "they have learned it thus on the hand . . . only following [the example of] the *computus*"⁵⁸ But the parallel goes beyond the fact that the hand was used in both domains and extends into the way in which it was used as well as into the terminology employed in both cases.

⁵⁵ Gerhard Pietzsch, *Die Musik im Erziehungs- und Bildungsideal des ausgehenden Altertums und frühen Mittelalters*, Studien zur Geschichte der Musiktheorie im Mittelalter 2 (Halle an der Saale: Max Niemeyer, 1932), pp. 57–116. See also Gurlitt, *op. cit.*, p. 67 and Smits van Waesberghe, *Musikerziehung*, p. 10.

⁵⁶ "Grammatici, cantus, computi ecclesiastici, aliarumque bonarum artium disciplinam discent." Charles W. Jones, "Development of the Latin Ecclesiastical Calendar" in Bede, *Opera de temporibus*, ed. Jones (Cambridge: The Mediaeval Academy of America, 1943), p. 75 n. 3.

⁵⁷ *Op. cit.*, p. 29 n. 17.

⁵⁸ "Aussi ne les à on point ainsi apprins en la main . . . que depuis le Compot . . ." *Le droict chemin de musique* (Geneva: [Jean Gérard,] 1550), fol. A2v. I am indebted to Professor Jane R. Stevens of Yale University for directing my attention to this passage. Similarly, a connection between the uses of the hand in the two areas was made by Prosdocius de Beldemandis in his *Tractatus planae musicae* of 1412: "In order that these said things were better committed to memory and more clearly understood, they so arranged these twenty names, as was the custom of the ancients, on the left hand Concerning this, it was the custom of the ancients to adapt very many things which were known to them to the hands, as is evident from computists who adapted almost all their rules to the hands, such as the method of discovering the epacts, Easter,

The use of the hand in the *computus* still awaits a comprehensive study.⁵⁹ The example which I will presently describe is representative but it should by no means be taken to exhaust the diverse ways in which the hand was used by the computists. The diagram reproduced in Figure 4 comes from an anonymous Italian navigation chart, a part of an atlas, prepared for the years from 1384 to 1434.⁶⁰ The represented hand serves primarily to assist in computing the date of Easter. Finding the date of Easter was in fact the main problem of the *computus*.⁶¹ The civil calendar of the Middle Ages, the Roman Julian calendar modified by Augustus which, with a late sixteenth-century Gregorian adjustment, is still in use, was solar. The date of Easter, however, depends on the Hebrew lunar calendar, the Resurrection having occurred on Sunday after Passover, that is, after the

the golden number, the indiction, the dominical letter, and thus concerning many other things." ("Et ut melius illa quae dicta sunt memoriae commendarentur et clarius haberentur, ut moris antiquorum erat, has viginti dictiones taliter super manu sinistra ordinaverunt . . . Unde mos erat antiquorum multa multa quae ab ipsis sciebantur manibus adaptare, ut patet de compotistis qui quasi omnes suas regulas manibus adaptant, ut de modo inveniendi epatam, pasca, aureum numerum, indictionem, litteram dominicalem et sic de multis aliis.") Ms. Lucca, Biblioteca Governativa, 359, fols. 49v–50r. I am indebted to my student, Mrs. Lise Foss, for directing my attention to this passage.

⁵⁹ For the uses of the hand in the computing of the ecclesiastical calendar, see especially Florian Cajori, "Comparison of Methods of Determining Calendar Dates by Finger Reckoning," *Archeion. Archivio di storia della scienza*, IX (1928), 31–42 and Florence A. Yeldham, "An Early Method of Determining Calendar Dates by Finger Reckoning" *ibid.*, pp. 325f. See also Christopher Wordsworth, ed., *The Ancient Kalendar of the University of Oxford*, Oxford Historical Society 45 (Oxford: Clarendon Press, 1904); David Eugene Smith, *Le Comput manuel de Magister Anianus*, Documents Scientifiques du XV^e Siècle 4 (Paris: E. Droz, 1928); Jean-Gabriel Lemoine, "Les anciens procédés de calcul sur les doigts en Orient et en Occident," *Revue des Études Islamiques*, VI (1932), 1–60; W. E. Van Wijk, *Le nombre d'or. Étude de chronologie technique suivie du texte de la "Massa compoti" d'Alexandre de Villedieu avec traduction et commentaire* (The Hague: Martinus Nijhoff, 1936).

⁶⁰ The diagram is reproduced from Cajori *op. cit.*, p. 33.

⁶¹ The fundamental work on the technical chronology remains F. K. Ginzel, *Handbuch der mathematischen und technischen Chronologie. Das Zeitrechnungswesen der Völker*, 3 vols. (Leipzig: J. C. Hinrichs, 1906–14). For the medieval *computus*, see especially A. Giry, *Manuel de diplomatique* (Paris: Hachette, 1894), pp. 79–314. For the early history of the *computus*, see Jones, *op. cit.*, pp. 3–122. A short recent introduction to the medieval chronology, with further bibliography, is R. Dean Ware, "Medieval Chronology: Theory and Practice" in James M. Powell, ed., *Medieval Studies. An Introduction* (Syracuse: Syracuse University Press, 1976), pp. 213–36.

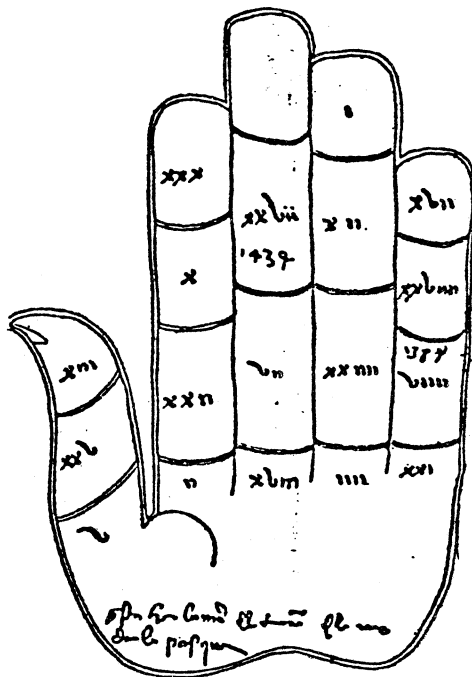


Figure 4

day of the full moon in the month of the vernal equinox. Consequently, the date of Easter is variable. After centuries of bitter disputes, it was established that Easter will be celebrated on the Sunday after the full moon occurring on or after the vernal equinox defined as March 21. Thus, anyone wishing to compute the date of Easter had to be able to predict the date of the full moon controlling it, known as the Paschal Term. Now it was discovered that, with small adjustments, at the beginning of each nineteenth year the moon is at precisely the same phase and, consequently, that every nineteenth year the date of the Paschal Term will be the same. It was enough to know the cycle of nineteen dates and the year in which the cycle begins (this was set at 532 or, which amounts to the same thing, at 1 A.D.) to be able to find the Paschal Term of any year. Since, as we already well know, the tips and joints of the fingers of the hand provide nineteen mnemonic places, it is natural that they were used in memorizing the cycle of the nineteen dates of the Paschal Term. This is precisely the function of the hand represented in Figure 4. (The inscription reads: "This is the hand for finding the calculation of

Easter” – “Cuesta he la mano del trovare de la raxon de la pasque”).⁶² Since the date of the Paschal Term can occur only between March 21 and April 18, it was unnecessary to indicate the months, and the numbers indicate the days only. They are arranged in the ascending order on each finger consecutively, starting with the thumb.⁶³ This type of the hand must have been well known by those learned in the *computus*, since it was already described in Bede’s *De temporum ratione* of 725,⁶⁴ the single most influential textbook of the science throughout our period.⁶⁵ In short, our example demonstrates that the nineteen places of the left hand could be used to assist the memory of the computist just as they helped the memory of the aspiring cantor. The only difference between this particular device and the “Guidonian” hand is in the order of places. It is worth recalling here that the order of places in the pre-Guidonian musical hand mentioned in some manuscripts transmitting *Musica enchiridis* was somewhat closer to our calendrical device, since it involved representing the individual consecutive tetrachords of the gamut on the individual consecutive fingers.⁶⁶ And it is likely that the order of the places used by the computists was not so strictly fixed as it came to be in the musical tradition, since the hand reproduced in Figure 5, taken from the *Eeuwige Handt-calendier* of Adrianus Metius (Amsterdam, 1627), seems to indicate yet another order.⁶⁷ Incidentally, traces of the mnemonic and computational uses of the hand probably still linger in such expressions as having something by “rule of thumb” or “at one’s fingers’ tips.”⁶⁸

⁶² Cajori *op. cit.*, p. 32.

⁶³ The dates of the Paschal Term in the lunar cycle are: 4/5, 3/25, 4/13, 4/2, 3/22, 4/10, 3/30, 4/18, 4/7, 3/27, 4/15 (inexplicably missing from the diagram), 4/4, 3/24, 4/12, 4/1, 3/21, 4/9, 3/29, 4/17.

⁶⁴ Ch. 55: “De reditu et computu articulari utrarumque epactarum” in Bede, *Opera de temporibus*, pp. 275f. See Yeldham, *op. cit.* and Lemoine, *op. cit.*, pp. 13–17.

⁶⁵ Bede, *op. cit.*, p. viii.

⁶⁶ Smits van Waesberghe, *Musikerziehung*, p. 122.

⁶⁷ Reproduced from Van Wijk *op. cit.*, p. 86.

⁶⁸ Wordsworth, *op. cit.*, p. 151.

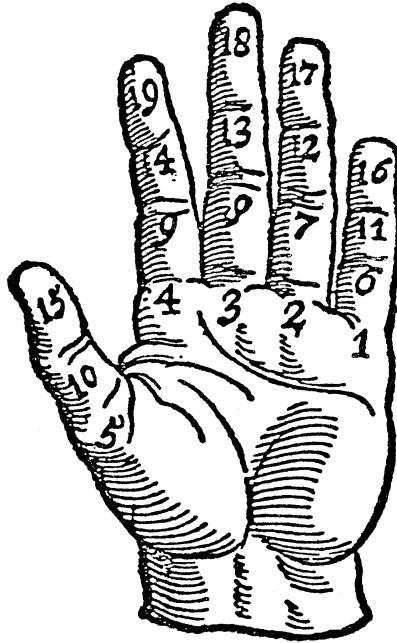


Figure 5

The parallels between the terminology of the *computus* and that of the *cantus* are also thought-provoking. Particularly conspicuous is the term *clavis*, common to both. One method of computing the dates of the movable feasts dependent on Easter involved choosing arbitrarily a fixed date which always fell before Easter and, at the appropriate number of days before and after it, fixed dates before the other variable feasts. These fixed dates were often called *loci* or *sedes clavium* and were, of course, invariable from one year to the next.⁶⁹ The number of days between the fixed date before Easter and the Paschal Term was called *clavis termini* and was, of course, different from one year to the next, but in any given year, once the *clavis termini* has been computed, the same number could be used to find the terms of the other variable feasts as well. In other words, in order to be able to find the dates of the variable feasts, one had to remember the series of fixed dates corresponding to these feasts and to know the *clavis termini* of the given year. By adding the *clavis termini* to the

⁶⁹ They were: 1/7 for Septuagesima, 1/28 for Quadragesima, 3/11 for Easter, 4/15 for Rogationes, and 4/29 for Pentecostes.

fixed date, one received the date on or after which there followed the Sunday of the looked-for feast. Needless to say, the *claves terminorum* also recurred in a cycle of nineteen⁷⁰ and a possibility opened itself to use the nineteen places of the hand to memorize the sequence of the nineteen *claves* just as one memorized the sequence of the *claves* on the musical hand. At any rate, the very existence of such series of *claves* in both the music theory and the technical chronology of the Middle Ages is suggestive.⁷¹

This excursus does not pretend to exhaust the subject. The hands and the terminology of the computists will repay further study by the musicologists interested in the background of the musical hand. A new dimension in our understanding of the hand is opened once we realize that the device which helped the musicians of the Middle Ages and the Renaissance to imagine and memorize the whole material of steps they used was employed by the very same men to fix in their memories the perpetual cycle of numbers by means of which they knew they could compute for ever the date of the most sacred day of the year, the day by the recurrence of which they measured their time.

⁷⁰ The cycle of *claves terminorum* is: 26, 15, 34, 23, 12, 31, 20, 39, 28, 17, 36, 25, 14, 33, 22, 11, 30, 19, 38.

⁷¹ As has already been mentioned, Reckow, *op. cit.* distinguished two basic meanings of the term *clavis*: a key of a keyboard and a step (as well as meanings related to the latter: a letter or a combination of a letter and syllable[s] designating a step, a clef, an accidental), the former first used in the mid-twelfth century, the latter in the late twelfth century. After a careful discussion, Reckow concluded that the former was the original meaning. To be sure he noticed the use of the term in the *computus* long before the twelfth century and considered the possibility that this might speak against the priority of key-meaning, but rejected it: "Die mittelalterliche Musiktheorie hätte also den Terminus *clavis* von der vertrauten Computusterminologie ohne Umweg über die Orgeltaste direkt auf Tonstufe bzw. Tonbuchstaben übertragen können, und zwar längst bevor die Orgeltaste selbst diesen Namen erhalten zu haben scheint. Doch fehlt auch für eine historisch konkrete Verbindung zwischen *Computus*- und *Musikterminologie* im Falle von *clavis* – nicht nur vor, sondern auch nach den *Regule* des Guido von Cherlieu – jedes Anzeichen, von einschlägigen Äusserungen der mittelalterlichen Autoren ganz zu schweigen." *Op. cit.*, p. 9. The present paper provides precisely the missing link, namely, the hand which gives a historically concrete connection between the terminologies of the *computus* and *cantus* and, consequently, argues in favor of a revision of Reckow's conclusion.

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If the art of memory resembles writing, it must be emphasized that it is imaginary, not to be confused with real writing. Quintilian reminds us of Plato's warning in the *Phaedrus*: "If men learn this [writing], it will implant forgetfulness in their souls; they will cease to exercise memory because they rely on that which is written, calling things to remembrance no longer from within themselves, but by means of external marks."⁷² It is particularly easy to fall into this confusion of memorizing and writing in the case of the hand, since here elements of the methods of notating and reading music are involved. Thus, let us stress that while the places of music theory are the locations on the hand-diagram and the staff, the hand is a mnemonic system of places and the staff is not. But precisely because both the hand and the staff consist of places, it is easy to transform the latter into a mnemonic device. In fact, not all the medieval and renaissance theorists chose to represent the content of the hand on the hand-diagram. Many left it in the form resembling our Figure 1. This form, an alternative to the hand-diagram, was often referred to as the "ladder" (*scala*). Thus, for instance, it is the form and name used by Coclico⁷³ whom we have seen at the very beginning of this paper employing the terms *manus* and *scala* as synonyms. In a manuscript copied in 1503–04 in Ghent, we find on the same leaf a ladder-diagram inscribed "Figura Scale musicalis" and a hand-diagram inscribed "Figura manus" (see our Figures 1 and 2), an implication being that these are alternative diagrams. Sebald Heyden uses the term "ladder" for the staff itself and explains that

"there are two reasons for this appellation. First, from its shape, since . . . lines so inscribed with notes represent in a certain way the transverse wooden steps . . . of ladders. The second reason appears to be taken

⁷² *Phaedrus*, 275a, trans. R. Hackforth (Cambridge and New York: Cambridge University Press, 1952). See Quintilian, *op. cit.*, XI.ii.9.

⁷³ *Op. cit.*, fol. Cv.

from practice, for the letters or keys of a musical ladder are named in exactly the same way as one ascends or descends the steps of a ladder."⁷⁴

We seem to be confronted here with a situation very similar to the one Tinctoris described when defining the term *manus*. Just as the musical hand denotes primarily the teaching contained within the hand-diagram and only secondarily the diagram itself, so the musical ladder, as the term is employed by Coclico (and this appears to be the most common usage), denotes primarily the same teaching when it is contained in the ladder-diagram and only secondarily the staff itself. Since the same teaching may be represented on the hand or on the ladder, we are probably justified in supposing that the ladder might have been a mnemonic device alternative to the hand.⁷⁵ But, let it be emphasized again, the art of memory may be like an imaginary writing, but a mnemonic system should not be confused with notation. Thus, in the ladder-diagram, the ladder is strictly speaking not the staff, but rather the staff transformed into a system of memory places. The staff was certainly not invented to serve as such a system and the ladder has to be understood as an element originally devised for the purpose of musical notation and transformed to serve a different, mnemonic, function.

It may be worth recalling here that when Guido described the places of his staff, he did not use the term *locus* at all. Instead, he employed the term *ordo* in the same sense which later theorists gave to *locus*. Since *locus* is the most characteristic of the mnemonic terms, one might speculate that it was transferred to music theory only after the art of memory was adapted to the teaching of the hand. Should this guess prove to be correct, it would be one more indication (besides that provided by the ladder-diagram) of the intimate and

⁷⁴ “. . . duae huius appellationis causae hoc loco sunt. Prima ex forma, quod lineae ita . . . Notulis subscriptae, portatilium Scalarum transversa tigilla . . . quodammodo repraesentent. Altera causa ex usu sumpta esse apparet. Quod in recitandis Musicae Scalae literis sive Clavibus, eodem plane modo quo et in Scalis portatilibus solet, scandendo procedatur descendendo autem retrocedatur.” *De arte canendi, ac vero signorum in cantibus usu* (Nuremberg: Ioh. Petreus, 1540), pp. 5f. trans. Clement A. Miller, *Musicological Studies and Documents* 26 ([Rome:] American Institute of Musicology, 1972), p. 28.

⁷⁵ The use of ladders in the peculiar method of artificial memory propagated by the influential thinker Ramon Lull (ca. 1235–1316) should be mentioned in this context. See Yates, *op. cit.*, pp. 180f.

complex relations between the arts of notation and memory, the staff and the hand.

The ultimate source of this relationship lies in the fact that the application of the art of memory to the teaching of the hand would have been difficult without earlier developments in pitch notation. The classical mnemotechnics depends on the possibility of representing what is to be remembered by means of visual images and of giving these images a spatial localization. Cicero explains:

“It has been sagaciously discerned by Simonides or else discovered by some other person, that the most complete pictures are formed in our minds of the things that have been conveyed to them and imprinted on them by the senses, but that the keenest of all our senses is the sense of sight, and that consequently perceptions received by the ears or by reflexion can be most easily retained in the mind if they are also conveyed to our minds by the mediation of the eyes, with the result that things not seen and not lying in the field of visual discernment are earmarked by a sort of outline and image and shape so that we keep hold of as it were by an act of sight things that we can scarcely embrace by an act of thought. But these forms and bodies, like all the things that come under our view require an abode, inasmuch as a material object without a place is inconceivable.”⁷⁶

In other words, even if what is to be remembered is an aural perception, it will be best retained when represented by a visual image and, once we have translated an aural perception into a visual image, we must be able to localize this image in space. These two fundamental features of the classical art of memory explain why the development of pitch notation was a prerequisite for the application of the art to the teaching of the hand. Before the hand-diagram could have been

⁷⁶ ‘Vidit enim hoc prudenter sive Simonides sive alius quis invenit, ea maxime animis effingi nostris quae essent a sensu tradita atque impressa; acerrimum autem ex omnibus nostris sensibus esse sensum videndi; quare facillime animo teneri posse ea quae perciperentur auribus aut cogitatione si etiam commendatione oculorum animis traderentur; ut res caecas et ab aspectus iudicio remotas conformatio quaedam et imago et figura ita notaret ut ea quae cogitando complecti vix possemus intuendo quasi teneremus. His autem formis atque corporibus, sicut omnibus quae sub aspectum veniunt sede opus est, etenim corpus intellegi sine loco non potest.’ *De oratore*, II.lxxxvii.357–58. Quoted from the Loeb Classical Library edition of the text (Cambridge: Harvard University Press, 1948), trans. E. W. Sutton and H. Rackham. The translation has been very slightly altered to ensure terminological uniformity.

devised, it was necessary to invent a method of visual representation of the steps of the gamut and it was helpful to start thinking about the steps in spatial terms. Marie-Elisabeth Duchez has recently demonstrated that this last development – the emergence of the spatial notion of pitch and spatialization of the relations between pitches – took place only between the ninth and eleventh centuries simultaneously and in connection with the search for an adequate pitch notation.⁷⁷ The spatial conception of pitch and the development of the type of pitch notation of which Guido's staff was the final product go hand in hand. It was this spatial conception which made possible, or, perhaps was suggested by the representation of the metaphorically "lower" or "higher" steps at literally lower or higher locations on the parchment and, eventually, on the staff. Once this literally spatial localization of the steps was achieved, once the steps received appropriate places, the possibility was open to locate them also in a system of mnemonic places, to identify the places of the staff with those of the hand, and to apply the art of memory to the rudiments of music.

We do not know who invented the musical hand. Still before Guido's time, some manuscripts transmitting *Musica enchiriadis* mention that the individual tetrachords of the gamut may be represented on the individual fingers.⁷⁸ It appears, then, that the mature hand, like the Guidonian staff, is an adaptation and improvement of a device already in existence, an improvement consisting primarily in the establishment of the standard spiral order of the places and their use for the Guidonian gamut. The oldest representation of such an improved hand dates from the end of the eleventh century (Ms. Monte Cassino, 318, p. 291). It marks the clefs of the two octaves from Γ to g in the appropriate places and, instead of syllables, indicates above each clef the interval between it and its predecessor by means of letters T (*tonus*) and S (*semitonium*).⁷⁹ A variety of forms survive from the twelfth century: hands with

⁷⁷ "La représentation spatio-verticale du caractère musical grave-aigu et l'élaboration de la notion de hauteur de son dans la conscience musicale occidentale," *Acta musicologica*, LI (1979), 54–73.

⁷⁸ Smits van Waesberghe, *Musikerziehung*, p. 122.

⁷⁹ *Ibid.*, pp. 126f.

only clefs marked,⁸⁰ with clefs and syllables,⁸¹ and even with clefs, syllables, and an indication of whether they are located on a line or space of the staff.⁸² The invention of the hand was first attributed to Guido in the first decade of the twelfth century by the chronicler Sigebert of Gembloux.⁸³ However, Guido, who described his other inventions with considerable pride, never mentioned the hand in his surviving writings. He was clearly interested in aspects of musical memory. The method described in the *Epistola* was designed to help the student to remember the qualities of the individual steps, “to implant the differences and qualities of the individual sounds and of all descents and ascents deep in the memory.”⁸⁴ In the context of this Guidonian interest in the implanting of the steps of the gamut in the memory, the application of the traditional methods of the *memoria artificiosa* to this task appears to have been inevitable. Already around 1100 a certain Johannes in his *De musica cum tonario*⁸⁵ refers to the use of the hand in a way which suggests that it was a common device. His remarks are particularly interesting, since they clearly connect Guido’s method of the *Epistola* with the hand and emphasize the mnemonic aspects of both:

“First we enjoin him who wishes to prepare himself for training in music that he zealously master the letters of the monochord and the syllables written above them and not leave off this task before he has them by memory. . . . It is said that the syllables we use are taken from

⁸⁰ See, e.g., *ibid.*, pp. 128f., fig. 62.

⁸¹ See, e.g., *loc. cit.*, fig. 63.

⁸² See, e.g., *ibid.*, pp. 130f., fig. 66.

⁸³ Sigebertus Gemblacensis, *Liber de scriptoribus ecclesiasticis* in J.-P. Migne, ed., *Patrologiae cursus completus*, Series latina prior, vol. CLX (Paris: Garnier Fratres, 1880), col. 579; *idem*, *Chronica*, *ibid.*, col. 204. See Smits van Waesberghe, *Musikerziehung*, p. 120.

⁸⁴ “. . . singulorum sonorum, omniumque depositionum et elevationum diversitates proprietatesque altae memoriae commendare.” *Epistola*, p. 45, trans. Strunk, *op. cit.*, p. 124.

⁸⁵ The provenance, date, and author of this treatise have been the subject of much discussion, most recently in Michel Huglo, “L’auteur du traité de musique dédié à Fulgence d’Affligem,” *Revue belge de musicologie*, XXXI (1977), 5–19. Huglo concluded once more that the treatise was written as a result of an order by the Abbot of Affligem, Fulgentius, between 1089 and 1122. For a dissenting opinion, see Palisca in *Hucbald, Guido, and John on Music*, pp. 87–95, who concludes that Johannes “probably wrote the treatise in the area between St. Gall and Bamberg around 1100.”

the hymn that begins: *Ut queant laxis* So let him who strives for knowledge of music learn to sing a few songs with these syllables until he knows fully and clearly their ascents and descents and their many varieties of intervals. Also, let him diligently accustom himself to measuring off his melody on the joints of his hand, so that presently he can use his hand instead of the monochord whenever he likes, and by it test, correct, or compose a song. After he has repeated these things for some time, just as we have directed, and has thoroughly memorized them, he will have an easier, unperplexed road to music.⁸⁶

The method described by Guido in the *Epistola* was designed to help the student to remember the steps and thus to sing directly from the notated page, without the aid of the monochord. Johannes advocates the use of the hand instead of the monochord for memorizing the gamut, its letters, and syllables. Thus, it is clear that the developed hand was the final product of the search initiated by Guido, the search for a method which would aid the student's memory of the steps and free him from the reliance on the monochord. In this sense at least, the hand deserves the epithet "Guidonian." It is characteristic that Sigebert, who wrote at about the same time as Johannes, saw Guido's main claim to fame in the method of singing directly from the notated page with the aid of the syllables and the hand:

"Guido, a monk of Arezzo, was renowned more than almost any church musician. He ought to be esteemed above his predecessors in that boys and girls learn or are taught unknown melodies even more easily by his rule than by the voice of the teacher or by the use of some instrument, provided that, once six letters or syllables have been applied melodically to the six steps which are the content of music and these steps have been distinguished through the joints of the fingers of the left

86 "Primum hoc illi, qui se ad musicae disciplinam aptare desiderat, iniungimus, uti litteras monochordi cum syllabis suprascriptis firmare studeat, nec antequam eas memoriter teneat, ab hoc opere desistat. . . . Eas vero, quibus nos utimur syllabas, ex hymno illo sumptas aiunt, cuius principium est: *Ut queant laxis* Per has itaque syllabas is, qui de musica scire affectat, cantiones aliquot cantare discat quousque ascensiones et descensiones multimodasque earum varietates plene ac lucide pernoscant. In manus etiam articulis modulari sedulus assuescat, ut ea postmodum quotiens voluerit pro monochordo potiat et in ea cantum probet, corrigat et componat. Haec ubi aliquamdiu iuxta quod diximus frequentaverit et altae memoriae commendaverit, facilius procul dubio ad musicam iter habebit." Johannes Affligemensis, *De musica cum tonario*, ed. Joseph Smits van Waesberghe, *Corpus Scriptorum de Musica* 1 (Rome: American Institute of Musicology, 1950), pp. 49f., trans. Babb in *Hucbald, Guido, and John on Music*, pp. 103f.

hand through the whole octave, the high and low ascents and descents of these steps offer themselves to the eyes and ears."⁸⁷

Memory, whose crucial function in the oral transmission of plainchant has been elucidated by Leo Treitler,⁸⁸ had a role to play also at the final stage of the process which transformed the oral tradition into a written one, the stage at which Guido was the key figure.

My claim that the musical hand belongs to the family of mnemonic devices which have their ultimate source in the classical art of memory is based on the fact that the hand had a mnemonic function and that its structure was that of the system described in the Roman textbooks of rhetoric. The hand corresponds in every respect (functionally, structurally, and even terminologically) to the devices of the classical art of memory. We cannot exclude the possibility that this correspondence is totally accidental, but the correspondence is too close to admit such a possibility. It is much more likely that the hand and the art of memory were in fact connected. How exactly this connection came about is difficult to ascertain. One can imagine three possible developments: First, the inventor of the hand might have learned about the system directly from the author of *Ad Herennium* or from Martianus Capella whose texts were read and copied again at his time. This would not have been the only known instance of contact between music and rhetoric during this period. F. Alberto Gallo demonstrated, for example, how a technical rhetorical term, *pronuntiatio*, became in the early Middle Ages a technical musical term without ever losing its original rhetorical meaning,⁸⁹ Smits van Waesberghe found indirect proof that Guido was familiar with *ars rhetorica* in his termi-

⁸⁷ "Guido, Aretinus monachus, post omnes pene musicos in Ecclesia claruit, in hoc prioribus praeferendus quod ignotos cantus etiam pueri et puellae facilius discant vel doceantur per ejus regulam quam per vocem magistri, aut per visum [usum] alicujus instrumenti, dummodo sex litteris vel syllabis modulatum appositis ad sex voces, quas sola musica recipit, hisque vocibus per flexuras digitorum laevae manus distinctis per integrum diapason, se oculis et auribus ingerunt intentae et remissae elevationes vel depositiones earumdem vocum." Sigebertus Gemblacensis, *Liber de scriptoribus ecclesiasticis*, col. 579. Cf. *idem, Chronica*, col. 204.

⁸⁸ "Homer and Gregory: the Transmission of Epic Poetry and Plainchant," *The Musical Quarterly*, LX (1974), 333–72.

⁸⁹ "Pronuntiatio. Ricerche sulla storia di un termine retorico-musicale," *Acta musicologica*, XXXV (1963), 38–46.

nology,⁹⁰ and, what is even more interesting in the context of the present discussion, Michel Huglo pointed out the existence of cases from the eleventh and twelfth centuries in which musical treatises have been copied together with the rhetorical ones, including at least one case in which the rhetorical treatise in question was Cicero's *De inventione*⁹¹ which, as we already know, was habitually associated during the Middle Ages with *Ad Herennium*. "It seemed quite appropriate to the teacher of this school," concluded Huglo, "to combine *ars rhetorica* of *trivium* with *ars musica*."⁹² Thus it is possible that, in fashioning his device, the inventor of the hand was aware of the tradition of *ars memorativa*. Second, it is equally possible that he was not inspired directly by the classical sources of the art but merely imitated the mnemonic devices already in use, the devices which themselves depended ultimately on the art, whether directly or indirectly. We have learned from Smits van Waesberghe about the pre-Guidonian use of the hand as a device for teaching and memorizing various subjects, both non-musical (the calendar) and musical (the terachords).⁹³ Whoever first came at the idea of repre-

⁹⁰ "Wie Wortwahl und Terminologie bei Guido von Arezzo entstanden und überliefert wurden," *Archiv für Musikwissenschaft* XXXI (1974), 79f. and n. 12. Cf. also *ibid.*, p. 73: "Musiktheoretiker wie Guido von Arezzo, Berno von Reichenau, Aribon von Freising, Johannes von Affligem und viele andere hatten, bevor sie Magister im Fach der *Ars musica* wurden, erst die Fächer des *Trivium* gründlich studiert." On Guido's and his contemporaries' awareness of music as a component of the system of liberal arts in general, see F. Alberto Gallo, "La musica e le *artes* in Italia attorno al Mille. L'insegnamento di Lorenzo da Amalfi nel Codice Marciano Z. lat. 497 (=1811)," *Quadrivium*, V (1962), 101–07.

⁹¹ "Der Prolog des Odo zugeschriebenen 'Dialogus de Musica'," *Archiv für Musikwissenschaft*, XXVIII (1971), 134f. and n. 4.

⁹² "dem Lehrer dieser Schule schien es wohl ratsam die *Ars rhetorica* des *Trivium* mit der *Ars musica* zu vereinigen." *Ibid.*, p. 134. Cf. also Joseph Smits van Waesberghe, "Studien über das Lesen (*pronuntiare*), das Zitieren und über die Herausgabe lateinischer musiktheoretischer Traktate (9.–16. Jahrhundert)," *Archiv für Musikwissenschaft*, XXVIII (1971), 174: "Im allgemeinen kann gesagt werden, dass ein Musiktheoretiker, der ein Traktat zu schreiben 'wagte', in den Fächern des *Trivium*s geschult war . . ."

⁹³ *Musikerziehung*, pp. 120–23. Smits van Waesberghe's interpretation of one of his examples, a ninth- or early tenth-century poem "*Indicis a summo capiens exordia primus*" (*ibid.*, pp. 122f.), has been very recently challenged by Tilden A. Russell ("A Poetic Key to a Pre-Guidonian Palm and the *Echemata*," *Journal of the American Musicological Society*, XXXIV [1981], 109–18) who argues that the poem "describes the use of the palm of the hand as a mnemonic aid in learning the intonation formulae of Western chant" (*ibid.*, p. 109).

senting the steps of the gamut on the hand, might have been simply adapting an already existing tool to his particular purpose in blissful ignorance of the centuries of tradition behind his invention. Finally, it is also possible that even if the inventor of the hand was ignorant of *ars memorativa*, some of the later and better educated users of his device associated it with this tradition. We are unlikely ever to know with certainty which of these conjectured developments stands for the historical reality, not only because we do not know who the inventor was, but also because the musical inventors of the age in general, and Guido in particular, rarely discussed the sources of their inspiration. Once a device was in common use, a medieval theorist was even less likely to discuss in detail its origin, beyond referring to a Pythagoras, a Boethius, or a Guido as the inventor. (As a matter of fact, all three of those were hailed as the inventors of the hand!)⁹⁴ However, even if we assume that those who developed and used the hand were not aware of the classical sources of the *ars memorativa*, they were certainly familiar with the mnemonic devices which might have ultimately stemmed from this tradition and, consequently, they probably had at least a practical grasp of the only theory of artificial memory available at their time. But we, for whom the classical rhetoric and its art of memory are no longer a part of a living tradition, have to learn anew the lesson of Simonides if we are to understand fully the teaching of the hand.⁹⁵

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⁹⁴ Smits van Waesberghe, *Musikerziehung*, p. 120.

⁹⁵ After this paper was completed, Gregory G. Butler's study of "Music and Memory in Johannes Romberch's *Congestorium* (1520)" appeared in *Musica disciplina*, XXXII (1978), 73–85. Searching one of the most popular of the Renaissance memory treatises for references to music, Butler found a passage which, while obscure and admitting more than one interpretation, probably refers to the Guidonian hand understood as a system of mnemonic places (*op. cit.*, p. 78, n. 16). At first glance this might appear like an independent confirmation of my hypothesis, but on reflection it turns out to be much less than this. It is good to know that an author of a popular handbook of mnemotechnics in the early sixteenth century probably referred to the musical hand as a system of memory places, but we cannot take it as a conclusive proof that the musicians of his time (let alone the hand's inventor) were aware of the mnemonic background of the device.