# *Part I*

# The content and structure of *musica ficta*

# 1 Within the hand

In the course of frequent boasts about the instruction he claimed to have received from the renowned Josquin des Prez, Adrian Petit Coclico gave a convincing outline of the order in which the main subjects of musical practice were studied by an aspiring adept of the art:

> He will . . . apply himself to learn . . . the musical hand or scale . . . and soon he will recognize the individual clef symbols; immediately thereafter, he will begin to practice solmization in plainsong or Gregorian chant, and to pronounce musical syllables and their combinations in their order. To these he will add the knowledge of the eight modes . . . Then he will recognize their signs, quantity and values, soon after, the shapes of notes, ligatures, points, pauses; afterwards, the prolations, major and minor, augmentation, diminution, imperfection, alteration, syncopation, at the same time as the beats and certain proportions of utility . . . He will then begin to sing, not only as [the music] is written but also with embellishments, and to pronounce skillfully, smoothly and meaningfully, to intone correctly and to place any syllable in its proper place under the right notes . . . When anyone has learned well those things I have indicated above, he can have also learned counterpoint and composition.[1]

It is likely that Coclico's curriculum corresponds to the normal course of instruction received by a music student not only in the early sixteenth century, but throughout most of the period to be examined in this book. The subjects mentioned by the theorist (the hand or scale, pitch notation, singing of plainchant with solmization syllables, modes, mensural notation, singing of polyphony with text underlay, counterpoint, composition) comprise all the topics commonly discussed in the period's textbooks of musical practice, and their order could hardly be improved upon or even drastically altered, since the successive areas of study presuppose the skills acquired previously. Thus, there can be little doubt that the exposition of the material of commonly used steps was the starting point of instruction.

It will also provide the most appropriate starting point for our investigation. Before we can find out why and how certain steps were used, we have to learn first what steps there were, how they were related to one another, and how they were written down and read. In this respect, we are in a similar position to Josquin's students. In addition, we have to recover the concepts and images in terms of which musicians of our period thought about and imagined the system of steps they used. This is necessary if we are to avoid

anachronistic assumptions when dealing with their practice. We shall also want to consider the origin and evolution of the gamut and the associated concepts and images. By showing how these originated, what sort of needs they answered, we shall gain insight into their functions. By showing how the gamut evolved, we shall be able to tell which steps were available at each stage of its development and to distinguish the normally used steps from the unusual ones. These are the questions which will occupy us in the first two chapters of the present book. Like Josquin's students, we shall start in this chapter with the material of the most common steps.

This material of commonly used steps was organized by musicians of the late Middle Ages and the Renaissance into a structure normally referred to as the 'hand' (*manus*) but occasionally known also under other names, such as, especially, the 'scale' (*scala*). The hand was so frequently described, or at least presupposed, by theorists that we may safely assume that it formed the most fundamental conceptual equipment shared by all musicians of our period. Its content and structure may be learned best from Johannes Tinctoris, who devoted a whole treatise (*Expositio manus*, written in or after 1477) to its exposition,[2] using terms frequently employed by other theorists and defining them with precision befitting the author of a dictionary of musical terms.[3]

Some common synonyms of *manus*, such as the already-noted *scala* (used, for instance, in the passage from Coclico quoted above) or *gamma* (used by Tinctoris, among others),[4] clearly indicate that the hand is the direct ancestor of such modern theoretical concepts as the gamut or scale, that is, a set of steps (pitches defined not in absolute but in relative terms, relative, that is, to other steps of 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 hand consists of twenty 'places' (*loca*) defined by Tinctoris as the 'sites' of the steps.[5] The function of the places is to indicate only the order of steps contained in them, but not the intervals between steps. To identify the places, one uses twenty 'letters' (*claves*) of the letter notation.[6] The eight 'low' (*graves*) letters are, in ascending order, the Greek letter Γ (corresponding to G in the modern letter notation) and the letters of the Latin alphabet from A to G (our A to g), while the seven 'high' (*acutae*) letters which ensue are usually the lower-case letters from a to g (our a to g′), and the final five 'highest' (*superacutae*) letters – the double letters from aa to ee (our a′ to e″).[7]

Intervals between steps located in places are indicated by means of the six 'syllables' (*voces*) of the hexachordal intervallic series called the 'deduction' (*deductio*), in the ascending order ut, re, mi, fa, sol, la, which are located in consecutive places of the hand, and which form an intervallic series consisting of a diatonic (or Pythagorean minor) semitone preceded and fol-

lowed by two consecutive whole tones.[8] A step of the gamut is identified by means of a letter and at least one syllable; by locating a syllable within a place, one defines the intervals between the step and the steps surrounding it within the range of the hexachord.

The hand contains seven interlocking hexachords beginning, respectively, on Γ, C, F, G, c, f, g, so that each of its twenty places contains one, two, or three syllables. In order to define intervals beyond the range of a hexachord, one makes a 'mutation' (*mutatio*) within a single place from a syllable belonging to one hexachord to a syllable of the same pitch belonging to another, interlocking hexachord.[9]

Since it is assumed that ut of each hexachord has the same pitch as the syllable of the lower hexachord present in the same place, the pitches contained in the hand include, in keyboard terms, all the 'white-key' steps from Γ-ut to ee-la (modern G to e″) plus the two 'black-key' steps of b-fa and bb-fa (modern b♭ and b♭′), which are a chromatic (or Pythagorean major) semitone lower than the 'white-key' b-mi and bb-mi (modern b♮ and b♮′) found in the same places.

In notation, the places are represented by the alternating lines and spaces of the staff, with the place of the lowest letter, Γ, being always a line. One letter (our 'clef') suffices to identify all the places of the staff, of course. Within the regular gamut, an ambiguity as to the desired pitch can arise at only two places, b and bb, since only these contain syllables differing in pitch; in them, fa is a chromatic semitone lower than mi. Because of this, two distinct forms of these letters are used, the 'round b' (*b rotundum*, the ancestor of our ♭, which will be used here) standing for fa, and the 'square b' ( ♮ *quadrum*, the ancestor of our ♮, which, being the most common medieval graphic variant of this letter, will be used here) standing for mi. As we learn from many theorists, mi is assumed in the places of b and bb unless the round b is implied or expressly indicated,[10] in which case more than one letter is used to define the places of the staff. Characteristically, some theorists refer to ♭ and ♮ as the 'less principal letters' or 'less principal clefs' (*claves minus principales*), to distinguish them from the independent 'principal letters' or 'principal clefs' (*claves principales*) in conjunction with which they are used.[11]

The notation of pitch by means of the staff and clefs (both the 'principal' and the 'less principal' ones) is, of course, in use until this day. It was described for the first time by Guido of Arezzo in a prologue to an antiphoner written around 1030.[12] Radically transforming and improving a device present in an embryonic form already some hundred (and perhaps as much as 170) years earlier in the anonymous *Musica enchiriadis*,[13] a method 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

modern staff. To identify the rows, he adapted (and extended to dd) the letter notation he found in the anonymous *Dialogus* written near Milan around 1000 and attributed since the twelfth century to an Abbot Odo,[14] the earliest surviving treatise in which letters (here actually called 'letters' [*litterae*]) from A to aa were used as 'notes' (*notae*) representing the steps of the Greater Perfect System (including the *synemmenon* tetrachord, that is, requiring ♭ in addition to ♮), that is, the gamut transmitted by Boethius, with an additional step represented by Γ added a whole tone below.

But if the notation of pitch by means of the staff and clefs is familiar to us, the conceptualization of pitch in terms of the places and syllables located in them is not, and hence it may be useful to take a closer look at the origin and function of these concepts. In an earlier study, I have attempted to show that one fundamental component of the musical hand, the system of places defining the order of steps located in them, was structurally, functionally, and terminologically identical with the mnemonic system of places defining the order of matters (represented by means of images or notes located in the places) to be taken up in an oration, the system described in classical textbooks of rhetoric. The mature hand was an eleventh-century application (almost certainly inspired, and perhaps even achieved, by Guido himself) of the system of places of the ancient art of memory to the purpose of memorizing the gamut.[15]

The introduction of syllables defining intervals between steps was also an eleventh-century development. While the fully mature system of seven deductions seems to have appeared only in the second half of the thirteenth century,[16] its basic elements were again suggested by Guido of Arezzo. In his *Micrologus*, written probably between 1026 and 1028, Guido demonstrated the 'affinities' (*affinitates*) between, respectively, D, E, F, and the steps a fourth below (or a fifth above), by indicating that the intervallic patterns around 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 ♮, and tritus at C, F or c.[17] Guido observed additionally that when ♭ was used instead of ♮, G sounded as protus, a as deuterus, and ♭ as tritus.[18] Thus he indirectly suggested one more range within which the intervallic patterns could be compared, F-d with ♭ instead of ♮.

It is worth emphasizing that the system of interlocking deductions and even the very concept of the hexachord or deduction were merely suggested, and not expressly formulated, by Guido, and – what is more important – that the reason why they were suggested was the necessity to resolve the contradiction between two independent traditions only recently brought into an uneasy coexistence, the contradiction between modal theory, which recognized only four different finals, on the one hand, and the heptatonic

scale, which allowed three additional placements for the finals, on the other.[19] The compromise between these two traditions which Guido suggested remained essentially unchallenged until almost the end of our period when Heinrich Glarean, in his *Dodecachordon* of 1547, proposed the celebrated resolution of the contradiction by increasing the number of the finals. There is a direct causal connection between medieval modal theory and the system of deductions, and it is certainly not an accident that the system gradually lost its vitality once the transformation of modal theory had begun.

The steps which led to the development of the concept of the hexachord have been convincingly reconstructed by Richard L. Crocker.[20] But Crocker's conclusion that his reconstruction 'depends on attributing a greater sense of tonal reality to the relationship of the finals than to the diatonic system'[21] undermines his own argument. Deductions were necessary precisely because the finals were projected upon the diatonic Greater Perfect System, precisely because the relationships of the finals and the diatonic system were felt to be equally 'real'. The deductions mediated between these two realities. Their mediation would have been unnecessary if medieval musicians attributed little tonal reality to the diatonic system and chose another (for instance, the scale of *Musica enchiriadis*) instead. Incidentally, Glarean's solution was to leave the diatonic system intact and to adapt modal theory to it, not the reverse. For him and those who followed him, it was the diatonic system that had a greater tonal reality.

Indeed, one feature of the hand not yet mentioned serves precisely to reaffirm the tonal reality of the diatonic system. 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 (or be) the same 'property' (*proprietas*) or quality, since they maintain the same relationship with the surrounding deductions. The deductions starting on Γ, G, and g have the property of the 'hard b' (♮ *durum*), since their mi is hard (or sharp) in respect to the fa sung in the same place; the deductions on C and c have the 'natural' property (*natura*), since their steps have the only pitches which are natural in their respective places; and the deductions on F and f have the property of the 'soft b' (*b molle*), since their fa is soft (or flat) in respect to the mi sung in the same place.[22] 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 other words, the deductions serve to demonstrate that the intervallic patterns surrounding the equally-named steps in different deductions are identical within the range-limits of these deductions, and the properties to demonstrate that the intervallic patterns surrounding the equally-named steps in different deductions of the same property are

identical without any range-limits. Thus, the properties serve to reassert the equivalence of the steps an octave apart, as if to counteract any possible blurring of this equivalence by the less complete affinities. Already Guido, having discussed the affinities in *Micrologus*, hastened to reaffirm that 'likeness [between steps] is not complete except at the octave'.[23]

In his last surviving treatise, *Epistola de ignoto cantu* of around 1032,[24] 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 whose consecutive phrases start on consecutive steps of the gamut. Guido provided such a melody for learning the steps from C to a and the text he associated it with could yield the corresponding syllables from ut to la.[25] Whether Guido himself used the syllables to name the steps, let alone to solmizate, must remain a matter of conjecture, but the use of syllables to name the steps of the hexachords starting on Γ and C (that is, a rudimentary solmization and mutation), can be documented already in the second half of the eleventh century.[26]

Thus, the system of deductions can also serve as an aid to a method of sight-singing known as 'solmization' (*solfisatio*).[27] Once the student remembers which syllable or syllables are associated with each letter and can sing the hexachord, he will be able to read any melody at sight by substituting the syllables for the letters and making mutations when the melody goes beyond the range of the deduction. The mutation may be 'explicit' (*explicita*) or 'vocal' (*vocalis*), in which case the singer pronounces both syllables, or 'implicit' (*implicita*) or 'mental' (*mentalis*), when only one of the syllables (usually the second) is actually pronounced, while the other is tacitly assumed, the latter method being, for obvious reasons, generally preferable, especially in measured music.[28] No mutation can be made when there is no common step in a progression from one deduction to another, a sort of progression some theorists refer to as 'disjunct' (*disjuncta*).[29] It should be stressed that the solmization, the method of sight-singing with the aid of the syllables, was a tool designed for beginners. Franchinus Gaffurius and several other theorists leave us in no doubt about this:

> Tones which notes indicate are usually expressed in three ways. The first is through solfege, that is, singing the syllable names of the tones . . . This manner of singing is the preferable method of instructing children. The second way is by producing only sounds and tones, and omitting entirely letters, syllables, and words. A skilled singer does this easily . . . The third way is by singing the words subjoined to the notes of a song, as in antiphons and responsories. This manner of singing . . . is the desired goal of the best ecclesiastical singers.[30]

Thus, we should probably not imagine professional singers solmizating in rehearsals but we may certainly expect that they had mastered sight-singing through this method.

The most interesting puzzle about Guido's invention is why he limited himself to only six steps when the gamut – as he repeatedly stressed – contained seven different ones.[31] From the point of view of sight-singing, the limitation was unfortunate since it forced Guido, or rather his successors, to use a highly complex system of interlocking deductions. A heptachord would provide a much simpler aid to sight-singers and it is as easy to learn by heart as the hexachord. We shall never know for sure whether Guido's limitation of the segment of the gamut to be fixed in memory to C-a was connected with the similar ranges he compared in *Micrologus*, but this seems to be the only alternative to thinking that the limitation was an insignificant accident, and – what is more important – the connection was certainly made, if not by him, then by his successors. As we have seen, the ultimate reason behind the creation of the system of deductions was the incompatibility of certain features of modal theory with the gamut. So long as this reason persisted, that is, certainly throughout our period, the system was necessary to demonstrate the affinities and could double as an aid to sight-singing. Even though a simpler system, based on a heptachord rather than the hexachord, could have been devised for the latter function, it was more practical from the standpoint of a student's memory to use a single system in both roles. This is probably why the earliest attempt to simplify the solmization by extending the hexachord to an octave proposed by Bartolomeo Ramos de Pareia in the late fifteenth century, while hotly debated, was not generally accepted. A century had to pass before such attempts started to gain ground.[32] The gradual decline of solmization based on hexachords, like that of hexachords themselves, had ultimately the same reason as that which brought it into being, namely, the evolution of modal theory.

In sum, the hand is the described correlation of the forty-two syllables of the seven deductions with the twenty places and their letters. This content of the hand was commonly represented in a diagram of the type seen in Figure 1. 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, it is necessary for the student to fix the whole structure firmly in his memory. In particular, if the system of deductions is to be a truly effective aid to sight-singing, the student must be trained to associate automatically particular letters with appropriate syllables. In order to facilitate the teaching and memorizing of the whole structure and especially of individual letters 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 or joint left for the last letter, it was inscribed on the same joint as the penultimate letter (the third joint of the

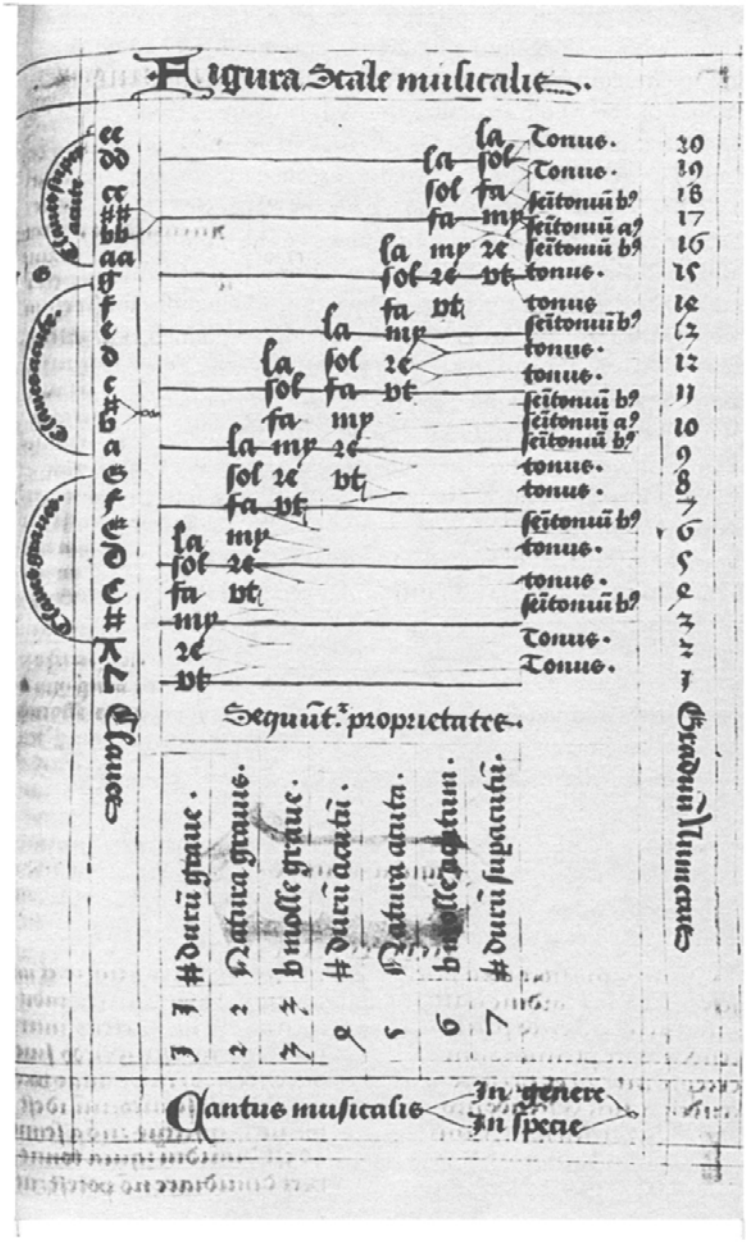


Figure 1. Ms. Ghent, Universiteitsbibliotheek, 70/(71), fol. 108r (1503–4)

middle finger), but on the reverse of the hand (a fine point usually misunderstood today, since on the diagrams representing the hand this highest letter appears, for obvious reasons, above the middle finger); see Figure 2. The name of the whole structure derived, of course, from this particular method of representation. (The alternative method of representation, shown in Figure 1, was often referred to as the 'ladder' [*scala*].) The hand-diagram was both a mnemonic and a pedagogical device. The association of a letter and its syllables with a specific place on the hand helped the memory and provided the teacher with a convenient method of demonstrating and practicing the steps and intervals of the gamut. When discussing the question of 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 on 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'.[33]

The student who has mastered Tinctoris's teaching thus far has mastered the basic gamut, but he is still far from knowing all the steps which may be used in music. The remaining steps will be considered now.