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### The climate since Harry Partch

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# The Climate Since Harry Partch

Bob Gilmore

This article examines the legacy of ideas left by the American composer, theorist and instrument builder Harry Partch (1901–1974). Partch's theoretical ideas about pure tunings and microtonal scales are examined, as is his application of them in his own compositional practice. The article then explores the impact of Partch's work on composers in the United States – in particular Lou Harrison, Ben Johnston and James Tenney – and the very different impact of his work in Europe, looking at such figures as György Ligeti and Manfred Stahnke. The paper ends with the author's personal evaluation of Partch's importance in twentieth-century music and beyond.

KEYWORDS: Partch, tuning, historical overview

Usually we think that to leave a mark on the history of music a composer has to reach the height of fame. But perhaps the 'butterfly effect' is also active in the artistic world, and marginal, forgotten characters have an impact which is frequently underestimated, or is at least bigger than we think. Such an influence cannot be measured by contemporary society, but requires an extreme space-time perspective, greatly enlarged.

Salvatore Sciarrino, from programme notes to  
*Il Clima dopo Harry Partch* (2000)

These perspicacious words of Salvatore Sciarrino should give pause to any musicologist (myself, for example) foolhardy enough to attempt a discussion of the influence of so unorthodox a figure as Harry Partch (1901–1974). It may be, as Sciarrino suggests, that the time is not yet ripe: we need a novel kind of wide-angle lens to see Partch clearly, one that enlarges our view both spatially and temporally. However, there are probably worse times to try to take stock of an artist's achievement than his centenary year, which in Partch's case fell in 2001; so, and somewhat following Sciarrino's own lead – for his *Il Clima dopo Harry Partch* for piano and orchestra was premiered in November 2000, only a few months before Partch's hundredth birthday – I offer here a collection of thoughts set in motion by the Partch centennial.

Sciarrino's is a striking idea. Existing on the margins of society, the unorthodox artist does not affect contemporary composition from within – and how could s/he? – for those composers, performers and opinion-shapers who inhabit the central institutions of the day rarely, if ever, encounter their work, and are in any case much too busy frying fish of their own to give it much attention. From this perspective the concerns of the unorthodox artist are bound to seem gratuitous or at best tangential (a textbook case of circular logic). And yet, thankfully, these oddballs never go away; twentieth-century music in

particular would be poorer without them. (Further examples, possibly tendentious, might be Sorabji, Scelsi and Nancarrow.) Their real impact is felt only much later, sometimes posthumously, and often takes unpredictable forms – hence Sciarrino’s suggestion of a “butterfly effect”.

There is a tendency today to regard Harry Partch as purely a “historical” figure, an eccentric whose work is perhaps interesting but rather marginal. Others see him more negatively, as an anarchist who showed two fingers to his contemporaries and to posterity, was disdainful of pupils and schools, and whose new instruments – designed and built by him over the whole of his creative lifetime and tuned in a microtonally extended just intonation – are a sort of negation of hundreds of years of western musical tradition. (This latter is a “grapevine” opinion, although a quite frequently encountered one, rather than a published and fully argued position; but it deserves consideration nonetheless.) However, there is another and quite opposite view of Partch, one that diverges sharply from Sciarrino’s initial premise. On this view, mostly found within North America, Partch is regarded as neither “forgotten” nor “marginal”: on the contrary, in the words of one distinguished composer and critic, Partch is seen by a considerable number as “the most American composer of all, the center and progenitor of our indigenous music culture” (Gann 1992: 90); he is one figure whose music compellingly suggests what a truly non-Eurocentric and non-popular music in the United States could be. The extreme form of this position is the tendency by some acolytes to exaggerate Partch’s influence and impact, to make him the leader of a cult that he himself would never have wanted to join.

There is, however, one point on which Partch’s defenders and detractors agree, albeit at times grudgingly: his pioneering achievements as a microtonalist. The composer Ben Johnston has perceptively commented that

Partch was determined to get this kind of music out of the limbo of theorizing, and he did it. . . . The training and coaching of performers, the maintenance and carrying about of his instruments, the persuading people that so unconventional a project is worth so much effort and expense, not to speak of the theoretical research, the design and building of instruments, and the composing itself – all these constitute a monumental life-work, mostly carried out, moreover, in conditions of poverty, public indifference, and rejection by his colleagues. Anyone interested in this field owes him not merely a debt but an apology. (Johnston 1967: 93)

Anyone reading this or similar claims – and they exist plentifully, though usually in very much less articulate form – might surmise that Harry Partch is one of the most influential figures in contemporary microtonality. In fact, such a conclusion is not easy to substantiate. For one thing, the picture looks very different in North America than it does in Europe. But more important is the fact that, with a few significant exceptions, the vast majority of those composers in the late twentieth century who have embraced microtones as an integral part of their compositional vocabulary simply disagree with Partch – if they have studied his work at all – on many issues, both as regards his theorizing about intonation and his manner of applying extended tuning systems to instrumental performance. This fact is rather sobering; and it throws open the question of what, exactly, Partch’s legacy has been.

Broadly speaking, we might say there are two basic measures of a composer’s impact. The first is the amount written about his/her work (a rather crude measure); and the second is the way that work influences the direction of

contemporary music making. The amount written about Partch, even though it has increased dramatically in the past five or six years, is still tiny in comparison to, say, the literature on Ives or Cage.<sup>1</sup> What, though, about the second measure? After all, *something* has changed in the half-century since Partch first published his book *Genesis of a Music* (Partch 1949). Back then, the book and its author were considered lunatic fringe, the theory arcane and the practice eccentric. Now, fifty-something years later, all the leading cities of Europe – Paris, Darmstadt, Donaueschingen, Huddersfield – are veritable hotbeds of microtonality. This change is in need of explanation. Is this the butterfly effect, of which Sciarrino writes, in actuality? Well, perhaps: but in trying to describe “the climate since Harry Partch”, I shall leave aside such premature conclusions (and such wishful thinking) and proceed, as far as possible, factually.

\* \* \*

“Harry told the truth about tune, as Kinsey did about sex”, the composer Lou Harrison wrote in 1970 (quoted in Blackburn 1997: 452). It might perhaps be sensible first to sketch something of the nature of that “truth” before examining its impact on others. Given the emphasis of this present issue of *Contemporary Music Review* on things microtonal, I am conveniently relieved of the necessity of summarizing Partch’s work as a whole, and will concentrate mostly on his tuning theories and their practical application. Nonetheless, it is crucially important to emphasize at the outset that Partch never regarded himself as a card-carrying “microtonalist” and, at least in the latter part of his life, was disinclined to talk about theory, microtonal or otherwise. What was far more important to him was the totality of his work, in which ancient Greek tuning theories nestle alongside the theatrical ideals of W. B. Yeats, the ancient verse of Li Po or the Psalms keeps company with hitchhiker graffiti, and hobos and anonymous travellers take their place beside the *dramatis personae* of classical dramas such as *Oedipus* and *The Bacchae*. That said, it would be utterly misleading to swing to the opposite extreme and downplay the importance of his theoretical endeavours to Partch himself: after all, one does not write a large book roughly eighty per cent of which describes and discusses the history of tuning and one’s own theories on the matter, and then spend much time and effort in the last years of one’s life ensuring its republication, if theory is unimportant.

Beginning with the composition in December 1930 of “The long-departed lover”, a setting of a poem by the eighth-century Chinese poet Li Po for voice and a newly customized viola (which he named the Adapted Viola), all of Partch’s music uses an elaborately microtonal system of intervals, chords and scales in just intonation. It does away completely with temperament, both as a tuning practice and as a conceptual vehicle; nor does it adopt the now current microtonal add-ons to 12-note equal temperament – there are no quarter-, sixth- or eighth-tones in Partch’s music (although, ironically, the “natural” eleventh, the ratio 11/8, which he does use, is almost exactly the same width as the equal-tempered perfect fourth raised by a quarter-tone). He developed this approach to pitch resources during the later 1920s, by way of both theoretical and empirical investigation: the former largely as a response to reading Helmholtz’s *On the Sensations of Tone*, and the latter by testing out, on violins and violas, that book’s various precepts about the relationship of pure intervals to string proportions. Unlike most traditional music

theory, Partch's system was not extrapolated from an existing body of music but evolved, so to speak, in the abstract, by rationalizing a set of pitch resources first and then composing music with them. (His earlier compositions – all of which he destroyed around 1930 – had used conventional tempered tuning, with only one exception, a string quartet in just intonation composed around 1925.)

The 43-tone scale that has become irrevocably associated with Partch's name is, as he himself pointed out, a misleading way of thinking about the nature of his pitch resources. Partch's music uses an expandable source scale of pure intervals, described in terms of frequency ratios, against a fundamental or 1/1 (in his system this theoretical 1/1 is always taken as G, regardless of the actual "tonic" of a given passage of music). In his earliest extant theoretical writings, he frequently changed his mind about the number of pitches in the octave that the source scale should be considered to contain; 29, 55 and 37 tones in the octave were all possibilities at different times. By the early 1940s he had settled for theoretical purposes on the 43-tone scale that he analyses in great detail in *Genesis of a Music*. All of these scales are in fact subsets of the theoretically infinite set of pitch resources that can be derived from the small set of generative intervals Partch chose to work with: besides the octave (2/1) these are 3/2, 5/4, 7/4, 9/8 and 11/8. (The set of intervals can be thought of analogously to the proportions 8:9:10:11:12:14 in the harmonic series, though Partch himself conceived of them not in terms of partials but of string proportions.) In his music these intervallic relationships are all considered consonant, despite the unfamiliarity of some of them to our ears (e.g. the interval between 9/8 and 7/4 – 14/9, approximately 765 cents). His scale, then, has as its basis those pitch relationships describable as small-number ratios (i.e. not multiple-number ratios), going only as far as the prime number 11. If this derivation is carried out systematically, a set of twenty-nine different pitches within the octave is obtained. Partch termed this set the twenty-nine "primary ratios". The other intervals in his scale are all compounds derived from these basic intervals. For example:  $3/2 \times 5/4$  (a just perfect fifth plus a just major third) gives 15/8, the just major seventh.  $5/4 \times 7/4$  gives the unfamiliar 35/32, about 155 cents. In his 43-tone scale Partch includes fourteen of these "secondary ratios" (multiple-number ratios), to divide the wide gaps between some of twenty-nine primary ratios and thereby to produce a more even overall scale contour. The decision to add only fourteen extra pitches is, like the decision to stop at the ratios of 11, a purely arbitrary one. The system is in principle expandable, and expanding upon it has been of much interest to several younger composers, as we shall see later.

None of Partch's music uses interval relationships analogous to anything higher than the eleventh partial, although, out of curiosity, he occasionally modelled theoretical chord shapes analogous to thirteenth- and seventeenth-partial relationships.<sup>2</sup> His rationale for this self-imposed limitation was that the wealth of intervals contained within his "11-limit" scale "fabric" (to use his terms) was already so overwhelming that, with such a feast spread before him, only a fool would go "tramping along the seashore and in the woods for still other exotic fare" (Partch 1974: 123). This rationale has seemed sensible enough even though the specific choice of intervallic stopping-point is arbitrary, and his lifelong adherence to it (and disinclination to go beyond it) has seemed, to some composers, unnecessarily restrictive.

The performance of Partch's early compositions is demanding enough today, but their difficulties must have seemed outrageous in the early 1930s.<sup>3</sup> The voice

part of “The long-departed lover”, for example, calls for the accurate intonation of nineteen discrete pitches within an overall vocal range of about a major sixth (from 15/14, in Partch’s scale a microtonally sharp A<sub>b</sub>, up to 16/9, the F above). The voice part is supported, much of time in unison, by the Adapted Viola, the fingerboard of which is marked with most (not all) of the degrees of his scale. At times the Viola provides pitches that function as “cues” for the voice; at times it joins the voice in unison for an elaborately microtonal phrase. In these ways Partch ameliorates the intonational difficulties of the voice part, which is just as well, as sometimes the intervals that result from the rare moments of counterpoint are truly complex.<sup>4</sup> Figure 1 shows a fragment from Partch’s manuscript of this song.

In this song and the larger set of which it is a part – the *Seventeen Lyrics by Li Po* (1930–1933) – the microtonality is easily audible, indeed sometimes breathtakingly so, even though Partch’s intention had less to do with microtones per se than it had with the wish to create a flexible and speech-like vocal line. Subsequent vocal works, such as the “hobo” works of the following decade like *Barstow* or *U.S. Highball* (inspired by his experiences as a vagrant during the Great Depression and beyond), develop these quite individual melodic practices further, sometimes adding to them more conventional diatonic patterns close to American folk or popular musics.

These early vocal works, rooted in text and speech patterns and with microtonal subtleties clearly audible, represent only one side of Partch’s work. The other, which began to develop intensely around the mid-point of his compositional career, is a concentration on instrumental music, predominantly percussive in nature. The increasing dominance of percussion instruments in his ensemble by the later 1950s led to changes in Partch’s musical language. The complex timbres of instruments such as the Cloud-Chamber Bowls and the Boo (and, in the 1960s, the Zymo-Xyl, the Mazda Marimba, the Gourd Tree, the Eucal Blossom, and many others), together with their inability to produce sustained tones, obviated the primacy of pitch as an organizational factor in the music written for them. These

The image shows two fragments of handwritten musical notation. The first fragment is for the phrase "I can not sleep." and consists of two lines of frequency ratios. The first line has ratios 16/11, 4/3, 11/9, and 11/8. The second line has ratios 4/3, 11/8, 9/8, 3/2, 16/11, and 10/7. Brackets connect the 4/3 ratio in the second line to the 11/8 ratio in the first line, and the 9/8, 3/2, 16/11, and 10/7 ratios in the second line to each other. The second fragment is for the phrase "It is three years since you went." and consists of two lines of frequency ratios. The first line has ratios 5/4, 9/7, 14/9, 3/2, 4/3, and 7/6. The second line has ratios 5/4, 9/7, 14/9, 3/2, 4/3, 7/6, 8/7, 9/8, 1/1, and 1/1. Brackets connect the 5/4, 9/7, 14/9, and 3/2 ratios in the second line to each other, and the 4/3, 7/6, 8/7, 9/8, 1/1, and 1/1 ratios in the second line to each other.

Figure 1

The original notation, using frequency ratios, of a fragment of Harry Partch’s “The long-departed lover” from his *Seventeen Lyrics by Li Po*. No rhythmic indications are given, as the “intoning” of the text is intended to follow the natural rhythms of the voice when reciting the words. (Manuscript property of the Harry Partch Estate Archive: reproduced by permission.)

instruments present a challenge to the ear's powers of pitch analysis, both with respect to assigning a definite pitch to single notes and in hearing clearly harmonic relationships in chords. In much of his later music, Partch develops other aspects of his language, notably complex rhythmic patterns and their superimposition, and the play of timbres (often linked in his music-theatre works to dramatic characterization). His percussive idiom, of which late works such as *And On the Seventh Day Petals Fell in Petaluma* (1964–1966) and *Delusion of the Fury* (1965–1966) are the culmination, represents the furthest point on his musical spectrum from the voice and Adapted Viola works of the early 1930s, in which subtlety of intonation was paramount.

Some critics, looking at Partch's compositional practice as a whole, have seen in it an apparent paradox: why, so the argument runs, go to such fanatical lengths to rationalize a complex microtonal tuning system, and build so many instruments to realize that system, if the timbres of some of the instruments make it next to impossible to hear subtleties of pitch? The musicologist Rudolf Rasch, for example, has remarked that:

the majority of Partch's instruments are percussion (which have sounds with inharmonic overtone structure), or plucked or struck strings (which have sounds with rapid decay). Neither category is very well suited to illustrate or make manifest subtle differences in tuning or intonation . . . it is difficult, if not impossible, to grasp the intonational details from arpeggios and ruffles. (Rasch 2000: 26)

Others have taken the opposite view, relishing the sense of creative anarchy that sometimes overtook Partch the composer faced with his *sui generis* instruments. Lou Harrison, for example, loved the moment in Partch's *Windsong* where the Surrogate Kithara player is instructed to play arpeggiated chords by strumming the strings behind the bridges of the instrument's two "canons": the resulting intrusion of irrational harmonic relationships into the pitch fabric is a very striking sonority (Lou Harrison, personal communication; reiterated in Harrison 2000: 136).

One further aspect of Partch's work that should be considered here is his approach to notation; in this domain, too, his work offers much to ponder. He grappled with the problem of an integrated notation system for his music, intensely so in the years 1928–1933, but his efforts at that time failed to yield what he considered a satisfactory solution. The problem was how to notate on the conventional 5-line staff a scale involving a high degree of microtonal subtlety, sometimes involving as many as 55 or more tones in the octave. Partch's solutions, ingenious if sometimes impractical, included at various times: dispensing with staff notation altogether and writing down pitches as frequency ratios (rejected as being too difficult to master and lacking the graphic component so intimately connected with our sense of pitch notation); reinventing the conventional staff as five pairs of lines, thereby providing an enlarged grid within which to place the microtonal pitches (rejected as taking up too much paper space and thereby being unnecessarily hard on the eye); and, finally, resurrecting the conventional staff but developing a new and complex system of noteheads (rejected as too esoteric and finicky). By the early 1940s he had settled on a solution that he stayed with for the rest of his career: an elaborate set of tablatures specific to each instrument, where the string to pluck or the block to hit is specified (on a conventional staff), but not the pitch that will result if one does so. The tablatures can be decoded using the "Tuning Information" at the beginning of his scores (and collected in *Genesis of a*

*Music*). Voice parts are given in approximate conventional notation with the addition of ratios above the noteheads to indicate the precise pitch intended.

It is hopefully clear, even from this brief sketch, that the legacy left by Partch at the time of his death – not just the physical legacy, of instruments and compositions, but the legacy of ideas – is a complex one. In the next section, I describe what seem to me some of the most impressive responses to Partch's work within the United States, and then look at some of the impact of that work in Europe.

\* \* \*

Historically, the first composer of stature to respond directly and substantially to Partch's work was his west coast colleague Lou Harrison (1917–2003). Harrison had been given, by Virgil Thomson, a copy of Partch's book *Genesis of a Music* upon its publication in 1949, and was immediately excited by Partch's description of the scales, modes and intervals of just intonation. Harrison began to apply such materials in several of his compositions in the 1950s, including the *Strict Songs*, the *Symphony in Free Style*, his incidental music (for tack piano) to Corneille's *Cinna*, and in numerous works thereafter, including his large body of music for American gamelan (the newly built instruments of which are modelled on Javanese instruments but tuned in pure intervals). The appeal of just intonation to Harrison was on many levels. Relatively low in importance was the fact that it made possible an expansion of pitch resources (in this sense he differs from true microtonalists, who lust for ever more pitches); much more important to him was the sheer beauty of the pure intonation itself, which he regarded and sometimes described as the aural equivalent of a healthy diet. This latter form of attraction to just tuning remained constant throughout his life, outweighing in importance its microtonal possibilities. (Oddly enough, one of his earliest just intonation works, the *Symphony in Free Style* (1955) for flutes, viols, harps, trombones, percussion and tack piano, is something of an exception in this regard: there the tuning is used to make elaborate chains of pure intervals that stray far from their starting pitch, so that when the melodic line weaves its way back to, say, the G on which it began, that G will be a comma (or several commas) sharper or flatter than the previous one. This results overall in a very high degree of microtonality; but Harrison, to my knowledge, was not especially concerned with how many pitches in the octave the work in fact uses.)

It is perhaps significant that Harrison's involvement with Partch's work was sparked through reading *Genesis of a Music*, which he described at the time of the publication of its second edition as "certainly the most important composer-written work of music theory in this century" (Harrison 1975: 4–5). This sets a pattern that was to continue, as we shall see. In fact Harrison had heard Partch's music some years earlier, at a concert in New York in 1944, and had not much liked it, writing a largely negative review of the concert for the periodical *Modern Music*. (There is a happy ending: the two men met for the first time in October 1953, in the San Francisco Public Library, and became fast friends.) In Harrison's case we might say, then, that Partch's book had given him a new way of conceptualizing pitch and shown him a new approach to tuning, affirming the connection of just intonation with the modes of the ancient world and those of contemporary cultures worldwide. Aesthetically, however, and in terms of its overall sensibility, Harrison's music is quite different from Partch's; rather, as Paul Griffiths has aptly



pointed out, it “suggests more a continuation from Cowell [Harrison’s teacher] in its abundance, its generous simplicity, and its complete lack of European hauteur with regard to the instruments, forms, and tunings of other cultures” (Griffiths 1995: 100).

A more complex response to Partch is found in the work of his younger contemporaries Ben Johnston (b. 1926) and James Tenney (b. 1934). Both men studied with Partch for brief periods, Johnston privately for six months in 1950–1951 on a ranch in northern California, Tenney at the University of Illinois at Urbana in 1959. In both cases, “studying” with Partch really meant being apprenticed to him; both Johnston and Tenney were pressed into service helping Partch with menial tasks (though sometimes such tasks included modest repair work on his instruments), and co-opted into performing his music (in Johnston’s case the *Eleven Intrusions*, *The Letter* and *Dark Brother*; Tenney played in the 1959 performances of *The Bewitched*). Yet ultimately, like Harrison, both men responded more to their reading (and subsequent re-readings) of Partch’s book than to the music itself: in *Genesis of a Music* the theoretical infrastructure of Partch’s system of extended just intonation is explained in detail, divorced from his own specific approach to composition. And, in both cases, the period of work with Partch took about a decade to bear fruit: Johnston produced his first composition in just tuning, *Five Fragments*, settings of texts by Thoreau for alto voice, oboe, cello and bassoon, in 1960; and Tenney wrote *Quintext: Five Textures for String Quartet and Bass* in 1972.

Johnston’s most immediate point of divergence from Partch’s practice is that he has never felt the need to develop new instruments in order to play microtonal music, opting instead for the arguably even more difficult process of training players of western orchestral instruments to find pure intervals. Predictably, the results of this endeavour have been mixed; but, for all the less-than-ideal performances his work has sometimes received, the successes are far more astonishing. Several string quartets have shown themselves equal to the challenge of Johnston’s String Quartet No. 4 (1973) (which, thanks to the recording by the Kronos Quartet, has become his best-known work); the latter part of this piece involves a scale of twenty-two pitches in the octave in what in Partch’s terms would be called a “7-limit” tuning. The microtonal demands of Johnston’s more recent works have attracted young performers more than they have scared them off; as of this writing, a recording of all ten of his string quartets is in prospect. (Parenthetically, it is gratifying to note that whereas Johnston has not designed or built new microtonal instruments, recent advances in acoustic instrument design have, in at least one notable case, made his music less difficult to perform. His *Twelve Partials* (1980) for flute and microtonally retuned piano was recorded in the late 1980s by the American flautist John Fonville using a conventional C flute:<sup>5</sup> with the development a few years later of the Brannen/Kingma flutes, the extra holes on which make it easier to play exact quarter-tones with the acoustic clarity of the original twelve, the just tuning of Johnston’s piece has become easier. This is for two reasons: first, that on the new flute there is a fingering that approximates the just pitch more closely; and second, that the acoustic quality of the “new” notes is easier to control and to tune.)

Johnston has also gone far beyond one of Partch’s self-imposed restrictions in using intervals analogous to partials much higher than the eleventh. In his *Suite for Microtonal Piano* of 1978, the twelve notes in the octave are retuned to selected partials from the fifth octave of the harmonic series on a low C (33 Hz); the twelve

pitches are in the proportion 16:17:18:19:20:21:22:24:26:27:28:30:(32). The retuning of a piano, which Johnston had first done in his *Sonata for Microtonal Piano* of 1959–1964 (although with a quite different tuning, involving no fewer than 81 different pitches across the keyboard range), is of course one way of ensuring accurate intonation; but the majority of his works are for instruments of unfixed pitch, and provide players with the challenge of realizing accurately pitches equivalent, in some works, to the first thirty-two partials of the harmonic series (for example in *String Quartet No.9* of 1988).

One further important innovation in Johnston's work is his development, in the 1960s and 1970s, of a fully integrated and expandable notation system capable of accurately and unambiguously representing any frequency ratio by use of a conventional staff with a complex set of newly invented accidentals. The intention of Johnston's notation is to make music in extended just tuning look as little different on the page as possible from more familiar music. He accomplished this not merely by inventing new symbols but, perhaps more significantly, by precisely defining the conventional symbols of standard notational practice. Uninflected notes on the staff, from C up to B, are assigned the frequency relationships of the just major scale ( $1/1 - 9/8 - 5/4 - 4/3 - 3/2 - 5/3 - 15/8 - (2/1)$ ). Syntonic comma inflections of these pitches are notated by use of plus and minus signs before the notehead: D-, for example, represents D ( $9/8$ ) lowered by the syntonic comma  $81/80$  ( $9/8 \times 80/81$ ), or  $10/9$ . Sharps and flats raise or lower a pitch by  $25/24$ . New accidentals are invented for all the higher primes: seventh-partial relationships are indicated by the number 7, which lowers a pitch by the ratio  $36/35$  (an inverted 7 raises it by the same interval); eleventh-partial relationships are indicated by the use of an upward-pointing arrow, which raises a pitch by the ratio  $33/32$  (a downward-pointing arrow lowers it by the same interval); and so on. For a great many ratios these symbols must be used in combination. Whether or not the system will find widespread use remains to be seen, although several younger composers around the United States working with just intonation have already made use of it.<sup>6</sup> Figure 2 shows the notation system as used in a passage from Johnston's *Suite for Microtonal Piano*.

In James Tenney's case, the impact of Partch's work began to manifest itself in the early 1970s, at a time when he was reinvestigating many of the fundamentals of music; rereading *Genesis of a Music* stimulated his thinking about pitch. As a consequence he came to regard intonation as one "compositional variable" among others, in much the same way that composers in the 1960s (and beyond) regarded notation, form, or instrumental sonority as issues to be considered afresh for each new piece. Yet in Tenney's work, more so than in that of Johnston, the divergences from Partch's practice seem even more significant than the convergences.

To begin with, Tenney has not felt the need to renounce tempered tuning in favour of just intonation; instead, the whole question of choice of tuning system becomes a live issue. Some of his works indeed employ just tuning: the *Spectral CANON for CONLON Nancarrow* (1974) retunes selected pitches of a player piano to the first twenty-four partials of a low A; and *Critical Band* (1988) offers a gently unfolding musical process in which pitches fan out from a central A-440, both upwards and downwards, in increments that form proportionally, although not acoustically, equal parts (the ascending sequence, for example, proceeds from  $1/1$  to  $129/128$  thence to  $65/64$ , proportionally  $128:129:130$ ). In other works, Tenney has used higher-division equal temperaments as approximations of complex just

As fast as possible

8<sup>va</sup>

*p* *crec. poco a poco*

5:4 6:4 6:4 6:4 6:4

8<sup>va</sup>

5:4 6:4 6:4 6:4 6:4

Figure 2

The opening of the third movement, "Etude", from Ben Johnston's *Suite for Microtonal Piano*, showing his notation system (used here to represent partials, up to the nineteenth, of a low C). (Copyright Smith Publications, Baltimore, MD: used by permission.)

tunings (and not simply as a compromise but from a fully reasoned out theoretical position, as we shall see in a moment). His first extended composition conceived in this way was *Glissade* for viola, cello, double bass and tape delay (1982, using 84-note equal temperament). Subsequent examples use 72-note equal temperament: his sixty-four "studies" for six harps, *Changes* (1985), in which the temperament is obtained by tuning each harp a sixth of a semitone distinct from each other, two above and three below the single harp that is tuned conventionally at A-440 (this is used to approximate the pitch relationships of an elaborately microtonal "11-limit" pitch space); *Water on the Mountain . . . Fire in Heaven* for six electric guitars (1985); *Song 'n' Dance for Harry Partch* (1999), for two Partch instruments (Adapted Viola and Diamond Marimba) and small orchestra; and *Harmonium #7* (2000), for variable ensemble.

Tenney's work builds impressively on that of Partch in the area of theory. In the later 1970s and early 1980s he rationalized a new formal model of pitch relationships which he calls "harmonic space", conceived as a multi-dimensional lattice. This aspect of Tenney's thought – which to date has found expression in only one major theoretical paper – re-examines the ideas of Partch in a more rigorous way, and ventures well beyond them into new territory of Tenney's own (Tenney 1984). Within the terms of the harmonic space model such musical issues as consonance and dissonance become quantifiable, and "harmonic distance" (the relative closeness in harmonic terms of pitches or chords) can be measured precisely. The points on the lattice model represent pitches expressed as frequency ratios, although with an important caveat: Tenney has introduced the concept of "tolerance" into the model, a theoretical notion (though one which corresponds to perceptual reality) in the terms of which an interval will still be "understood" as, say, a 6/5, even if it is played with a small amount of intonational imprecision. On his view, a slightly mistuned 6/5 will, in most contexts, be accepted (or tolerated) by the ear; the slight

mistuning does not confuse the identity of the interval. The concept of tolerance is an important contribution to the ongoing debate about the relationship of tempered pitch systems to just intonation.

As a recent example of Tenney's practice, we might consider the opening of *Harmonium* #7 (2000), for twelve or more sustaining instruments (figure 3). Although he has long been aware of Johnston's notation system for extended just intonation, Tenney has never adopted it, preferring a more flexible approach dictated by the nature of each individual work. Here, for example, the exact pitches intended are specified in two ways: by the use of arrows above the noteheads, indicating deviations from 12-note equal temperament in sixths of a semitone (one arrowhead representing one-sixth of a semitone, two representing two-sixths, and so on); at the same time, the frequency ratio in each segment indicates the precise interval of that pitch to some octave of the current tonic, or 1/1. The notation thus seems to permit realizations of this music in strict 72-note equal temperament or – and, in practice, probably more likely – in extended just intonation. The real difference between these two possibilities is, in this case, slight.

It is perhaps inevitable that the present should influence our perception of the past. The work of such figures as Harrison, Johnston and Tenney makes us look differently at Partch himself, and sets in motion lines of thought that become embedded in our view of him while not in fact corresponding to things he himself ever quite said. Some examples:

- (1) Many of Lou Harrison's works have made use of just tunings in what has been called a "transcultural" context: his *Pacifika Rondo* (1963), for example, is scored for an orchestra of flute, trombone, organ, celesta, piano, vibraphone, percussion, p'iris, sheng, psalteries, cheng, kayagum, pak, jalataranga and strings. It is tempting, in the light of this practice, to see Partch as a sympathetic older brother whose position outside the conventional western instrumentarium has pointed the way. But whereas Harrison composed many works un-self-consciously combining Western orchestral instruments with instruments from other traditions, Partch himself was, by contrast, quite circumspect about composing for *any* instruments other than his own. He rarely made use of an "imported" instrument (i.e. one with an already clearly defined traditional usage) without first customizing and thereby personalizing it: this is as true of the viola, harmonium and guitar he employed early on as it is several decades

Figure 3

James Tenney, *Harmonium* #7 (opening). (Copyright James Tenney: used by permission.)

later in his use of a koto, a Bolivian double flute and his version of the Indian *ektara*.<sup>7</sup> Harrison's transcultural, "Pacific Rim" consciousness really owes far more to the un-self-conscious attitude to such matters adopted by Henry Cowell.

- (2) Ben Johnston has made a connection between Partch's just-tuned hexadic chords and the use of overtone-derived chords in the music of Debussy, Ives, Bartók, Scriabin, Messiaen and others. In this sense, Johnston feels it is important "to connect Debussy and Partch", to establish his place in a line of musical creators chipping away at the same piece of marble – in this case, a particular approach to harmony (Johnston 1988). Partch himself did not see his work in these terms at all; not knowing much of the music of any of these composers, he was more inclined to project a lineage for his work back to more ancient traditions (particularly to the bardic ideal of a singer chanting and telling stories and to ancient Greek theatre). Nonetheless, Johnston's idea is a striking one, oddly similar to, although in fact anticipating, recent discussions about a roughly similar lineage for French "spectral" music.<sup>8</sup>
- (3) Johnston has argued that the crisis of tonality of the beginning of the twentieth century was predicated upon an exhaustion of the resources of equal-tempered tuning. The richness of harmonic ambiguity so prevalent in this music results, he claims, from an attempt to forge new harmonic relationships in a tuning system that was incapable of rendering them accurately. Partch said this in a more limited way (that with equal temperament "we effectively close all doors to any further adventures of consonance, and also, amazingly, we close all doors to any meaningful adventures in dissonance"; Partch 1991: 195); but Johnston has expanded the thought into a fully fledged interpretation of recent music history.
- (4) Partch's insistence upon the mutual exclusivity of equal temperament and just intonation, and his belief that the two "cannot coexist in the same musical system . . . [s]uch xenogamy is conceivable but not yet practical" (Partch 1974: 158) has been refuted by James Tenney, in his reconception of Partch's intonational system in terms of the harmonic space model, described above, with its mechanism of *tolerance*. Intonation, in Tenney's work, has been foregrounded as a musical issue; this has implied a lack of exclusivity and a dissolving of the former dichotomy between pure and tempered intervals.

A few further aspects of the American response to Partch should be mentioned before proceeding. The first is that, unlike Partch himself, Harrison, Johnston and Tenney have all been important and influential teachers, and several of their distinguished students have explored the use of just tunings still further (although most often, as is true of Tenney, not to the exclusion of other approaches, as in the cases of Larry Polansky and Kyle Gann). This generation has a claim to be, as it were, the spiritual grandchildren of Partch. Second, a small but not insignificant number of younger composers has written for Partch's own instruments. This was not something Partch himself particularly encouraged, but a different attitude has been taken by the subsequent custodians of the instruments, Danlee Mitchell and (especially) Dean Drummond. Finally, it is worth noting that there is one area in American music in which we might expect to see the influence of Partch whereas in fact there is scarcely any: minimalism.<sup>9</sup> Both La Monte Young (beginning in the early 1960s) and Terry Riley (beginning in the late 1970s) have used just intonation

in their own music, but this has come about largely through an immersion in the study of Indian music, not through an interest in Partch.<sup>10</sup>

\* \* \*

If we turn now to the question of the influence of Partch's work in Europe, we find a very different picture. In fact the direct influence of his work on musicians on this side of the Atlantic is small. There are some quite pragmatic reasons for this. Partch visited Europe only once, in 1934–1935, specifically to study books on intonation in the British Museum in London (although he found plenty of extracurricular entertainment during his stay); there was, therefore, little in the way of continuity with European friends when he left. Moreover, no European composer ever studied with Partch; insofar as he taught at all, the individuals who benefited most from their contact with him were all North Americans.<sup>12</sup> Added to this is the fact that the first edition of *Genesis of a Music* – which was only 1000 copies – had very limited distribution in Europe, so the book was largely unknown here in Partch's lifetime. By the time the second edition was issued (in 1974, only a few weeks before his death), various strands of microtonal usage had indeed crept into European music, but from quite different starting points (as we shall see below). There is, however, one important exception to all this, a leading European composer on whom, by his own admission, Partch's work had a significant impact: György Ligeti (b. 1923).

Ligeti was not the first European composer of distinction to have beaten a path to Partch's door. Stockhausen, in the company of David Tudor, visited Partch in his studio in Petaluma, northern California, in January 1964. (Apart from Partch's remark in a letter to a friend that the visit had been "very congenial", we have no idea what transpired between the three men nor what, specifically, they talked about;<sup>11</sup> Partch tended to treat such visits as signalling an expression of interest in his work by the other party, and rarely expressed much curiosity in the work of his visitors, even the most distinguished.) During a spell as composer-in-residence at Stanford University in 1972, Ligeti visited Partch at his home in Encinitas, southern California.

[I] had the opportunity to play on his instruments. I was interested in Partch's basic research on pure intonation, also in the totally original music which derived from his alternative tuning concept. This meeting made me realise the power and newness of tuning systems other than equal temperament and changed my concept of harmony.<sup>13</sup>

The most immediate result of this encounter can be heard in the Double Concerto for flute, oboe and orchestra, at which he was already at work, and which was completed later the same year in time for its Berlin première in September. Here Ligeti employs what he calls "Partch effects"<sup>14</sup>: occasional microtonal inflections in the solo parts (and in the orchestral wind and string parts) that produce sometimes pure and sometimes merely "irregular" intervals, creating a new, hybrid harmonic world that the composer describes as "neither chromatic nor diatonic, but [which] occupies an intermediate, fluctuating position" (Ligeti, cited in Toop 1999: 144). Ligeti's term "Partch effects", then, can perhaps be taken to mean a momentary, not integral, use of pure intervals in an otherwise tempered intervallic context.

Any discussion of the effect of Partch's work on Ligeti (to call it "influence" seems too strong a term) must be prefaced by the observation that the use of

microtones was already an established part of Ligeti's language. From as early as the "Kyrie" of his *Requiem* in 1964, Ligeti had acknowledged that the intricately woven and intensely chromatic vocal lines of that music would inevitably result in imperfect intonation in performance; rather than resign himself to waiting for perfect performances in the generations to come, he seems to have welcomed the blurring effects created by the inevitable but ultimately haphazard microtonal deviations. Occasional, and this time fully intentional, microtonal inflections – quarter-tones or less precise inflections up or down from tempered pitches – have an important place in subsequent works, for example in movements 2 and 3 of the String Quartet No. 2 (such things had become common currency in European music by the later 1960s). In *Ramifications*, a work for string orchestra from 1969, Ligeti uses two string groups, one of which tunes a quarter-tone lower than the other; but this strategy does not really result in quarter-tone music, nor was it intended to, as Ligeti's assumption is that the scordatura group (those that tune their open strings down) will tend to slide upwards in intonation at times during the music and then correct themselves. The result, rather as in the *Requiem*, is again a blurring of the intonation, a smudging of equal temperament.

All these works predate the Double Concerto of 1972; it seems clear that the encounter with Partch largely reinforced tendencies already present in Ligeti's work. And yet one should not underestimate the importance of this brief hands-on encounter with Partch's instruments to the ever-pragmatic Ligeti, with his preference for practical experience over abstract systematizing. Partch's name resurfaced repeatedly in Ligeti's conversation and in interviews around the time of the Concerto for Violin and Orchestra in 1991–1992; in this work, an orchestral violin and viola are retuned to the fifth and seventh partials of the double bass, injecting pure intervals into a tempered context. (They can be heard clearly, albeit quietly, at the very beginning of the Concerto; their effect is vertiginous, momentarily upsetting "normal" harmonic expectation.) Similar ideas are developed even more extensively in the *Hamburgisches Konzert* for horn and chamber orchestra of 1998–2002. This concerto is again, to some extent, a study in tuning and in the unfamiliar harmonies that result when natural harmonics infiltrate an equal-tempered context. Apart from the soloist, there are four horn players in the orchestra, all performing on natural instruments, as the soloist does in some passages; in the movement entitled "Spectra", the fifth of the work's seven movements, Ligeti creates a brilliant sonority of pure octaves, fifths and fourths, together with very unusual intervals resulting from the higher harmonics of the natural horns.

As well as their extensive presence in the violin and horn concertos, just intervals are used in a simple and yet magically compelling way in "Hora lunga", the opening movement of the Sonata for Viola Solo (1991–1994). In the passage reproduced in figure 4, Ligeti calls for three different kinds of "microtonal departures from normal intonation": an A lowered by 14 cents (the difference between the equal-tempered and the just major third above F); a B lowered by 49 cents, corresponding to the eleventh harmonic of an F fundamental; and an E<sub>b</sub> lowered by 31 cents, corresponding to the seventh harmonic. If these inflections are realized accurately by the viola player, these opening phrases will in fact be played in just intonation (or at least in an intonation as "just" as much of the Adapted Viola music of Partch). However, the rest of Ligeti's Sonata, intonationally speaking, is a very different matter.

The clash of tuning systems – of pure as opposed to tempered intonation – has,

Lento rubato e molto dolente, ♩ = 76

\*)  $\frac{12}{16}$  sempre sul IV - al fine

Figure 4

Latter-day “Partch effects”: more than twenty years after their use in his *Double Concerto*, pure intervals ( $5/4$ ,  $7/4$  and  $11/8$ ) once again infiltrate an equal-tempered context in the opening movement of Ligeti’s *Sonata for Viola Solo*. (Copyright Schott Musik International GmbH & Co: used by permission.)

in fact, emerged as one of the “themes” of Ligeti’s recent music, quite as much (and certainly with as great a consequence) as the Nancarrow-inspired polyrhythms that dominated mid-1980s works such as the *Concerto for Piano and Orchestra* and the piano *Études*. This clash seems to be resonant with symbolic import, but the symbolism is not entirely straightforward: do we hear in these works a new world perceived fleetingly amidst the chaos of the old? Or is Ligeti confronting us with the unattainability (or undesirability) of perfection? In all of Ligeti’s uses of microtones, the intention is clearly to break down or to undermine a rigid and (in his own words) “worn-out medium”<sup>15</sup> – 12-note equal temperament – rather than to enshrine a new microtonal paradigm. In this sense, his practice is quite opposite to that of Partch, who, despite his proclamations to the contrary, has in fact erected a new system in place of the old.

In the case of Ligeti, it is, finally, hard to imagine that his work would have developed significantly differently without his encounter with Partch. Even the direct hands-on experience of just intonation on Partch’s instruments seems to have needed to be reinforced by subsequent encounters with other musicians. One of these is Ligeti’s former student Manfred Stahnke (b. 1951), who has the unusual background of having been a student both of Ligeti and of Ben Johnston.<sup>16</sup> Stahnke shares with the former an anti-ideological stance in the face of questions of compositional technique, preferring a creative, free play to the dictates of fixed systems. This is evident in his *Partch Harp*, for harp and synthesizer (1987–1989). Despite its apparent modesty of means (10 minutes in duration, and involving only two musicians) this is a major work, and its appeal for Ligeti is perhaps easy enough to understand when one looks at the music more closely. The harp uses a pure tuning that is based on the Partchian triad  $1/1 - 5/4 - 7/4$  (a subset of the hexad that is the basis of Partch’s harmonic system). The seven open strings in each octave of the harp are tuned in a way that provides this triad plus two transpositions of it (with two pivot notes), as shown in figure 5. The synthesizer (originally a Yamaha DX7-II) matches this tuning in its middle range, but rather than duplicating these pitches in the different octaves (as the harp does), it uses the interval of a 12th root of 1.956, which provides  $1/1 - 5/4 - 7/4$  triads in any transposition across its range with a deviation for each proportion of less than one cent



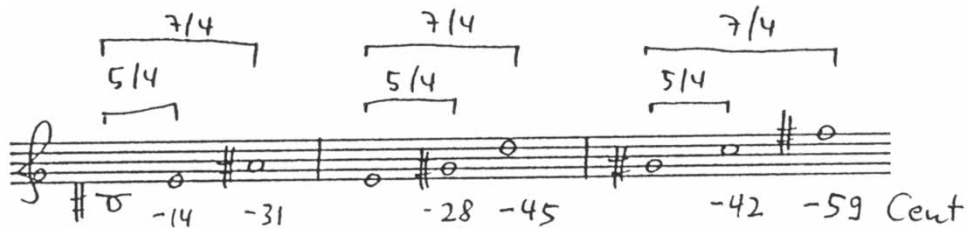


Figure 5

Tuning of the harp in Manfred Stahnke, *Partch Harp*: 5/4s are just major thirds and 7/4 is the natural seventh. The scale resulting from this tuning is marvellously eccentric: an octave from C up to B $\sharp$  would, in ratio terms, be 125/64, 35/32, 5/4, 175/128, 25/16, 7/4, 1/1. (Copyright Manfred Stahnke: used by permission.)

throughout. But the use of just-tuned chords in the music is complicated by the fact that the harpist is asked to change pedal settings from time to time, thereby effectively transposing the notes (or chords) in question by an equal-tempered semitone and compromising the purity of the just intonation. This is not seen by the composer as a problem: "Partch is present with minor deviations," he has written. "I am not as strict as Partch . . . my minuscule deviations add a kind of unforeseeable 'beating' to the music which I love" (Manfred Stahnke to Bob Gilmore, April 20, 2003). The interlocking rhythms of the harp and synthesizer parts create music of great freshness and effervescence; the work, however, ends on a more pensive note, with a short coda movement entitled "Partch en ciel" (Partch in heaven).

As was noted above with regard to minimalism, it might be worth remarking that the composers who developed so-called spectral techniques in Paris in the mid 1970s – Horatiu Radulescu, Gérard Grisey, Tristan Murail and others – similarly developed their ideas from other starting points than Partch's work. This could conceivably be due in part to the fact that Partch's book was not yet back in print when they each produced their first explorations of these techniques – Radulescu in *Credo* for nine cellos in 1969, Grisey in *Dérives* in 1973–1974, Murail in *Sables* in 1974; but it is doubtful that, even if it were, it would have really made a significant difference to them. Spectral music, historically, had more to do with explorations of time and timbre than with the pursuit of microtones or just tunings per se.

\* \* \*

Throughout this article I have tried to measure the response to Harry Partch's work by describing only documented cases of direct influence on specific composers with a detailed knowledge of at least some aspects of that work. Clearly, this approach has kept the barometer pointing steadily in the direction of positivism; as such it gives at best a partial measure of the overall climate. The list of composers could, of course, be extended to include less well-known figures whose work has not yet been much in the public consciousness, some of whose work may well in the long term prove highly significant (such as the interactive environmental compositions of David Dunn, Partch's last assistant). Or it could be extended to include artists in other domains (sound sculpture, for example, or the world of popular music; various practitioners in both these

domains not infrequently cite Partch as an inspiration). And for every specific case known to me there are doubtless others unknown. But this still seems to leave important aspects of the total picture untouched. To conclude, then, I shall offer some rather more impressionistic remarks about Partch's work which may bring us back, full circle, to the striking passage from Sciarrino I quoted at the outset.

During his lifetime (and beyond) Partch was not known to the world at large for any one particular work. Unlike, say, Cage with *4'33"*, or Jack Kerouac with *On the Road*, Partch was never associated in the public imagination with a single earth-shattering, epoch-defining masterwork. His impact and influence, even during his lifetime, was less due to his actual work than to the *idea* of his work. As we have seen, it was rarely a particular Partch performance or recording that made a profound, life-changing impact on those individuals who responded, but most often the whole *fact* of his endeavour (the closest was perhaps *Genesis of a Music*, which indeed portrays and describes that work as a whole). Young artists in California and elsewhere were certainly aware of him, albeit as a rather shadowy figure; his influence, although real, was usually somewhat ephemeral. Photographs of Partch with his instruments were in reasonably wide circulation and tended to linger in the imagination, creating a sense of him as a strange, other-worldly puppet master controlling a bizarre and quite individual musical universe. Young artists derived encouragement and inspiration from the very fact that he was there, doing what he was doing: he was an artist who stood for something, even if the essence of that "something" seemed elusive or, when one actually had the opportunity to experience it, problematic (as we saw in the case of Lou Harrison's initial reaction upon hearing Partch's music). He was a legendary figure as much as a real one. For this reason much of Partch's impact was felt – and still is – through, one might almost say, secret channels: he unlocks a part of the imagination quite distinct from the rationalizing intellect.

Perhaps, as Sciarrino suggests, measuring Partch's impact indeed "requires an extreme space-time perspective, greatly enlarged". Ultimately, the contemporary music world has responded (and continues to respond) to Partch in the same way as it responds to the work of any artist: it profits where profit is to be had, differs where it does not agree, ignores what does not appeal. Nearly thirty years after his death, Partch seems (to borrow the wonderful description of Scelsi by Tristan Murail) both central and marginal at the same time (Murail quoted in Szendy 2002: 34). That is part of his fascination. In our new century that fascination shows no signs of wearing off.

### *Acknowledgements*

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## Notes

1. Three books on Partch have been published in the past six years: Blackburn (1997); Gilmore (1998); and Dunn (2000).
2. A "13-limit" chord matrix (which Partch termed a "tonality diamond") is included in *Genesis of a Music* (Partch 1974: 454); and manuscript drawings of scales and a tonality diamond for a "17-limit" just tuning system, which were in Partch's possession in the early 1950s (although they are not in his handwriting), are reproduced in Blackburn (1997: 123–125).
3. "Why he persists in believing that his intervals are vocally possible and that he uses them while at the same time he declares with some vehemence that our ordinary scale is never sung in tune and that it is quite impossible to sing the 'arbitrary' and 'arithmetical' interval of a quarter tone (which gives us only twenty-four intervals to the octave) is a mystery", bellowed Henry Cowell (1949: 65) in his review of the first edition of Partch's *Genesis of a Music*.
4. Towards the end of the song, for example, at the words "the yellow leaves fall from the branch", the oscillation of two pitches in the viola part (16/11 and 3/2) against a reiterated 8/7 in the voice creates two extremely complex intervals, 14/11 (418 cents) and 21/16 (471 cents). For further analysis of these songs, see Gilmore (1992).
5. Johnston's *Twelve Partials*, performed by John Fonville and Virginia Gaburo, is included together with music by Brian Ferneyhough, Joji Yuasa, Sal Martirano and Fonville himself on Fonville's CD *Temporal Details* (on the New York label Einstein Records 005, 1995).
6. A fuller discussion of Johnston's notation system is to be found in Johnston, *Maximum Clarity and Other Writings on Music* (in press).

7. Some of Partch's large dramatic works occasionally call for sonorities not available in his own instrumentarium – for example, piccolo, clarinet, brass – but these are almost always supplementary in function, and rarely (if ever) an integrated part of his own ensemble.
8. With the notable addition of Stockhausen's *Stimmung*. See, for example, the discussion in the opening chapter, "Du spectre à la musique spectrale", of Jérôme Baille's *Gérard Grisey: Fondements d'une écriture* (2000: 7).
9. Richard Kassel, in his entry on Partch in the 2001 *New Grove Dictionary of Music and Musicians*, has even stated that Partch "influenced the percussive motor-rhythm music of the minimalists of the 1960s and 70s"; if there is any evidence to support this claim, I am unaware of it.
10. Partch and Young met on only one occasion, in New York in September 1968, but the meeting was not a success. Young invited Partch to his studio and let him hear a just-tuned electronic drone that he had set up there. Partch was horrified, and in a letter to Young a couple of months later (to decline his request for a grant recommendation) he wrote: "I realize that I was not pleasant when I met you in your studio. I don't think that I could have taken that New York ordeal much better twenty years ago. And I also doubt that if I awoke fresh as the rosy dawn I could stand an electronic drone very long without suffering." (Partch, cited in Gilmore 1998: 349).
11. The question of whether or not Partch ever taught admits of only a rather complex answer. In one sense, no, in that the only formal teaching he ever undertook lasted precisely one semester, the first of the academic year 1967/1968, at the University of California, San Diego; even then, this was not a composition class but a seminar on tuning theory. During his residencies at the University of Wisconsin, Madison, in 1944–1947 and at the University of Illinois at Urbana in 1956–1957 and 1959–1962, he had no composition students in a formal sense. On the other hand, dotted throughout his life are a number of young men (and a much smaller number of young women) who were deeply interested in his work and became apprentices in the way described above with regard to Johnston and Tenney. These apprenticeships rarely lasted longer than a few months, though were often quite pivotal in the lives of the musicians concerned. It is curious that the longer-lived apprenticeships were all with performers, usually percussionists, rather than composers; among them were Michael Ranta and, longest-lasting of all, Danlee Mitchell, whom Partch subsequently made his heir. Partch did, of course, give quite a few one-off lectures throughout his life, often to good effect; but ultimately his most effective act of teaching remains his book.
12. Harry Partch to Danlee Mitchell, 31 January 1964; cited in Gilmore (1998: 310).
13. György Ligeti to BG, 17 October 1997.
14. Ligeti in conversation with Péter Várnai, in Ligeti (1983: 54).
15. Ligeti in conversation with Péter Várnai, in Ligeti (1983: 54).
16. "Directement j'ai été influencé par Manfred Stahnke, un de mes anciens étudiants, qui applique avec grande conséquence un certain système microtonal dans ses oeuvres. Je peux nommer ses deux pièces *Partch Harp* et *En cet hybride tamps*" (Ligeti 1991: 14–15).