Total Serialization

Total serialization involves not only the use of serialized pitch but the serialization of other musical parameters as well. Total serialization may sound very mechanical, but it is the result of a desired effect of a composer. If the effect is not achieved the composer revises. The structure of total serialized works may be highly complex and may take many hearings before the structure is apparent. Many works may initially be perceived as nothing more than random sounds.

Milton Babbit's *Three Compositions for Piano* (1947) involves the serialization of rhythm. The prime form of the rhythmic series is 5-1-4-2. The retrograde would therefore be 2-4-1-5. The inversion and retrograde inversion permutations are formed by subtracting the prime and inversion forms from 6. The number 6 is chosen so that a positive number will always result. Each number in the series represents either a group of sixteenth notes or simply a group of notes. The perception of each rhythmic series is created through articulation or placing rhythmic spaces between each member in the series.

Messiaen's *Mode de valeurs et d'intensité* (1949) introduced nonordered twelve-member sets of numerous parameters (pitch, rhythm, dynamics, density, intensity, attack, and register).



Although Messiaen's *Mode de valeurs* was not technically serial, it led other composers, such as Pierre Boulez and Karlheinz Stockhausen, to continue to develop the idea of the use of ordered musical parameters. Boulez's *Structures 1a* (1952) was his first work to serialize pitch, duration, attack, and dynamics. *Structures 1a* divides into three pieces:

1a concentrates on the serialization of pitch and duration.

1b concentrates on the serialization of attack.

1c concentrates on the serialization of dynamics.

The pitch and rhythm matrix for Structures 1a is:

	Piano I	: pitcl	h >								_		_
Piano II: pitch V	1/E) 7/E 3/A 10/B) 12/B	2/D 1 4 3 10/B	3/A 10 1 7 11/F	4/A) 3 2 1 7/E	5/G 4/A 8/C 2/D 1/Đ	6/F \$ 5 9 8 2/D	7/E 11 10 12 9/C	8/C 2 5 4 3/A	9/C 8 6 5 4/A	10/B) 12 7 11 6/FJ	11/F 6 12 9 8/C 1	12/B 9 11 6 5/G	< Piano II rhythm
	2/D 11/F 6/F# 4/G# 8/C# 5/G	12 8 7 11 5 9 6	4 12 9 2 5 8	5 10 12 8 6 9	6/FI 3/A 10/89 9/C 11/F 12/8	11 4 3 12 7	e 1 6 5 3 2 4	9 1 7 6 12	12 2 1 11 10 7	5 3 9 8 1 4 2	2 7 5 4 10 1 3	4 10 2 7 3	

Piano I: rhythm

P-1 (the first horizontal row from the top of the matrix) applies order numbers to each pitch in the row. For instance, Eb is the first number in the row so it is order number 1. Ab is the fourth number in the row so it is order number 4. A row for the rhythmic durations, with the thirty-second note being the smallest rhythmic value, is then constructed based on the order numbers of the pitches. Each number in the row refers to the number of thirty-second notes in a rhythmic value. The row of rhythmic durations that corresponds with P-1 is as follows:



Boulez's *Le marteau sans maitre* (begun in 1952 and is still undergoing revision) was Boulez's response to the "totalitarianism" of *Stuctures* and the rigorous treatment of the serial technique was "loosened." In Marteau, the twelve pitches of the chromatic scale are divided into five segments (A-E):

 A
 B
 C
 D
 E

 F-Eb
 ||
 B-D-Bb-C#
 ||
 A-C
 ||
 G#
 ||
 G-E-F

These five segments were subject to "multiplication." Any of the segments could be multiplied by another segment. For example, AB (AxB) would be obtained by taking the m7th of segment A and finding a m7th above each pitch of segment B. This would produce the following pitches:

B-A D-C Bb-Ab C#-B

When the redundant pitch B is removed only seven pitches (B, A, D, C, Bb, Ab, C#) are left. These are the pitches at the beginning of the alto flute melody in movement three (note order is not retained).



Stockhausen's *Gruppen* for three orchestras (1957) expanded serial procedures to include form, tempi, texture, and the number and speed of events within a section.