
“Ut musica pictura”: Arcimboldo and the search for “musical consonances within colors”, in Arcimboldo. Milanese artist between Leonardo and Caravaggio, exhibition catalogue (Milan, 2011), edited by S. Ferino-Pagden, Milan, 2011, pp. 349-359.

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Giacomo Berra

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Abstract

In his treatise-dialogue entitled *Figino*, the Lateran canon Gregorio Comanini, basing himself on Aristotle's *Poetics*, reread through the vulgarization of Ludovico Castelvetro, establishes a precise parallel between the six "parts" of tragedy and those which he considers to be the corresponding parts of painting ¹. In the last comparison Comanini develops the relationship between the melody of the verse and the harmony of colours, underlining how painting and poetry have in common with music the very principle of harmony. To better explain this concept, Comanini introduces, not without a certain erudite satisfaction, the meticulous analysis of a chromatic-musical research that his friend Arcimboldo had experimented with a few years earlier at the Prague court. The canon reports the painter's words with such accuracy that one can safely assume that Arcimboldo himself wanted to

check the text before it was sent to print 2 . With this Arcimboldo experiment, the poetry-painting parallelism results in a sort of *ut musica pictura*: the painter tries to demonstrate how at the basis of music and painting there was a common harmonic system based on the consonances deriving from numbers. Comanini begins his account by referring to the theoretical foundations of the Arcimboldo experiment, that is, the Pythagorean consonances: "I want the aforementioned Arcimboldo to prove to you, who discovered the tones, and the semitones, and the diatessaron, and the diapente, and the diapason, and all the other musical consonances within the colors, with precisely that art which Pythagoras invented the same harmonic proportions."

As can be seen, Comanini uses terms that are not particularly familiar to us and require, before continuing the actual analysis of the Arcimboldo experiment, a little clarification. The precise reference is obviously to Pythagoras (or rather, to what tradition attributed to Pythagoras) and to his well-known proportional theory of music. Comanini himself, to help the reader understand the profound meaning of Arcimboldo's chromatic investigation, continues his 'report' by proposing a brief summary of the event that gave rise to the Pythagorean theory:

"For as these [Pythagoras] having noticed in the forges, that from the blows of the hammers on the anvil the consonance resulted from the order of their weights, and having collected those numbers, with which their diversity concurred to form a common melody from many consonances, he stretched out some blacks, to which he attached as many varieties of weights, as he had observed to be in those hammers of the blacksmiths, [...]." We can better understand the meaning of the words of the Pythagorean experimentation summarised by Comanini if we look, for example, at the famous quadripartite image published at the end of the fifteenth century in the text by Franchino Gaffurio entitled *Theorica mvsice* (fig. 2). In the first panel of the woodcut the beginning of Pythagoras' research is illustrated (cited precisely by Comanini) 3 . According to tradition, Pythagoras discovered musical relationships by initially hearing, by chance, the sound produced by hammer heads of different sizes striking anvils. The story of the hammers and the subsequent identification of musical proportions by Pythagoras was widely known in the Renaissance, especially through the account given by Boethius in *De institutione musica* (I, 10) and Macrobius in his *Commentarii in Ciceronis somnium Scipionis* (II,1,(8)(9)(10)(11)(12)(13)(14)(15)(16)(17)(18)(19)(20)(21)(22)(23)(24)(25). Gaffurio himself, like other theorists who dealt with music, cites, not by chance, Boethius and Macrobius in his treatise 4 . It is very probable that Comanini (and obviously also Arcimboldo), as has been observed, knew in particular the version given by Macrobius 5 . Let us return to the xylography of Gaffurio's text.

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In the other panels the same concept of the relationships between musical measures/proportions is illustrated with the example of bells, partially filled glasses, strings that are stretched by different weights and flutes of various lengths. Whether we are referring to hammers, weights that stretch the strings (as indicated in Comanini's text) or other objects, the concept is always the same: Pythagoras, in the relationships that are created between the numbers 16, 12, 9, 8, 6, 4 (which are indicated on the individual objects to qualify their size) has identified precisely the proportions inherent in the different musical intervals 6 . In essence - referring only for clarity to the example of the bells illustrated in the second panel of the engraving - if two bells indicated with different numbers according to their size are rung simultaneously, different musical intervals are obtained. For example, if we strike together the bells designated with the numbers 12 and 8 (numbers referring to their different sizes) we have a ratio of 3:2 called *sesquialtera* or *diapente*, which we call a 'perfect fifth' (for example the interval of C-G). If instead we strike the bells with the numbers 16 and 8 (as Pythagoras is doing in the engraving) we have a *proportio dupla* or *diapason* (2:1), that is, an 'octave' (C-C1). And so on. To simplify, here is the scheme that will help you better understand Comanini's complex discourse, which, it should be reiterated, is reported in Arcimboldo's own words 7 : 2:1 *proportio dupladiapason* (octave) (example: C-C1) 3:2 *sesquialteradiapente* (perfect fifth) (example: C-G) 4:3 *sesquiterzadiatesseron* (perfect fourth) (example: C-F) 9:8 *sesquiottavatonus* (whole tone) (example: C-D) 3:1 *proportio tripladiapason diapente* (twelfth) (example: C-G2) 4:1 *proportio quadrupladiapason* (double octave) (example: C-C2).

All the intervals mentioned by Comanini had also been graphically rendered in a clear engraving present in the text by Gaffurio himself (the numbers seem different but represent the same proportions: for example, the ratio 12:16 is nothing other than 3:4 etc.; fig. 1) 8 . It should also be noted that the use of the harmonic-musical proportions of the Pythagorean tradition was very frequent in the architectural field 9 . Not only that. Giovanni Paolo Lomazzo himself had also recalled them to define the proportional relationships of the various parts of the human body. For example, he says that the space between the nose and the chin and that from the chin to the base of the neck "comes to resonate in a double proportion that makes the *Diapason*" and so on 10 . It is evident that the insistence on the use of musical proportions contributed in some way to ennobling painting as well, which in this way could also be based on music, that is, on one of the arts of the quadrivium (arithmetic, geometry, astronomy, music).

Having clarified the meaning of the terminology used by Comanini, let us now see precisely what Arcimboldo's experiment actually consisted of. The canon, therefore, still referring to the Pythagorean experiment of the "nerui" (i.e. the extendable strings) pulled by different weights (as can also be seen in the illustration of the text by Gaffurio; fig. 2), begins to tell us about the first step of the chromatic-musical experiment developed by the Milanese painter:

"& then [Arcimboldo] discovered that from a black, which advanced the other by a *sisquiottava* proportion in its extension, a tone was born against this other, that is, a full and perfect sound, which was the proportion of nine to eight; just as [Pythagoras] by placing on a table an extremely white color, and darkening it somewhat part by part with black, he derived from it the *sesquiottava* proportion, and the tone itself: [...]."

Note how Comanini always uses only the example of the gradation from white to black, but, as he himself will say later, the same applies to five other different colours mixed with white which will be discussed later: white-yellow, white-green, white-blue, white-black, white-tan ¹¹. Therefore, in the illustrative examples of this essay, instead of just black-white, I will also use the other colours to get a complete idea of Arcimboldo's intentions. Then Comanini's narration continues as follows:

"[Arcimboldo] advanced in this Pythagoras: that where the acute Philosopher could not divide the tone into two equal semitones, because not even the number nine tolerated the division into equal parts; but he did indeed find a semitone somewhat greater than the half; and another somewhat smaller than the same half, commonly called *diesis* by professors of music; this most ingenious Painter not only knew how to find the said semitones greater and lesser in his colors; but also the division of the tone into two equal parts: thus he went lightly and sweetly by obscuring the white with black, always ascending step by step to greater blackness, just as from a low sound one gradually increases to a high and above high."

In this last part of the passage the very thorny question of the division of the *tonus* (9:8) is addressed, which had been widely investigated in the various treatises which had dealt with the complex aspects of musical theory. Comanini says that the "number nine suffers division into equal parts" and it has been observed that he (and Arcimboldo) is mistaken in that it is incorrect to say that the number 'nine' cannot be divided ¹². In reality, as we have seen, the Mantuan canon (who certainly meant to speak of the ratio 9:8) cites in particular the text of Macrobius (II, 1, 22) which presents the same oversight ¹³. According to the Pythagorean theory, the division into two equal parts of a tone, corresponding to the ratio 9:8 (and therefore not to the number 9 alone), gave an irrational number. Therefore the tone was divided into two unequal semitones, one of which was called minor (which Comanini also calls "*diesi*") and the other called- "He did the same with the *diapente*, that is, the fifth. For just as Pythagoras found it in the proportion which is called *sequialtera*; which is when the greater number embraces the lesser once, and in more than its half; as it would do between three and two; because three contains two once, and adds to it the unity, which taken twice makes two; so Arcimboldo, extending the black with this same proportion was the white, and giving it five degrees of darkness, as in the *diapente* there are five sounds; he expressed the nature of this same consonance of the light." The experiment continues with the twelfth interval that is born from the union of the *diapason* with the *diapente* (triple proportion; 3:1), that is, C is the white while G (that is, after the first octave) is obtained by increasing the white by "twelve degrees

of darkness", that is, C-G2 (fig. 3).

"What shall I say? Pythagoras saw that from the diatesseron and the diapente the diapason was born: and Arcimoldo [sic] observing these two proportions, produced the octave in his colors. The former from the triple proportion produced the diapason diapente, which is the twelfth: the latter with the same proportion ascended to give twelve degrees of darkness to white."

Finally, the conclusion of the experiment appears, which clarifies the previous steps even better. It is the disdiapason, that is, the quadruple proportion (4:1), or the double octave, which Comanini also calls "quintadecima", and which the Pythagoreans considered the maximum musical proportion: essentially from the note C to the C two octaves above (C-C2).

"He also did the same in forming the disdiapason, that is, the fifteenth, which is generated from the quadruple proportion. And what I say of the color white and black together, I also say of all the other colors. For just as he went on gradually shading the white, and reducing it to sharpness; so he did with yellow, and with all the others: [...]" The first C is white, the C two octaves above is instead the saturated color. In Comanini's example it is black, but as has been repeated above this is true for all the colors he cites (fig. 3). Arcimboldo, therefore, must have asked himself this before developing his experiment: given a double octave in music (with the problem of the division of the tone) and given the different possible chromatic passages between white and a particular saturated color, what analogies can be traced in the two expressive systems, sound and color, if we take the mathematical-Pythagorean theory of proportions as a point of reference?

As we have seen, in all the passages of the experiment described by Comanini there is the schematic repetition: like Pythagoras... so Arcimboldo... And this approach certainly derives from the fact that it was precisely the painter's intention to confront himself with an ancient text on the one hand and surpass it in originality on the other. In a passage that we have seen above there is even the or-352 to instead major 14 . These are numerical calculations that appear completely abstruse to us, but which were instead familiar to the musicians of the time. Therefore, in essence, they were aware at that time that the Pythagorean theory determined problems in the subdivision of the semitone. The Pythagorean tradition, in fact, considered consonance as an autonomous mathematical value, certainly prior to sensation, and in fact determined a fracture between numbers and concrete musical experience ¹⁵ . Arcimboldo, therefore, must have been proud of being able to propose in colouristic terms the 'resolution' of the problem of the division of tone, and it is no coincidence that Comanini, speaking of his painter friend, uses in this passage the expression "most ingenious painter".

Today we are accustomed to dividing the octave according to equal temperament,

according to which, for example, C# and Db are considered the same note (like the black key on the piano), while at that time these semitones were considered different and some of them were missing altogether. During the sixteenth century, to overcome the inconveniences of the difference in semitones, the so-called "equal temperament" began to be developed, that is, the division of the chromatic octave into twelve equal semitones (the term 'chromatic', when referring to a musical scale, as is known, does not refer to the colours, but to the presence of the different semitones). Comanini's observations regarding tone, therefore, are particularly important because they testify to how the Milanese painter had developed a 'chromatic' scale (and in this specific case the term also alludes to the actual colour) which included three different types of semitones: the minor semitone, the 'just' semitone, the major semitone (fig. 3). In order to obtain all the colour transitions of his experiment, Arcimboldo must have scrupulously calculated the various chromatic gradations by precisely weighing the white pigment and the other colour in order to obtain the exact proportionality in mathematical terms (just as Pythagoras had initially identified the intervals from the weight of the hammers on the anvil).

Let us now see how Comanini tells us about Arcimboldo's method of identifying the other chromatic proportions. After the tone (and the semitone), he continues with the identification of the musical proportion 2:1, that is, the proportio dupla or diapason, for us the octave.

"Add, that just as Pythagoras, touching a string which had double the weight, and was therefore doubly stretched more than another; and striking at the same time this one, which was doubled in length by its companion, found the diapason, or the octave, as we wish to say; while one of the strings, being doubly [sic] more stretched than the other by the force of the weights, also doubly, that is with double vehemence, and returning to its straightness with speed, made a high voice; and the other, as if twice less stretched than the neighbouring one, returning more slowly to its former straightness, made the voice low; which two voices nevertheless were so friendly, that they seemed to be the same sound, but in one string narrower than itself, and in another broader; so Arcimboldo, obscuring in double proportion this white more of that other, has formed the same proportion of the diapason, ascending with eight degrees of darkness from the deepest whiteness; however, the same whiteness is numbered, and placed in the first degree."

So, assuming that we start from the note C, we have pure white for C and a double proportional increase of the other color (which can be gray as in the example given by Comanini - but also light green, light tan, etc.) to arrive at C of an octave higher, as can be seen in the diagram proposed here (fig. 3). As has been said, to obtain this proportion of the tuning fork (2:1) Arcimboldo must have diligently mixed a certain quantity of white pigment and an exactly double quantity for the other color. The experiment continues with the identification of the proportion 4:3, sesquiterza-diatesseron (perfect fourth), or interval C-F (fig. 3). "Moreover, just as the one [Pythagoras] seeing the sesquiterza proportion in the

strings, found the diatesseron, or the fourth; so the other [Arcimboldo] giving to a white in sesquiterza proportion the dark given to another white, likewise formed this same ratio, from which the diatesseron is produced; as is the proportion between four and three, in which the four contains once the three, and the third part, which is the one, because the one repeated three times, makes three." Same procedure for the diapente-sesquialtera (3:2) or perfect fifth, or interval do-sol, composed of five sounds: do is the white while sol is obtained "giving it five degrees of darkness" (that is, light grey or also light green, light yellow etc.; fig. 3).

Fig. 3

The chromatic-musical proportions according to the experiment of Giuseppe Arcimboldo (graphic designer of the author) Arcimboldo claims to have arrived with his chromatic experiment where Pythagoras (according to the version known through Boethius, Macrobius and the theorists of music of the time) had not succeeded. In fact, while Pythagoras 'had not been able' to divide the tone into two exactly equal parts, Arcimboldo, on the contrary, using the various gradations of color, had succeeded in precisely dividing the chromatic tone. Not only that. He had also been able to maintain the minor and major semitone. In essence, the painter with his experiment created a chromatic scale of two octaves whose tones are divided by minor semitones, major semitones and also by 'just' semitones, those that today we would call 'tempered'. The Pythagorean procedure, as we have seen, had led to an impasse in the division of the tone into equal parts (in reality only in some instruments such as the harpsichord), while the painter had resolved this issue through the use of minimal shades of colour 16 . Arcimboldo, as a probable lute player (as will be said later), knew well, based on the practice of lutenists, that the octave could be divided into twelve equal semitones (each of which with an approximate ratio of 18:17) through the use of rods to be placed on the neck of the instrument (fig. 4) 17 . Therefore, in all probability, when thinking of the division of the tone into two equal semitones, Arcimboldo had in mind in particular the division of the notes played with the lute (which is essentially based on equal temperament), while in considering the minor semitone and the major semitone the painter had in mind the typical musical practice, for example, of the harpsichord. In tackling this problem of tone, Arcimboldo demonstrated a notable musical culture that certainly allowed him to consciously tackle the elaboration of designs for costumes of various characters, also linked to music, to be used for celebrations and/or tournaments. For example, for the tournament held in Vienna in 1571, the artist designed the figure of "Arithmetic conducted by the Italian Pythagoras and the Greek Euclid / Green dress" and also a "Music" depicted by a character (Boethius or Arion) holding a stringed instrument, figures that were part of the seven liberal arts (fig. 5) 18 .

The words of Comanini that have been analyzed up to now concern the actual experiment of his painter friend based on theoretical-Pythagorean foundations. In the last part of his exposition, however, Comanini continues - unfortunately in a much more synthetic way - indicating a different relationship addressed by Arcimboldo: that between the colors and

the different melodies of a polyphonic piece for five voices. In the sixteenth century, a polyphonic piece could have four, five or six contemporary melodic voices that formed a precise harmony. Arcimboldo, therefore, after having identified the harmonic relationship between two notes and two colors, also identified a particular color to be associated specifically with one of the voices of the polyphonic song. 6). In choosing the type and number of colours, seven (including black, even if he does not use yellow for one of the polyphonic voices), Arcimboldo certainly based himself on a precise Aristotelian tradition which had investigated the phenomenon of colours and which had also been taken up by Gerolamo Cardano and Lomazzo 19 . Comanini speaks of the mutual capacity of colours to 'obscure' each other, just as one polyphonic voice is followed by another: this is, he essentially states, the analogy between colours and polyphonic voices. It has been noted, however, that Arcimboldo, distorting the normal codes of meaning of colours (high-light, low-dark) has assigned the bass part to white (in reality he speaks of white, but indirectly means the pair white-black) and the high part to dark tanè (red/black). This is not, however, an oversight by the painter. In his treatise *Sopplimenti mvsicali*, published in 1588, Zarlino presents a complex explanation of the association white/low and black/high, essentially establishing the following passages: white, or fire-light-sun, therefore large body and therefore low sound; black, or darkness/earth, therefore small body and consequently high sound. This explanation was published after the experiment of the painter, but evidently these were notions that were circulating in those years 21 .

If we hypothesize the extension of the Arcimboldo procedure to all the colors he indicated, we would have a graduated succession of six chromatic scales that from white transform into six different colors: black-white, yellow-white, green-white, blue-white, black-white, tan-white (fig. 7). Note how in each of this white+color sequence a coloristic gradation is determined that can recall the Leonardesque "sfumato" that Arcimboldo, son of Biagio, a painter working in the Leonardesque circle, must have known well 22 . Comanini's definitive conclusion to the long discussion on Arcimboldo's experiment - this one even more synthetic than the discussion on the voice/color relationships - concerns precisely the concrete application of Arcimboldo's theorization and its insertion in a historical context. Comanini concludes: "Trained in this order, Mauro Cremonese, musician of the Emperor Rudolph II, found on the bass fiddle all those consonances that Arcimboldo had marked with colors on paper." Even these few words are significant. The painter, therefore, reported to Comanini an experiment he himself had developed a few years earlier at the imperial court of Rudolph II. Therefore, taking into account that Rudolph became emperor in 1576 and the painter left his court in 1587, we have the time frame in which the painter and the Cremonese musician concluded the experiment. More precisely, it gave seven keys for the notes and twelve for the semitones. It, in fact, differentiated, for example, C# from Db, and introduced a semitone also between E and F and between B and C 33 . This type of harpsichord will be the object of particular attention especially during the seventeenth century. But already towards the middle of the sixteenth century attempts were made in this direction and the research of Gioseffo

Zarlino and Nicola Vicentino was fundamental. Zarlino describes and illustrates a harpsichord with more semitones in his *Istitvioni harmoniche* of 1573 ³⁴, while Vicentino in his treatise describes the characteristics of the "archicembalo" that he had built (now it no longer exists) and in another of his texts also speaks of a similar "arciorgano" ³⁵. Of the two instruments by Vicentino there is also a beautiful illustration on the front of a medal (on the back instead his portrait appears) that the musician himself had made by a Milanese sculptor of the second half of the sixteenth century, an artist who could be identified with Annibale Fontana (fig. 8) ³⁶. This "archicembalo" was equipped with two keyboards tuned differently so that it could reproduce all the possible sounds (and therefore also different semitones) used in the three genres of ancient Greek music, namely the diatonic, chromatic and enharmonic genres ³⁷. The Vicentino was born in Vicenza in 1511, but was active above all as a musician (and also as a parish priest) at the church of San Tommaso in Terramara in Milan (by explicit will of San Carlo) from 1565 until 1577, the year of his death. Therefore in the city where Arcimboldo was trained there was a musical ferment, even on a theoretical level, which cannot fail to have infected the painter. Arcimboldo may therefore have been familiar with the theories of Vicentino (also cited by Lomazzo ³⁸) since, as is known, the artist returned to the Lombard capital several times and in particular in 1576 or 1577 to make his will ³⁹. It should also be taken into account that the painter must have had a good knowledge of the music produced for the Milanese cathedral in the years in which he had worked there before moving to Vienna. We also know with certainty that Arcimboldo 'physically' knew the cathedral's organs since it appears from three documents that the painter in his first years in Milan had also carried out work for two of them. In fact, in a document dated 28 February 1554 a payment in favour of the painter is recorded "pro ejus mercede pingendi in parte antas organi": it must have been, perhaps, the organ of Leonardo d'Alemagna ⁴⁰. Instead, two other unpublished archive documents show that Arcimboldo had also intervened to carry out work on an organ that can be reasonably identified with the one that Gian Giacomo Antegnati was completing in those years. In fact, in a document dated 30 December 1556 we read that the 'masters' Giuseppe Arcimboldo and Andrea Meda (he is the father of Giuseppe Meda) had received seventy lire and nineteen soldi for purchases made for work on the organ case: "partim magistro Joseph Arcimboldo et partim magistro Andree de medda pictoribus occaxione diversarum rerum per eos emptarum pro usu capse dicti organi ab hodie retro [...] libras LXX solidi XVIII denarios -"; while in the other document, dated 29 December 1557, there is talk of a payment for the priming of the organ doors: "magistro Joseph de arcimboldis pictori pro Jngiessatura antarum organi suprascripti [...] libras VIII solidis XIII denarios VI" ⁴¹.

But let us return to the question of the harpsichord. Similar to the instrument developed by Vicentino was the "clavicymbalum universale", with nineteen keys for each octave, which Michael Prateoriosis testified was in the possession of Charles Luython at the Prague court ⁴². We do not know whether Sinibaldi used the same harpsichord or a similar one that had several semitones. Comanini's few words are too generic to hypothesize anything more

precise. However, the canon explicitly says that "those consonances", that is, those specific to the experiment he had spoken of before (diapente, diapason, etc.), "had been marked with colors on a piece of paper" and that they were 'found' by Sinibaldi. As already mentioned, it does not say that Arcimboldo, once he had found the consonances, had used them to draw up a sort of chromatic score, developing a new system of musical notation - as some scholars have erroneously maintained - which would have been even worse than the systems in use at the time (for example, it would not have been possible to establish the duration of the note) 43 . Sinibaldi, therefore, should have, with the vivid memory that emerges from Comanini's words, it must have been the eighties. We also have the name of the accomplice in his enterprise: "Mauro Cremonese dalla viuola". This musician has been correctly identified with the Cremonese Mauro Sinibaldi (Cremona, 1541-1591), a viola player active at the court of Maximilian II and also of Rudolf II 23 . Lomazzo himself had spoken of him in his treatise of 1584 indicating him precisely as "Mauro Sinibaldi Cremonese", while in his Rime of 1587 he had cited him as "Sinibaldi" player of "viuola" 24 . Most probably this Cremonese musician was a virtuoso of the viola bastarda 25 . We know for certain, therefore, that the musician, "trained" by the painter on the results and specific Pythagorean-chromatic conclusions, which had been "marked with colors on a paper", "found all those consonances on the grauciembalo". Note how verbs indicating a real performance such as 'play' or 'perform' are not used. Instead, the verb 'find' is used to indicate that essentially the musician could have identified and traced on the instrument the same musical consonances that the painter had expressed through different shades of color on a "paper". In any case, Arcimboldo's collaboration with a professional musician (who may have even helped him in part 26) presupposed a perfect knowledge of musical theory on the part of the painter himself, who certainly also had to be able to play an instrument, most likely the lute. It is also well known that in the past many painters had dabbled, even at a very high level, in playing musical instruments, with a certain preference for the lute 27 . And perhaps it is no coincidence that in an inventory of 1621 a lute associated with the painter's name is also mentioned: "Eine Lauten vom Arciboldo", perhaps to be identified with "Ein Perspektif lauten (?)" reported in another inventory of the imperial collection 28 . Most probably it was a drawing of a lute in perspective elaborated by the painter, perhaps in the wake of Dürer's well-known demonstration 29 . It should be noted that Sinibaldi was a viola player and for the experiment he used the "grauciembalo". Why this choice? In reality we have seen that Arcimboldo's experiment presupposed the possibility of playing both major and minor semitones and the 'correct' semitones. And this was not possible with the viola, which had bars on the neck for the division of the 'correct' tone 30 . And perhaps this is also the reason why Arcimboldo did not use the lute, but entrusted his musician colleague (who, although not being a specialist, must have also been able to play the harpsichord) with the concrete conclusion of his Pythagorean-chromatic experimentation.

But what kind of "grauciembalo" was the one used by Sinibaldi? As has been said, the harpsichord of the time lacked some of the necessary semitones and there could be

intonation problems when the instrument was associated with the voice (or other instruments) 31 . From the end of the sixteenth century, therefore, other semitones were gradually added to the harpsichord. The result was a different instrument which, at the beginning of the seventeenth century, was called the archicembalo or enharmonic chromatic harpsichord 32 . The most common was the nineteen-key chromatic harpsichord which included-

1986, pp. 147-170. 16 On this aspect see also Pavan 1998, p. 27. 17 Cfr. Zarlino 1588, p. 209. On the question of the subdivision of the octave in the lute, see Rasch 2008, pp. 253-254. 18 Cfr. Kaufmann 1978 Beyer 1983, pp. 18 (fig. 4), 74 and pp. 20 (fig. 6), 75; Lindell 1990, p. 265, fig. 7. Speaking of drawings for parties and tournaments, I take this opportunity to point out a beautiful drawing with a Costume of Mercury - preserved at the Israel Museum in Jerusalem ("The Vera and Arturo Schwarz Collection of Dada and Surrealist Art") - attributed to Arcimboldo in the museum catalogue: cfr. *Dreaming with Open Eyes* 2000, p. 134, n. 19. It seems to me that the attribution is sustainable, even if, knowing only the small photo published in the catalogue, I reserve the right to express a more well-founded opinion after I have had the opportunity to see the drawing directly. 19 See respectively Cardano 1663 a , II, p. 552; and Lomazzo 1584, p. 306. Kemp (1994, p. 303) has actually underlined that the colours cited by Comanini were those of the Aristotelian scale. On the different 'scales' of colours reworked also in the wake of the Aristotelian tradition during the sixteenth century, see in particular: Barasch 1963; Barasch 1992, pp. 185-198; Gavel 1979. See also Tornitore 1988 See, for example, Tornitore 1985, p. 69 (substantially taken up again in Tornitore 1987, p. 347 and Tornitore 1988); Pavan 1998, p. 28. 21 Cfr. Zarlino 1588, pp. 174-175. See also Kemp 1994. On these aspects of "sfumato", see Barasch 1992, pp. 96-99, 197; with reference to the Arcimboldo experiment, Gage 1993, p. 230. On the relationship between music and pictorial theory in the sixteenth century, see Suthor 2008. 23 Cfr., in particular, Lindell 1988 and Lindell 1994, p. 267. Oddly enough, for example, Vergo (2005, p. 231) claims that the musician has not yet been identified. 24 Lomazzo 1584, p. 348; Lomazzo 1587, p. 164. 25 Cfr. Woodfield 1986, p. 242, note 8. 26 See Lindell 1994 Lindell 2006, p. 27, note 19. 27 See Paris 1940. It is also known that Caravaggio himself, as emerged from a document dated 1 September 1605, knew how to play (we do not know at what level) the "guitar": see Ossola 1971, p. 157; Praz 1971, p. 28; Ferrari-Bravo 1975, pp. 39-40; Veronesi 1977, p. 7; Porzio 1979, p. 27; Berra 1996 a , pp. 58, 61, note 62; Giuntini 2008 Giuntini -2009 in all probability, recreated with the keyboard all the intervals identified on the "paper" by Arcimboldo, so that one could see the 'intervals' of the colours placed on the "paper" and at the same time hear the sound of the same 'intervals' which were precisely based on the common denominator of the mathematical-Pythagorean consonances. For example, if a white and a black (or a white and a green) were painted on the "paper", the musician played the double octave; if a white and a particular grey (or a particular shade of blue) were painted, Sinibaldi made the diapente or fifth interval resonate (for example C-G); if instead two minimal shades of a colour were laid out, a note and one of the three identified semitones were played (for example C and C#, or, with a different shade, C and Db). On the "paper" the different musical consonances were indicated with those different colors that, as we have seen, Comanini spoke to us about,

according to a gradation taken from the structure of a five-voice song. The musical consonances found by the musician on the harpsichord were therefore based on the gradations of five pairs of colors: black-white, green-white, blue-white, black-white, tan-white. In essence each color pair had to be 'found' in a specific part of the keyboard. And if white was associated with the bass, the consonances could only be played on the left part of the keyboard of the "grauiciembalo", while that of the "canto", for example, that is the highest, was entrusted to the consonances with the tan color to be found in the right part of the keyboard. If each pair of colors, says Comanini, had an extension of two octaves, it is clear that they could overlap on the extension of the keyboard of the instrument (as obviously also happens in the extension of the voices of the song).

In essence, therefore, the meaning of the painter's experiment was the attempt to experiment 'scientifically' and 'mathematically' with the degree of harmony present in the chromatic consonances within a single colour, placing white and a saturated colour as extremes. Obviously, one cannot help but observe that his experiment also had a certain degree of inevitable arbitrariness: the identification of the double octave as a reference, the use of some particular colours and not others, the choice not to address in his experiment the possible mathematical-Pythagorean consonance between two different colours, for example between tan and light blue, between yellow and green and so on 44 . However, it must have appeared as an absolute novelty, perhaps particularly eccentric, but not devoid of objective elements (obviously with respect to the culture of the time). We can therefore imagine, even if unfortunately we have no evidence to this effect, that Emperor Rudolf II and his learned court must have greatly appreciated this 'curious' experiment oscillating between the *ars musica* and the *ars pictoria*, also because it allowed them to simultaneously perceive with two senses, sight and hearing, the harmonious beauty of the Pythagorean consonances. 1993, pp. 248-249. 11 The "morello" was brown tending towards black, while the "tanè" indicated a colour that was between red and black. In the graphic examples that I propose in this essay I have used those colours that should come closest to Arcimboldo's intentions, even if obviously a certain degree of arbitrariness is inevitable due to the lack of a more precise chromatic reference. The only proposal to graphically render Arcimboldo's experiment in colour can be found in Gavel 1979, p. 93 and fig. III: however, this is a very partial reconstruction (and, in my opinion, also completely erroneous) because it refers only to the voice-colour relationship of a polyphonic song (which will be discussed later), 12 Caswell 1980, p. 161, note 19. 13 Cfr. Macrobio (2007) [1985][1986]. Berra 1988 G. Berra, Allegory and mythology in Arcimboldi's painting: the "Flora" and the "Vertunno" in the verses of an unknown booklet of rhymes, in "Acme", XLI, II, 1988, pp. 11-39 (also in <http://archiv.ub.uniheidelberg.de/Data>, 32, 1978, pp. 10-15. Ferrari 1978 C. Ferrari, Life and Works, in Barthes et al. 1978, pp. 117-122. Ferrari-Bravo 1975

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