On Music Derived from Language

Clarence Barlow
University of California, Santa Barbara, USA

Abstract

This paper outlines techniques I have developed and used since 1971 to transform aspects of language into performable music, classed below as

I. *Orthographic Metamorphosis*: graphemes translated into melodies and chords,
II. *Phonetic Composition*: phonemes treated as musical timbres,
III. *Electronic Transformation*: the electroacoustic alteration of speech,
IV. "*Synthrumentation*": acoustic instruments spectrally synthesizing speech,
V. "*Spectastics*": tone-clouds generating phonemic timbres,
VI. "*Sound Wave Surfing*": free motion in time along sound waves, and
VII. *Semantic Composition*: acoustic instruments playing meaningful sentences built on a special vocabulary and grammar.

Keywords:

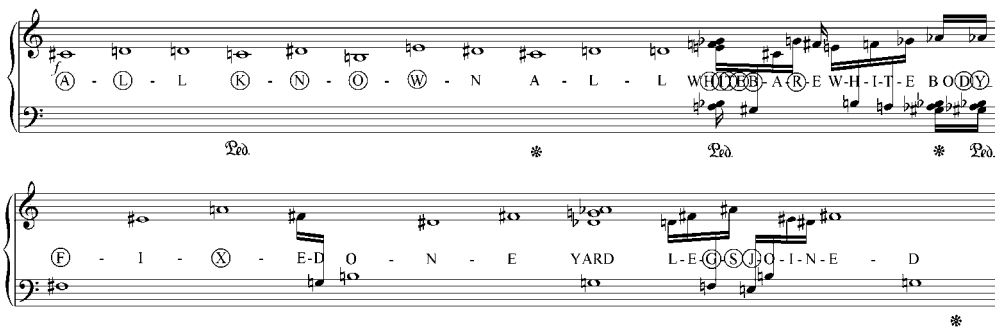
Acoustic, composition, grammar, phonetic, semantic, sound, spectrum

I. Orthographic Metamorphosis

In my *Textmusic for Piano* series, the letters of a text are allocated in zigzag form to the black and white keys of a piano, first separately, then together (for pentatonic, diatonic and chromatic passages). The text is then 'played' as a melody from single letters or on the level of syllables, words, phrases or whole sentences as chords. Changes of this level and of the key-color are effectable at certain points. Attention is also paid to loudness, duration and right-pedalling.

From 1971 to 1984, fifteen versions of *Textmusic* were realized, seven by me, eight by others, employing languages including English, French, German, Hindi and Hungarian. Figure 1 shows the start of *Textmusic #6* (1973), generated from Beckett's *Ping* by a special computer program working from variable probabilities of text-level, key-color, loudness, duration and pedalling. See also the chromatic keyboard allocation of the letters in the text ("all known all white bare white body fixed one yard legs joined...") and – encircled – the letters' first appearance.

Figure 1 – The beginning of *Textmusic #6*, showing the pitch source – Samuel Beckett's text *Ping*.



II. Phonetic Composition

Here, spoken language is itself treated according to musical considerations. In *Haiku* (1968) for baritone and clarinet, subsets of 30 phonemes from various languages were subjected to permutation and mirroring to form meaningless palindromes then set to music – see Figure 2.

Figure 2 – The ten palindromes of *Haiku* (1968), written in the International Phonetic Alphabet.

o fyrakule, møʒeniθə θinɛʒøm, eluka ryfo.
zəhɛnɜriʃɑ, kømule sose lumøk, aʃirɜ nɛhɔz.
piθʌʃɜløsɑ - kytof enune fotyk - asølɜ ʃʌθip.
likɑθunɜpy; ʃʌterɛso sɛretʌʃ; ypɜ nuθɑkil.
firoʒɑ hɛmø, ketɜ vunɔnuvɜtek, ø mɛhɑʒorif.

ðeʒømirozɑ; dubɜlov ɛ volɜbud; azori møʒeð.
ʃuke zɔnɛli - rohɑ tɜvyvɜt ahor - ilɛnɔz ekuʃ.
robɑ digezu, lytʌʒɛnɜ nɛʒʌtyl, uzegi dabor.
tonɑli-kɜme ɛsɔgu ʃʌʃugɔsɛ emɜki-lɑnot.
veðɜ nulɑsi - rytofɔm ø mɔfotyr - isalunɜðev.

das høəʃpil - nax maʊritsjo kagɛl (1970), a stand-alone text starting in German, was phonetically treated so as to almost imperceptibly pass through English into French, more symptomatic of a musician's timbral sensitivity than a poet's way of thinking – see Figure 3.

Figure 3 – *das høəʃpil - nax maʊritsjo kagɛl* (1970), written in the International Phonetic Alphabet.

das ˈhøəʃpil ɪst ˈvedə amə lɪtəˈʁaʁɪʃə nɔx amə muziˈkɑlɪʃə, zɔndən ˈledɪglɪç amə aˈkustɪʃə ˈgatʊŋ ˈʊnbəʃtɪmtən ˈmhalts. foˈʁaʊszɛtsʊŋ ðizəs ˈuəaɪgənən ˈrʊntfʊŋkˈʒɔ̃rəs ɪz n ybəˈtrɑgʊŋzˈfeɪçkaɪt zʌʧə ɑʁt, ðat ði ækˈtøʁə - spʁikə, ˈmjuzikə, ˈʃãsmɪθwɜkəndə - nɛçt hævn tu akˈtiərən bɪfoə ðen ɔijən ðes hjøʁəz, ʊm tu mæk ði jeˈwaɪliə situˈwɛʧon ˈdɔɪtlaɪk. dɑ ðə dɛfmɪˈʧonən fɔn ˈmjuzɪk ɔdr ˈɹadjospil ʃim nɛt laŋgə æpt jənuf tu fətˈsɪlɪtet nə nit dɪsˈtɪŋʃn, ənt sms ði mtəprəˈteɪʃn ɔv sʌʊnd ənd wɜd həz ɪn ʌiðə keis bəkʌm kwɛstʃˈnɑbl, ˈmjuzɪk əz ˈɹædjofɔnɪk ple wɔz ʧəuzn əlz θem fɔ ðə køˈləunjə ˈkuʁsəs ˈnamtinˈsɛpti. ɪt ɪz nɔt ə ˈstjydi dəv jutɪlɪˈzeʃðn əv mjuˈzik ɪn ˈradjoθiˈɑtə køt wʌn riˈsœʃ dð læˈtœnʃn əv prəˈmuvɪŋ kɛlkm nɔˈvɛl ʁøˈsɛt də ˈʁiəplɑn ˈmyzikəl. wjæl o ˈkðtʁɛʁi - ðez elɛv kəmˈpəuzəʁð ðə pis ʁadjofœˈnik ælz a tu, wɪˈsð ˈɛtɪə oblaɪˈʒe a ˈʁiðfɔʁˈse dez akts'jðs akustikøˈmðt æsyfiˈsðt ɔ a ˈʁymine des akˈsð dʁamaˈtik ˈdeʒa plaˈse.

For the *Ode to St. Cecilia* from *fruitti d'amore* (1989), I wrote stanzas with each syllable of a line phonetically resembling the corresponding syllable of another – see Figure 4.

Figure 4 – *Ode to St. Cecilia* (1989)

The	view	se-	cure,	in	flight	a-	bove	the	lawn /	A	haugh-	ty	fea-	thered	friend	of	mu-	sic be
And	through	this	song-	ster's	throat	(but	not	for	long) /	Be-	fore	it's	caged	and	braised,	a	me-	lo- dy.
A	su-	per-	mar-	ket	oo-	zing	gen-	tle	sound /	Sees	for-	tunes	spent	with	grey	ra-	pi-	di- ty.
Be	mu-	sic	but	a	fruit	of	love,	pay	on! /									
(If	you	think	"can't	af-	ford	e-	nough",	be-	gone!) /	And	more	we	serve	this	fair	com-	mo-	di- ty.
En-	thu-	si-	ast?	Be-	fud-	dled?	But	you're	one! /	It's	Form	where-	with	so	sheer	con-	tent	we be.
A	few	would	fain	be-	lieve,	o-	bey,	be-	long… /									
Here	mu-	sic	(just	the	thing	to	lull	the	throng!) /	Lets	dou-	bters	yield	to	hap-	py	sa-	ni- ty.
With	you,	O	bu-	gle	bright,	men	rise	at	dawn; /	Their	chore,	to	e-	du-	cate	an	e-	ne- my,
										A	jaun-	ty	march	to	spur	their	jol-	li- ty.
In-	qui-	si-	tors,	be	full	of	lus-	ty	song, /	And	tor-	tured	yells	dis-	perse	in-	au-	di- bly.
Thus	beau-	te-	ous	is	mu-	sic… /				And	more	we	serve	this	fair	com-	mo-	di- ty.

III. Electronic Transformation

The use of an analog electronic studio is here referred to. In my recorded media piece *Deutscher Sang* (1980), a text spoken in German by an Englishman with a strong Hampshire accent was filtered with the central frequencies progressively weakened in amplitude, until only extremely low and high sounds caused e.g. by the [d]s and [sch]s (both as in "deutsch") remained, forming a percussive music rhythmically shaped by the speaker's enunciation.

IV. "Synthrumentation"

This term – from "synthesis through instrumentation" – denotes the following: a spectral Fourier-analysis of a recording of spoken language is rendered as a series of chords of short and equal duration, each of them one or more Fourier time windows, represented as a MIDI data file. The MIDI velocities of harmonic partials falling near multiples of a given tolerance value are rounded to those multiples. Partials now of equal loudness in two contiguous chords continue uninterruptedly from one chord into the next. The result is a MIDI file sounding like the original recording. I first used this technique in my ensemble composition *Im Januar am Nil* (1984) and subsequently in the orchestra piece *Orchideæ Ordinariæ* (1989) and later works to the present.

Figure 5 shows an excerpt of the score of *Im Januar am Nil* – when computer-synthesized, this music is clearly recognizable as the German words "In Armenien" (= "in Armenia"); when played by musicians, the residual similarity to speech is still quite evident.

Figure 6 (upper half) shows the sonagrammed phrases "why me", "no money" and "my way" and (lower half) the corresponding pitches as scored in *Orchideæ Ordinariæ*, plotted as frequency (y) against time (x). The orchestra's playing clearly reflects the original words.

Figure 5 – Excerpt from *Im Januar am Nil*

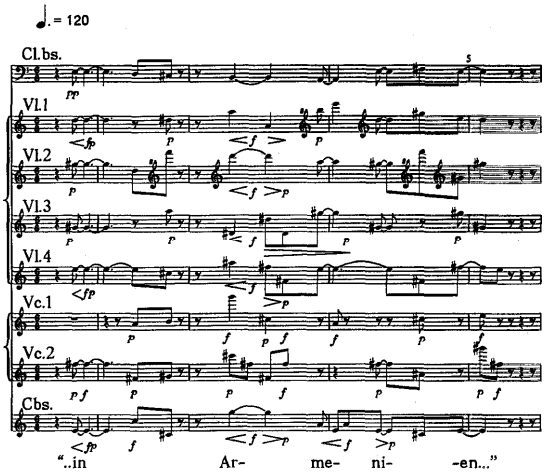
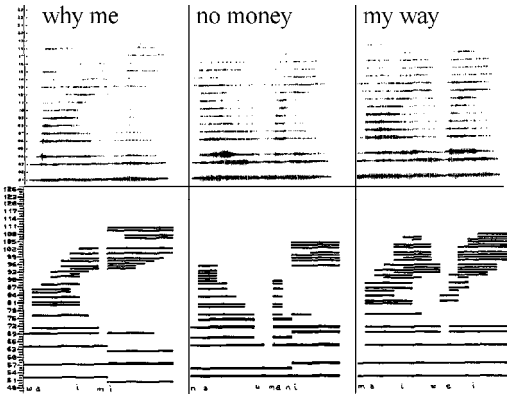


Figure 6 – Sonagrams and Pitch scores from *Orchideæ Ordinariæ*



A recording of *Felle Hymnus van Verre* (2002), written for the 175-year celebration of the Royal Conservatoire The Hague and played by a wind band, sounds when sped up 16 times like the melody and text of the first line of the Dutch National Anthem on which it is based.

V. "Spectastics"

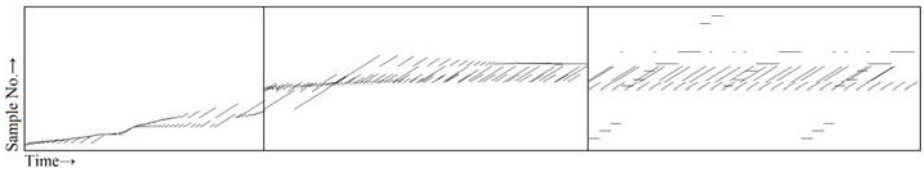
This technique (from "spectral stochastics") converts a spectral analysis into a rapid monodic stream. First, values are interpolated between the analyzed harmonic amplitudes for every degree of the chromatic scale rising from the fundamental frequency of the analysis. These values are used as probabilities for the random generation of a melody of ideally 20-200 notes per second: the 'louder' a note is during a certain time period in the spectrum, the more frequently it will appear in the melody during that time. A "spectasized" melody, as rendered on a synthesizer or a player piano, audibly resembles the original sound recording.

VI. “Sound Wave Surfing”

This technique, one I first used in 1987, uses forwards-backwards motion through the samples of a recorded sound wave. For any generated sound segment, the parameters are sample rate, first sample and the number of samples and iterations. For one iteration, the other parameters equal to those of the recording, we re-obtain the recording itself. But with a sample rate of 44.1 kHz, non-silence, a 441-sample segment-length and 200 iterations, we obtain a two-second 100 Hz tone. By applying the technique to spoken language, my recorded media piece *fLvXv$* (1990) moves organically from “concrete poetry” through a form of rap music to electronic clicks and bleeps.

Figure 7 is a “surf chart” of another piece, *Herre Gott* (1987) – the diagonal lines are sound segments played forwards “normally”. The horizontal lines seen mainly on the right are tones caused by small numbers of samples looped several times: the vertical width of a loop sets the frequency of the perceived tone, the number of iterations (horizontal) its duration.

Figure 7 – Surf chart of *Herre Gott*



VII. Semantic Composition

Here, as in *From “Progéthal Percussian for Advanced Beginners”* (2003), a percussion piece, the sounds are not phonetically simulated but form a language comprising words and sentences based on a special vocabulary and grammar. The vocabulary was made by coding the thousand-odd categories of meaning in Roget’s Thesaurus of 1852 into a new five-digit system reflecting Roget’s six classes (concerning the Abstract, Space, Matter, the Intellect, Volition and Emotion) and the sections therein, as well as concepts like synonymity. The grammar was in part inspired by existing languages, in part newly devised. Texts, e.g. Hamlet’s Soliloquy and United Nations resolutions, their thesaurally encoded words parsed into parts of speech and attendant properties such as syntax (e.g. negation, plurality etc), were converted by a computer program I wrote in a Linux environment into a musical score.

Figure 8 shows Roget’s categories 1-40 within Class I, Sections I-III with my five-digit code.

Figure 8 – Categories (here 1-40) from Roget’s Thesaurus, recoded with five digits seen at left

CLASS I: WORDS EXPRESSING ABSTRACT RELATIONS

SECTION I. EXISTENCE

1. BEING, IN THE ABSTRACT

11111 #1. Existence.
11110 #2. Inexistence.

2. BEING, IN THE CONCRETE

11211 #3. Substantiality.
11210 #4. Unsubstantiality.

3. FORMAL EXISTENCE

i. Internal conditions

11311 #5. Intrinsicality.

ii. External conditions

11310 #6. Extrinsicality.

4. MODAL EXISTENCE

i. Absolute

11411 #7. State.

ii. Relative

11410 #8. Circumstance.

SECTION II. RELATION

1. ABSOLUTE RELATION

12111 #9. Relation.
12110 #10. Irrelation.

12121 #11. Consanguinity.
12131 #12. Correlation.
12141 #13. Identity.
12142 #14. Contrariety.
12140 #15. Difference.

2. CONTINUOUS RELATION

12211 #16. Uniformity.
12210 #16a. Nonuniformity.

3. PARTIAL RELATION

12311 #17. Similarity.
12310 #18. Dissimilarity.
12321 #19. Imitation.
12320 #20. Nonimitation.
12331 #20a. Variation.
12341 #21. Copy.
12351 #22. Prototype.

4. GENERAL RELATION

12411 #23. Agreement.
12410 #24. Disagreement.

SECTION III. QUANTITY

1. SIMPLE QUANTITY

13111 #25. Quantity.
13112 #26. Degree.

2. COMPARATIVE QUANTITY

i. Comparative Quantity in general

13211 #27. Equality.
13210 #28. Inequality.
13221 #29. Mean.
13231 #30. Compensation.

ii. Quantity by comparison with a standard

13241 #31. Greatness.
13240 #32. Smallness.

iii. Quantity by comparison with a similar object

13251 #33. Superiority.
13250 #34. Inferiority.

iv. Changes in quantity

13261 #35. Increase.
13260 #36. Nonincrease, Decrease.

3. CONJUNCTIVE QUANTITY

13311 #37. Addition.
13310 #38. Nonaddition. Subduction.
13321 #39. Adjunct.
13331 #40. Remainder.

Figure 9 – Excerpt from Hamlet Soliloquy in meta-language (right), parsed, converted to meta-score (left)

```
 1: 6 :a<M1---002...---   > 11111  Verb  intr  inf              existing
 2: 7 :b<G1--2022._.---   > 51161  Conj  coor                   or
 3: 6 :a<M1---002...---0  > 11111  Verb  intr  inf         Neg!  not existing
 4: 7 :a<M4-11000.._--!   > 14432  Pron  demon sing  sub         that
 5: 6 :a<M2---220...-!-   > 12141  Verb  intr  pres             is
 6: 8 :a<P1---212__.!--   > 41132  Noun  comm  sing  sub         topic
 7: 6 :a<M2---220...-!-   > 12141  Verb  intr  pres             is
 8: 7 :d<G1--2022._.---   > 51161  Conj  subor                  whether
 9: 7 : <P1---002_..!--   > 41111  Adv.  qual  posit            conceptually
10: 7 : <S4--1011_..!!-   > 64321  Adj.  qual  comp             nobler
11: 6 :a<M2---220...-!-   > 12141  Verb  intr  pres             is
12: 6 :f<S2---001...---   > 62110  Verb  tran  inf              bearing
13: 7 : <G2---201_..!--   > 52320  Adj.  qual  posit            outrageous
14: 8 : <M8---111__.!!-   > 18131  Noun  comm  figur gen        fate's
15: 8 : <G4---121__.--! & > 54221  Noun  comm  plur  obj        attacks
16: 7 :b<G1--2022._.---   > 51161  Conj  coor                   or
17: 6 : <G4---100...---   > 54220  Verb  tran  inf              arming
18: 8 :a<G4---021_._---   > 54130  Prep                         against
19: 7 :a<M3---200._.---   > 13311  Conj  coor                   and
20: 6 :b<G4---021...!!-   > 54130  Verb  tran  gen              opposing's
21: 6 :a<M7---020...---   > 17121  Verb  tran  inf              ending
22: 7 :b<M4-11000_..--!   > 14432  Adj.  demon def              this
23: 8 :b<S2---001__.!!- & > 62110  Noun  comm  plur  gen        troubles'
24: 8 :a<M4---200__.--!   > 14311  Noun  comm  sing  obj        pool
```

Figure 9 shows Hamlet's lines "To be, or not to be: that is the question: whether 'tis nobler in the mind to suffer the slings and arrows of outrageous fortune, or to take arms against a sea of troubles, and by opposing end them?" expressed at right in a meta-language, parsed and converted algorithmically into a meta-score shown on the left, of which for instance the first line ("`1: 6 :a<M1---002...---  >`") signifies

"`1:`" the bar number (each bar corresponds to a word of the meta-text),

"`6 :`" the bar length in pulses, which is always 6, 7 or 8 (see below),

"`a`" the 1st synonym within category `11111` ("`b`" would mean the 2nd of altogether 6),

"`M1`" Metal instrument #1 (Metal for Class I: the Abstract, else Class II Space: Air, III Matter: Wood, IV Intellect: Plastic, V Volition: Glass, VI Emotion: Skin),

"`---002`" three rests (the first three pulses are always short – a 16th-note each) followed by three notes, the last of them two higher in the same idiophone, i.e. here using "`M3`",

"`...`" the last three notes of this bar are short (leading to a total bar duration of $^{6}/_{16}$; a long note, written "`_`", lasts an 8th-note, so that "`._.`" in bar 2 makes for $^{7}/_{16}$) and

"`---`" the last three notes are soft (loud="`!`"); when played, the first three pulses are soft. These rhythms and dynamics derive directly from the parsing seen at center right.

Compare this description (which excludes copious additional general rules) with Figure 10.

Figure 10 – *From "Progéthal Percussian for Advanced Beginners"* (2003): Hamlet Soliloquy (excerpt)