STUDIES AND REPORTS

Vicentino's "*Incerta et occulta scientia*" Reexamined

By MARIA RIKA MANIATES

Certainly one of the most colorful and controversial figures in a period studded with flamboyant personalities is Don Nicola Vicentino. His compositions, performance practices, and theories are still a source of lively debate, a situation that would please this militant and aggressive champion of novelty. One current interest is the construction and tuning of Vicentino's *archicembalo* as it is described in his treatise, *L'antica musica ridotta alla moderna prattica*.[1] This topic has important implications not only for the *archicembalo* as a practical instrument for solo performance[2] and as a theoretical model for complete (that is, perfect) tuning systems,[3] but also for the use of this instrument to accompany choral ensembles and for the relationship of its tunings to Vicentino's basic theory of the three genera.

Analysis of Vicentino's theoretical and practical descriptions of both the genera and the tunings of the *archicembalo* is fraught with many problems. This theorist evidently did not read classical sources and relied on Boethius as

[1] (Rome, 1555); Facsm., ed. Edward E. Lowinsky, Documenta musicologica, Ser. I, Vol. XVII (Kassel, 1959). The discussion of the *archicembalo* occupies Book V of the *Prattica musicale*.

[2] Luzzasco Luzzaschi was famous for his virtuoso playing on the *archicembalo*, which was notorious for its formidable problems. According to Bottrigari, he also wrote compositions for this instrument, but these are no longer extant. See *Hercole Bottrigari: Il desiderio*, trans. Carol MacClintock, Musicological Studies and Documents, 9 (n.p., 1962), pp. 50–51. See also Henry W. Kaufmann, *The Life and Works of Nicola Vicentino*, Musicological Studies and Documents, 11 (n.p., 1966) and Otto Kinkeldey, "Luzzasco Luzzaschi's Solo-Madrigale mit Klavierbegleitung," *Sammelbände der Internationalen Musikgesellschaft*, IX (1908), 562.

[3] The idea of a "universal," "perfect," and "complete" keyboard instrument pervades a series of theoretical works of the seventeenth and eighteenth centuries. The first of these seems to be Lemme Rossi's *Sistema musico overo musica speculativa* (Perugia, 1666), which served, also, as the basis for an essay on the *archicembalo* by Henry Kaufmann; see below, fn. 8. Concepts for and explanations of seventeen- and nineteen-note keyboards, all of which entail some sort of tempering, were commonplace since the late fifteenth century. In his *Syntagma musicum*, Vol. II (Wolfenbüttel, 1619), pp. 63–66, for example, Praetorius describes having seen a thirty-one note keyboard instrument about 1588—one that was owned by Carl Luython at the court of Rudolph II in Prague. This "Universalclavicymbel," to use Praetorius's name, formed part of Rudolph's collection of bizarre curiosities. Praetorius does not attempt to explain its tuning. Rossi's writing, however, was a model for future discussions, emendations, and additions put forth by Mersenne, Printz, Mercator, Huygens, and Sauveur, to name only a few. These writers are briefly discussed in Wilhelm Dupont, *Geschichte der musikalischen Temperatur* (Nördlingen, 1935). Huygens's advocacy of tempered fifths enlarged by 1/110 of a comma was well known enough to be called the "Huygens System" by modern acousticians; see Dupont, *op. cit.*, p. 54.

his authoritative text. From this point of view Vicentino cannot be classified as a humanist scholar with respectable research techniques like those of Zarlino, Salinas, and Bottrigari. But Vicentino worked in cities and courts where learned academies flourished. Unlike Galilei, he did not have the benefit of a first-rate tutor such as Mei, but he undoubtedly picked up ideas about various Greek systems from other scholars. The Vicentine humanist Giangiorgio Trissino, for example, wrote that contemporary practice ignored the chromatic and enharmonic genera and even in the diatonic genus failed to achieve ancient perfection and exquisiteness.[4] It was precisely these lost qualities that Vicentino attempted to rejuvenate in his system. This aim was motivated neither by antiquarian scholarship nor by a desire to establish the genera as norms for ordinary music. Vicentino invented a radical system for his own brand of new and extraordinary composition.[5] Like mannerist thinkers in literature and the visual arts, he exploited classical authority to justify stylistic extravagance whose appreciation he himself restricted to a small circle of refined connoisseurs. The *mirabil dolcezza*[6] of chromatic and enharmonic styles became the aesthetic basis of avant-garde "musica reservata."[7] Considering the wide divergence of opinions about Greek tuning systems prevalent throughout the sixteenth century, one cannot fault Vicentino for propagating his highly personal interpretation. But one is hard put to quell feelings of exasperation when coming to terms with the myriad errors and inconsistencies that abound in Vicentino's text.

The construction of the two-manual *archicembalo* with its six orders (three in each keyboard) has been described in detail by Henry Kaufmann.[8] According to Vicentino, this instrument can be tuned in two different ways: one producing the chromatic semitones, enharmonic dieses, and commas necessary for the three genera; and one producing perfect fifths and thirds. His somewhat meager science and impoverished systematization, compounded by typographical misprints, make accurate explication of these two tuning systems very difficult. Close transliteration of his methodology must be spiced with scholarly conjecture and intuitive hypothesis.

[4] The source of Trissino's comment is a letter of June 19, 1541 sent to Pope Paul III along with Nicolò Leoniceno's translation of Ptolemy's *Harmonika*. The letter is cited in Kaufmann, *Life and Works*, p. 17.

[5] Zarlino's sly criticism of arrogant modernists who mistakenly believe that they have revived the ancient genera is an oblique reference to Vicentino's ideas. Cf. *Le istitutioni harmoniche* (Venice, 1558), Bk. III, Chap. 72 and *Gioseffo Zarlino: The Art of Counterpoint*, trans. Guy A. Marco and Claude V. Palisca (New Haven, 1968), p. 267, fn. 1. Although Zarlino does not name Vicentino, his meaning would be clear to any reader conversant with the incipient quarrel between conservatives and radicals, a quarrel destined to culminate in the debate between Artusi and Monteverdi. Another more obvious reference to Vicentino's text in Zarlino's treatise will be discussed in my forthcoming article on the significance of the term "maniera" in the treatises of Zarlino and Vicentino.

[6] The phrase occurs in the same chapter of Vicentino's *L'antica musica* that contains the now celebrated discussion of the aesthetic effects and social climates proper to the three generic styles (Bk. I, Chap. 4).

[7] Edward E. Lowinsky, *Secret Chromatic Art in the Netherlands Motet* (New York, 1946), pp. 88–89, 109.

[8] Kaufmann, *Life and Works*, pp. 163–66 and idem, "More on the Tuning of the *Archicembalo*," this JOURNAL, XXIII (1970), 84–94.

Let us begin by examining the first tuning system Vicentino explains at great length (in Chap. 5). As Kaufmann indicates, the first three orders in the first keyboard are tuned by the accepted meantone temperament of the sixteenth century: that is, the one-quarter comma system of Pietro Aaron.[9] This keyboard comprises a nineteen-note octave with split keys for all chromatic pitches as well as extra keys inserted between the diatonic semitones *b–c* and *e–f*. The fourth and fifth orders in the second keyboard reproduce, respectively, the white keys of the first order and the flat keys of the second and third orders, but tuned one minor enharmonic diesis higher than the original pitches.[10] The sixth and last order includes only five keys (*g*, *a*, *b*, *d*, and *e*), and we assume they are tuned one comma above their diatonic counterparts in the first order.[11] An overview of the *archicembalo* keyboards, according to Vicentino, appears in Table 1.

TABLE 1

THE KEYBOARDS OF VICENTINO'S ARCHICEMBALO

Sixth Order:		$\dot{g}$		$\dot{a}$		$\dot{b}$			$\dot{d}$		$\dot{e}$		
Fifth Order:		$\dot{g}\flat$		$\dot{a}\flat$		$\dot{b}\flat$			$\dot{d}\flat$		$\dot{e}\flat$		
Fourth Order:	$\dot{f}$		$\dot{g}$		$\dot{a}$		b		$\dot{c}$		$\dot{d}$		$\dot{e}$		$\dot{f}$
Third Order:		$g\flat$		$a\flat$		$a\sharp$		$b\sharp$		$d\flat$		$d\sharp$		$e\sharp$	
Second Order:		$f\sharp$		$g\sharp$		$b\flat$				$c\sharp$		$e\flat$			
First Order:	f		g		a		b		c		d		e		f

Vicentino's description of his practical tuning method entails several enigmas, particularly in relation to the upper three orders. After stating that the first two orders are set by meantone temperament, Vicentino proceeds to elucidate a method of tuning by interlocking tempered fifths. In simplified terms, one tunes upward from $2g\sharp$[12] to $3d\sharp$, $3a\sharp$, $3e\sharp$, and $3b\sharp$; then one tunes downward from $2e\flat$ to $3a\flat$, $3d\flat$, $3g\flat$, and $4\dot{b}$.[13] On the basis of some discrepancies in Vicentino's text and some musical examples (in which $\dot{b}$ is notated as $c\flat$), Kaufmann projects that $4\dot{b}$ is equivalent to $c\flat$. In his second essay, however, he omits his original hypothesis that the entire fourth order might be understood enharmonically.[14] He rejects this possibility because Vicentino states that the fourth and fifth orders are one minor enharmonic diesis higher than the orders of the first keyboard. But does this mean that $4\dot{b}$ cannot be

[9] Kaufmann, *Life and Works*, pp. 168–69; idem, "More on the Tuning," pp. 85–86. Aaron's system is explicated in the *Thoscanello de la musica* (Venice, 1523), Bk. II, Chap. 41.

[10] Kaufmann, *Life and Works*, p. 168; idem, "More on the Tuning," pp. 85–86. Vicentino places a dot above these notes in his treatise; they are similarly designated in our text below, where a dot appears over the letter name of a given note from the fourth and fifth orders.

[11] Kaufmann, *Life and Works*, p. 168; idem, "More on the Tuning," pp. 85–86. Vicentino designates notes from the sixth order with a superscript comma—a practice we have taken over into our text.

[12] The numbers preceding the letter names of the keys indicate the order to which they belong.

[13] Kaufmann, *Life and Works*, p. 170; idem, "More on the Tuning," pp. 85–86.

[14] Kaufmann, *Life and Works*, p. 170; idem, "More on the Tuning," pp. 86–87.

equivalent to $c\flat$? Has Vicentino erred in tacking on $4b$ at the end of the tuning cycle of the third order? If he did not, and if we can assume that $4b$ is indeed another spelling for $c\flat$, then Vicentino's generalization about the enharmonically raised fourth order is palpably misleading. Is it also possible that $3b\sharp$ represents an alternative candidate for an enharmonic equivalent to $c\flat$? These questions will be answered a little later in the present study. At this point we can postulate that had Vicentino meant an enharmonic reading (in the modern sense) for the fourth order, he could have proceeded immediately to tune it by a circle of descending tempered fifths starting from $4b$: that is, $4\dot{e}$, $4a$, $4d$, $4g$, $4c$, and $4f$. As it is, Vicentino skips to the fifth order. One begins with $3b\sharp$ and then tunes upward to $5g\flat$, $5d\flat$, $5a\flat$, $5\dot{e}\flat$, and $5b\flat$. Then the fourth order is tuned upward from $5b\flat$, producing $4f$, $4c$, $4g$, $4d$, $4a$, $4\dot{e}$ (and $4b$?).[15] It should be noted that Vicentino does not specify all the steps for the fourth order but only indicates the method by going as far as $4c$. His incomplete statement thus leaves the problem of $4b$ up in the air. At this point in Chapter 5, Vicentino states that his instrument is completely tuned. Notably absent is an explanation of the tuning for the sixth order.

The latter order gives rise to a number of difficulties. Nowhere in the treatise does Vicentino clearly say that it is the "comma" order. In Chapter 3, where he briefly explains the functions of the different orders (first, diatonic; second and third, chromatic; fourth and fifth, enharmonic), Vicentino implies that the sixth order has no special name but may be called the "order of perfect fifths." For this reason, Kaufmann connects this order to the second tuning system.[16] Quite apart from problems inherent in the second tuning system, the sixth order has nothing to do with it *per se*. Vicentino himself is confused at this point. The first mention of keys tuned one comma higher than diatonic ones occurs in Chapters 8–34, in which Vicentino describes the variety of intervals (especially thirds and sixths) that one can play from every degree found on the *archicembalo*. In Chapter 13 he mentions *a*. In Chapter 18 he says it is unnecessary to enumerate the intervals from *g*; thus one is to understand that the same goes for *e*, *d*, and *b*. In summation, we can, by inference, posit the sixth order as a "comma" order.

The next topic pertains to the actual mathematical tuning of the six orders. Concerning the first three of them, Kaufmann has explicated Lemme Rossi's interpretation of the nineteen keys in the first keyboard.[17] Kaufmann does not indicate the source of Rossi's string lengths from which he derives the cents calculations for the pitches. Furthermore, Rossi's system spans an octave from *A* to *a* instead of the span from *F* to *f* used by Vicentino. Table 2, which follows, compares, in columns A and B, a translation of Rossi's interpretation and Aaron's meantone temperament as they may be applied to Vicentino's orders. In Aaron's system, the difference between all semitones is either 76 or 76.1 cents, while the difference between modern enharmonic equivalents is

[15] Kaufmann, *Life and Works*, p. 170; idem, "More on the Tuning," pp. 88–89.

[16] Kaufmann, "More on the Tuning," p. 89. The second tuning system will be discussed further below.

[17] Kaufmann, "More on the Tuning," pp. 87–88. See also fn. 3, above. Rossi, of course, used his interpretation of the first keyboard as the basis for his own tuning system.

TABLE 2

THE TUNING SYSTEMS OF AARON AND ROSSI APPLIED TO VICENTINO'S KEYBOARD

	A	B		C		D
	Aaron	Rossi		Rossi		[Rossi]
1*f*	503.4	503.2				
			$4\dot{f}$	541.9		
2*f*♯	579.5	580.6				
3*g*♭	620.5	619.3				
			$5\dot{g}\flat$	658		
1*g*	696.6	696.8			$6\dot{g}$	716.15
			$4\dot{g}$	735.5		
2*g*♯	772.6	774.2				
3*a*♭	813.6	813				
			$5\dot{a}\flat$	851.7		
1*a*	889.7	890.4			$6\dot{a}$	909.75
			$4\dot{a}$	929.1		
3*a*♯	965.8	967.7				
2*b*♭	1006.8	1006.5				
			$5\dot{b}\flat$	1045.2		
1*b*	1082.9	1083.9			$6\dot{b}$	1103.25
			$4\dot{b}$	1122.6		
3*b*♯	1159	1161.3				
1*c*	1200 (0)	1200 (0)				
			$4\dot{c}$	1238.7 (38.7)		
2*c*♯	76.1	77.5				
3*d*♭	117.1	116.1				
			$5\dot{d}\flat$	154.8		
1*d*	193.2	193.6			$6\dot{d}$	212.95
			$4\dot{d}$	232.3		
3*d*♯	269.3	270.9				
2*e*♭	310.3	309.7				
			$5\dot{e}\flat$	348.4		
1*e*	386.3	387.1			$6\dot{e}$	406.45
			$4\dot{e}$	425.8		
3*e*♯	462.4	464.6				
1*f*	503.4	503.2				

41 cents. In Rossi's system, the semitones are separated by either 77.4 or 77.5 cents (except for two pairs which are 77.3 cents apart), while the modern enharmonic equivalents entail a difference of 38.6, 38.7, or 38.8 cents. Thus the discrepancies between Aaron's and Rossi's tunings are minimal in themselves, but they have subtle repercussions both on the tuning of the second keyboard and on the entire second system described by Vicentino.

The tuning of the second keyboard depends on the ratio given to the minor enharmonic diesis and to the comma, which is one-half of the former interval. Kaufmann is quite correct in observing that Rossi's interpretation of Vicentino's system, plus his own tuning, creates a kind of equal temperament insofar as the diesis division between adjacent pitches is more or less uniform.[18] (See Table 2, cols. B and C.) This uniformity produces other differences which relate to

[18] Kaufmann, "More on the Tuning," p. 93, including Table II. The cents value for *F should be 851.7.

the question of $c\flat$. All the fifths within the first keyboard and all those within the second keyboard are separated by either 696.7, 696.8, or 696.9 cents; they adhere, thus, to a generally uniform principle of temperament. The sole exception in each of the two keyboards is $3b\sharp$–$3g\flat$ (658 cents) and $4\dot{b}$–$5\dot{g}\flat$ (735.4 cents). These discrepancies clearly show that $4\dot{b}$ is not equivalent to a $c\flat$ key in the second keyboard and that $3b\sharp$ does not function as a $c\flat$ key in the first keyboard. In fact, the fifth between $3b\sharp$ and $3g\flat$ falls short of the normal tempered size for this interval by 38.7 cents, while the fifth between $4\dot{b}$ and $5\dot{g}\flat$ exceeds the normal tempered size for this interval by the same amount. Significantly, 38.7 is the average size of Rossi's minor enharmonic diesis. (Rossi's minor semitone of 77.5 cents yields a diesis of 38.7 cents.) In effect, this arrangement means that the diesis lost in the circle of tempered fifths within the first keyboard is regained in the circle of tempered fifths within the second keyboard. The mutual cancellation creates an overall integrated system of interlocking tempered fifths when viewed linearly. It does not, however, posit a system of modern enharmonic equivalents except for two cases explained below. On one side, $4\dot{b}$ can be used as the fifth below $3g\flat$; this fifth ($4\dot{b}$–$3g\flat$) contains 696.7 cents; it thus appears that $4\dot{b}$ is indeed equivalent to $c\flat$. On the other side, one can use $3b\sharp$ as the fifth below $5\dot{g}\flat$; this fifth ($3b\sharp$–$5\dot{g}\flat$) also consists of 696.7 cents; $3b\sharp$ is, therefore, equivalent to $\dot{c}\flat$.[19] If we accept $4\dot{b}$ as another spelling for $c\flat$, then $4\dot{e}$ (which is 696.8 cents below $4\dot{b}$) could be read as $f\flat$. The only problem is that this pitch ($4\dot{e}$ or $f\flat$) does not form tempered fifths with any keys on the first keyboard. The same holds true for $3e\sharp$, which fails to make tempered fifths with any keys on the second keyboard. In short, only $4\dot{b}$ and $3b\sharp$ are amenable to enharmonic equivalence in the modern sense of the term. The reader should also note that there are two (not one) candidates for $c\flat$: $4\dot{b} = c\flat$ and $3b\sharp = \dot{c}\flat$. And the difference between them is precisely 38.7 cents, or Rossi's diesis.

Returning to the subject of equal temperament in Rossi's calculations, one must recognize several important features. All meantone temperaments involving seventeen- and nineteen-note octaves have one common aim. They seek to distribute the so-called comma discrepancy between chromatic intervals which in the modern equal-tempered system are truly equivalent enharmonically. In this respect, the first three orders of Vicentino's instrument do not approach equal temperament. Rossi's interpretation of the way in which Vicentino has applied Aaron's system produces a difference of 38.6 to 38.8 cents,[20] values that are, in fact, roughly the same as Rossi's minor enharmonic diesis. They separate $2f\sharp$–$3g\flat$, $2g\sharp$–$3a\flat$, $3a\sharp$–$2b\flat$, $3b\sharp$–c, $2c\sharp$–$3d\flat$, $3d\sharp$–$2e\flat$, and $3e\sharp$–f, as well as all pitches adjacent to keys in the fourth and fifth orders. These facts demonstrate that an equal-tempered effect emerges only when the

[19] The fact that the interrelated tunings of the two keyboards produce two $c\flat$ keys—one proper to the first keyboard ($4\dot{b}$) and one proper to the second keyboard ($3b\sharp$)—can be used to explain the oddity of Vicentino's method, an oddity hitherto only noted in passing by modern scholars. In fact, Vicentino ensures that $3b\sharp$–$5\dot{g}\flat$ is an ordinary tempered fifth by jumping from the third to the fifth orders via precisely these two keys. Then, by inserting the fourth order in successive fifths from $5\dot{b}\flat$, he arrives at a closed system.

[20] This may be seen by figuring the difference between the values given in cols. B and C of Table 2.

archicembalo combines chromatic *and* enharmonic styles in a consistent fashion. Diatonic and chromatic styles restricted to the first keyboard entail two semitone sizes (compounded in composite thirds and sixths) plus the "wolf-tone" discrepancy between the chromatic intervals listed above. This discrepancy becomes transformed into a normal interval size when it is allied with the first two orders of the second keyboard. From this point of view, Vicentino's system represents a unique transfiguration of an erstwhile anomaly into a novel norm. *Moderna prattica* dissolves a difficulty by applying the enharmonic genus of *antica musica.*

The last point of discussion on Rossi's system is that he does not include the sixth order. Taking Rossi's value for the minor enharmonic diesis, one can hypothetically insert this order into his system. (See Table 2, col. D.) The cents values for these five keys are derived by halving the difference between the relevant keys of the first and fourth orders. In all cases, the enharmonic distance is 38.7 cents, yielding 19.35 cents for the comma. Having completed, and in some cases adjusted, Rossi's system as it is presented by Kaufmann, we can now project how it would work according to Vicentino's text. This theorist devotes many chapters to explaining in detail the intervals (especially those of the semitone, tone, third, fourth, fifth, and sixth) that can be constructed on every key of the *archicembalo.* Much of this discussion is redundant and tiresome in its pedantry. Some portions, however, can be used to demonstrate his thinking. After a long series of examples showing the various octave species and modes on every degree (Chap. 59), Vicentino indicates his awareness that his first tuning system produces a kind of equal temperament, since the tone between *f* and *g* is equally divided into five dieses. From Rossi's calculations we see that this is indeed the case. (See Table 3.) Since the

TABLE 3

DIVISIONS OF THE TONE

f		*ḟ*		*f*♯		*g*♭		*ġ*♭		*g*		[*ġ*	*ġ*]
	38.7		38.7		38.7		38.7		38.8		[19.35		19.35]

orders between *f* and *g* have no comma key, Vicentino states, but does not demonstrate, that the comma is one-tenth of the tone or one-half of the minor enharmonic diesis. The tone between *f* and *g*, of course, contains the customary minor semitone (*f*–*f*♯) and major semitone (*f*♯–*g*). Of these, the former is equivalent to two minor enharmonic dieses or to one major enharmonic diesis; the latter is equal to three minor enharmonic dieses or to a combination of one major and one minor enharmonic diesis. At this point, Vicentino does not introduce intervals larger than the tone but smaller than the minor third. Earlier in the treatise, however (in Chaps. 14–24 of the *Theorica musicale*), he had included, among intervallic divisions, the comma, the minor enharmonic diesis, the major enharmonic diesis (or minor semitone), the major semitone, the minor tone, the natural tone, and the major tone. Vicentino omitted the comma tone, however, which can actually be found on five degrees of the *archicembalo.* By inserting it, and with reference to Rossi's interpretation, we may measure eight intervals between *g*–*ȧ*, as is illustrated in Table 4. These

TABLE 4

SIZES OF THE TONE

Vicentino	Rossi
Comma	[19.35]
Minor enharmonic diesis	38.7
Major enharmonic diesis (=minor semitone)	77.4
Major semitone	116.2
Minor tone	154.8
Natural tone	193.6
[Comma tone]	[212.95]
Major tone	232.3

values, of course, proceed from a meantone temperament which Vicentino does not advocate for vocal performance. As a matter of fact, the comma does not figure at all in his vocal music.

In relation to the *archicembalo,* these eight intervals have obvious implications. To illustrate them we refer to Vicentino's discussion of the six thirds found on his instrument (Bk. V, Chap. 52).[21] Two of these are the basic tempered major and minor thirds. If they involve white keys, Vicentino calls them "natural," and if they involve black keys, dieses, or comma keys, he calls them "accidental" (the nomenclature indicating their notated form). The minor third that is one comma larger than the ordinary minor third is much livelier and verges toward the major third; Vicentino calls it *propinquissima.* The minor third that is one minor enharmonic diesis larger than the ordinary tempered minor third is very good in fast movement because it lies between the tempered minor and major thirds. The major third that is one comma larger than the tempered major third is an excellent interval precisely because it is not tempered. And, finally, the major third that is one diesis larger than the ordinary major third is permissible in running passages "but not to good effect." Rossi's major third (387.1) differs from the pure third found in just intonation and Aaron's meantone system (386.3) by only .8 cents. His minor third (309.7) differs from the just minor third (315.6) by 5.9 cents and from Aaron's minor third (310.3) by .6 cents. Now, if the comma is added to Rossi's major third, bringing it to 406.45 cents, this interval becomes 1.35 cents short of the Pythagorean major third (407.8). Comma adjustments to Rossi's fourths and fifths take these intervals further away from their pure counterparts. Thus, it is evident that Vicentino's interval sizes, or interval inflections, are not meant to approximate any of the known tuning systems (except for the basic meantone temperament of the first keyboard). The unique sonority of the intervals produced on the *archicembalo* bears directly on Vicentino's general conception of the genera and the affective quality of various intervals—in short, on his fundamental aesthetic of rhetorical eloquence through the novel application of *effetti meravigliosi.*

At this point in the present article, we digress briefly to consider the ramifications of Vicentino's first tuning system for the *archicembalo.* Until now, the place occupied by Vicentino in the history of both chromatic and enharmonic

[21] The following description pertains only to those thirds that may be formed by two keys one of which is tuned six different ways on the various orders.

theory and practice has been accorded negligible importance by modern historians. As far as theory is concerned, we have already shown that a surprising number of eminent musical theorists, physicists, mathematicians, and acousticians have shown consistent interest in what we might call the "universal" or "perfect" instrument.[22] This interest seems to be an empirical counterpart to speculative mathematics. In other words, the "universal" keyboard affords a practical instrument for working out and perceiving all possible tunings known at the time. From this point of view, it seems not unreasonable to predicate that Vicentino's *archicembalo* and its later interpretations (including misunderstandings such as the omission of the sixth order and new additions producing fifty-three- and seventy-seven-note keyboards) represent a modern equivalent to the medieval monochord. As far as practice is concerned, we drew attention to the well-known fact that Luzzasco Luzzaschi played Vicentino's *archicembalo* and composed music specifically for it as a solo instrument.[23] In a recent book on Gesualdo, Glenn Watkins puts forth the tantalizing thesis that the *Canzona del Principe* is a keyboard work by Gesualdo written, if not for Vicentino's instrument, then at least in emulation of Luzzaschi's aforementioned keyboard works.[24] Watkins also points out that there exists a small but fascinating body of extremely chromatic keyboard works by the Neapolitan school of Giovanni Macque and Giovanni Maria Trabaci among others (variously called *stravaganze* and *durezze*) which evinces characteristics similar to the putative Gesualdo piece.[25] The suggestion that the so-called "universal" instrument might have had practical use is further strengthened when we note, for example, a description by Fabio Linceo Colonna, the Italian theorist, of his fifty-string *Pentecontachordon*, a keyboard instrument that divided the octave into seventeen parts.[26] Given the audacities found in such keyboard compositions as those of the Neapolitan school, we can assume that they were written for instruments strikingly similar to those explained in the theoretical treatises. This admittedly incomplete excursus has been inserted to alert us that both the theoretical and practical influence of Vicentino's theories awaits further systematic investigation.

Before leaving the subject of Vicentino's first tuning system, several other points should be reviewed. As was stated previously, Rossi's minor enharmonic diesis (and our interpolated comma) departs from the division of his tempered tone (193.6) into five parts. Vicentino himself does not specifically indicate that this is his method of deriving the minor enharmonic diesis. In fact, Vicentino's discussion of ratios on the *archicembalo* (Bk. V, Chaps. 60–65) is confused and misleading.[27] Inconsistently qualifying his remarks with such words as "like," "in between," "with a slight difference," and "but tempered," Vicentino postulates proportions for the various intervals as they are listed

[22] See above, fn. 3.

[23] See above, fn. 2.

[24] Glenn Watkins, *Gesualdo: The Man and his Music* (Chapel Hill, 1973), pp. 291–95.

[25] *Ibid.*, pp. 294–95.

[26] *La sambuca lincea overo dell'stromento musico perfetto lib. III* (Naples, 1618).

[27] His notions of ratios for vocal music in the three genera is even more problematic. They are explored in my forthcoming book, *Mannerism in Italian Musical Culture, 1530–1630.*

TABLE 5

INTERVALLIC RATIOS

Vicentino			Rossi
Interval	*Ratio*	Equivalents in Cents	
Fifth	3:2	[702]	696.8
Fourth	4:3	[498]	503.2
Major third	5:4	[386]	387.1
Minor third	6:5	[316]	309.7
Major tone	8:7	[232]	232.3
[Comma tone]	—	[225]	[212.95]
Natural tone	9:8 or 10:9	[204 or 182]	193.6
Minor tone	13:12	[139]	154.8
Major semitone	14:13	[128]	116.1
Minor semitone (major enharmonic diesis)	21:20	[84]	77.4
[Minor enharmonic diesis]	—	[42]	38.7
[Comma]	—	[21]	[19.35]

in Table 5. Two features emerge from the table. First, the commonplace designation of Vicentino's enharmonic style as "quarter-tone" or microtonal music is erroneous. The enharmonic genus exhibits two dieses: minor and major. The latter interval is also known as the minor semitone. The major semitone is subdivided into one minor and one major enharmonic diesis.

Vicentino's description of the three genera on the tetrachord, pentachord, and octave (Bk. III, Chaps. 36–42) is illustrated schematically in Table 6. From the subdivisions of the natural tone one can readily discern that the minor enharmonic diesis is one-third of the major semitone and the major enharmonic diesis two-thirds thereof. Although Vicentino calls this genus enharmonic, it is really closer to Aristoxenos's soft chromatic genus.

A second feature of Vicentino's discussion of enharmonic properties concerns his mathematics. The ratio for the major enharmonic diesis (84 cents) implies a minor enharmonic diesis of 42 and a comma of 21 cents. But if one proceeds from this comma and recomputes the intervals, a glaring discrepancy between them and the ratios given by Vicentino emerges, as may be observed in Table 7.

TABLE 6

THE THREE GENERA

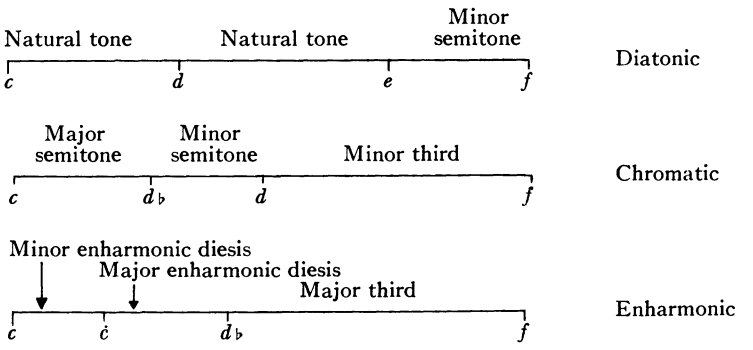

TABLE 7

SIZES OF MICROTONAL INTERVALS

Values in Cents (Adding Minor Enharmonic Diesis)		Vicentino (See Table 5)
Major tone	252	232
Comma tone	231	225
Natural tone	210	204 or 182
Minor tone	168	139
Major semitone	126	128
Major enharmonic diesis (=Minor semitone)	84	84
Minor enharmonic diesis	42	42
Comma	21	21

Since inconsistencies seem to be integral to Vicentino's various computations, one is emboldened to suggest alternate interpretations. In Table 8, Column A presents values for Vicentino's first keyboard according to Aaron's meantone temperament. Columns B and D offer the values for the second keyboard arising from a minor enharmonic diesis of 40.8 and a comma of 20.4 cents. Although Vicentino cites both 10:9 and 9:8 as ratios for the natural tone, he minimizes the difference between them and finally opts for the 9:8 tone of 204 cents. As one-tenth of the latter, the comma works out to be 20.4 cents and the minor enharmonic diesis, 40.8 cents. Of course, the keys tuned 40.8 cents above their diatonic counterparts are only 35.2 or 35.3 cents below the next highest keys of the first keyboard. The difference between 40.8 and the latter values is 5.5/5.6 cents and results from the meantone temperament of the first keyboard, a system now combined with a justly derived set of ratios for the second keyboard. One striking element of this system is that the difference of 40.8 between keys of the first keyboard and their enharmonically raised neighbors in the fourth and fifth orders is almost identical with the 41 cents that divide sharps and flats in the first keyboard. This logical factor, however, produces the 5.5/5.6 discrepancy already noted.

The addition or subtraction of the comma does not always produce significant changes in relation either to Vicentino's ratios or to those of the Pythagorean and just systems. Vicentino's minor semitone (84 cents) turns out as 76.1 cents in Aaron's meantone temperament, 7.9 cents smaller. With the comma added, the minor semitone of 96.5 cents is 12.5 cents larger than Vicentino's ratio, 25.83 cents larger than the just minor semitone (70.67), but only 6.3 cents larger than the Pythagorean minor semitone (90.2). Aaron's major semitone (117.1) is 10.9 cents smaller than Vicentino's ratio (128) and 3.4 cents larger than the Pythagorean major semitone (113.7). The addition of the comma to Aaron's major semitone (c–$d\flat$) or the subtraction of the comma from his minor tone (c–$d\flat$) produces a pitch of 137.5 cents; this interval is 1.5 cents smaller than Vicentino's minor tone (139). Adding the comma to Aaron's tone, of course, produces his comma tone of 213.6 cents; this interval is almost midway between Vicentino's ratios for the natural tone (204) and the comma tone (225). Comma adjustments to other intervals result in no important changes in this regard. Again, this exercise points out that the above calculations, by which we may bring some of the tempered intervals

TABLE 8

FIRST TUNING SYSTEM

	A Aaron		B Just Enharmonic Diesis	C Tempered Enharmonic Diesis		D Just Comma	E Tempered Comma
1*f*	503.4						
		4$\dot{f}$	544.2	541.45			
2*f*#	579.5						
3*g*♭	620.5						
		5$\dot{g}$♭	661.3	658.55			
1*g*	696.6						
					6$\dot{g}$	717	715.6
		4$\dot{g}$	737.4	734.6			
2*g*#	772.6						
3*a*♭	813.6						
		5$\dot{a}$♭	854.4	851.65			
1*a*	889.7						
					6$\dot{a}$	910.1	908.725
		4$\dot{a}$	930.5	927.75			
3*a*#	965.8						
2*b*♭	1006.8						
		5*b*♭	1047.6	1044.85			
1*b*	1082.9						
					6$\dot{b}$	1103.3	1101.925
		4*b*	1123.7	1120.95			
3*b*#	1159						
1*c*	1200						
		4$\dot{c}$	1240.8	1238.05			
2*c*#	76.1						
3*d*♭	117.1						
		5$\dot{d}$♭	157.9	155.15			
1*d*	193.2						
					6$\dot{d}$	213.6	212.225
		4$\dot{d}$	234	231.25			
3*d*#	269.3						
2*e*♭	310.3						
		5$\dot{e}$♭	351.1	348.3			
1*e*	386.3						
					6$\dot{e}$	406.7	405.325
		4$\dot{e}$	427.1	424.35			
3*e*#	462.4						
1*f*	503.4						

closer to other tuning systems, are purely fortuitous. Hence we may assume that this is not Vicentino's aim.

Turning once more to Table 8, we find in Columns A, C, and E a tuning system that combines Aaron's basic meantone temperament for the first keyboard with Rossi's rationale for the second keyboard (that is, calculating the minor enharmonic diesis and comma from Aaron's tempered minor semitone). The figures in these columns do not differ appreciably from Rossi's and result in the same kind of "equal tempering" in music employing the second keyboard intermingled with the first one. One point should be noted, however: the minor enharmonic diesis and comma in this system display less variety in their inflections than do the comparable intervals in Rossi's system. (The minor enharmonic diesis = 38.05 and 38 cents in only three cases; the comma = 19.03 and 19 cents in only two cases.) Thus, our hypothetical tuning is actually more equal than Rossi's "equal temperament."

We turn now to the topic of Vicentino's second tuning system based on the "puzzling doctrine of the perfect fifth."[28] This system (discussed in Bk. V, Chap. 6) represents an alternate method facilitating the use of the *archicembalo* to accompany vocal music in ordinary style—the *communa* of which Vicentino speaks.[29] First of all, we must reiterate that this system is not, in spite of Vicentino's statement in Chapter 3, a result of any special feature of the sixth order. It relates to the entire second keyboard whose keys are to be tuned a perfect fifth above the first keyboard. In his second study, Kaufmann attempts to reconcile Vicentino's explanation of this method with all possible sizes of fifths encountered in his text, including the tempered one with its *propinqua* and *propinquissima* varieties.[30] He finds, naturally, that Vicentino's terms are not consistent from chapter to chaper and from book to book. Kaufmann's rationale departs from an interpretation of Vicentino's second tuning as merely an alternate method for arriving at the same ratios as those given by Rossi—in other words, a second practical way of constructing the first tuning. Kaufmann therefore concludes that Vicentino's use of "perfect fifth" is only a general term and not a specific description of a precise ratio (3:2 or 702 cents) and logically finds Vicentino's second tuning, as he understands it, to be "possible, but much more complicated and involuted than his first tuning."[31]

Our thesis is that Vicentino's second tuning actually represents a system entirely different from the first one. The problem in working it out lies not in the extrapolation of the precise meaning of "perfect fifth" in this theorist's terminology. As we shall see, Vicentino indeed means the perfect fifth or pure fifth of 702 cents. Once understood, his method is extremely simple, simpler in fact than that of the first tuning system. But his description of the practical construction of the second system appears involuted and complicated because it is inaccurate.

He describes this tuning as one exhibiting perfect fifths in every key, a slightly misleading caption. To begin with, he states that one tunes the three orders of the first keyboard in the customary tempered manner. Thus it is self-evident that all the fifths found in this keyboard will be tempered and not perfect; major thirds, of course, are pure sizes. One tunes 4*g* a perfect fifth above 1*c*, and ascends on the white keys of the fourth order in the same way: that is, 4*a* a perfect fifth above 1*d*, etc. So far, so good. Vicentino goes on to say that the keys of the fifth order are tuned a perfect fifth above the second, while those of the sixth are likewise tuned above the third. Here Vicentino's explanation breaks down. In actuality, the keys of the fifth order ($g\flat$, $a\flat$, $b\flat$, $d\flat$, and $e\flat$) should be tuned a perfect fifth above those keys in the first keyboard which lie one major semitone above their closest diatonic neighbors (1*b*, $3d\flat$, $2e\flat$, $3g\flat$, and $3a\flat$).[32] Then the keys of the sixth order should be tuned a perfect fifth above those keys in the first keyboard which lie one minor

[28] James M. Barbour, *Tuning and Temperament* (East Lansing, 1951), p. 118. See also Kaufmann, *Life and Works*, p. 171 and idem, "More on the Tuning," p. 89.

[29] Bk. III, Chap. 15.

[30] Kaufmann, "More on the Tuning," pp. 89–92.

[31] *Ibid.*, p. 92.

[32] The exception in this procedure is 1*b*, which lies a major semitone below 1*c*.

semitone above their closest diatonic neighbors (2*c*♯, 3*d*♯, 3*e*♯, 2*g*♯, and 3*a*♯). The keys of the sixth order act as surrogate sharp keys, filling in the gaps of the fifth order. Table 9 presents the values in cents for these tunings; column A gives Aaron's meantone temperament for the first keyboard, and column B gives the keys of the second keyboard which are tuned by the method described above. Vicentino's comments about performing on the *archicembalo* tuned according to this system are revealing. He advises playing in octaves on the first keyboard the fundamental note of each triad with the outside fingers of the hand, and then without moving the hand searching out pure thirds or fifths or both on the higher keyboard. Table 10 tabulates the salient combinations. It demonstrates that just major or minor triads (comprised of perfect fifths subdivided into just major and minor thirds) can be discovered on all degrees of the diatonic scale save one. The minor triad on *f*♯

TABLE 9

THE SECOND TUNING SYSTEM

	A Aaron		B "Perfect Fifth"
1*f*	503.4	4*f*	508.8
2*f*♯	579.5		
3*g*♭	620.5	5*g*♭	584.9
1*g*	696.6	4*g*	702
2*g*♯	772.6	6*g*♯	778.1
3*a*♭	813.6	5*a*♭	819.1
1*a*	889.7	4*a*	895.2
3*a*♯	965.8	6*a*♯	971.3
2*b*♭	1006.8	5*b*♭	1012.3
1*b*	1082.9	4*b*	1088.3
3*b*♯	1159	6*b*♯	1164.4
1*c*	1200 (0)	4c	1205.4 (5.4)
2*c*♯	76.1		
3*d*♭	117.1	5*d*♭	122.5
1*d*	193.2	4*d*	198.6
3*d*♯	269.3	6*d*♯	274.6
2*e*♭	310.3	5*e*♭	315.6
1*e*	386.3	4*e*	391.7
3*e*♯	462.4	6*e*♯	467.8
1*f*	503.4		

TABLE 10

JUST TRIADS IN THE SECOND TUNING SYSTEM

1*c*	386.3	1*e*	315.7	4*g*	1*c*	315.6	5*e*♭	386.4	4*g*
3*d*♭	386.3	1*f*	315.7	5*a*♭	2*c*♯	315.6	4*e*	386.4	6*g*♯
1*d*	386.3	2*f*♯	315.7	4*a*	1*d*	315.6	4*f*	386.4	4*a*
2*e*♭	386.3	1*g*	315.7	5*b*♭	3*d*♯	315.6	5*g*♭	386.4	6*a*♯
1*e*	386.3	2*g*♯	315.7	4*b*	1*e*	315.7	4*g*	386.3	4*b*
1*f*	386.3	1*a*	315.7	4*c*	1*f*	315.7	5*a*♭	386.3	4*c*
3*g*♭	386.3	2*b*♭	315.7	5*d*♭					
1*g*	386.3	1*b*	315.7	4*d*	1*g*	315.7	5*b*♭	386.3	4*d*
3*a*♭	386.4	1*c*	315.6	5*e*♭	2*g*♯	315.7	4*b*	386.3	6*d*♯
1*a*	386.4	2*c*♯	315.6	4*e*	1*a*	315.7	4*c*	386.3	4*e*
2*b*♭	386.4	1*d*	315.6	4*f*	2*b*♭	315.7	5*d*♭	386.3	4*f*
1*b*	386.4	3*d*♯	315.6	5*g*♭	1*b*	315.7	4*d*	386.3	5*g*♭
	702					702			

depends on two equally inferior spellings; in either alternative, one of the inner thirds is 5.5/5.4 cents short of just thirds:

2*f*♯	315.7	4*a*	380.9	2*c*♯
2*f*♯	310.2	1*a*	386.4	2*c*♯

This problem arises because there is no *c*♯ key in the sixth order. Since the *f*♯ minor triad introduces the sole discrepancy in the system, it also suggests other compromises: that is, enharmonic readings such as 6*e*♯ 310.3 6*g*♯ 386.3 6*b*♯. These triads utilize all keys except for 3*a*♯, 3*b*♯, and 3*e*♯.[33] Disregarding this last hypothetical triad, it is clear that all the other chords utilize the two keyboards in the manner described by Vicentino.

In closing, Vicentino remarks that performing on the *archicembalo* with the second tuning system enables the player to use not only perfect fifths, but also thirds more perfectly tuned than those he uses (*piu perfettamente accordate che quelle, che noi usiamo*). The latter part of this phrase refers to the first tuning system whose tempered thirds are somewhat imperfect even with diesis and comma adjustments. With the second tuning system Vicentino claims to have revived a "marvellous" system of the ancients. He means, of course, the fabled just intonation or Ptolemaic tuning espoused by Ramos and Zarlino as the basis for good and scientifically perfect intonation for vocal polyphony. Of course, Ptolemy's syntonic diatonic, like Aristoxenos's soft chromatic, is only one out of a number of tunings apparently practiced in ancient music. Vicentino's second tuning system gives yet another instance of the sixteenth-century belief that just intonation was properly the tuning for vocal music. His unique contribution lies in his invention of a method whereby this tuning system could be produced on a keyboard instrument. At the close of this chapter Vicentino notes the particular applicability of this system for the *arciorgano*. His statement there supports our thesis that the second tuning is constructed with a view to using keyboard instruments to accompany vocal music in the ordinary diatonic genus. One must remember, however, that Vicentino later ad-

[33] One cannot help but wonder if the second tuning system holds the key to answering the problem of which six keys are missing on the *arciorgano*, a later instrument constructed by Vicentino on the model of the *archicembalo*. See Kaufmann, *Life and Works*, p. 173.

vertizes the *arciorgano* as a portable, complete instrument, capable of producing both tuning systems.[34]

It is well known that Vicentino's concept of generic purity depends on the use of intervals belonging to each genus. This concept formed the basis of his famous public debate with Vicente Lusitano (Rome, 1551). Both combatants agreed that the diatonic genus was defined by series of tones and minor semitones. But Vicentino maintained that contemporary music also emphasized the major semitone, minor third, and major third. Hence he concluded that polyphony in his day mixed the three genera.[35] The judges, Bartolomé Escobedo and Ghiselin Danckerts, awarded the purse to Lusitano. Adverse criticism only whetted Vicentino's appetite, and four years later he published his treatise in Rome and dedicated it to his patron, Cardinal Ippolito d'Este, who was present during part of the debate. Vicentino undoubtedly dismissed the unfavorable verdict as an inevitable result of short sighted attitudes. He saw himself as a kind of magus whose farsighted ideas were destined to be fully understood only by a few elite spirits in his own and future generations. Thus he placed the following boastful motto around his portrait: *Incerta et occulta scientia tuae manifestasti mihi.*

In the context of Vicentino's treatise as a whole, the second tuning system for the *archicembalo* is clearly a sop thrown in the direction of conservative practice. And the cavalier treatment of this subject shows the small estimation given to it by the author. The first tuning system, by way of contrast, represents the highlight of Vicentino's entire thesis. As Kaufmann indicates, Vicentino's "avowed purpose was not to revive ancient music but to interpret it so that it could be 'reduced to modern practice,' as the title of his treatise proclaims."[36] But "modern practice" in this case does not mean a timeless ideal of

[34] *Descrizione dell'arciorgano* (Venice, 1561). Facsm. of the one-page description appears in Kaufmann, *Life and Works,* opp. p. 172. See also pp. 172–73 and idem, "Vicentino's *Arciorgano:* An Annotated Translation," *Journal of Music Theory,* V (1961), 32–53. The suggestion made in this article that Vicentino's instruments are related to later practical and theoretical "perfect" instruments receives added support by the wording of the *Descrizione dell'arciorgano.* Many of the phrases in this sheet are borrowed from Vicentino's treatise, but it is significant that the virtues of the second tuning system are a primary consideration: they enable an organist to accompany choirs singing in the pure and mixed diatonic style. Since the first tuning system produces microtonal intervals, it enables the player to produce an eloquently rhetorical style as well as to study the practices of what we call the music of high "non-Western" civilizations. The latter claim intimates that the frontiers of ethnomusicology extend back into the sixteenth century.

[35] Kaufmann, *Life and Works,* p. 25. Kaufmann cites similar ideas about a semichromatic genus (mixing intervals of the diatonic and chromatic genera) in Bermudo's *Libro llamado declaracion de instrumentos musicales* (Ossuna, 1555), in Martin de Tapia's *Vergel de musica spiritual speculativa y activa* (Burgos de Osma, 1570), and in Morley's *Plaine and Easie Introduction* (London, 1597). Ghiselin Danckerts prepared a written rebuttal to these ideas that survives in a manuscript at the Biblioteca Vallicelliana in Rome. Many years later, Ercole Bottrigari went over the whole matter again and concluded in favor of Vicentino; his treatise, *Il Melone, discorso armonico* (Ferrara, 1602), included a refutation of yet another treatise directed against Vicentino, that of Gandolfo Sigonio. The latter treatise was printed together with Bottrigari's.

[36] Kaufmann, "More on the Tuning," p. 94.

the *ars perfecta* or *contrapunto osservato*. The latter relates more to theorists such as Glareanus and Zarlino. Vicentino's conception of vital "modern practice" encompasses the novel and progressive techniques inherent in fully chromatic and enharmonic styles.[37] These *maniere* form the heart of Vicentino's treatise and their exposition, problematic as it is, firmly places Vicentino in the front wave of avant-garde[38] musicians of the sixteenth century.

University of Toronto

[37] Vicentino's use of the term *maniera* and its relationship to his concepts of style is the subject of a forthcoming article by the present author.

[38] Edward E. Lowinsky, "The Musical Avant-Garde of the Renaissance, or: The Peril and Profit of Foresight," *Art, Science, and History in the Renaissance*, ed. Charles S. Singleton (Baltimore, 1967), pp. 113–62. See also my forthcoming book, *Mannerism in Italian Musical Culture, 1530–1630*.

Ancora su Ottavio Rinuccini

By GARY A. TOMLINSON

Few figures played as important a role in the shaping of opera in its first years as the poet Ottavio Rinuccini. Librettist of five of the first seven melodramas known to have been performed in Florence and Mantua,[1] he is challenged only by Gabriello Chiabrera as the main arbiter of the literary direction taken by the genre up to 1607. His contribution needs to be assessed with care if we are to understand opera in its earliest formative stages.

Such an evaluation has recently been attempted in this Journal by Barbara Russano Hanning. She is at pains to stress that "a certain continuity links *Dafne* with Rinuccini's succeeding libretti, a relationship not present between his earlier *poesia musicale* and *Dafne*; and this argues for a view that, from the beginning, the libretti were all products of a single program."[2] She goes on to suggest that "Rinuccini . . . did indeed have a program—one which was deeply influenced by the Greek, and especially Aristotelian, concept of the powers and function of music."[3]

In extending this program back to *Dafne*, the first of Rinuccini's *favole per musica*, Hanning squarely confronts "the possibility of a fruitful relationship between theory and style in the course of music history,"[4] but, in doing so, she fails to avoid completely the pitfalls of determinism lurking in that issue. For it is not clear that the libretti of Rinuccini form a neat succession of signposts on the way to a long-envisaged goal. Rather, each seems to represent the author's response to a set of circumstances and exigencies peculiar to the work

[1] Peri's *Dafne* and *Euridice*, Caccini's *Euridice*, Gagliano's *Dafne*, and Monteverdi's *Arianna*. The other works included in this count are Caccini's *Il Rapimento di Cefalo*, libretto by Chiabrera, and Monteverdi's *Orfeo*, libretto by Striggio.

[2] Barbara Russano Hanning, "Apologia pro Ottavio Rinuccini," this Journal, XXVI (1973), 240–62. My quotation is from p. 253.

[3] *Ibid.*, p. 261.

[4] *Ibid.*