

A Matter of Time: Igor Stravinsky's *Symphony of Psalms*

The problem raised in this article is: if Stravinsky did indeed start to compose his *Symphony of Psalms* in what was to be the middle of the work, as he claimed, how did he construct the often changing rhythms, meters and tempi in order to create logic and coherence? Why, in this constantly changing flow of tempi, does the score look so remarkably uniform? It will be proposed that before working out the rhythmical patterns, Stravinsky made a complete design for the entire composition, of measures, groups of measures and tempi. For the composition of this grid, use was made of the numbers 3, 4 and 7.

In his second Harvard lecture, called 'The Phenomenon of Music', Igor Stravinsky states that music is nothing other than a phenomenon of speculation, and that 'The laws that regulate the movement of sounds require the presence of a measurable and constant value: meter, a purely material element, through which rhythm, a purely formal element, is realized. In other words, meter answers the question of how many equal parts the musical unit which we call a measure is to be divided into, and rhythm answers the question of how these equal parts will be grouped within a given measure.'¹ After this explanation, the composer is quite specific about the relation between the two musical elements: 'Thus we see that meter (...) is necessarily utilized by rhythm, whose function it is to establish order in the movement (...).'² It seems that Stravinsky not only put a considerable emphasis on the distinction between rhythm and meter, but he also states that the relationship between the two is hierarchical. Meter provides the parameters which are worked out in the rhythm. Rhythm is realized through meter, and it utilizes meter in order to manifest itself. The function of rhythm is to establish order in the raw matter provided by meter. We may perhaps go so far as to conclude that for Stravinsky rhythm exists in order to explain or to embellish meter. However one interprets Stravinsky's words, meter seems to be the foundation on which rhythm is built. First there must be meter, and then there is rhythm.

In the following, I shall analyse the elements that Stravinsky used for the composition of time and, more specifically, of meter and tempo in his *Symphony of Psalms*. I shall explain that its three movements have really been conceived as one large movement, subdivided into three shorter ones. In their turn, those three movements are composed of a total of 62 or 63 again smaller fragments, indicated by rehearsal numbers; see Table 1. If we want to understand the logic within any of the parts, we must first consider the organisation of the whole composition and then look into the position of the details within the larger construction. In order to understand the organisation of time, we must count. Sections and groups of sections as well as measures and groups of measures are to be counted from the beginning to the end, and not per movement – at least,

1 Igor Stravinsky, *Poetics of Music*, Cambridge 1947, p. 28.

2 *Ibidem*.

not at first. Simple ratios among the various tempi will be identified. All of these material elements are composed with the help of only very few numbers; this has been done in such a rigorously consistent manner, that it will be hard not to conclude that Stravinsky composed his metrical design before working out the details of his rhythmical patterns, in accordance, indeed, with his remarks about the relation between meter and rhythm made in his Harvard lecture ten years later. I shall propose that in any given passage of the Symphony, we must distinguish between an established meter and the exceptional measures that are inserted in that passage. If a section is written in a 4/4-meter, then a 2/4 or 3/4 measure will be considered exceptional. The regular meter will be called the rule, the irregularities are the exceptions; see Table 2.

Measures and rehearsal numbers						
Movements	I		II		III	
Measures	1-78	+	79-166	+	167-189	+ 190-378 = 189 + 189
Rehearsal numbers	0-13	+	0-17	+	(0-2)	+ 3-29 = 36 + 27

Table 1

Measures and rehearsal numbers.

Much later, in a statement made in one of the interviews with Robert Craft, Stravinsky claims that the fast sections of the third movement were written first, after which the composer turned to the first and second movements, and that the 'Alleluia' and the slow music at the beginning of Psalm 150 were written last.³ In other words: the double line between rehearsal numbers 2 and 3 of the third movement designates the end and the beginning of the creative process. It also divides the 378 measures of the whole piece into two equal sections of 189 measures each. The number 189 equals 7×3^3 . It will appear that many aspects of form and meter are organized with the help of the numbers 3, 4 and 7.

Measures

As mentioned, we must make a distinction between an established meter and exceptional measures that are inserted in a given passage. A good example is the second movement, which is written in a regular 4/8 meter. This metrical regularity of 86 measures is only interrupted by one 3/8 followed by one 2/8 measure, immediately before rehearsal number 14. The fact that the 2/8 is the only completely empty measure of the composition gives us additional grounds to suspect that the composer wanted to draw attention to this section and to the text that is sung here: 'Et immisit in os meum canticum novum'. The proposal is that we must read these irregular measures as two 4/8, from which (1 + 2 =) three beats have been omitted. The rule is constituted by a regular 4/8 meter, and the two measures are inserted as exceptions. Another example is found in the third movement, rehearsal number 18, where the regular motion of the 4/4 meter is interrupted by a 2/4 and a 3/4 measure. Again, three beats have been taken from the two measures that are to be seen as exceptional.

3 Igor Stravinsky & Robert Craft, *Dialogues*, London 1968, p. 44.

Again, in our analysis, we must first establish the regular meter of a given passage before establishing the exceptions. Thus, the instrumental introduction to the first movement is written in a 2/4 meter. In rehearsal number 4, the meter changes to a regular 4/4, while the last section, from rehearsal number 10 onwards, has a 3/2 meter. All three meters are interrupted by 'irregular' measures. After this, the second movement has a 4/8 meter, with the two irregular measures as mentioned. I propose that the 86 measures of the second movement constitute a larger group of 108 measures with the 22 in the 2/4 section of the instrumental introduction to the first movement. I will come back to this shortly. The third movement has several more changes of meter. There are the three 4/4 sections at the beginning, in the middle and at the end, where the word 'Alleluia' is sung in a slow tempo of 48 for the quarter note. Then, there are the larger 4/4 sections at the beginning and in the middle, where the tempo increases to a rapid 80 for the half note. Lastly, the long and slow 3/2 section is given as a conclusion right before the end.

Numbers of measures							
"Rule"				Exceptions			
3/2	x	84		2/2	x	28	28
4/4	x	144		1/4	x	1	
				2/4	x	4	
				3/4	x	4	9
4/8 + 2/4	x	108		2/8	x	1	
				3/8	x	1	
				1/4	x	2	
				3/4	x	1	5
378	=	<u>336</u>	+				<u>42</u>
Nota Bene:							
		84	=	3 x 4 x 7			
		108	=	3 ³ x 4			
		144	=	3 ² x 4 ²			
		108 : 144	=	3 : 4			
		84 : 28	=	3 : 1			
		84 : (108 + 144)	=	1 : 3			

Table 2
Numbers of measures.

Adding up the 4/4 and 3/2 measures of the outer movements, we may make several observations. As stated, in order to understand the logic of the details, we must look into their context within the whole. There are a total of 84 3/2, and 28 2/2 measures where the 2/2 are to be considered exceptions to the regular 3/2. Just so, there are 144 4/4 measures and 9 exceptions. Table 2 shows that the numbers of regular as well as exceptional measures add up to round numbers with simple ratios. Three, four and seven are used for many important numbers and ratios. Note, however, that if we want to arrive at these satisfying ratios, we must consider the 2/4 and 4/8 sections as one group. Stravinsky may well have used the ambiguous relation between 3 and 4 in order to create variety in this

design. The main meters are 3/2, 4/4 and 4/8. These three are expanded with a fourth meter, 2/4, that is really part of the third group.

Now that we have proposed a logic underlying the numbers of measures that make up the three or four meters, we must look and see how those groups are distributed over the movements. Without going into too much detail, a few observations may suggest that, again, numbers played a role in the composition of the metrical scheme. For example, on the one hand, there is the long slow waltz at the end of the third movement, with a total of 42 3/2 measures. This is precisely half of the 84 3/2 measures played in the piece, and they are found in seven sections designated by rehearsal numbers. On the other hand, seven 'loose' 3/2 measures are found to be scattered all over the first and third movements. In fact, the first 21 3/2 measures are found in the first half of the piece (that is, before rehearsal number 3 of the third movement), the remaining 63 in the second half (21 : 63 = 1 : 3). Furthermore, the exceptions to the 3/2 sections are the 2/2 measures. The vast majority of these (i.e., 21 of the 28) are given in the third movement at exactly 2/3 of the composition, both in terms of measures and of rehearsal numbers.⁴

The 4/4 measures and their exceptions, too, are given in groups with these simple ratios. The 4/4 section in the first movement has 27 measures; the 4/4 sections in the third movement, 48 and 42 respectively. Lastly, the three sections that have the word 'Alleluia' must be considered one single movement with a total of 36 measures (27 : 36 = 3 : 4; 36 : 48 = 3 : 4; 42 : 48 = 7 : 8).⁵ The exceptional 1/4, 2/4 and 3/4 measures are part of these ratios, and so are the 3/2 measures.⁶

It may be clear that Stravinsky organized meter with the help of the numbers 3, 4 and 7, and that a compelling logic, expressed in the use of a limited amount of numbers, governs the scheme of regular and exceptional measures.

4 Movement 3, rehearsal number 9 (preceded by 42 sections designated by rehearsal numbers, and also the first of the last 21 of these sections) lies at precisely 2/3 of all sections designated by rehearsal numbers. Just so, the first measure of rehearsal number 11, measure 1 (preceded by 252 and followed by 126 measures) lies at exactly 2/3 of all measures.

5 One has to be very cautious when choosing and comparing digits. A composer working with numbers simply must put certain limits in place in order not to lose himself in mathematical precision rather than making music. When analyzing the score one encounters these limits. In the case of the 4/4 measures discussed here, the numbers are 27 (in the first movement) and 36, 42 and 48 (in the third movement). The numbers and ratios in this last movement are elegant enough (6 : 7 : 8) to convince the analyst. The 27 measures of the first movement may be compared with 36 measures of the 'Alleluia' sections (27 : 36 = 3 : 4) but not, with 42 or 48.

For Stravinsky's use of the numbers 7 and 8 in his serial works, see: André Douw, *Closing the Circle: 'Stravinsky's Epitaphium'*, in: *Muziek en Wetenschap* 5/2 (1995/6), pp. 125-127; and: André Douw, 'Sounds of Silence: Stravinsky's Double Canon', in: *Music Analysis* 17/3 (1998), p. 333, footnote 4.

6 The 3/2 measures meant here are those in the third movement, in rehearsal numbers 1, 8 and 14, measures 7, 7 and 3 respectively. Notice they are all seventh and third measures within their sections. In order to understand the organisation of the 4/4 sections, these 3/2 measures must be considered part of these 4/4 sections even though, as observed, they are also part of the 3/2 groups which is obviously inconsistent within the rigorous logic of the organisation. An ambivalence has been insinuated. If we count those three measures as 3/2, the 3/2 sections are logical, but the 4/4 sections are not. If we count them as 4/4, the 4/4 sections are logical, but the 3/2 sections are not. In the first case, there are a total of 84 3/2 and 144 4/4 measures; in the second case, there are 81 3/2- and 147 4/4 measures. The result of this ambivalence is an ambiguity between 81 and 84, as well as between 144 and 147: 81 : 84 = 3⁴ : 3 × 4 × 7; also 144 : 147 = (3² × 4²) : (3 × 7²).

Rehearsal numbers

If we count rehearsal numbers, again from the beginning to the end of the Symphony rather than per movement, we obtain a total of $(14 + 18 + 30 =)$ 62 sections. However, a certain inconsistency is perceived. No practical reason has been found for the rehearsal numbers 8, 11 and 13 in the first movement, for numbers 6, 11, 13, 15 and 16 in the second, and for several more in the third movement. No conductor would ask his singers and players to start in the middle of an ongoing motion or even between two syllables of a word, as in rehearsal number 8 of the first movement. However helpful most of the numbers may be for rehearsals, some seem to be put in without apparent reason. This seems to indicate that Stravinsky had other than mere practical motives for putting them in. To speculatively omit or erase the superfluous ones does not give us an insight why so many were written, and why so many of these are impractical. On the other hand, if we add just one number to the existing ones, a strict pattern becomes clear.

We propose that the only measure of silence in the piece, the $2/8$ measure right before rehearsal number 14 in the second movement, may be numbered '13B'. Now, a total of 63 rehearsal numbers divides the piece into as many sections, 36 of which are found before and 27 after the section that the composer mentioned as the one where he started composing, and which appears to be the 'middle' of the piece.⁷ To give this measure of silence an extra rehearsal number may seem illegitimate as an act to facilitate analysis, because it can never be proven that Stravinsky himself erased it before publication. However, if we gather enough circumstantial evidence that he might have done just that; if we find a reason to suppose that the composer erased the rehearsal number after he first put it in; and if without this action by us, the composer's motivations remain unclear, then, we as analysts feel excused in proposing that it is not unthinkable that he provided this measure of silence with an extra rehearsal number.⁸ A first line of circumstantial evidence may be found in the rigorous way in which he uses his numerical material, a second resides in the fact that this extra number puts an extra emphasis on this peculiar measure and perhaps, on the text that follows it. Whatever the reason may have been for Stravinsky's putative omission of this rehearsal number, one obvious reason seems clear: such number would have drawn unnecessary attention to his method.

Tempo

In the same interview with Robert Craft mentioned above, Stravinsky says: 'I was much concerned, in setting the Psalm verses, with problems of tempo. To me, the relation of tempo and meaning is a primary question of musical order, and until I am certain that I have found the right tempo, I cannot compose.'

If the organisation of time has been executed so consistently with the help of numbers, we may assume that a comparable logic governs the choice of tempi as well; see Table 3.

7 The numbers 63, 36 and 27 as well as their ratios are composed of threes, fours and sevens, as follows: $63 = 3^2 \times 7$ and $36 : 27 = 3^2 \times (4 : 3)$.

8 Note that if this $2/8$ measure is given a separate rehearsal number, it is number 28 from the beginning of the Symphony. Preceded by 27 numbers, the extra 'section' expresses the ambivalence between 27 and 28 (3^3 and 4×7). Also, note that the empty measure may be seen to emphatically split the second of the three movements of the Symphony into two separate ones, suggesting a total of four shorter movements rather than three. This composer is nothing but consistent; wherever there is a three, there will be a four.

Tempi

$$81 : 36 = 9 : 4$$

$$36 : 48 = 3 : 4$$

$$81 : 60 = 4 : 3$$

$$81 : 184 = 4 : 9$$

Table 3

Tempi.

The first and second movements have indications of 92 to the quarter and 60 to the eighth note respectively. In the third movement we find 48, 80 and 72. Except for the simple and familiar ratio 3 : 4 between 60 and 80, no logic is evident. However, given the limitations of the metronomes as Stravinsky knew them in 1930, he may well have rounded off some of his numbers. I propose that we assume that the tempo 80 to the quarter throughout the third movement must be regarded as an 81, which for this practical reason was rounded off to 80. Similarly, the tempo indication 72 to the quarter in the slow 3/2 waltz must be rewritten as 36 for the half note, since the 36 was not available on the metronomes of the time. Another adjustment is necessary in order to trace back how the composer may have worked. Given the fact that, according to the reasoning as outlined above, the 2/4 meter of the instrumental introduction to the first movement may be read as a 4/8, we feel free to propose to rewrite the 92 to the quarter as 184 to the eighth.

For reasons which will become clear, I propose that the slow 3/2 section at the end of the third movement served as a starting point in terms of meter and tempo. As stated, it has a metronome indication of 72 to the quarter or 36 to the half note. This number 36 is the product of 4 and 9. I propose that the ratios between that very slow tempo, the tempo of the three 'Alleluia' sections and the tempo of the 4/4 sections in the third movement provided the composer with his initial idea. Their ratios are 3 : 4 and 4 : 9; Stravinsky then seems to have taken the number 81 (as 3⁴) and derived the other tempi from it.

This study would not be complete without some concluding remarks about the duration of the various meters. For all practical purposes, the three meters 3/2, 4/4 and 2/4 (plus 4/8), all have the same duration of about 6 minutes.⁹ This is remarkable, since the 3/2 measures are performed in no less than six different tempi (36, 46, 48, 60, 80, 24), and the 4/4 measures, in three (92, 48, 80). Stravinsky's scores were never richly provided with tempo marks like *ritenuto*, *accelerando* or *fermate*. However, in the score of this Symphony, we don't find even a single one of these liberties of tempo. The conclusion may be justified that he did indeed organize the relation between tempo and meter as described, and that he wanted the tempo indications to be followed as meticulously as possible.

9 As there are 42 3/2 measures in a tempo of 36 for the half note, the slow 3/2 waltz at the conclusion of the third movement lasts exactly 3'30". The remaining 3/2 measures have a total duration of precisely 2'30". The ratio between the waltz and the total duration of the 3/2 measures is 3'30" : 6 = 7 : 12 or 7 : (3 x 4). This ratio yields the numbers 3, 4 and 7. Next to the 6 minutes of the 3/2 measures, there are the 6'05" of the 4/4 sections and the 6'15" of the combined 4/8 and 2/4-sections. The 'exceptional' 2/2 measures add another 45", bringing the total duration of the composition to almost exactly 19 minutes as the sum of 6' + 6'05" + 6'15" + 45". The principal idea must have been to divide the total duration of 18 minutes into three equal parts of 6 minutes.

Conclusions

Even though the analysis above is not contradicted by the results of an analysis of other elements such as harmonic and melodic design, it still does not give a satisfying answer to the question of why the 'exceptional' measures are written exactly where they are. Further research may find answers to these and many other interesting problems. As it is, we may observe that the first movement has three different meters, the second just one, and the third only two, that, however, are played in varying tempi. All regular meters have interruptions caused by the exceptional measures, precipitating the typically Stravinskian disturbances of ongoing motion.

Moreover, the analysis presented here fails to describe exactly how the composer worked. For example, it does not seem logical to assume that the metrical design with its three movements, its changes of meter and its fascinating patterns of shifting beats was composed before or, for that matter, after a decision was made concerning the tempi. Rather, tempo and meter must have been worked out more or less simultaneously. However, it must be stressed at this point that the 'creative process' and the order in which the various aspects were worked out is of no concern to the analyst. A strict logic is found to underly the organisation of time, and this seems to confirm what the composer himself said about this aspect of his scores, but whatever we try and conclude about the order of his decisions must remain within the area of dangerous speculation.

If we need extra confirmation of our analysis and its conclusions, all we can do is to try and determine if the same logic or numbers are used for other aspects of the score, such as harmony and melody. Another avenue of investigation may concern the history of the method. What we know for certain is that before 1930 Stravinsky had written four ballet scores, and that those were created in close collaboration with their choreographers.

This collaboration must have entailed discussions about tempo, meter and form, because, while ideas about pitch are the sole responsibility of the composer, the two art forms touch each other very closely in the organisation of time. It may well be that the method was developed in the great ballets, and that the device pleased Stravinsky enough to maintain it as part of his technique. Yet another motivation for Stravinsky to work out his metrical scheme so meticulously may be found in the first subject of the double fugue. In measure 3 and 4 of this movement, the name Bach is spelled with notes, in reversed order. Stravinsky's metrical grid may well contain a reference to the method of his great predecessor.

Meter in the *Symphony of Psalms* may well be based upon a metrical principle of the twelfth-century *Ars Antiqua*. As in the medieval principle, the $3/2$ measure takes center stage in the metrical design. Franco of Cologne, in his *Ars Cantus Mensurabilis* (c. 1260), describes the rules of the then new notation of meter. He says: 'As in the older notation, the number three is the only perfect one.'¹⁰ This is a reference to the *tempus perfectum* of medieval music theory, which is a triple rhythm as opposed to the *tempus imperfectum*, which is binary. In Stravinsky's composition, the imperfect $2/2$ measures are exceptions to the perfect $3/2$ meter. This idea seems to have been developed into a complicated system with rules and exceptions. Taking the number 3 as the main digit, Stravinsky added the numbers 7 and 4, and decided that a total of $(3 \times 4 \times 7 =) 84$ $3/2$ measures,

¹⁰ Alec Harman etc., *Man and His Music, The Story of Musical Experience in the West, Part I: Mediaeval and Early Renaissance Music*, London 1962, p. 113.

in a tempo 36 to the half note, were to be the kernel of his composition. This idea was worked out further in the ensuing ratios. A total of nine different measures was used (Table 2). In this process, the 9 served as an extra number to be employed for the composition of tempo.

How do these patterns of numbers influence the actual sound of the music, or, more precisely: what is the influence of this grid of meter and tempo on the way the melodies and chords are played and heard? Much of what we hear requires intensive further investigation. However, the result of the research presented here seems to suggest that, at least in the *Symphony of Psalms*, the typically Stravinskian rhythmical irregularities are the result of metrical irregularities and not the other way around. Boulez has said of the *Rite of Spring* that rhythm could act as a 'principle structural agent'.¹¹ If in the *Symphony* we may say the same about meter, then the data presented here may help us understand other aspects of the score, such as harmony and melody, for meter and tempo in and of themselves are mere abstractions, that at best furnish the material with the help of which another abstraction, that of pitch, is projected in time.

¹¹ Quotation taken from Jonathan Cross, *The Stravinsky Legacy*, Cambridge 1998, p. 81.