MESSIAEN'S INFLUENCE ON POST-WAR SERIALISM

THESIS

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MASTER OF MUSIC

by

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The objective of this paper is to show how Olivier Messiaen's *Mode de valeurs et d'intensités* influenced the development of post-war serialism. Written at Darmstadt in 1949, *Mode de valeurs* is considered the first European work to organize systematically all the major musical parameters: pitch, duration, dynamics, articulation, and register. This work was a natural step in Messiaen's growth toward complete or nearly complete systemization of musical parameters, which he had begun working towards in earlier works such as *Vingt regards sur l'Enfant-Jésus* (1944), *Turangalîla-symphonie* (1946-8), and *Cantéyodjayâ* (1949), and which he continued to experiment with in later works such as *Île de Feu II* (1951) and *Livre d'orgue* (1951). The degree of systematic control that Messiaen successfully applied to each of the musical parameters influenced two of the most prominent post-war serial composers, Pierre Boulez and Karlheinz Stockhausen, to further develop systematic procedures in their own works. This paper demonstrates the degree to which both Boulez' *Structures Ia* (1951) and Stockhausen's *Kreuzspiel* (1951) used *Mode de valeurs* as a model for the systematic organization of musical parameters.
# TABLE OF CONTENTS

LIST OF EXAMPLES ......................................................... v

Chapter

I. MESSIAEN'S CONTRIBUTIONS TO POST-WAR SERIALISM ..................... 1

The State of Music After World War II .................................. 1
The Influence of *Mode de valeurs* on Boulez and Stockhausen ......... 4
The Relationship of *Mode de valeurs* to the Rest of Messiaen's Works .... 6
Elements and Techniques Found in *Technique* That Were Similar To Those Found in Serial Music ................................. 10
The Beginning of Messiaen's Serial Experiments .......................... 27

II. TWO WORKS REPRESENTATIVE OF THE PERIOD FOLLOWING *TECHNIQUE* ...... 29

Organizational Techniques Used in *Vingt regards sur l'Enfant-Jésus* .... 29
Organizational Techniques Used in *Turangalîla-symphonie* ............... 44
The Period Following *Turangalîla* ...................................... 55

III. THE *MODE DE VALEURS* PERIOD ................................... 57

The Use of Total Systematic Organization in *Canteyodjâya* .............. 57
The Use of Other Organizational Methods in *Canteyodjâya* .............. 62
The Use of Total Systematic Organization in *Mode de valeurs et d'intensités* .... 65
The Use of Total Systematic Organization in *Île de Feu II* .............. 70
Systematic Organizational Methods Used in *Livre d'orgue* .............. 74
The Period Following *Livre d'orgue* .................................... 80
**TABLE OF CONTENTS, continued**

<table>
<thead>
<tr>
<th>IV. THE INFLUENCE OF MODE DE VALEURS ON BOULEZ AND STOCKHAUSEN</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulez' Adoption of Messiaen's Organizational Principles</td>
<td>82</td>
</tr>
<tr>
<td>Stockhausen's Adoption of Messiaen's Organizational Principle</td>
<td>91</td>
</tr>
<tr>
<td>Summary</td>
<td>100</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>104</td>
</tr>
</tbody>
</table>
# LIST OF EXAMPLES

<table>
<thead>
<tr>
<th>Example</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Messiaen's modes of limited transposition.</td>
<td>12</td>
</tr>
<tr>
<td>2. Intervallic structure of mode 2.</td>
<td>14</td>
</tr>
<tr>
<td>3. Intervallic structure of mode 3.</td>
<td>14</td>
</tr>
<tr>
<td>4. Row from Webern's Concerto for Nine Instruments, Opus 24, first movement, mm. 1-3.</td>
<td>15</td>
</tr>
<tr>
<td>5. Intervallic structure of the tone-row from Webern's Concerto for Nine Instruments, Opus 24, first movement.</td>
<td>15</td>
</tr>
<tr>
<td>6. Row from Webern's Streichquartett, Opus 28, first movement, mm. 1-7</td>
<td>16</td>
</tr>
<tr>
<td>7. Intervallic structure of the tone-row from Webern's Streichquartett, Opus 28, first movement.</td>
<td>16</td>
</tr>
<tr>
<td>8. Webern, Symphony, Opus 21, first movement, mm. 1-12. Tone-row analysis.</td>
<td>18</td>
</tr>
<tr>
<td>9. Combination of prime, duple, and triple rhythmic values using the sixteenth-note as the base unit</td>
<td>19</td>
</tr>
<tr>
<td>10. Messiaen's table of augmentations and diminutions (Technique, p. 3, example 24)</td>
<td>20</td>
</tr>
<tr>
<td>11. Possible augmentations and diminutions for one rhythmic pattern, using Messiaen's table.</td>
<td>21</td>
</tr>
<tr>
<td>12. Complex rhythmic pattern using a basic rhythm and several of its augmentations and diminutions (Technique, p. 5, example 41)</td>
<td>22</td>
</tr>
<tr>
<td>13. The superposition of a rhythm on its retrograde (Technique, p. 6, example 43).</td>
<td>23</td>
</tr>
<tr>
<td>14. The superposition of a rhythm on its augmented and diminuted forms (Technique, p. 5, example 42)</td>
<td>23</td>
</tr>
<tr>
<td>Example</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>15. Canon using a rhythm and its augmented form (Technique, p. 8, examples 53, 54, and 55)</td>
<td>24</td>
</tr>
<tr>
<td>16. Canon using a compound rhythm (Technique, p. 8, examples 56 and 57)</td>
<td>25</td>
</tr>
<tr>
<td>17. Melody and its inversion (Technique, p. 20, example 124)</td>
<td>26</td>
</tr>
<tr>
<td>18. Pitches extracted from the melody and its inversion (Technique, p. 20, example 125)</td>
<td>26</td>
</tr>
<tr>
<td>19. &quot;Interversions&quot; of melody and its inversion (Technique, p. 20, example 126)</td>
<td>27</td>
</tr>
<tr>
<td>20. &quot;Durées chromatiques&quot;</td>
<td>31</td>
</tr>
<tr>
<td>21. Chromatic duration series within larger rhythmic patterns (Technique, p. 6, example 43)</td>
<td>32</td>
</tr>
<tr>
<td>22. Messiaen, &quot;Par Lui tout a été fait&quot; in Vingt regards, p. 33, mm. 99-101</td>
<td>34</td>
</tr>
<tr>
<td>23. Messiaen, &quot;Regard de Père&quot; in Vingt regards, p. 1, mm. 1-2</td>
<td>34</td>
</tr>
<tr>
<td>24. Messiaen, &quot;Regard de l'Eglise d'amour&quot; in Vingt regards, pp. 171-2, mm. 144-60</td>
<td>35</td>
</tr>
<tr>
<td>25. Messiaen, &quot;Regard de l'Onction terrible&quot; in Vingt regards, pp. 138-9, mm. 1-19</td>
<td>37</td>
</tr>
<tr>
<td>26. Messiaen, &quot;Première communion de la Vierge&quot; in Vingt regards, pp. 81-2, mm. 54-73</td>
<td>38</td>
</tr>
<tr>
<td>27. &quot;Agrandissement asymétrique&quot;</td>
<td>40</td>
</tr>
<tr>
<td>28. Messiaen, &quot;L'échange&quot; in Vingt regards, p. 8, mm. 1-6</td>
<td>41</td>
</tr>
<tr>
<td>29. Messiaen, &quot;Regard de l'Eglise d'amour&quot; in Vingt regards, pp. 158-9, mm. 9-12</td>
<td>43</td>
</tr>
<tr>
<td>30. Permutations of the pitch set in Example 29.</td>
<td>44</td>
</tr>
</tbody>
</table>
### List of Examples, continued

<table>
<thead>
<tr>
<th>Example</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Messiaen, &quot;Turangalîla 1&quot; in Turangalîla, pp. 96-8, mm. 42-52, cello.</td>
<td>45</td>
</tr>
<tr>
<td>32. Messiaen, &quot;Développement de l'amour&quot; in Turangalîla, pp. 335-8, mm. 300-15, bells</td>
<td>46</td>
</tr>
<tr>
<td>33. &quot;Personnages rythmiques&quot;</td>
<td>47</td>
</tr>
<tr>
<td>34. Messiaen, &quot;Turangalîla 1&quot; in Turangalîla, pp. 99-102, mm. 55-71, wood block, maracas, and bass drum</td>
<td>48</td>
</tr>
<tr>
<td>35. Messiaen, &quot;Turangalîla 2&quot; in Turangalîla, pp. 266-7, mm. 21-36, percussion battery</td>
<td>49</td>
</tr>
<tr>
<td>36. Distribution of duration series fragments in Example 35</td>
<td>50</td>
</tr>
<tr>
<td>37. Messiaen, &quot;Turangalîla 3&quot; in Turangalîla, pp. 342-4, mm. 21-37, percussion battery</td>
<td>51</td>
</tr>
<tr>
<td>38. Distribution of duration series fragments in Example 37</td>
<td>52</td>
</tr>
<tr>
<td>39. Prolongation of durational series in Example 37, woodblock</td>
<td>52</td>
</tr>
<tr>
<td>40. Duration series, &quot;Turangalîla 2&quot; in Turangalîla, pp. 272-6, mm. 56-72, temple block, petite cymbal, and tam-tam</td>
<td>53</td>
</tr>
<tr>
<td>41. Messiaen, &quot;Introduction&quot; in Turangalîla, p. 11, mm. 44-8, strings</td>
<td>55</td>
</tr>
<tr>
<td>42. Pitch and rhythm modes used in Canteyodjaya, pp. 8-10, mm. 64-101</td>
<td>59</td>
</tr>
<tr>
<td>43. Dynamics mode used in Canteyodjaya, pp. 8-10, mm. 64-101</td>
<td>60</td>
</tr>
<tr>
<td>44. Pitch modes combined with fixed parameters in Canteyodjaya, pp. 8-10, mm. 64-101</td>
<td>60</td>
</tr>
<tr>
<td>45. Messiaen, Canteyodjaya, p. 8, mm. 64-67</td>
<td>61</td>
</tr>
</tbody>
</table>
## LIST OF EXAMPLES, continued

<table>
<thead>
<tr>
<th>Example</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>46. Messiaen, <em>Cantéyodjaya</em>, pp. 19-20, mm. 244-58.</td>
<td>63</td>
</tr>
<tr>
<td>47. Messiaen, <em>Cantéyodjaya</em>, pp. 13-14, mm. 140-63.</td>
<td>65</td>
</tr>
<tr>
<td>49. Messiaen, <em>Mode de valeurs</em>, pp. 3-4, mm. 1-13</td>
<td>68</td>
</tr>
<tr>
<td>50. Messiaen, <em>Mode de valeurs</em>, p. 5, mm. 28-30</td>
<td>69</td>
</tr>
<tr>
<td>51. Messiaen, <em>Mode de valeurs</em>, p. 11, mm. 111-5.</td>
<td>70</td>
</tr>
<tr>
<td>52. Mode from Messiaen's <em>Île de Feu II</em>, mm. 76-85.</td>
<td>71</td>
</tr>
<tr>
<td>53. The &quot;interversion&quot; process used in <em>Île de Feu II</em></td>
<td>73</td>
</tr>
<tr>
<td>54. Messiaen, &quot;Les yeux dans les roues&quot; in <em>Livre d'orgue</em>, p. 27, mm. 1-10, manuals.</td>
<td>74</td>
</tr>
<tr>
<td>55. Messiaen, &quot;Les yeux dans les roues&quot; in <em>Livre d'orgue</em>, p. 27, mm. 1-12, pedal.</td>
<td>75</td>
</tr>
<tr>
<td>56. Permutations of the pedal mode from &quot;Les yeux dans les roues&quot; in <em>Livre d'orgue</em>.</td>
<td>76</td>
</tr>
<tr>
<td>57. Three deci-talâs used in &quot;Reprises par interversion&quot; in <em>Livre d'orgue</em>.</td>
<td>76</td>
</tr>
<tr>
<td>58. Ordering of the deci-talâs in &quot;Reprises par interversion&quot; in <em>Livre d'orgue</em>, mm. 1-19.</td>
<td>77</td>
</tr>
<tr>
<td>59. Messiaen, &quot;Reprises par interversion&quot; in <em>Livre d'orgue</em>, pp. 1-2, mm. 1-19.</td>
<td>78</td>
</tr>
<tr>
<td>60. Messiaen, &quot;Reprises par interversion&quot; in <em>Livre d'orgue</em>, p. 2, mm. 20-30.</td>
<td>79</td>
</tr>
<tr>
<td>61. Systematic ordering of the durational series in &quot;Soixante-quatre durées&quot; in <em>Livre d'orgue</em>, pp. 33-43, mm. 1-129.</td>
<td>80</td>
</tr>
<tr>
<td>62. Pitch mode for top staff of <em>Mode de valeurs</em>.</td>
<td>83</td>
</tr>
<tr>
<td>63. Matrix of pitch row forms for <em>Structures Ia</em>.</td>
<td>84</td>
</tr>
<tr>
<td>Example</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>64. Boulez, <em>Structures Ia</em>, p. 1, mm. 1-7</td>
<td>85</td>
</tr>
<tr>
<td>65. Duration mode for top staff of <em>Mode de valeurs</em></td>
<td>86</td>
</tr>
<tr>
<td>66. Matrix of duration series for <em>Structures Ia</em></td>
<td>86</td>
</tr>
<tr>
<td>67. Chromatic pattern of dyad pairings in <em>Structures Ia</em></td>
<td>88</td>
</tr>
<tr>
<td>68. Dynamics and articulation series in <em>Structures Ia</em></td>
<td>88</td>
</tr>
<tr>
<td>69. Boulez, <em>Structures Ia</em>, p. 5, mm. 32-5</td>
<td>90</td>
</tr>
<tr>
<td>70. Stockhausen, <em>Kreuzspiel</em>, pp. 1-2, mm. 1-13</td>
<td>92</td>
</tr>
<tr>
<td>71. Distribution of the duration values in the tom-toms, mm. 7-13</td>
<td>93</td>
</tr>
<tr>
<td>72. Stockhausen, <em>Kreuzspiel</em>, pp. 2-3, mm. 14-20</td>
<td>94</td>
</tr>
<tr>
<td>73. Pitch series permutations used in the first section of <em>Kreuzspiel</em></td>
<td>95</td>
</tr>
<tr>
<td>74. Duration series permutations used in the first section of <em>Kreuzspiel</em> in the tom-toms</td>
<td>96</td>
</tr>
<tr>
<td>75. Stockhausen, <em>Kreuzspiel</em>, p. 2, mm. 14-18, p. 6, mm. 46-52, and p. 10, mm. 82-87</td>
<td>98</td>
</tr>
<tr>
<td>76. Register changes in the first section of <em>Kreuzspiel</em></td>
<td>99</td>
</tr>
</tbody>
</table>
CHAPTER I

MESSIAEN'S CONTRIBUTIONS
TO POST-WAR SERIALISM

The State of Music After World War II

A redefinition of musical thought occurred during the years that followed the end of World War II. In 1946, Wolfgang Steinecke founded the Internationale Ferienkurse fur Neue Musik at Darmstadt. These courses brought an end to the cultural hiatus created by the war, and enabled composers from all over Europe to gather together. From the summer of 1946 up through the mid-1950's Darmstadt served as a major European musical center for both the performance of new works and the development of new ideas. One of the most important works to come out of the summer sessions was Olivier Messiaen's *Mode de valeurs et d'intensités*. Written at Darmstadt in 1949, Messiaen's *Mode de valeurs* had a considerable impact on the development of post-war serialism, and greatly influenced two of the most prominent composers to emerge from that period: Pierre Boulez and Karlheinz Stockhausen.

Near the end of the war these composers and others showed a renewed interest in the music and in the methods and practices of the Second Viennese School. During the years that followed, the period that Paul Griffiths refers to as "the serial ascendency,"¹ composers were

¹Paul Griffiths, Modern Music: The avant garde since 1945 (New York, 1981), p. 17. Griffiths also includes under this title the works of American serialists, such as Milton Babbitt and George Perle.
constantly extending the serial frontiers by expanding on old techniques and by developing new ones.

While the general interest in serialism was widespread among composers at the time, there were two distinct and opposing schools of serial thought. Many composers treated serialism in much the way Schoenberg had. They used the serial methods and practices as a means of organizing and developing musical material within the framework of a pre-existing style. Just as Schoenberg had worked out serial procedures within the classical forms of the 19th-century symphonic tradition, composers such as Wolfgang Fortner and Hans Werner Henze used serial methods within the framework of the French neo-classical style.

Other composers, exemplified by Boulez, were very critical of Schoenberg's serial aesthetic. Boulez wrote,

"That exploration of dodecaphonic realm may be bitterly held against Schoenberg, for it went off in the wrong direction so persistently that it would be hard to find an equally mistaken perspective in the entire history of music."²

Boulez felt that serialism was more than just a group of individual procedures. It was a unique concept, a musical language all its own. He wrote that "Schoenberg employed the series as a smaller common denominator to assure the semantic unity of the work, but...he organized the language elements thus obtained by a pre-existing rhetoric, not a serial one."³ He also criticized Schoenberg for

³Ibid., p. 274.
applying his serial procedures to only the pitch element, thus failing "to grasp the serial domain as a whole."^4 Boulez's goal was to find a way to organize all the elements of sound into a serial context.

Despite the criticisms of Boulez, the Schoenbergian approach to serialism was the dominant school of thought at Darmstadt during the summers from 1946 to 1950. Fortner was the principal teacher at the first summer session, and Henze had many of his works performed at Darmstadt during those years. René Leibowitz, a former student of Schoenberg's, was the principal teacher during the 1948 summer courses. The year before, he had founded the International Festival of Chamber Music in Paris, which was primarily devoted to the performance of works by Schoenberg, Webern, and Berg. Also that year, he published *Schönberg et son ecole*, which was the first detailed book on serialism written in French. In 1950, Schoenberg's *A Survivor from Warsaw* had its European premiere at Darmstadt. The following year Schoenberg was supposed to be the principal teacher, but he had become very sick and could not attend the courses. The position was taken over by Theodor Wiesengrund-Adorno, a staunch supporter of Schoenberg's serial aesthetic. That same summer, however, also proved to be the turning point in the development of post-war serialism. It was at the 1951 summer courses at Darmstadt that the direction of serial development began to turn away from the traditional serial practices of Fortner and Leibowitz, and towards the total serialism proposed by Boulez.

During the late 1940's and the early 1950's the organization of all the elements of sound into a serial context was foremost in the mind of Boulez. He wrote that "the greatest importance is not the twelve tone, but, much more, the serial conception--that is, the notion of a sound-universe, proper to each work." In 1951, Boulez finished Structures Ia, his first piece in which all the musical elements were organized within the serial domain. That same year, Stockhausen, who had become interested in total serialism independently of Boulez, also wrote a serially integrated work entitled Kreuzspiel. Though Structures Ia and Kreuzspiel each evolved along different lines, they shared one common heritage. Both used Messiaen's Mode de valeurs as a model for the serial handling of non-pitch parameters.

The Influence of Mode de valeurs on Boulez and Stockhausen

Boulez probably heard Mode de valeurs shortly after it was written. He had been a student of Messiaen's during the war, studying harmony with him at the Paris Conservatoire, and attending his private composition classes at the home of Guy Bernard-Delapierre. Throughout the 1940's he remained in close contact with Messiaen, and it can be assumed that he must have heard Mode de valeurs soon after Messiaen returned from Darmstadt. At that time, Boulez was searching for ways of applying the permutational principles normally associated with pitch to the non-pitch elements, and he saw Mode de valeurs as the

5Ibid.
prototype for that kind of composition. He wrote that

Olivier Messiaen concretized these needs, which are dispersed almost everywhere through valid contemporary music, and gave us a *Mode de valeurs et d'Intensités*, in which the idea of an organized universe—modally, in this precise instance—is applied not only to the *tessituras* but equally to durations (that is, the rhythmic organization of musical time), to intensities (that is, the amplitude of the sounds), and to attacks (the initial profile of the sound).⁶

Though Boulez did not complete *Structures Ia* until 1951, two years after *Mode de valeurs* was written, the lapse of time between the two works did not in any way lessen the influence *Mode de valeurs* had on him. Not only did he write that "the serial rhythmic principles that I have set forth could not have been conceived without the disquietude and technique that Messiaen has transmitted to us,"⁷ but he also used the first mode from the Messiaen work as the row for his own piece.

Stockhausen first heard *Mode de valeurs* at Darmstadt in the summer of 1951. His impression of it was that

we hear only single notes, which might almost exist for themselves alone, in a mosaic of sound; they exist among others in configurations which no longer destine them to become components of shapes which intermix and fuse in the traditional way; rather they are points amongst others, existing for themselves in complete freedom, and formulated individually in considerable isolation from each other. Each note has a fixed register, and allows no other note within its preserve; each note has its own duration, its own pitch and its own accentuation...⁸

Stockhausen's reaction to *Mode de valeurs* was much more immediate than

---

Boulez's. A few months after hearing it he wrote Kreuzspiel, and in January of 1952 he went to Paris to study with Messiaen.

While both Boulez and Stockhausen acknowledged the influence Mode de valeurs had on their work, it must also be mentioned that two other integrated serial works appeared in 1951: Karel Goeyvaerts' Sonata of 2 Pianos and Michel Fano's Sonata for 2 Pianos. Richard Toop points out that these two works also influenced Boulez and Stockhausen in their writing of Structures Ia and Kreuzspiel. Stockhausen, in particular, was very influenced by Goeyvaerts' work, which he encountered at the same time as Mode de valeurs.⁹

The Relationship of Mode de valeurs to the Rest of Messiaen's Works

In spite of his impact on the development of post-war serialism, Messiaen was not a serial composer. The organizational methods he employed in Mode de valeurs were very similar to the permutational principles associated with serial music, but were not taken from the practices of the Second Viennese School. Instead, they were derived from musical elements used in his works. Messiaen explicated these elements in Technique de mon langage musical. Written in 1942, this work outlined all the various elements that made up Messiaen's musical language at that time, and gave examples of their use in his works.¹⁰


¹⁰Messiaen limits his study to rhythm, melody, and harmony. He does not discuss the subjective qualities of his music, such as the religious and mystical connotations found in many of his works, and only devotes half a page to his use of birdsong. Neither does he mention any specific aspects of orchestration or of writing for piano or organ.
These elements, used to different degrees and in varying combinations, dictated the style for each particular piece. The differences between pieces were caused either by a change of the predominant elements, or by the further development of elements used in previous pieces. Despite its serial implications, *Mode de valeurs* was not an anomaly within Messiaen's *oeuvre*, but a natural consequence in the evolution of his musical language.

As the title implies, *Mode de valeurs et d'intensités* is made up of various types of modes. Modality is a feature found in all of Messiaen's works, and several chapters in *Technique* are devoted to his use of modes. In many of his works prior to *Mode de valeurs*, he relied on his modes of limited transposition for a large portion of the musical material. These modes range from seven to ten notes and can only be transposed a certain number of times before arriving back at the original mode. Despite the fact that each of the three pitch modes used in *Mode de valeurs* contains all twelve chromatic pitches, as in a serial tone-row, Messiaen utilizes them in much the same way he used the modes of limited transposition. In a conversation with Claude Samuel, he reveals the similarities in his use of the modes of limited transposition and modes that contain all twelve chromatic pitches.

*Claude Samuel.* Have you consciously used these modes of limited transposition from the beginning?

*Olivier Messiaen.* It was an unconscious step at first; later I became aware of their power and ability. . . . I do not use my modes melodically. I would go as far as to say that I use them as colours. They are not harmonies . . . . They are not even recognized chords. They are colours . . . .

*Claude Samuel.* How do you place yourself in regard to classical tonality?
Olivier Messiaen. There are tonal passages in my works but they are precisely blended with these modes which colour them... Some of my later works also include note-rows, but they haven't anything like the sound one would expect to find in a serial development, nor have they the 'serial spirit;' they remained coloured because... I treat them as colours.

Claude Samuel. But, harmonically speaking, you are more of a modal composer?

Olivier Messiaen. Yes. I've happened to use the twelve notes in bundles and they sound quite unlike a series or a truncated series: they sound like colours.\(^1\)

In addition to the pitch modes, Messiaen also used modes to control the three major non-pitch parameters: rhythm, attack and dynamics. Each mode was made up of different values, corresponding to the particular parameter it controlled. The methods used in the systematic organization of these parameters can also be found in *Technique*.

Another feature, in addition to modality, found in all of Messiaen's works was his treatment of the rhythmic domain as equal in importance to the pitch domain. Boulez wrote, "to Messiaen we owe all--among other aquisitions--the first idea of separating rhythmic writing from polyphonic writing."\(^12\) The basis for Messiaen's rhythmic writing was the use of durational values. In all of his rhythmic manipulations, he was concerned with the durational values of each member of a rhythmic pattern, as some multiple of a base unit of

---


duration. The pattern

\[ \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \]

would have the values

\[ 2 1 3 4 3 1 2 \]

using the sixteenth-note value as the base unit. There are four different values in this pattern. In *Mode de valeurs*, he developed this idea further and created three rhythmic modes, which paralleled the pitch modes. Each mode contained twelve different durational values, and was built on a different base unit. The rhythmic modes paralleled the pitch modes by having the durational values cover inclusively all the multiples of the base unit from one to twelve. Messiaen felt that this was similar to the way the twelve chromatic pitch were organized in an equal tempered scale. Though Stockhausen showed that this was not exactly true, it did not lessen the effectiveness of Messiaen's rhythmic modes in his music.\(^{13}\)

*Technique* contains several chapters on Messiaen's use of rhythm. He divides rhythms into two kinds: nonretrogradable and retrogradable. Nonretrogradable rhythms are rhythmic patterns that read the same backwards as forwards, whereas retrogradable rhythms do not. In *Technique*, Messiaen showed how it was possible to superpose either

\[^{13}\text{Karlheinz Stockhausen, ".....how time passes....." in Die Reihe, no. 3 (1957, English edition 1959), pp. 10-15.}\]
type of rhythm on its augmented and diminuted forms, and how to super-
pose a retrogradable rhythm on its retrograde. He also showed how it
was possible to create rhythmic canon using either retrogradable or
nonretrogradable rhythms. These elements and techniques will be
discussed further in the following section.

Elements and Techniques Found in Technique That
Were Similar to Those Found in Serial Music

While the actual organizational methods Messiaen employed in
Mode de valeurs were not taken from the practices of the Second
Viennese School, the impetus for his serial exploration did come from
serial composers. Messiaen began teaching at the Paris Conservatoire
during the war, and while he was not part of the serial revival,
many of his students were. In addition to Boulez, Messiaen also had
Michel Fano, Karel Goeyvaerts, Serge Nigg, and Jean-Louis Martinet as
students. Though they studied the twelve-tone technique with René'
Leibowitz, they also studied composition with Messiaen. His constant
contact with them led him to explore the possibilities of pre-
compositional organization. He later said "their questions and their
attitude compels me to new researches of which I might not have dreamed
without them." 14

The relationship of Mode de valeurs to the rest of Messiaen's
output can be further illustrated both by examining closely the
specific elements and techniques outlined in Technique, which are

14 Samuel, Conversations with Olivier Messiaen, p. 105.
similar to elements and techniques used in serial music, and by tracing their development from the works that preceded Mode de valeurs through those that followed it.

Henri Pousseur has written that "Composers' explanations of their craftsmanship are . . . the only way in which craftsmanship can develop further." This is true in Messiaen's case. Technique was written early in Messiaen's career, sixteen years after his first published work and forty-one years before his latest. Nevertheless, the musical elements he discussed in it continued to play an important role in his works, and they constituted a large repertoire of compositional devices and techniques from which he could draw. In addition to using the elements and devices in their original form, he also developed and expanded them. In Mode de valeurs he drew on those musical elements and compositional devices that were similar to serial principles and techniques, and he developed them in a way that contributed to the systematic organization of the entire work.

Musical Elements

The principal musical elements discussed in Technique were the modes of limited transposition and the retrogradable and nonretrogradable rhythms. These elements were not serial in nature, but they had features that were similar to those found in serial tone-rows.

Modes of limited transposition.—Messiaen's modes are artificial and bear no relation to the modes of plainchant or folk-music. They were created by various symmetrical divisions of the equal tempered

---

scale (Example 1). In a conversation with Samuel, Messiaen explained their genesis by saying that our tempered music comprises twelve semitones, and that the number twelve is obtained by the following multiplications: three times four, four times three, twice six, and six times two. The modes of limited transposition are divided into symmetrical groups, the last note of each group being the same as the first of the following group. These groups are organized in six groups of two notes [Mode 1], four groups of three notes [Mode 3], and two groups in which the number of notes is variable [Modes 4, 5, 6, and 7]. It follows that, after a certain number of transpositions, modes arrive back at the same series of notes, and, consequently, it's impossible to transpose any further.

Example 1. Messiaen's modes of limited transposition.


17Samuel, Conversations with Olivier Messiaen, p. 22. Brackets are mine.
Of the seven modes, only mode 2 and mode 3 were used with any frequency by Messiaen. Modes 4, 5, 6, and 7 were not used very often because of their large number of possible transpositions. Whereas mode 2 had only two possible transpositions and mode 3 only three, modes 4, 5, 6, and 7 could all be transposed five times before arriving back at the original mode. Mode 1 could only be transposed one time, but Messiaen used it sparingly because it was the same as a whole-tone scale and had been fully exploited by other composers. The limited transpositional character of the modes was due to their division into symmetric groups. Messiaen said that "the modes of limited transposition can't be transposed because they contain tiny transpositions within themselves."\(^{18}\)

Messiaen's division of his modes into small groups was similar to the serial composers' partition of their tone-rows. Though serialists used asymmetric as well as symmetric partitioning, group sizes that were factors of twelve, such as dyads, triads, tetrads, and hexachords, were the most common. In addition to the similarity in size between Messiaen's groups and the serialists' partitions, there was also a similarity between the intervallic structure of Messiaen's groups and the intervallic structure of certain tone-rows used by Webern.

Each group of notes within one of Messiaen's modes has the same intervallic makeup as the other groups within that same mode.\(^{19}\)

\(^{18}\)Ibid.

\(^{19}\)The following abbreviations will be used: M=Major, m=minor, P=Perfect, 2=second(s), 3=third(s), 4=fourth(s), etc., and TT=tritone. Intervals will be considered in terms of their interval class i.e. m2=M7, M2=m7, m3=M6, M3=m6, and P4=P5. In referring to pitches, only
Mode 2 is made up of four groups, and each consists of a m2, a M2, and a m3 (Example 2).

\[
\begin{align*}
    m2 & \quad M2 \\
    C & \quad D^b & \quad E_b & = & \quad E_b & \quad F & = & \quad F^# & \quad G & = & \quad A & \quad B^b & \quad C \\
    m3 & \quad m3 & \quad m3 & \quad m3
\end{align*}
\]

Example 2. Intervallic structure of mode 2.

The three groups in mode 3 each consists of two m2's, two M2's, a m3, and a M3 (Example 3).

\[
\begin{align*}
    m3 & \quad M2 & \quad m2 & \quad m2 \\
    C & \quad D & \quad E^b & \quad E_b & = & \quad E_b & \quad F^# & \quad G & = & \quad A & \quad B^b & \quad E^b & \quad C \\
    m3 & \quad m3 & \quad m3
\end{align*}
\]

Example 3. Intervallic structure of mode 3.

Webern, whom Messiaen considered "the 'real' serial composer," \(^{20}\) also used groups with equal intervallic content in constructing many of his tone-rows.

upper-case letters will be used. In referring to keys, upper-case will indicate a major key and lower-case will indicate a minor key. Enharmonics will be considered equivalent.

\(^{20}\) Samuel, Conversations with Olivier Messiaen, p. 116.
The tone-row from Webern's *Concerto for Nine Instruments, Opus 24* can be divided into four equal groups of three notes (Example 4).

Example 4. Row from Webern's *Concerto for Nine Instruments, Opus 24*, first movement, mm. 1-3.

Though the groups in this tone-row do not overlap, as do the groups in Messiaen's modes, each contains the same intervals, namely an m2, a m3, and a M3 (Example 5). The tone-row from Webern's *Streichquartett, Opus 28* can be divided into three equal groups of four notes (Example 6). Each of the four note groups is made up of three m2's, two M2's, and a m3 (Example 7).

Example 5. Intervallic structure of the tone-row from Webern's *Concerto for Nine Instruments, Opus 24*, first movement.
Example 6. Row from Webern's Streichquartett, Opus 28, first movement, mm. 1-7.

Example 7. Intervallic structure of the tone-row from Webern's Streichquartett, Opus 28, first movement.

The similarities in construction between Messiaen's modes and Webern's tone-rows show that some of the principles underlying the serial language were not that far removed from Messiaen's own musical language. The use of intervallically equal groups enabled Messiaen to construct modes that could only be transposed a certain number of times before arriving back at the original pitches. This same principle enabled Webern to create tone-rows in which the transpositions, inversions,
and retrograde inversions of the tone-row were all closely linked due to ordered and unordered invariant pitch class sets.

Another feature of Messiaen's modes of limited transposition, which was also found in tone-rows, was their independence of any specific tonality. Within a particular mode, all the notes were equally prominent. There was no tonic or pitch center. In addition, because the transpositions of each mode were an integral part of the mode's structure, all twelve chromatic pitches were present. Therefore, all tonalities were possible. This independence of any one tonality was similar to the concept of pantonality. Pantonality implied that all the possible tonalities were present and equally prominent, and it was an inherent structural feature of dodecaphonic rows.

Retrogradable and nonretrogradable rhythms. --Whereas the modes of limited transposition were already complete at the time Technique was written, Messiaen's rhythmic concepts were undergoing constant development. The terms retrogradable and nonretrogradable were used to label the overall form of his rhythmic patterns, but beyond that there were no specific features consistent with the rhythms of either group. In spite of this, there were similarities between Messiaen's rhythms and serial tone-rows.

21 This is not true of equal tempered scales. Though each of these scales can be transposed twelve times, and thus all twelve chromatic pitches can be obtained, each transposition represents a separate entity. The C scale can be transposed up a whole step to create the D scale, but this does not mean that the D scale is a structural feature of the C scale. The C and D scales are individual entities.
The terms retrogradable and nonretrogradable are applicable to tone-rows, as well as to Messiaen's rhythms. Most tone-rows are retrogradable. The intervallic arrangement of the pitches in these rows is not the same backwards as it is forwards. However, some rows are nonretrogradable, such as the row from Webern's *Symphony, Opus 21* (Example 8).

Webern's row has the same intervallic relationships between pitches in both the original version and the retrograde. This created row forms that had hexachords in common, and enabled Webern to subtly shift from one row form to another.

Another similarity between Messiaen's rhythms and serial tone-rows came about through his research into Hindu and African music. During his research he had become interested in rhythmic structures that used prime number rhythmic values, such as 1, 3, 5, 7, 11, and 13. By combining these values with the more common duple and triple rhythmic
values Messiaen created rhythms that could span inclusively an entire gamut of rhythmic values (Example 9).

Example 9. Combination of prime, duple, and triple rhythmic values using the sixteenth note as the base unit.

This was similar to the way the twelve chromatic pitches filled in the equal tempered octave. Messiaen could then arrange the values, or a subset of the values, into a specific order, much the same way a serial composer would have arranged the twelve chromatic pitches into a tone-row. He greatly expanded on this idea in the works that followed Technique.

**Compositional Devices**

The principal compositional devices discussed in Technique, which had similar counterparts in serial music, were augmentation and diminution, superposition, canon, and interversion.

**Augmentation and diminution.**—In the music of the common practice period, augmentation and diminution were used chiefly as contrapuntal devices, either doubling or halving the rhythmic values of a melody.
or subject. In addition to using the traditional types of augmentation and diminution by factor of two, Messiaen also used augmentation and diminution by factors of three, four, and five (Example 10).

Augmentation

a) addition of a quarter of the values:

b) addition of a third of the values:

c) addition of the dots:

d) addition of the values to themselves:

e) addition of twice the values:

f) addition of three times the values:

g) addition of four times the values:

Diminution

a) withdrawal of a fifth of the values:

b) withdrawal of a quarter of the values:

c) withdrawal of the dots:

d) withdrawal of half of the values:

e) withdrawal of two-thirds of the values:

f) withdrawal of three-fourths of the values:

g) withdrawal of four-fifths of the values:

Example 10. Messiaen's table of augmentations and diminutions (Technique, p. 3, example 24).
This increase in the number of possible types of augmentation and diminution enabled him to create rhythmic patterns that could have as many as fourteen augmentations and diminutions (Example 11).

<table>
<thead>
<tr>
<th>Augmentation</th>
<th>Dimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>+1/4 / -1/5</td>
</tr>
<tr>
<td>+1/3 / -1/4</td>
<td></td>
</tr>
<tr>
<td>+1/2 / -1/3</td>
<td></td>
</tr>
<tr>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>+2/3</td>
<td></td>
</tr>
<tr>
<td>+3/4</td>
<td></td>
</tr>
<tr>
<td>+4/5</td>
<td></td>
</tr>
</tbody>
</table>

Example 11. Possible augmentations and diminutions for one rhythmic pattern, using Messiaen's table.

Messiaen treated a rhythmic pattern and its augmentations and diminutions as a set, from which he could extract any or all of the rhythms. Using these rhythms, he created larger, more complex rhythmic patterns, in which the rhythm was totally predetermined (Example 12).
Example 12. Complex rhythmic pattern using a basic rhythm and several of its augmentations and diminutions (Technique, p. 5, example 41).

This type of organization was similar to the way serial composers controlled the pitch structure by using a group of specific row forms derived from the matrix.

Superposition.—Messiaen used superposition in reference to both his modes of limited transposition and his retrogradable and non-retrogradable rhythms, but it was the superposition of his rhythms that had a serial counterpart. The superposition of modes involved two or more different modes, not just transpositions of the same mode, whereas the superposition of his rhythms involved different forms of the same rhythm. In Technique, he showed how it was possible to superpose a rhythm on its retrograde, which was similar to using a tone-row and its retrograde simultaneously (Example 13).
Example 13. The superposition of a rhythm on its retrograde (Technique, p. 6, example 43).

In Example 13, the rhythmic pattern repeated in the middle line, B, is the retrograde of the rhythmic pattern repeated in the top line, A.

Messiaen also showed how it was possible to superpose a rhythm on its augmented and diminuted forms (Example 14).

Example 14. The superposition of a rhythm on its augmented and diminuted forms (Technique, p. 5, example 42).
In Example 14, the bottom voice repeats the original rhythm, while the top voice repeats the original rhythm and several of its augmentations and diminutions.

**Canon.**—Messiaen used canon in reference to both his modes and rhythms, but as with superposition, it was the rhythms that had a serial counterpart. In fact, he treated canon as a form of delayed superposition. His rhythmic canons followed the same principles as traditional pitch canons. However, instead of defining the canonic structure by the pitch relationships between two or more contrapuntal lines, he defined it by the rhythmic values in two or more rhythmic patterns. In *Technique*, he shows how a canon can be created between a rhythm and its augmented or diminuted form (Example 15).

![Example 15](image-url)

Example 15. Canon using a rhythm and its augmented form (*Technique*, p. 8, examples 53, 54, and 55).

Messiaen also showed how it was possible to create a canon using a compound rhythm, which was made up of several augmentations and diminutions of a smaller rhythm (Example 16).
Messiaen's canons involving augmented and diminuted rhythms were similar to serial techniques for the same reasons as the superposition of augmented and diminished rhythms.
"Interversion."—"Interversion" was a technique used by Messiaen to reorder the pitches of a melody or line. He did not give a precise definition of the process in *Technique*, but he did give an example of how it was used. In the first step, he took a melody and inverted it (Example 17).

\[
\text{melody} \quad \text{inversion}
\]


From the melody and its inversion, he extracted all the different pitches (Example 18).

\[
\]

Example 18. Pitches extracted from the melody and its inversion (*Technique*, p. 20, example 125).

Using the different pitches as a set, Messiaen then derived variations of that set, slightly changing the order of the pitches each time (Example 19).
nine "interversions":

Example 19. "Interventions" of melody and its inversion
(Technique, p. 20, example 126).

The use of interversion was very similar to the use of unordered pitch invariants. Though he applied interversion only to pitch in Technique, in later works he began to apply it to other musical parameters. In addition, he began to use more systematic forms of interversion, and in these works it began to take on the characteristics of the serial permutation techniques used by Boulez.

The Beginning of Messiaen's Serial Experiments

Technique de mon langage musical represented the sum of all the musical elements and compositional techniques used in Messiaen's works up to that time. Though many of these elements and techniques had serial features or counterparts in serial music, this was due to the similarities between his musical language and the serial language, and not to a conscious effort by him to utilize serial procedures. However, in the works that followed Technique he began to systematize these elements and techniques, and this paved the way for Mode de valeurs. Of the works that he wrote between Technique (1942) and the beginning of the Mode de valeurs period, which began with Cantéyodjaya (1949),
the two that were best representative of his beginning experiments with quasi-serial procedures were Vingt regards sur l'Enfant-Jésus (1944) and Turangalîla-Symphonie (1946-8).
CHAPTER II

TWO WORKS REPRESENTATIVE OF THE PERIOD FOLLOWING TECHNIQUE

Mode de valeurs was not written until five years after Technique was published. Its chief characteristic trait was that all the musical parameters in it were organized into modes. These modes, especially those that organized the pitches and durations, were the result of Messiaen's experiments with techniques he had developed during the intervening years between Technique and Mode de valeurs. These techniques included "durées chromatiques," "agrandissement asymétrique," and "personnages rhythmiques." This and the following chapter will include analyses that I have made of a number of works that exhibit these and other techniques, and will show how Messiaen uses and develops them.

Organizational Techniques Used in Vingt regards sur l'Enfant-Jésus

Olivier Messiaen wrote Vingt regards between March 23 and September 8, 1944. Its chief importance among his works as a whole lies in its exploration of the possibilities of the solo piano. In addition to being a very large and demanding work from a performance standpoint, taking well over two hours to play, it also introduces many new pianistic effects. Among these are the use of large asymmetric chord-clusters, the simultaneous use of extreme treble and bass registers,
the combining of accelerando and rallentando, and the use of what Messiaen calls the "rebounding" technique, which "consists of laying the hand flat in attacking the four fingers with the thumb as pivot; the hand is turned around the thumb and the four fingers are now to the right and now to the left of the thumb."¹ Though *Vingt regards* is known mainly for its pianistic innovations, it is also an important work from a developmental standpoint. It is one of the first post-*Technique* works,² and represents the beginning of Messiaen's experiments with systematic organization.

"Durees Chromatiques"

The most important development in rhythmic organization found in *Vingt regards* is the concept of "durees chromatiques." This term refers to a rhythmic pattern that is made up of an inclusive set of durational values, in either increasing or decreasing order. As was shown in the previous chapter, the basis for all of Messiaen's rhythmic manipulations was in assigning durational values to each member of a particular rhythm, in terms of a base unit.


² Though Messiaen wrote *Technique* in 1942, it was not published until 1944. Both of his 1943 works, *Rondeau* and *Visions de l'Amen*, were included in the list of works at the end of *Technique*, in which he also made extensive use of examples from *Visions*. Therefore, the two 1944 works, *Trois petites Liturgies de la presence divine* and *Vingt regards*, were actually the first post-*Technique* works.
The rhythm

\[
\begin{array}{cccccc}
\cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\
\end{array}
\]

would have the values

4 1 3 6 2 8

using the sixteenth-note as the base unit. Messiaen's rhythms could contain virtually any value because in addition to using duple and triple values such as 2, 4, 8, and 16 and 3, 6, 9, and 12, he also used prime values and other less commonly used values such as 1, 5, 7, 11, and 13 and 10, 14, and 15. In its simplest form, "durées chromatiques" is a series of progressively increasing or decreasing durational values, in terms of a base unit (Example 20).

Example 20. "Durées chromatiques."

The application of this concept enables Messiaen to organize the rhythmic parameter systematically, and is the first step towards the total systemization found in Mode de valeurs.

Chromatic durations in rhythmic cells.--In works prior to Vingt regards there were instances of chromatic duration series, but only within larger rhythmic patterns (Example 21).
Example 21. Chromatic duration series within larger rhythmic patterns (Technique, p. 5, example 43).

The duration values in the top line of Example 21 are

\[4\ 1\ 1\ 1\ 2\ 3\ 2\ 8\]

and the values of the middle line are

\[8\ 2\ 3\ 2\ 1\ 1\ 1\ 4\]

using the sixteenth-note as the base unit. In both instances the short chromatic series, 1 2 3 and 3 2 1, are part of a larger rhythmic pattern and not an independent unit. This use of chromatic series was not part of an effort to organize the rhythmic parameter, but more an example of Messiaen's rhythmic variety, and may have been brought about by his studies of Hindu rhythm.

**Chromatic durations in Hindu rhythms.**—Messiaen was very influenced by the rhythmic properties of Eastern music, and frequently used the table of 120 Sharngadeva deci-tālas from Lavignac's *Encyclopédie de la musique et dictionnaire de la conservatoire* as a source of rhythmic patterns.³ Because Eastern rhythm is based on using a small beat

³Each deci-tāla is followed by the number it is assigned in Lavignac's table.
and multiples of that beat, and not on the Western principle of subdivision of a larger beat, chromatic duration series were not uncommon in small units or as part of larger units. Many of the Sharngadeva deci-tālas contained chromatic series. The tāla "tribhinna" (21)

\[ \text{\textbullet\textbullet\textbullet\textbullet} \]

has the values

\[ 2 \ 3 \ 4 \ 8 \]

using the thirty-second note as the base unit, and the tāla "laksmana" (88)

\[ \text{\textbullet\textbullet\textbullet} \]

has the values

\[ 1 \ 2 \ 3 \]

using the sixteenth-note as the base unit. This type of chromatic series can also be found in Vingt regards.

Applications of chromatic durations.--In the sixth movement of Vingt regards, "Par Lui tout a été fait," there is a chromatic series within a fugal subject (Example 22).

A chromatic series is also used in the first movement, "Regard de Père," as part of an ostinato pattern (Example 23).


In both these examples, the chromatic series are only part of a larger rhythmic pattern. However, "durées chromatiques" form complete rhythmic patterns in themselves.
Applications of "durées chromatiques."--Messiaen uses "durées chromatiques" in several movements of Vingt regards. Each of the series uses the sixteenth-note as the base unit and contains sixteen different durations, values one through sixteen. However, each of the series is structurally different from the others. In addition, they also differ in their relationship to the overall form of the movement and to the pitch parameter.

The last movement, "Regard de l'Eglise d'amour," contains an example of "durées chromatiques" in its simplest form (Example 24).

Example 24. Messiaen, "Regard de l'Eglise d'amour" in Vingt regards, pp. 171-2, mm. 144-60.
Within the fifteen bars the series occupies, the rhythmic parameter is completely predetermined. Though the series forms an independent rhythmic unit, it does not play a key role in the overall form. Messiaen uses the increase in durational values mainly to augment the effect of the crescendo. However, the rhythmic parameter does take precedence over the pitch parameter. Because the harmony is static and has very few chord changes the rhythmic structures stands out.

In the eighteenth movement, "Regard de l'Onction terrible," a series of increasing values and a series of decreasing values are used simultaneously at both the beginning and the end of the movement (Example 25). In the first nineteen bars of the movement, the left hand plays the series with decreasing values while the right hand plays the series with increasing values. In the final nineteen measures of the movement, their roles are reversed. These series play a larger role in the overall form of the movement than did the series in Example 24. They determine the scope of both the beginning and ending sections of the movement and assist in creating a sense of recapitulation. Another important facet of these series is that they draw the relationship of chromatic rhythm to chromatic pitch. The decreasing durational series is accompanied by a rising chromatic line, and the increasing series is accompanied by a descending chromatic line.

In addition to containing examples of "durées chromatiques" that increase or decrease in values, Vingt regards also contains one example of a permutation of a chromatic series (Example 26). In this series, the durations ascend two increments then drop back one and repeat this
Example 26. Messiaen, "Premiere communion de la Vierge" in Vingt regards, pp. 81-2, mm. 54-73.
pattern until all sixteen values have been used. Thus, instead of the usual ascending order of
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
this series has the order
1 3 2 4 3 5 4 6 5 7 6 8 7 9 8 10 9 11
10 12 11 13 12 14 13 15 16
using the sixteenth-note as the base unit. This was one of Messiaen's first uses of systematic permutation. In Technique, he had demonstrated a technique he called "interversion" (see Chapter I), which was essentially a device that permuted pitch structures, but this process was not systematic. The series in Example 26 is also one of the first instances in which Messiaen uses rests and repeated notes as part of the chromatic durations. Stockhausen adopts the use of repeated notes to define the length of durations in Kreuzspiel. The use of permutations and rests points to the more complex rhythmic structure of Turangalila.

"Agrandissement Asymétrique"

The most important development in pitch organization found in Vingt regards is the concept of "agrandissement asymétrique." The basic principle of this technique is to take a set of pitches through a series of repetitions, and with every repetition, each of the pitches is either raised a half-step, lowered a half-step, or left the same (Example 27).

4 Though a measure of rest interrupts the pattern in the next to last measure, the pattern is completed in the following bar.
Example 27. "Agrandissement Asymétrique"

In Example 27, the first pitch is raised each time, the second pitch is lowered each time, and the third pitch is left the same. Messiaen used this technique in several of the movements in Vingt regards. The number of pitches in each of the sets that undergo "agrandissement asymétrique" range from a three-note motive in the third movement to a fifteen-note fugal subject in the sixth movement. The treatment of the pitches, whether raised, lowered, or left the same, also varies. The importance of the use of "agrandissement asymétrique" is that it is a form of systematic organization. Messiaen could take a set of pitches, and through this technique, generate a large amount of musical material in which the pitch parameter is completely predetermined.

In the third movement, "L'echange," Messiaen uses "agrandissement asymétrique" to determine the pitch structure of the entire movement. Five different pitch groups are presented in the first two measures of this movement, and these groups undergo "agrandissement asymétrique" every two measures (Example 28).
In Example 28, groups A and C remain the same through the series of repetitions. However, all the other groups change with each repetition. From one instance of group B to the next, the first and third pitches move chromatically downward. In group D, all the pitches move up chromatically with each repetition except for the seventh and ninth, which move down. The two strands of group E are treated independently. The pitches in the bottom half move up with each repetition, while the pitches in the top half are treated according to the following pattern: down, same, down, up, and up. Because of the chromatic nature of this process, it begins to repeat the same pitches after twelve repetitions. Therefore, Messiaen ends the procedure in the twenty-fourth measure. The remaining seven bars form a coda based on group B, which utilizes the original pitches of that group: E, E♭ (D#), and F. Thus, the pitch structure and form of the movement are both organized by the systematic development of the first two measures.

Pitch Permutation

One other important pitch development in *Vingt regards* is found in the final movement, "Regard de l'Eglise d'amour." It manifests an example of pitch permutation, using a pitch set that contains all twelve chromatic pitches (Example 29). The technique used in Example 29 is similar to "interversion" except that in this instance all the chromatic pitches are used, as in serial music. The permutations are not systematic, but they do retain the character of the original set (Example 30). This permutation of sets containing all twelve chromatic pitches paves the way for procedures that will later be developed in *Mode de valeurs.*
Example 29. Messiaen, "Regard de l'Eglise d'amour" in Vingt regards, pp. 158-9, mm. 9-12.
Example 30. Permutations of the pitch set in Example 29.

Organizational Techniques Used in Turangalîla-symphonie

Messiaen began writing Turangalîla on July 17, 1946 and finished it on November 29, 1948, over four years after Vingt regards. Turangalîla represents the sum of all of his rhythmic explorations to that date. It calls for the largest orchestra of any of his works up to that time, including triple woodwinds, thirteen brass, sixty-eight strings, four keyboard instruments, and a battery of fourteen percussion instruments played by five performers. This enables Messiaen to utilize many layers of simultaneous musical activity, and to create immensely complex rhythmic passages, in which as many as a dozen separate rhythmic patterns can be going on at once. However, despite its large proportions, the work maintains a structural unity. Part of this is due to the use of non-pitched percussion instruments to make up the bulk of all the complex rhythmic passages. These instruments include the following:

triangle
wood block
temple blocks (three)
petite cymbals turque (small Turkish cymbal)
cymbales (one suspended and two struck)
cymbale chinoise (Chinese cymbal)
tam-tam
tambour de basque (Basque drum)
maracas
tambourin provençal (Provençal tambourine)
caisse claire (snare drum)
grosse caisse (bass drum)

They enable Messiaen to create complex rhythmic passages without interfering with the harmonic structure. Another reason for the structural unity of the piece is the systematic organization of the rhythm. "Durées chromatiques," which were first used in Vingt regards, are used throughout Turangalîla. Because of this and the development of other rhythmic and pitch organizational techniques, Turangalîla points ahead to the total organization found in Mode de valeurs.

"Durées Chromatiques"

There are a myriad of examples of chromatic duration series in Turangalîla, but the series are not used in the same manner as in Vingt regards (see Example 26) and no longer use simple textures consisting of only one chromatic series, but rather multi-part textures in which series are accompanied by permutations of themselves. In addition, he no longer restricts himself to using sixteen-member series (Example 31).

Example 31. Messiaen, "Turangalîla 1" in Turangalîla, pp. 96-8, mm. 42-52, cello.
In Example 31, the cello plays the durational pattern

```
11 7 10 6 9 5 8 4 7 3 6 2 5 1
```

using the sixteenth-note as the base unit. This series contains only eleven durational values and uses the following permutation pattern: down four values, up three values. He also uses permutational patterns that involved more than one or two notes (Example 32).

Example 32. Messiaen, "Développement de l'amour" in Turangalîla, pp. 335-8, mm. 300-15, bells.

In Example 32, the bells have the durational pattern

```
5 7 10 7 5 4 6 9 6 4 3 5 8 5 3
```

```
2 4 7 4 2 1 3 6 3 1
```

using the sixteenth-note as the base unit. In this case, the permutation involves three durational values together with their retrograde.

"Personnages Rhythmiques"

Another important development in rhythmic organization found in Turangalîla is the concept of "personnages rhythmiques." This is a technique that takes a set of three contiguous rhythms through a series of repetitions, and with each repetition augments one note value, diminishes one, and leaves the other the same (Example 33).
Example 33. "Personnages Rhythmiques."

This technique is the rhythmic equivalent of "agrandissement asymétrique," but instead of using chromatic raising or lowering of pitches, it uses chromatic augmenting or diminishing of durational values (Example 34). In Example 34, the wood block maintains the same rhythm, 2 1 1 1 2, throughout the entire section. The maracas begin with the rhythm 8 8 and diminish to 1 1, while the bass drum begins with the rhythm 1 1 and augments to 8 8. When the first cycle is completed after eight repetitions, the maracas and the bass drum switch patterns. The maracas augment from 1 1 to 8 8, and the bass drum diminishes from 8 8 to 1 1. After the second cycle is completed the maracas and the bass drum switch patterns again. This procedure continues until measure 108. However, the cycles are not always exact. In the tenth cycle the maracas and the bass drum jump two values instead of one. The maracas increase from 3 3 to 5 5, and the bass drum goes down from 7 7 to 5 5. Messiaen's organizational techniques are not always absolutely exact but are sometimes interrupted to permit cadences. This consideration of the musical element before the organizational element carries over into Mode de valeurs.
Example 34. Messiaen, "Turangalîla I" in Turangalîla, pp. 99-102, mm. 55-71, wood block, maracas, and bass drum.
Series Fragmentation

Another rhythmic feature of Turangalîla is the breaking up of a chromatic duration series into fragments, and the distribution of the fragments among the instruments (Example 35).

Example 35. Messiaen, "Turangalîla 2" in Turangalîla, pp. 266-7, mm. 21-36, percussion battery.

In Example 35, a sixteen-member durational series is divided into three fragments: 4 3 13 15, 5 6 9 11 10, and 12 14 1 2 7 8 16. These fragments and their retrogrades are distributed among the six non-pitched percussion instruments (Example 36).
Example 36. Distribution of duration series fragments in Example 35.

The division and distribution of the series among all the instruments enables Messiaen to create a complex rhythmic passage that contains several layers of different but inter-related rhythmic patterns.

Another important rhythmic organization device in Turangalîla is Messiaen's use of prolongation of rhythmic patterns. In the ninth movement, "Turangalîla 3," he uses a seventeen-member durational series, which is divided among five non-pitched percussion instruments (Example 37). The series in Example 37 is also divided into three fragments: 4 5 7 3 2 1 6 17 14, 8 9 10 16 12 15, and 11 13 11 13 11 13. These fragments and their retrogrades are distributed among the five instruments (Example 38). Because of the asymmetric division of the series and the use of rests, not all the endings of the patterns coincide. Nevertheless, once each pattern has been completed, Messiaen immediately repeats it. However, with each repetition he places an additional durational value in front of each member in the patterns (Example 39).
Example 37. Messiaen, "Turangalîla 3" in *Turangalîla*, pp. 342-4, mm. 21-37, percussion battery.
Wood block: \(4, 5, 7, 3, 2, 1, 6, 17, 14, 8, 9, 10, 16, 12, 15\)

Susp. cymbals: \((7), 11, 13, 13, 11, 13, 13/(11), 14\)

Maracas: \((1), 15, 12, 16, 10, 9, 8/(1), 15\)

Prov. tamb.: \((11), 14, 17, 6, 1, 2, 3, 7, 5\)

Tam-tam: \((3, 2, 1, 6, 17, 14)\)

Example 38. Distribution of duration series fragments in Example 37.

Example 39. Prolongation of durational series in Example 37, woodblock.

---

5The numbers in parentheses represent the durational values of rests. These are not related to the actual series, but they do remain consistent throughout the entire procedure.
In Example 39, Messiaen places a note with a durational value of one in front of each member of the original pattern. He does this with each pattern. This procedure lengthens the original pattern by four and a half quarter-note beats, but maintains the tightly knit structure because the procedure is systematic. In the next repetition, he places two notes in front of each member, each having a durational value of one. In the third repetition, he places a trill that has a durational value of five sixteenth-note beats in front of each member. After this repetition, he uses the trill to fill out the remainder of the movement. The wood block has 100 sixteenth-note beats of trill, the suspended cymbal has twenty, the maracas have seventy-two, the Provengal tambourine has nineteen, and the tam-tam has 100. The entire passage lasts ninety-two measures. Yet, the rhythm is completely predetermined throughout the entire passage due to the systematic prolongation of the initial rhythmic pattern in each part.

The Use of Rests in Durational Series

One other important rhythmic development in Turangalîla is the incorporation of rest values into the durational series (Example 40).

**Temple block:** 1 1 1 (16) 1 1 1 (15) 1 1 1 (14) 1 1 1 (13) 1 1 1 (12) 1 1 1 (11) 1 1 1 (10) 1 1 1 (9) 1 1 1 (8) 1 1 1 (7) 1 1 1 (6) 1 1 1 (5) 1 1 1 (4) 1 1 1 (3) 1 1 1 (2) 1 1 1 (1) 1 1 1 (0)

**Petite cymbal:** 7 1 (9) 6 1 (10) 5 1 (11) 4 1 (12) 3 1 (13) 2 1 (14) 1 1 (15) 0 1 (16)

**Tam-tam:** (8) 9 (7) 10 (6) 11 (5) 12 (4) 13 (3) 14 (2) 15 (1) 16

Example 40. Duration series, "Turangalîla 2" in Turangalîla, pp. 272-6, mm. 56-72, temple block, petite cymbal, and tam-tam.
In Example 40, the temple block pattern is an example of a prolonged series in which the rests are used as chromatic durational values. The petite cymbal is an example of "personnages rhythmiques" that uses a rest as one of its three elements. The tam-tam pattern is a common type of permutation, but it uses rests to represent half the durational values. Though Messiaen does not use rests as part of the rhythmic organization in *Mode de valeurs*, they do play an important role in the other works of that period and are very influential to Boulez and Stockhausen, who incorporate rests into their rhythmic organization.

**Chromatic Pitch Series**

There are no significant pitch developments in *Turangalîla* that have to do with systematic organization. However, there is an important reworking of a procedure developed in *Vingt regards*. In *Vingt regards*, there were several instances in which Messiaen combined "durées chromatiques" with a chromatic pitch line (see Example 25). However, the pitches were always used in scalar order, either ascending or descending, depending on the order of the durational values. Messiaen also combines these two parameters in *Turangalîla*, but in this instance the order of the pitches is not dependent on the order of the durations (Example 41). In Example 41, the durational values are in the descending order 6 5 4 3 2 2 2 1 1 1 1, but the pitches are arranged to form a unique mode that is made up of both ascending and descending intervals. This development leads directly to *Mode de valeurs*, which uses three such modes.
Example 41. Messiaen, "Introduction" in Turangalîla, p. 11, mm. 44-8, strings.

The Period Following Turangalîla

After Turangalîla, Messiaen wrote Cinq rechants, which he finished in December of that year.⁶ Cinq rechants is closely linked to Turangalîla in terms of both its musical and extra-musical ideas, and along with Harawi (1945) forms what Messiaen called his "three 'Tristans'."⁷ However, in 1949 he begins to depart from his style of the mid-forties and starts working towards a system of total organization. Though both Vingt regards and Turangalîla had utilized many systematic methods of organization, these methods were treated as just one facet of his entire musical language. The works from 1949 through 1951 represent Messiaen's

⁶Though Cinq rechants was finished in 1948, it was not published until 1949, and is usually labeled as such.

⁷Samuel, Conversations with Olivier Messiaen, pp. 8-9.
first attempts to work out organizational methods on a large scale. Written during the summer of 1949, *Mode de valeurs* represents the apex of this period, in the sense that it is the first piece that had all the musical elements systematically organized. However, there are other works of that period that are also important in the development of Messiaen's new style. *Cantéyodjaya*, written a few months prior to *Mode de valeurs*, is the link between his style of the mid-forties and the style of his "experimental period." It also contains the first instance of large scale systematic organization. *Île de Feu II* (1950) and *Livre d'orgue* (1951) are the best representatives of the works that followed *Mode de valeurs*. In these works he takes the principles of total organization and combines them with some of his other organizational principles to create new forms. These works and their relationship to *Mode de valeurs* will be discussed in the next chapter.

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CHAPTER III

THE *MODE DE VALEURS* PERIOD

The Use of Total Systematic Organization in *Cantéyodjayâ*

Written in early 1949, *Cantéyodjayâ* is similar in many respects to *Vingt regards* and *Turangalîla*, in that it uses systematic procedures such as "durées chromatiques" and "interversion," but it also represents a departure for Messiaen in terms of organizational style. It is in *Cantéyodjayâ* that he first experiments with total systematic organization. There had been examples of systematic organization in works prior to *Cantéyodjayâ*. It was shown in the previous chapter that *Vingt regards* made extensive use of "durées chromatiques" and "agrandissement asymétrique" to systematize rhythm and pitch, and that *Turangalîla* used many types of permutation techniques, including "personnages rythmiques," to organize its complex rhythmic structures. However, it is in *Cantéyodjayâ* that Messiaen first works out the principles of total systematic organization, and though this method of organization is only present in a small section of *Cantéyodjayâ*, it is this passage that is the precursor of the techniques used in *Mode de valeurs*.

Messiaen's new style of organization has many features that set it apart from any system of organization used in his previous works. *Cantéyodjayâ* is the first instance of a piece in which he uses patterns of systematically organized musical elements that he actually identifies as modes. The passage beginning at measure 64 and ending at measure 101...
is labeled "mode de durées, de hauteurs et d'intensités." This is also the first instance in which Messiaen uses a form of systematized dynamics, "mode d'intensités." The only type of mode that is not present in Cantéyodjaya is an articulation mode, "mode d'attaque." This mode, however, is used in Mode de valeurs. In the latter work, Messiaen prefaces the music with a page that identifies the mode he uses, but in Cantéyodjaya the modes are not identified in this way. However, there are several structural similarities between the two works. Therefore, by comparing the two works the modes used in Cantéyodjaya can be identified.

One feature that Mode de valeurs and the passage in Cantéyodjaya have in common is that they both use a three staff structure. In Mode de valeurs, each staff has its own rhythm and pitch mode. Each rhythm mode has the same ordered set of durations, one through twelve, but uses a different base unit. The top staff uses the thirty-second-note as its base unit, while the middle staff uses the sixteenth-note. The bottom staff uses an eighth-note base unit. The pitch modes can be derived from the rhythm modes because each pitch has its own fixed duration. This procedure also holds true for the passage in Cantéyodjaya, except that the rhythm and pitch modes have eight values instead of twelve (Example 42). Though each pitch in Mode de valeurs also has a fixed intensity, there is only one dynamics mode. It is derived by ordering all the dynamic markings used in the piece from softest to loudest. The dynamic mode for Cantéyodjaya can be derived the same way (Example 43). In addition to having fixed durations and fixed dynamics, the pitch modes in both Cantéyodjaya and Mode de valeurs also have fixed registers.
Top staff
"mode de hauteurs": D C# Bb G# A Eb F# C
(pitch mode)
"mode de durées": 1 2 3 4 5 6 7 8
(duration mode)
base unit
\[\text{Middle staff}\]
"mode de hauteurs": F E B Bb Ab D A Eb
(pitch mode)
"mode de durées": 1 2 3 4 5 6 7 8
(duration mode)
base unit
\[\text{Bottom staff}\]
"mode de hauteurs": Bb E F# G# C# Eb G C
(pitch mode)
"mode de durées": 1 2 3 4 5 6 7 8
(duration mode)
base unit

Example 42. Pitch and rhythm modes used in Cantéyodjâ, pp. 8-10, mm. 64-101.¹

¹A pitch is considered to be natural unless it is followed by a sharp or a flat.
Example 43. Dynamics mode used in *Cantéyodjaya*, pp. 8-10, mm. 64-101.

However, the registers are not organized into modes. The following example shows the three pitch modes for the passages in *Cantéyodjaya*, combined with their fixed parameters (Example 44).

![Example 44: Pitch modes combined with fixed parameters in *Cantéyodjaya*, pp. 8-10, mm. 64-101.](image)

Not only do *Cantéyodjaya* and *Mode de valeurs* have similarities in their overall structure, but they also have similarities in their actual use of the modes. For the most part, the ordering of pitches in both works is based on permuted fragments of the original modes, combined with a few statements of the modes in their entirety. However,
in some cases the ordering of the pitches is determined by other means. Richard Toop points out that in Mode de valeurs serial considerations such as the avoidance of octave doublings, pitch repetition, and harmonic function sometimes outweigh the use of exact permutation.\(^2\) This can also be seen to some degree in Cantéyodjayâ (Example 45).

Example 45. Messiaen, Cantéyodjayâ, p. 8, mm. 64-67.

In Example 45, Messiaen begins the top staff with a complete statement of the original mode. However, in the middle staff he inserts a durational value of six at the beginning, and then proceeds with a complete statement of the mode. If he had begun the complete statement of the mode at the same point where he used the durational value six, he would have created a strongly harmonic F major six-four chord between the three voices.

The similarities between the passage in *Cantéyodjaya* and *Mode de valeurs* show the development of Messiaen's total systematic organization. In the works prior to *Cantéyodjaya* he had used "durées chromatiques" coupled with a chromatic pitch line. He further develops this concept in *Cantéyodjaya* and creates a "mode de durées" and a "mode de hauteurs." In addition, he adds a systematized form of dynamics, a "mode d'intensités." In *Mode de valeurs*, he adds a fourth mode, a "mode d'attaque," and expands the pitch and rhythm modes from eight members to twelve. However, *Mode de valeurs* represents more than just an enlarged version of the passage in *Cantéyodjaya*. This will be discussed in the analysis of *Mode de valeurs*.

The Use of Other Organizational Methods in *Cantéyodjaya*

There are two other organizational methods used in *Cantéyodjaya* that have a great effect on the development of Messiaen's organizational style. They are "interversion" and "durées chromatiques." Messiaen had used these techniques before, but in *Cantéyodjaya* he carries them out on a larger scale. Though the use of these methods does not have a direct effect on the creation of *Mode de valeurs*, as does the passage from bars 64 to 101, they do effect the development and utilization of organizational methods in *Ile de Feu II* and *Livre d'orgue*.

"Interversion"

As was discussed in Chapter I, "interversion" was a technique that Messiaen employed to reorder a given set of pitches. This process could be carried out an indefinite number of times, depending on the number of pitches in the set. Though he had used many
permutational techniques in Vingt regards and Turangalîla that resembled "interversion," he never identified them with that term. However, in Cantéyodjaya he begins to use this term again (Example 46).

Example 46. Messiaen, Cantéyodjaya, pp. 19-20, mm. 244-58.
In Example 46, "interversion" is used in the same manner as it was in *Technique*, except that it is also applied to the rhythm. In the left hand it is applied to repeated notes, and in the right hand it is used with held notes. The original group, which contains the pitches

\[
D \quad E \quad D\# \quad A
\]

and the durations

\[
2 \quad 3 \quad 4 \quad 8
\]

undergoes a series of five "interversions." The last group is essentially the same as the first, with the final duration slightly altered to coincide with the bar lines. The use of "interversion" on both the pitch and rhythm elements is part of Messiaen's move towards systematization of all the musical parameters. In addition, because the left hand always plays *mezzo forte/staccato*, and the right hand always plays *fortissimo/marcato*, both the dynamics and articulation are systematized. Messiaen does not use "interversion" in *Mode de valeurs*, but it does play a prominent role in *Ile de Feu II* and *Livre d'orgue*.

"Durées Chromatiques"

In works prior to *Cantéyodjaya*, the largest chromatic durational series Messiaen used contained sixteen values. In *Cantéyodjaya*, he uses a "durées chromatiques" that contains twenty-three values (Example 47). The use of larger "durées chromatiques" enables Messiaen to exert complete rhythmic control over a greater period of time. Even though Example 47 uses a thirty-second note as its base unit and thus only exerts rhythmic control over twenty-four measures, it has the potential to encompass an even greater number of measures. Messiaen exploits this potential in *Livre d'orgue*. 
Example 47. Messiaen, *Cantéyodjaya*, pp. 13-14, mm. 140-63.

The Use of Total Systematic Organization in
Mode de valeurs et d'intensités

Written at Darmstadt during the summer composition courses of 1949, Mode de valeurs is the second of Messiaen's *Quatre études de rythme*.

This work consists of *Neumes rhythmiques* (1949), *Mode de valeurs* (1949), *Île de Feu I* (1950), and *Île de Feu II* (1950), and is labeled *Quatre études de rythme* because each etude is concerned with some form
of rhythmic experimentation. In *Mode de valeurs*, the rhythmic experimentation is only part of a larger concept, which is to take the principle of total systematic organization, used briefly in *Cantéyodjayâ*, and extend it over an entire work. As in *Cantéyodjayâ*, Messiaen achieves this organization by systematizing all the musical elements into modes. He identifies each of the modes and explains how they interact in the introduction to *Mode de valeurs* (Example 48). The general structure of *Mode de valeurs* is very similar to the passage described in the analysis of *Cantéyodjayâ*. However, because its systematization covers the entire work, it contains several important organizational features that were not found in *Cantéyodjayâ*.

In the passage from *Cantéyodjayâ*, the order of the pitches was determined by a combination of complete statements of the original mode and mode fragments. There were three complete statements of the pitch mode and many examples of three-note or four-note fragments. This is true for *Mode de valeurs* as well, but on a much larger scale. *Mode de valeurs* contains eight complete statements of the original pitch modes and many examples of mode fragments ranging from three to eight notes. *Mode de valeurs* also uses two-note fragments. However, these groups function more as individual motives than as parts of larger structures. The use of motives gives *Mode de valeurs* a sense of overall structural unity. This type of structure was not necessary in *Cantéyodjayâ* because the passage was only a small part of the work as a whole. However, in *Mode de valeurs* it is necessary in order to stretch out the principle of total organization over 115 measures without losing the sense of the unity of the work as a whole.
Dynamics mode,
("mode d'intensités")

\[
\begin{array}{cccccccc}
ppp & pp & p & mf & f & ff & fff \\
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\end{array}
\]

Articulation mode
("mode d'attaque")

\[
\begin{array}{cccccccc}
> & > & > & > & > & sf & sf \\
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\end{array}
\]

Duration modes
("mode de valeurs")

I: durées chromatiques de \( \frac{1}{12} \) à \( \frac{12}{12} \) \( (\frac{1}{12}, \text{etc.}) \)

II: durées chromatiques de \( \frac{1}{12} \) à \( \frac{12}{12} \) \( (\frac{1}{12}, \text{etc.}) \)

III: durées chromatiques de \( \frac{1}{12} \) à \( \frac{12}{12} \) \( (\frac{1}{12}, \text{etc.}) \)

Pitch modes (with fixed parameters)
("mode de hauteurs")

The most common motive used in *Mode de valeurs* consists of the first three notes of the pitch mode for the top staff (see Example 48). This motive is used a total of twelve times in the work, including four times in the first thirteen bars (Example 49).

In addition to unifying the work, this recurring motive also gives the work a sense of development.

The interval between the second and third pitches of the pitch mode for the top staff is a perfect fourth. As the work progresses Messiaen expands this interval. In measure eleven it becomes a tritone, and in measure forty-one a minor seventeenth, two octaves plus a minor third (Examples 49 and 50).

![Example 50. Messiaen, Mode de valeurs, p. 5, mm. 28-30.](image)

This process also works in reverse. The last five appearances of the motive are followed by a minor seventeenth, a tritone, a tritone, a perfect fourth, and a perfect fourth, respectively. The use of the minor seventeenth is also important because it functions as an acceleration of the original row. The use of the first, second, and twelfth pitches of the row functions as a shortened version of the original row.

One other important organizational feature that is found in Mode de valeurs but not in Cantéyodjaya is the use of divisions. Messiaen uses the last note of the pitch mode for the lower staff to section the work into three parts. The two-note motive from the mode of the top
staff stands out because it occurs frequently and because the notes are the shortest and softest pitches in the piece. The converse is true of the last note of the mode from the lower staff. It is the longest and loudest pitch in the work and occurs only three times. These three occurrences, at bars 23, 78, and 111, divide Mode de valeurs' 115 measures into three parts. These divisions are further emphasized because the interval that precedes the lowest pitch is always very large. Two of the three times it is preceded by the first pitch of the mode, which creates an interval of a major thirtieth, four octaves and a major second (Example 51).

![Example 51. Messiaen, Mode de valeurs, p. 11, mm. 111-115.](image)

The use of the first and last pitch of the mode, separated by a large interval, also gives the sense of row acceleration, as with the motive from the pitch mode of the top staff.

The Use of Total Systematic Organization in Île de Feu II

Written the year following Mode de valeurs, Île de Feu II is the last member of the Quatre études de rythme. In addition to experimenting with rhythmic patterns used on the island of Fiji, it also experiments
with organized rhythm in the form of a systematized mode, in which not only the duration are fixed but also the pitches, dynamics, articulation, and registers (Example 52).

Example 52. Mode from *Ile de Feu II*.

However, Messiaen did not use this mode to create a totally organized work like *Mode de valeurs*. Instead, he applies a series of systematic "interversions" to the mode and uses these "interversions" to determine the form of the piece. The use of whole or fragmented modes and the use of short motives gave *Mode de valeurs* a sense of overall unity. However, the formal structure of the work was not determined by the modes. In *Ile de Feu II*, the entire work is not totally organized, but the form of the work is determined by sections of music that are totally organized through the use of systematic "interversions."

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3This mode is also used in the treble clef. In this case, the registers are also fixed, but one octave higher than in the bass clef.
The "interversions" used in Ile de Feu II are systematic in that they are determined by a rigid process, and not merely by reordering the pitches. In addition, each "interversion" is derived from the previous one and not from the original. Therefore, the sequence of "interversions" is also systematic. Each "interversion" reorders the preceding series by starting with the middle values and working out towards both end values. The order in which the values are used is the following: seventh, sixth, eighth, fifth, ninth, fourth, tenth, third, eleventh, second, twelfth, and first. The first "interversion" is derived from the original mode. The second "interversion" is derived in the same manner from the first, and the third from the second, and so on. The tenth "interversion" completes the cycle because it is the same as the original mode (Example 53).

Messiaen's use of a series of systematic "interversions" in which each one is derived from the previous one, is important not only because it is used to determine the form of Ile de Feu II, but also because it influences later works. In the works of the early 1960's, beginning with Chronochromie (1960), Messiaen began experimenting with this type of "interversion" on a much larger scale, including modes that contained thirty-two different members.
**Original mode**

<table>
<thead>
<tr>
<th>Order numbers</th>
<th>Duration values</th>
<th>&quot;interversions&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
<td>12 11 10 9 8 7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

| I | 6 7 5 8 4 9 3 10 2 11 1 12 |
| II | 3 9 10 4 2 8 11 5 1 7 12 6 |
| III | 11 8 5 2 1 4 7 10 12 9 6 3 |
| IV | 7 4 10 1 12 2 9 5 6 8 3 11 |
| V | 9 2 5 12 6 1 8 10 3 4 11 7 |
| VI | 8 1 10 6 3 12 4 5 11 2 7 9 |
| VII | 4 12 5 3 11 6 2 10 7 1 9 8 |
| VIII | 2 6 10 11 7 3 1 5 9 12 8 4 |
| IX | 1 3 5 7 9 11 12 10 8 6 4 2 |
| X | 12 11 10 9 8 7 6 5 4 3 2 1 |

Example 53. The "interversion" process used in *Ile de Feu II*.  

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Systematic Organizational Methods
Used in Livre d'orgue

Written in 1951, Livre d'orgue is the last work of Messiaen's Mode de valeurs period, and is the last of his large organ works until Méditations sur le mystère de la Sainte Trinité (1969). Each of the seven movements in Livre d'orgue makes extensive use of twelve-note pitch modes. The sixth movement, "Les yeux dans les roues," makes use of thirteen different twelve-note pitch modes. Each hand in the manual parts plays a repeating set of six different modes (Example 54).

Example 54. Messiaen, "Les yeux dans les roues" in Livre d'orgue, p. 27, mm. 1-10.

The modes are not directly related through systematic permutation, but they do have some similar features. In both sets, the last note of the fourth mode is the same as the first note of the fifth mode. This enables Messiaen to use overlapping, a technique often used by Webern.
in which one pitch functions as both the beginning and the end of two different pitch series. The pedal part contains the thirteenth mode (Example 55).

However, this mode is also accompanied by a series of twelve durational values. In addition, whereas the six modes in each of the manual parts undergo nearly exact repetitions, the mode in the pedal part goes through a series of systematic permutations. These permutations are not linked together like the "interversions" in Ile de Feu II, but they do form a symmetric pattern, which after five permutations yield the retrograde of the original mode (Example 56). This pattern takes up the entire movement and thus determines its form.

The form of the other movements is also determined by systematic methods. In the first movement, "Reprises par interversion," Messiaen uses three of the Sharhadeva decitalas to make up the rhythmic content of the movement (Example 57).
Example 56. Permutations of the pedal mode from "Les yeux dans les roues" in Livre d'orgue.

"pratâpacekhara" (75)  "gajajhampa" (??)

Example 57. Three decimalas used in "Reprises par interversion" in Livre d'orgue.

Example 57 shows the rhythms in their original forms. However, Messiaen applies "personnages rhythmiques" to the three-rhythm set thus systematically changing two of the rhythms, "pratâpacekhara" and "gajajhampa." Permutation is also applied to the three rhythms as whole units.

Mathematically there are six different orderings of three elements. Messiaen uses these six different orderings to determine the form of the first nineteen measures (Example 58). The rhythms are also used to determine pitch, dynamics, articulation, and timbre. A different twelve-note series is assigned to each of the six permutations. This works
| mm. 1-3 | "(prat)âpacekhara" | "(gaj)ajhampa" | "(sâr)asa" |
| mm. 4-6 | prat | sâr | gaj |
| mm. 7-9 | gaj | sâr | prat |
| mm. 10-12 | gaj | prat | sâr |
| mm. 13-15 | sâr | gaj | prat |
| mm. 16-18 | sâr | prat | gaj |
| m. 19 | three quarter-note rests |

Example 58. Ordering of the decî-tālas in "Reprises par interversion" in Livre d'orgue, mm. 1-19.

Out even though there are thirteen durational values in the three-rhythm set, because the repeated duration in "gajajhampa" also repeats the pitch. Dynamics, articulation, and timbre are determined by assigning each rhythm a specific set of these parameters. For example, "pratâpacekhara" is always played mezzo forte with the accent pattern strong-weak-strong, regardless of pitch. In addition, it is always played recit (swelling). The following example shows how all these elements interact to form the first nineteen bars of the movement (Example 59).

The second section of the movement is a permutation of the first section (Example 60). However, in this section the form is determined by the pitches. In Example 61, the pitches are derived by alternating very selectively the pitches from the beginning and the end of Example 59 and working toward the middle. All the parameters that are associated with each pitch in the first section such as duration, dynamics, accents, and timbre are present in this section. The third
Example 59. Messiaen, "Reprises par interversion" in Livre d'orgue, pp. 1-2, mm. 1-19.
section is an exact retrograde of the second section, and the fourth section is an exact retrograde of the first section.

One other use of large scale systemization to determine form is found in the last movement, "Soixante-quatre durees." In this movement, Messiaen uses a chromatic duration series that consists of sixty-four values and spans the entire movement. This series is played systematically
in groups of four durational values beginning at the ends and working towards the middle (Example 61). This series is also played in the pedal part but in retrograde order.

\[
\begin{align*}
61 & \quad 62 & \quad 63 & \quad 64/4 & \quad 3 & \quad 2 & \quad 1/57 & \quad 58 & \quad 59 & \quad 60/8 & \quad 7 & \quad 6 & \quad 5/53 & \quad 54 & \quad 55 & \quad 56/12 & \quad 11 & \quad 10 & \quad 9/49 & \quad 50 & \quad 51 & \quad 52/16 & \quad 15 & \quad 14 & \quad 13/45 & \quad 46 & \quad 47 & \quad 48/20 & \quad 19 & \quad 18 & \quad 17/41 & \quad 42 & \quad 43 & \quad 44/24 & \quad 23 & \quad 22 & \quad 21/37 & \quad 38 & \quad 39 & \quad 40/28 & \quad 27 & \quad 26 & \quad 25/33 & \quad 34 & \quad 35 & \quad 36/32 & \quad 31 & \quad 30 & \quad 29
\end{align*}
\]


The Period Following Livre d'orgue

Livre d'orgue is the bridge work between Messiaen's style of the Mode de valeurs period and his style of the middle to late fifties. It is his last work to explore systematic organization and quasi-serial procedures until Chronochromie (1960). It is also one of the first works that began to use birdsong again. Messiaen first started using birdsong again in Le Merle noir, a small work for flute and piano written in early 1951. This reemergence of birdsong leads to works such as Reveil des oiseaux (1953), Oiseaux exotiques (1956), and Catalogue d'oiseaux (1956-8), in which Messiaen deals almost exclusively with birdsong as the main source of musical material.

Though Messiaen moves away from systematic organization after Livre d'orgue, the effect of his experimental works on other composers was just becoming evident.\(^5\) Boulez's Structures Ia and Stockhausen's

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\(^5\) Messiaen did write a work between Livre d'orgue and Reveil des oiseaux, Timbres-durées (1952) was his only electronic piece. However, he considered it to be unsuccessful, and it was never published.
Kreuzspiel were both written during the same year as Livre d'orgue. Though both works are very different in terms of overall style and structure, they both use the systematic principles found in Mode de valeurs as the basis for their organization. In the following chapter, Structures Ia and Kreuzspiel will be analyzed, and the extent of the influence of Mode de valeurs will be demonstrated.

6 It should be emphasized again that the Goeyvaerts work and the Fano work were also influential on Boulez and Stockhausen.
CHAPTER IV

THE INFLUENCE OF MODE DE VALEURS
ON BOULEZ AND STOCKHAUSEN

Boulez' Adoption of Messiaen's Organizational Principles

As was mentioned in Chapter I, Messiaen's influence on Boulez began several years before Mode de valeurs. The newly devised piano techniques in Vingt regards and the complex rhythmic structures in Turangalîla were very influential on Boulez' early works, most notably his Second Piano Sonata (1947-8). However, Boulez later remarked, in reference to those works, that "Messiaen's system ... had not yet been worked out as completely as it was a few years later .... There was not yet the rigorous control that he was to put into later constructions."¹ Though this rigorous control became first evident in Cantéyodjaya, it was not until after Boulez heard Mode de valeurs that he wrote Structures Ia.

Structures Ia, for two pianos, was the first of three pieces that together made up a larger work, which Boulez entitled Structures. The remaining two pieces, Structures Ib and Structures Ic, were written the following year. Boulez' goal in Structures Ia was "to use the potential of a given material to find out how far automatism in musical relationships

would go."² The material he uses in this instance is a series derived from the pitch mode for the top staff in Mode de valeurs (Example 62).

Example 62. Pitch mode for top staff of Mode de valeurs.

However, Boulez' use of the mode differs from Messiaen's.

Though the mode contained all twelve chromatic pitches, Messiaen did not treat it as a serial tone-row. He organized the pitch structure on the top staff in Mode de valeurs through the use of complete statements and fragments of the mode and did not exploit any of its possible transpositions or inversions. Boulez, on the other hand, does treat the mode as a tone-row, and he organizes the entire pitch structure of Structures Ia through the systematic use of all forty-eight possible row forms (Example 63).

Structures Ia begins with Piano I playing the row in its original form, P₀, while Piano II plays its inversion, I₀ (Example 64). After these initial statements, Piano I plays all the transpositions of the row while Piano II plays the remaining inversions. During this procedure, however, more than one row form can be played at a time in either piano. The order in which Piano I plays the transpositions is

²Ibid., p. 55.
Example 63. Matrix of pitch row forms for Structures Ia.³

determined by the order of the pitches in I₀. After P₀ is played, it is followed by P₁, P₆, P₇, P₈, P₉, P₁₁, P₂, P₃, P₅, P₁₀, and P₄.
Conversely, the order in which the inversions are played in Piano II is determined by the order of the pitches in P₀. Piano II begins with I₀ and ends with I₈. After all the transpositions and inversions have

³The following standard notation will be used: P=transpositions of the row, including the original, R=retrogrades of the row, I= inversions, and RI=retrograde inversions.
Example 64. Boulez, Structures Ia, p. 1, mm. 1-7.

been played, Piano I switches to the retrograde inversions while Piano II switches to the retrogrades. However, the order in which these forms are played follows a pattern different from the transpositions and inversions. This will be covered in the discussion of the duration series.
In addition to using the pitch mode from the top staff in Mode de valeurs, Boulez also uses the duration mode for that staff (Example 65).

![Example 65. Duration mode for top staff of Mode de valeurs.]

However, Boulez also treats this mode in a serial manner. Each pitch of the original series is assigned a durational value according to the numerical equivalent of its position in the series. Since E♭ is the first member of the series, it has a durational value of one, while B, which is the twelfth member of the series, has a durational value of twelve. The durational value assigned to each pitch remains fixed throughout the entire work. Therefore, a durational matrix can be derived for the duration series (Example 66).

```
1  2  3  4  5  6  7  8  9  10 11 12
7  1 10  3  4  5 11  2  8 12  6  9
3  4  1  2  8  9 10  5  6  7 12 11
10 3  7  1  2  8 12  4  5 11  9  6
12 10 11  7  1  2  9  3  4  6  8  5
 9 12  6 11  7  1  8 10  3  5  2  4
 2  8  4  5  6 11  1  9 12  3  7 10
11  7 12 10  3  4  6  1  2  9  5  8
 6 11  9 12 10  3  5  7  1  8  4  2
 4  5  2  8  9 12  3  6 11  1 10  7
 8  9  5  6 11  7  2 12 10  4  1  3
 5  6  8  9 12 10  4 11  7  2  3  1
```

In the work, Boulez pairs duration series and pitch series. When P's determine pitches in Piano I, RI's determine the durations. Likewise, RI's determine pitches when P's determine duration. The same relationship holds true for the I's and R's in Piano II. Ligeti writes that "the choice of durations, though in itself logical (as an arithmetical series), is all the same arbitrary."\textsuperscript{4} However, DeYoung points out that there is a logical method to the choice of durations.\textsuperscript{5} He says that the pitch rows are paired together to form dyads. For example, the dyads formed by a combination of I\textsubscript{0} and P\textsubscript{0} are

\begin{align*}
E^{b} & \quad D \quad A \quad A^{b} \quad G \quad F^{\#} \quad E \quad C^{\#} \quad C \quad B^{b} \quad F \quad B \\
E^{b} & \quad E \quad A \quad B^{b} \quad B \quad C \quad D \quad F \quad F^{\#} \quad A^{b} \quad C^{\#} \quad G
\end{align*}

Note that there are only six different dyads and that they make up a contrary motion chromatic pattern traversing the interval from $E^{b}$ to $A$ in opposite directions (Example 67). DeYoung argues that the rows that control duration are paired to form the same dyads when they are interpreted as pitches. Therefore, the rationale for pairing the rows that control pitch and duration share common generative properties. The duration rows are paired so that these dyads are present. The order in which the duration rows occur in the first half of the piece is the same as the order in which the pitch rows occur in the second half of the piece.


\textsuperscript{5}Lynden DeYoung, "Pitch Order and Duration Order in Boulez' Structures Ia" in Perspectives of New Music, XVI/2 (1978), pp. 27-34. The above analysis is taken from DeYoung's article. DeYoung also points out that there are two exceptions to his analysis.

Boulez also organizes series of dynamics and articulations (Example 68).

Dynamics series

1  2  3  4  5  6  7  8  9  10  11  12
pppp ppp pp p quasi p mp mf quasi f f ff fff ffff

Articulation series

1  2  3  5  6  7  8  9  11  12
=>  =>  . normal  \  s^f_{A}  \  \  
(4 and 10-no articulation)

Example 68. Dynamics and articulation series in Structures Ia.

Though these series are similar to the dynamics and articulation modes used in Mode de valeurs, Boulez treats them entirely in a serial manner.
Instead of assigning each pitch a fixed dynamic level and articulation as Messiaen did in *Mode de valeurs*, Boulez assigns each row form a fixed dynamic level and articulation. He then creates four different dynamics and articulation series, one for each type of row form. However, the order in which the articulations and dynamics occur within the series is not determined by conventional means. These series are created by extracting patterns from the diagonals of the duration matrix. The numerical values in the matrix correspond to the numerical order of the two modes.\(^6\)

Though Boulez refers to *Structures Ia* as being "purely automatic"\(^7\) because of its strict adherence to the serial method, it still shows the influence that Messiaen's *Mode de valeurs* had on its creation. In addition to adopting the general idea of organizing pitch, rhythm, dynamics, and articulation from *Mode de valeurs*, there is also a similarity in style between the two works. Throughout much of *Structures Ia* Boulez uses three different row forms simultaneously in each piano (Example 69). In Example 69, the use of the three row forms, in which the durations of each are constantly overlapping, is very similar to the three staff structure Messiaen used in *Mode de valeurs*. In addition, the simultaneous use of very different dynamic levels and articulation markings is also reminiscent of *Mode de valeurs*.

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Example 69. Boulez, Structures Ia, p. 5, mm. 32-5.
Stockhausen's Adoption of Messiaen's Organizational Principles

As was mentioned in Chapter I, Stockhausen first heard *Mode de valeurs* during the summer composition courses at Darmstadt in 1951. He was so impressed with this "fantastic music of the stars"\(^8\) that he went to study with Messiaen in Paris the following January. During the intervening period, he composed *Kreuzspiel*. *Kreuzspiel* is considered to be one of Stockhausen's first major works\(^9\) and unlike *Mode de valeurs* and *Structures Ia* it is scored for other instruments in addition to the piano. Though the piano is the primary instrument, the work is also scored for oboe, bass clarinet, and percussion. The percussion section utilizes three players, and consists of six tom-toms, two tumbas (small drums), and four suspended cymbals. In addition, the pianist also plays a wood block. In spite of the difference in scoring between *Kreuzspiel* and the other two works, Stockhausen still relies on the general systematic principles and organizational methods used in *Mode de valeurs* as the basis for his work.

Like *Mode de valeurs*, *Kreuzspiel* is divided into three sections. However, in *Kreuzspiel* each of the sections is very distinct. This is achieved through the use of short introductory passages, which lead into each of the sections. These introductory passages also serve another purpose, which is to present the various series that are used to make up their respective sections (Example 70).

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\(^9\) Most authors refer to works written prior to *Kreuzspiel*, such as *Drei Lieder* and the *Sonata for Violin and Piano*, as student works.
Example 70 shows the thirteen bar introduction to the first section. In the first half of this passage, the tumbas play the durational series 2 8 7 4 11 1 12 3 9 6 5 10. Stockhausen distinguishes between the values in this series by using the first tumba only to initiate each new durational value. This series is taken up in the tom-toms following the introduction. During the second half of the introduction, the tumbas play the durational series 1 2 3 4 5 6 7 8 9 10 11 12. This is the same series that Boulez borrowed from Mode de valeurs to use in Structures Ia. However, Stockhausen slightly alters the base unit of the original mode, changing it from a thirty-second-note to a triplet sixteenth-note. The tumbas continue to use this series throughout the first section. The retrograde of this series is played simultaneously in the tom-toms (Example 71).

| tom-tom 1:  | 7 | 4 | 1 |
| tom-tom 2:  | 8 | 6 | 3 |
| tom-tom 3:  | 9 | 5 | 2 |
| tom-tom 4:  | 12 | 11 | 10 |

Example 71. Distribution of the duration values in the tom-toms, mm. 7-13.\(^\text{10}\)

The distribution of the durational values in Example 71 is significant because each tom-tom retains these same values throughout the first section, despite the use of different series.

In addition to the two durational series, the pitch series for the first section is also used in the introduction. The piano part in the introduction contains three statements of the pitch series: measures 1-6,

\(^{10}\)Rests are counted as part of the preceding durational value.
7-8, and 9-13. Though each of these statements contains all twelve chromatic pitches, the exact order of the series is not apparent. This is because Stockhausen incorporates a non-systematic element into the generally systematic fabric of Kreuzspiel. He wrote in the program notes for Kreuzspiel that

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    each time notes and noises occur at the same point in time--which happens fairly frequently--the note in some way or another drops out of the series, alters its intensity, transposes into the wrong register or takes a different duration from the one pre-ordained.11
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However, the pitch series is stated in its entirety at the beginning of the first section (Example 72).

Example 72. Stockhausen, Kreuzpiel, pp. 2-3, mm. 14-20.

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Example 72 shows the beginning of the first section, which immediately follows the introductory passage quoted in Example 70. In this example, the piano plays the pitch series $E^b$ $D^b$ $C$ $D$ $B^b$ $F$ $B$ $E$ $G$ $A$ $A^b$ $G^b$. Stockhausen uses this pitch series to form the pitch structure for the entire first section. However, much as Messiaen did in *Mode de valeurs*, Stockhausen achieves this pitch structure through the use of quasi-systematic permutation, rather than serial manipulation (Example 73).

Example 73. Pitch series permutations used in the first section of *Kreuzspiel*.

In the first half of Example 10, the pitch series goes through a series of permutations that uniformly move the pitches in the center of the series, $F$ and $B$, to the beginning and end of the series. In the
second half of Example 73, the opposite takes place. The pitches on either end of the series, Gb and Eb, are uniformly moved to the center of the series. Though not all the pitches are equally affected by the process, the permutations are generally systematic. The end result of this procedure is that the final permutation is the same as the original series with the hexachords reversed.

Messiaen also uses this procedure on the rhythmic series played in the tom-toms (Example 74).

Example 74. Duration series permutations used in the first section of Kreuzspiel in the tom-toms.
In Example 74, the sixth permutation yields the durational pattern being used in the tumbas. This relationship between the two durational patterns in the first section contributes to the overall unity of the work.

Stockhausen's use of three series, two duration and one pitch, in the first section is very similar to Messiaen's use of three pitch modes in *Mode de valeurs*. Though only one of series in the first section of *Kreuzspiel* is a pitch series, they all have a set of fixed parameters, as did the pitch modes in *Mode de valeurs*. Each of the pitches in the pitch modes in *Mode de valeurs* had a fixed duration, dynamic level, and articulation. In the first section of *Kreuzspiel*, each value in both the tumbas series and the tom-toms series has a fixed dynamic level, while each pitch in the pitch series has a fixed dynamic level and duration. However, Stockhausen also has one fixed parameter that is not present in *Mode de valeurs*. Each of the values in the tom-toms series is committed to a certain drum (see Example 71).

Though Messiaen used permutations of pitch and duration, each pitch and its accompanying duration was always played in the same register. Stockhausen, on the other hand, permutes the register along with the pitch and duration. This creates what he calls "an intersection (crossing) of temporal and spatial phenomena."

In the first section, the piano plays the very high or very low pitches. The oboe and bass clarinet play the pitches that fall in between, with the oboe picking up the medium high notes and the bass

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clarinet picking up the medium low ones. The crossing in the first section involves the movement of pitches from the highest register to the lowest register, or vice versa (Example 75).

Example 75. Stockhausen, Kreuzspiel, p. 2, mm. 14-18, p. 6, mm. 46-52, and p. 10, mm. 82-87.

In Example 75, the pitches are evenly distributed between the high and low registers and are present in the piano. In the center of the section, the pitches have moved towards the middle registers and are
present in the oboe and bass clarinet. At the end of the section, the pitches have moved back to the outer registers and are again present in the piano. However, they have reversed their registers from the beginning of the section. For example, the pitch $eb''$ moves down to $eb'$ in the center of the section and down to $Eb'$ at the end, while the pitch $Db'$ moves up to $db'$ in the center and finally up to $db''$ at the end.

The change in register, from the beginning to the end of the section, is systematic. Stockhausen uses one pattern and its retrograde to map out all the registral changes (Example 76).

$$\text{original pattern: } eb'' Eb eb' eb eb'' Eb'$$
$$\text{retrograde: } Db' db'' db db' db'' Db db''$$

Example 76. Register changes in the first section of *Kreuzspiel.*

Example 76 shows the registral changes of the first two notes of the pitch series. Each of the pitches in the series undergoes one of these patterns. However, three pitches, A, $Bb$, and $B$, undergo their patterns one octave lower. This way Stockhausen can utilize the three lowest keys on the piano.

The second and third sections are closely related to the first. The second section turns the procedure in section one inside out. The pitches begin in the middle register and towards the center of the

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12 Standard register notation is used: $c=$middle C.
section they move to the outer registers. At the end of the section, they are back in the middle registers. The third section combines both these processes.

In addition to using the general systematic principles and organizational methods found in *Mode de valeurs*, Stockhausen also uses procedures that are similar to those found in other Messiaen works. The permutation pattern he applies to the pitch and duration series in the first section of *Kreuzspiel* is very similar to the process used by Messiaen in the first movements of *Livre d'orgue*, in which the second section of the piece was created by alternating very selectively the pitches from the beginning and the end of the first section and working towards the middle (see Chapter III, Examples 59 and 60). However, there is no evidence that Stockhausen had seen or heard *Livre d'orgue* before he wrote *Kreuzspiel*. This shows that Stockhausen and Messiaen intuitively were using similar thought processes in dealing with systematic principles.

Summary

"Style," as Stravinsky has said, "is the particular way a composer organizes his conceptions and speaks the language of his craft."13 This quote is particularly applicable to Messiaen because his works reflect many styles. As has been shown, the basic stylistic qualities of his early works up through and including *Visions de l'Amen* (1943) were collected in his *Technique de mon langage musical* (1942, published

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This book went into great detail discussing all the various musical elements and compositional techniques that he utilized in his music: the modes of limited transposition, retrogradable and non-retrogradable rhythms, augmentation and diminution, superposition, canon, and "interversion." After *Technique* was published, Messiaen entered a different stylistic period. During these years, 1944 through 1948, he began to develop techniques that could organize pitch and rhythm into predetermined patterns through the use of systematic permutation. In *Vingt regards sur l'Enfant-Jésus* (1944) and *Turangalîla-symphonie* (1946-8) he utilized many of these processes, including "durées chromatiques," "agrandissement asymétrique," and "personnages rhythmiques."

A new stylistic period began for Messiaen in 1949, when he started experimenting with ways in which he could totally organize all the musical elements. These experiments began with *Cantéyodjaya* (1949) and continued on through *Livre d'orgue* (1951). Though the works of this period were all concerned with large scale organization and systemization, they were very different from one another. *Mode de valeurs et d'intensités* (1949) was the first work in which the organization of each musical element was predetermined. However, in the actual work, the order of the pitches and the other musical elements was not always determined systematically. In *Île de Feu II* (1951), the musical elements were not always totally organized, but in the sections that were organized the process was completely systematic. After *Livre d'orgue*,

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14 This is not to say that all of Messiaen's works up through *Visions* were written in the same style, but that the basic qualities in all these works were summed up in *Technique*. 
Messiaen went through a period in which his main source of musical material was birdsong. This was exemplified in works such as *Reveil des oiseaux* (1953), *Oiseaux exotiques* (1956), and *Catalogue d'oiseaux* (1956-8).

Though each one of Messiaen's stylistic periods was different from the period that preceded or followed it, they were all part of the natural evolution of his musical language. For example, the modes of limited transposition used in the early works were supplanted by experiments with large scale chromaticism in *Vingt regards*. This in turn was followed by the chromatic pitch modes in *Cantéyodjayâ* and *Mode de valeurs*. In the same way, Messiaen took the principles of augmentation and diminution and combined them to create techniques such as "agrandissement asymétrique" and "personnages rythmiques." Chromatic duration modes were essentially derived from his experiments with chromatic pitch modes. The organization of pitch and rhythm into modes led to the creation of dynamics modes and articulation modes.

Birdsong, which was briefly discussed in *Technique*, was used again in *Livre d'orgue* and *Le Merle noir*. This in turn led to *Reveil des oiseaux* and the other works of that period.

The objective of this paper was to demonstrate that *Mode de valeurs* was a natural step in Messiaen's growth toward complete or nearly complete systemization, and that the degree of control that he successfully applied to each of the musical elements in the work inspired Boulez and Stockhausen to further develop systematic procedures in their own works. Boulez took Messiaen's procedures and applied them within a strict serial context in *Structures Ia*, creating a piece in which he
systematized not only the musical elements, but also the formal structure. Stockhausen did not apply Messiaen's principles to strict serialism in Kreuzspiel, but he did apply them to other musical elements, such as instrumentation. In addition, he took Messiaen's concept of permutation and applied it to one element that Messiaen left fixed, which was register.
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