

TONALITY IN THE MUSIC OF HARRY PARTCH

A Harmonic Analysis of Verse 3 of
"And On the Seventh Day Petals Fell
in Petaluma"

JOE
~~ELLIOTT~~ FRIEDMAN

In 1963-64 Harry Partch composed "And On the Seventh Day Petals Fell in Petaluma", a set of 23 instrumental duets designed as studies for a larger work, "Delusion of the Fury", which appeared in 1967. These duets are identified on the title page of the score¹ as "Studies in techniques, timbres, double-rhythms, double tonalities...", and were revised in 1966 to combine into ten quartets, a quintet and a septet, all of which were recorded by Composer Recordings Inc. in 1967.²

Although articles and essays abound with explanations and descriptions of Partch's 43-tone-to-the-octave scale in just intonation, his 28 tonalities, and his over 40 hand-made instruments³, I felt that a valid approach to an understanding of Partch's world of ratios and microtones is in the analysis of the music itself; hence this analysis of Verse 3 of "Petals", scored for Harmonic Canon I and Blue Rainbow.⁴ After a brief description of the system of Otonality and Utonality, a harmonic analysis will show some of the ways Partch deploys his tonalities and melodic tones.

The concept of tonality flux is most important.⁵ Tonality flux consists primarily of interlocking chords, where corresponding elements are only microtones apart. A closely related concept especially pertinent to this study is described by Ben Johnston:

East Indian monophonic musical practice... "opposed" a line of fluctuating pitch against a fixed pitch or drone. The "harmonic" relation of melodic pitches to the drone is primary to this expression, whereas the intervallic relations between melodic tones are less important... There is a legitimate but subordinate use of "out-of-tuneness" in the practice of inflecting or "teasing" certain pitches microtonally.⁶

The "teasing" or inflecting of main tonal pitches by melodic pitches can cause a kind of tonality flux, for example, when the 'major third' of a triad is inflected downward toward the 'minor third'. In this verse both kinds of tonality flux occur, and the "opposing" of fluctuating pitch to fixed pitch, or drone, is an integral technique of the composition.

Otonality is Partch's word for major tonality in just intonation; unity is the 'root', the 5 identity is the 'third' and the 3 identity is the 'fifth'. Thus:

Unity	5 Identity	3 Identity	
1/1	5/4	3/2	- - - 1/10 (G maj)
(G)	(B)	(D)	

The ratios of major triads are always in the relationship 4:5:6, which is readily seen if we convert the ratios:

Unity	5 Identity	3 Identity
4/4	5/4	6/4

Now we add 7, 9, and 11 identities:

Unity	5 Id.	3 Id.	7 Id.	9 Id.	11 Id.
1/1	5/4	3/2	7/4	9/8	11/8
(G)	(B)	(D)	(F)	(A)	(C)

In the language of ratios, the numbers 1, 2, 4, 8 and 16 are 2/1 (octave) doublings; thus $7/8$ and $11/8$ could be expressed as $9/4$ and $11/4$.

Utonality, or minor tonality, has for its unity what we normally call the 'fifth' of the triad:

Unity	5 Identity	3 Identity	
1/1	8/5	4/3	- - - 1/1U (c minor)
(G)	(Eb)	(C)	

Converting the ratios:

Unity	5 Identity	3 Identity
8/4	8/5	8/6

We find thus that in Utonality the 4:5:6 relationship is in the denominator, the true relationship of the ratios being 1/4:1/5:1/6.

Now we add 7, 9 and 11 identities:

Unity	5 Id.	3 Id.	7 Id.	9 Id.	11 Id.
1/1	8/5	4/3	8/7	16/9	16/11
(G)	(Eb)	(C)	(Bb)	(F)	(Db)

In order to make these ratios more accessible to those not used to thinking in ratios, the following table (see next page) can be used to compare monophonic ratios to 12-tone scale degrees. Throughout this study approximate equivalents to 12-tone scale degrees are given in parentheses after the ratio, as are approximate tonality equivalents.

There are two main tonalities in this verse. The first is based on 16/9, and can be expressed monophonically as 16/9 Otonality or 4/3 Utonality (F major or F minor). For purposes of this study both tonalities are combined (F maj/min). This combination is justified by the ambiguity centering about the 'third' of the triad.

Series which is a mirror of the harmonic series and

Mono- phonic ratios	Mono- phonic cents	12- tone equal	Mono- phonic ratios	Mono- phonic cents	12- tone equal
81/80	21.5		10/7	617.5	
33/32	53.2		16/11	648.7	
21/20	84.5		40/27	680.5	
16/15	111.7	100 (Ab)	3/2	702.0	700 (D)
<hr/>			<hr/>		
12/11	150.6		32/21	729.2	
11/10	165.0		14/9	764.9	
10/9	182.4		11/7	782.5	
9/8	203.9	200 (A)	8/5	813.7	800 (Eb)
<hr/>			<hr/>		
8/7	231.2		18/11	852.6	
7/6	266.9		5/3	884.4	
32/27	294.1		27/16	905.9	900 (E)
6/5	315.6	300 (Bb)	<hr/>		
<hr/>			<hr/>		
11/9	347.4		12/7	933.1	
5/4	386.3	400 (B)	7/4	968.8	
<hr/>			<hr/>		
14/11	417.5		16/9	996.1	1000 (F)
9/7	435.1		<hr/>		
21/16	470.8		9/5	1017.6	
4/3	498.0	500 (C)	20/11	1035.0	
<hr/>			<hr/>		
27/20	519.5		11/6	1049.4	
11/8	551.3		15/8	1088.3	1100 (Gb)
7/5	582.5	600 (Db)	<hr/>		
<hr/>			<hr/>		
			40/21	1115.5	
			64/33	1146.8	
			160/81	1178.5	
			2/1	1200	1200 (G)

Delete lines in both columns

The second main tonality is 5/3 Utonality (a minor).
 Secondary tonalities are not heard as main tonalities but are represented by at least the basic triad (unity, 5 and 3 identities).

Implied tonalities are those tonalities represented by at least two of the possible six identities of a tonality, but not a complete triad.⁸

The HCI, A set (the 44 horizontal strings) contains the main drone of this piece. The first three measures, a kind of introductory section, runs the gamut of the A set, which contains the following ratios, from highest to lowest strings: 10/9, 7/6, 9/8, 21/20, 4/3 and 16/9. The lowest strings (4/3, 16/9) create a strong bass, while the high 10/9 is heard clearly as the 'third' of the triad. In the steady 3-beat-to-a-measure drone which begins in measure 4, this triad is reinforced and the remaining ratios (7/6, 9/8, 21/20) are heard as inflections of the 10/9.

(F)	(Gb)	(G)	(Ab)	(A)	(Bb)	(B)	(C)	(Db)	(D)	(Eb)	(E)
16/9				10/9			4/3				
			21/20	9/8	7/6						

16/9
(F MAJ.)
INFLECTING TONES.

The 9/8 inflection is 81/80, or a syntonic comma above 10/9. This is 21.5 cents, about a fifth of a semitone. A larger inflection upward is 7/6, which is 21/20, or 84.5 cents above 10/9. The largest inflection is 21/20, which is 200/189 or 97.9 cents below 10/9. this is actually 64/63, or 27.3 cents below the 'minor third', 16/15, which has not yet appeared. Already considerable flux is established around the 'third' of the 'F major' tonality.

If we scan the BR, left canon part, we find a drone on the ratios 10/9, 5/3 and 9/7. The 10/9 and 5/3 form a 5/3 Utonality triad (a minor) when combined with 4/3. The 9/7 is heard (to my ears) strikingly as a supertonic to the 10/9 ('root' of 5/3U) when it occurs (measure 1, 2, 14, 16, 19, 24, 26, 31). This 9/7 bears a 'tritone' relationship to our original low 16/9 drone, and is repeated in three 2/1 doublings (octaves). This 9/7 also functions as an inflection of 4/3, being 28/27 or 63 cents lower. Thus our two main tonalities, formed by drones, are established.

(F)	(Gb)	(G)	(Ab)	(A)	(Bb)	(B)	(C)	(Db)	(D)	(Eb)	(E)
16/9				18/16			4/3				5/3
			21/20	9/8	7/6	9/7					

16/9 (FM)
5/3 U (Am)
INFL. TONES

The HCI, X set (the 44 slanted strings), after some indeterminate upward gliding in measures 5 and 6 settles into a drone on the following pitches: 10/9, 42/25 (not in the 43-tone scale, but created by the gliding pyrex rod), 8/5, 28/25 (another maverick), 11/10, 16/15, 5/4, 5/3, 7/6 and 9/7. Of the new pitches introduced, two (16/15, 5/4) contribute to new tonalities while the rest function as inflecting tones.

(F)	(Gb)	(G)	(Ab)	(A)	(Bb)	(B)	(C)	(Db)	(D)	(Eb)	(E)
16/9			16/15	18/16			4/3				5/3
-----			16/15	11/10	28/25	9/8	7/6	9/7			42/25

4/3 U FM/m
16/9
5/3 U Am
16/15 5/4 ABM
INFL. TONES

The 16/15 ratio is doubly significant. First it is the missing 'minor third' of 4/3 Utonality (Fminor) and second, along with 4/3 and 8/5, it forms a triad on 16/15 Otonality (Ab major). This latter tonality is a secondary one, as are all tonalities shown below the dotted line.

The 5/4 ratio will become part of a triad on 5/4 Utonality (e minor) when 1/1 is introduced in the melodic pitches. The introduction of 1/1 will also complete a triad (plus a 'seventh', 7/6) on 4/3 Otonality (C major).

The new inflecting tones are $9/5$ (81/80 or 21.5 cents above $16/9$), $11/8$ (33/32 or 53.2 cents above $4/3$) and $11/7$ (35/33 or 101.9 cents below $5/3$).

Besides these main and secondary tonalities with all these triadic identities present, there are at least thirteen implied tonalities, the implications ranging from strong to almost non-existent.

In the following chart all implied tonalities with at least two identities are shown. All of the inflecting tones from the previous charts (except the mavericks $28/25$ and $42/25$) now take on a tonal identity.

(F)	(G ^b)	(G)	(A ^b)	(A)	(B ^b)	(B)	(C)	(D ^b)	(D)	(E ^b)	(E)	
		$1/1$				$9/7$				$11/7$		$8/5$ AM
$9/5$		$1/1$								$8/5$		$8/5$ EM
		$1/1$		$9/8$		$5/4$		$11/8$				$4/3$ GM
$9/5$		$1/1$		$9/8$		$9/4$						$9/8$ U dm
		$1/1$	$11/10$					$11/8$		$11/7$		$11/8$ U f#m
		$1/1$					$4/3$					$3/2$ U gm
		$1/1$			$7/6$							$7/4$ U b m
$9/5$				$9/8$								$9/5$ FM
$9/5$			$21/20$									$6/5$ B ^b M
$16/9$							$4/3$					$33/27$ B ^b M
$16/9$				$10/9$								$10/9$ U dm
						$5/4$					$5/3$	$15/8$ U b m
			$21/20$		$7/6$							$21/16$ U f#m

Two examples of the subtlety and richness of the monophonic system are provided by the ratios 9/8 and 7/6. While 9/8 functions as an inflecting tone of 10/9, it also is a 9 identity of 1/1 Otonality (G major). In the 12-tone equal tempered system, the ninth of G would be the same as the third of F, and the subtlety would be lost. The second example, 7/6, functions as 1) the 7 identity of 4/3 Otonality (C major) 2) the 3 identity of 7/4 Utonality (root of Bb. minor) 3) the out-of-tune 3 identity of 8/5 Otonality (fifth of Eb major sounding 48.7 cents too low) and 4) an upper inflection of 10/9.

Many other examples could be given, such as 16/9 which functions as four different identities in four different tonalities. All these relationships can be interpolated from the charts given in this study.

In this piece, tonality flux is achieved in two ways. First, a system of interlocking chords with many common tones creates a solid tonal structure of clearly related pitches, our main and secondary tonalities. A low insistent drone establishes a tonality on 16/9, from which this tonal structure is derived by tertian extension. Second, the inflecting tones, although functional in implied tonalities, have a much stronger function in creating flux around these already established main and secondary tonalities.

The concentrations of these inflecting tones is strongest around the 10/9 area, there being seven different 'thirds' for the Fmaj/min tonality (21/20, 11/10, 28/25, 9/8, 10/9, 7/6 and 16/15). These inflecting tones also act as inflections of 5/3 Utonality (A minor), 10/9 being the 'root'. Significantly only one pitch inflects the low 16/9 drone, the ratio 9/5.

Secondary concentrations of inflecting tones appear around 5/3 (11/7, 8/5, 42/25) and 4/3 (9/7, 11/8), the two 'fifths' of our two main tonalities. This symmetry supports the claim for two main tonalities.

Finally we must mention the emphasis on 'F major' rather than 'F minor'. The drone on 10/9 in the BR, left canon, established 10/9 as the strongest 'third' of the F maj/min complex. Further the distribution of the seven thirds puts 10/9 fairly in the center of the pattern of distribution:

$21/20$	$16/15$	$11/10$	$28/25$	$10/9$	$9/8$	$7/6$
98.0 cents				84.5 cents		

By no means, however, does this investigation of tonal dispositions convey the full impact of the music. Percussive and gliding effects, timbres, visual dynamics, rhythmic subtleties and the drama of the performers themselves contribute to the powerful effect of Partch's music, and all are necessary to fulfill his vision of 'corporeality' in music.

- NOTES: 1. Published by Source, Music of the Avant-Garde, Vol. 1, no. 2, 1967. This is the first published score of Partch's music.
2. CRI. 213, Stereo and Mono, with the Gate 5 Ensemble directed by the composer.
3. The most complete explanation is Partch's own testament, "Genesis of a Music", originally published in 1949 by the University of Wisconsin Press. Although out of print, a second edition is forthcoming from Da Capo Press, N.Y., sometime in 1970 containing appendices of writings by and about Partch, and up-to-date descriptions of his instruments and compositions.
4. A rhythmic analysis of these verses was written by Paul Earls, "Harry Partch - Verses in Preparation for 'Delusion of the Fury'", Inter-American Institute for Musical Research Yearbook, Vol. III, 1967, P. 1.
5. Discussed on pp. 187-189 of "genesis".
6. Ben Johnston, "Proportionality and Expanded Musical Pitch Relations", Perspectives of New Music, Vol 5, no. 1, Fall-Winter 1966.
7. For the derivation of this monophonic scale, see "Genesis", pp. 109-134.

OF INTEREST

- * Synthesis is an electronic music quarterly begun recently. Information on subscriptions, etc. may be had by writing, Synthesis, 1315 fourth Street Southeast, Minneapolis, Minnesota 55414.
- * MISSPELLING... In the last issue of The Composer in the REVIEW, Stockhausen's work is PROZESSION not PROGRESSION. Apologies go to the composer and the readers.
- * We have had numerous requests for the first two issues of The Composer (which were sold out). A reprinting of these issues is possible if 100 or more requests are made. If you are interested in either of these two issues, please write T.C. 3756 Seminole, Houston, Texas. Copies of the past two issues are still available.

CONTESTS

- * \$200 and royalties from publication will be given for an original composition for SATB, SSA or TTBB by a resident U.S. composer (including any students). Deadline is Jan. 31, 1971 and complete information may be had by writing Choral Competition, Dept. of Music, Brown University, Providence, Rhode Island 02912.
- * July 1, 1970 is the deadline for The Friends of Harvey Gaul, Inc. composition contest for a choral composition for women's voices. Provide also an SATB arrangement and a complete piano score to be used separately or with small ens. Mrs. David Murdoch, 5914 Wellesley Ave. Pittsburgh, Pa. 15206.