

Twelve-Tone Analysis – Dr Ian Percy – Rosetta Stone Five

12-Tone Rows and Pitch-Matrices

Arnold Schoenberg (1874-1951) formally unveiled his system of twelve-tone pitch organisation in 1923. It dismantled the hierarchical relationships of the tonal system and liberated the twelve 'equal' tones of the chromatic scale: Twelve tones ALL of EQUAL importance.

To establish this equality, Schoenberg's system states that once the initial twelve-tone sequence has been composed, each note in the twelve-tone row should be placed in strict consecutive order and no note can repeat until the cycle has rotated through all twelve tones of the chromatic scale.

The twelve-tone row is NEVER converted to Normal Order/Prime Order (as when organising PC Sets), as this would make every twelve-tone row a consecutive row of semi-tones. However the original row is often referred to as the **Prime Row** or **Prime Form**. Schoenberg's system is completely transposable and through adopting exclusive use of mirror inversion (not harmonic inversion), negated the variable intervallic relationships of functioning harmony and the role of the octave and through pitch-matrices established a way to organise the internal symmetries and proportional relationships of the Prime Row. Pitch-matrices show all 48 possible permutations of the 12-tone row within a 12 x 12 grid:

	I0	I2	I3	I7	I10	I5	I11	I4	I1	I9	I8	I6	
P0	0	2	3	7	10	5	11	4	1	9	8	6	R0
P10	10	0	1	5	8	3	9	2	11	7	6	4	R10
P9	9	11	0	4	7	2	8	1	10	6	5	3	R9
P5	5	7	8	0	3	10	4	9	6	2	1	11	R5
P2	2	4	5	9	0	7	1	6	3	11	10	8	R2
P7	7	9	10	2	5	0	6	11	8	4	3	1	R7
P1	1	3	4	8	11	6	0	5	2	10	9	7	R1
P8	8	10	11	3	6	1	7	0	9	5	4	2	R8
P11	11	1	2	6	9	4	10	3	0	8	7	5	R11
P3	3	5	6	10	1	8	2	7	4	0	11	9	R3
P4	4	6	7	11	2	9	3	8	5	1	0	10	R4
P6	6	8	9	1	4	11	5	10	7	3	2	0	R6
	RI0	RI2	RI3	RI7	RI10	RI5	RI11	RI4	RI1	RI9	RI8	RI6	

The top row of the matrix when reading from Left to Right, lists the **Prime Row** or **Prime Form** [P0], which is the original twelve-tone row written in the exact order it was composed (conceived).

The top row of the matrix when reading from Right to Left, lists the **Retrograde Row** [R0], which is the Prime Row [P0], played backwards.

The far left column of the grid reading downwards from Top to Bottom lists the **Inversion** [I0], which is the mirror-inversion of the Prime Row [P0].

The far left column of the grid reading upwards from Bottom to Top, lists the **Retrograde Inversion** [RI0], which is the Inversion [I0], played backwards.

The consecutive descending rows of the matrix, when reading from Left to Right, list all twelve possible transpositions of the Prime Row (P0 – P11).

When reading from Right to Left, the descending rows of the matrix list all twelve possible transpositions of the Retrograde Row (R0 – R11).

Note: For clarity of reference, the following matrix has taken the pitch-class 0 from the matrix above to equal the pitch-type of C, but 0 can be any of the twelve tones of the chromatic system. Twelve-tone theory is completely transposable.

	I0	I2	I3	I7	I10	I5	I11	I4	I1	I9	I8	I6	
P0	C	D	E ^b	G	B ^b	F	B	E	C [#]	A	G [#]	F [#]	R0
P10	B ^b	C	D ^b	F	A ^b	E ^b	A	D	B	G	F [#]	E	R10
P9	A	B	C	E	G	D	A ^b	D ^b	B ^b	G ^b	F	E ^b	R9
P5	F	G	A ^b	C	E ^b	B ^b	E	A	F [#]	D	C [#]	B	R5
P2	D	E	F	A	C	G	C [#]	F [#]	D [#]	B	B ^b	A ^b	R2
P7	G	A	B ^b	D	F	C	F [#]	B	G [#]	E	D [#]	C [#]	R7
P1	C [#]	D [#]	E	G [#]	B	F [#]	C	F	D	B ^b	A	G	R1
P8	G [#]	A [#]	B	D [#]	F [#]	C [#]	G	C	A	F	E	D	R8
P11	B	C [#]	D	F [#]	A	E	B ^b	E ^b	C	A ^b	G	F	R11
P3	E ^b	F	G ^b	B ^b	D ^b	A ^b	D	G	E	C	B	A	R3
P4	E	F [#]	G	B	D	A	E ^b	A ^b	F	D ^b	C	B ^b	R4
P6	F [#]	G [#]	A	C [#]	E	B	F	B ^b	G	E ^b	D	C	R6
	RI0	RI2	RI3	RI7	RI10	RI5	RI11	RI4	RI1	RI9	RI8	RI6	