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Sound Poetry:

I. History of Electro-Acoustic Approaches

II. Connections to Advanced Electronic Technologies

Larry Wendt

Abstract—The author surveys the history of text-sound composition and its relationship to sound poetry. He describes some styles of sound poetry performance and examines the aesthetic and practical features of the technology used in sound poetry. The author also discusses the use of technology in his sound poetry.

I. HISTORY OF ELECTRO-ACOUSTIC APPROACHES

Background History

For some time, I have been building microprocessor controlled devices for the production of sound poetry. These devices manipulate vocal material in a variety of ways in order to isolate and accentuate its sonic properties. My main intent is to discover the unobserved sonic complexities of even the most common and pedestrian modes of speech and thereby create greater acoustical resources for the poet. I see my work as a continuation of the research started by linguistic artists during the 1960s [1].

Documentation for a history of sound poetry is paradoxically both hard to find and overly abundant. Much of this material is published in limited editions by small or handmade presses, many of them in Europe [2].

Around 1967, Bengt Emil Johnson and Lars-Gunnar Bodin of Sweden coined the term *text-sound composition* to describe their work and the work of others they believed were creating a new art "which expresses feelings, values and conceptions of life which are characteristic for our own time, and this means that it is often stamped and partially created by the new technology..." [3]. Johnson's and Bodin's work was a linguistic art form which used electronic and tape techniques to expand the expressive capacities of the human voice. They were among a group of Swedish intermedia artists connected to Fylkingen, a government-funded con-

temporary music organization in Stockholm which had been in existence since 1933. In the early sixties, Fylkingen was reorganized to include artists working with artforms other than music [4].

The Fylkingen text-sound composers produced a number of collaborative works referred to as 'borderline transgressors'. These were bits of instrumental theatre and "happenings with musical, linguistic and pictorial elements, etc." [5]. This work was similar to the *hörspiel* or radio play work being done on German radio and work which the British Broadcasting Corporation (BBC) sound effects studio had done in the early sixties in England with such poets as Brion Gysin, Ernst Jandl and Bob Cobbing [6]. There were also several other poets producing a similar kind of *electro-acoustic literature* such as François Dufrêne, Henri Chopin, Bernard Heidsieck [7], and the Flemish poet Paul de Vree [8]. In America, production of electro-acoustic literature began somewhat later with the works of Jackson MacLow [9], Charles Amirkhanian [10] and John Giorno [11].

The productions of the Fylkingen text-sound composers had a surface similarity to both older and contemporary electronic music pieces, but they also explored a grey area between music and poetry. These works were different from either art form—they were *acoustical artifacts* that could not be described as either music or literature. Although the term 'sound poetry' had been used previously to describe similar work [12], the term did not accurately relate to the new text-sound compositions. The Dadaist originators of the term loosely envisioned sound poetry as "poems without words" [13]; however, some of these compositions came to incorporate words. Acoustical writings by precursors and con-

temporaries to the Dadaists also became known as sound poems.

Ideally, the term 'sound poetry' would describe poetry which emphasized acoustical properties rather than the meaning of words, i.e. the conventional relationship between sound and semantics in poetry would be reversed and the connotations would accentuate the poem's sonic, rather than semantic, qualities. This definition is descriptive rather than prescriptive since there are some sound poems which are texts more than poems, as well as a host of other varieties. With each group of works there is a unique set of properties related to the acoustical manipulation of speech. The term 'sound poetry' has become a catch-all term for a very open-ended art form whose vague definitional boundaries are a result of its cross-disciplinary heritage.

When acoustical literature was rediscovered in the fifties, its practitioners often had no knowledge of their precursors. This newer work often disposed of even the idea of a *poem* using any text available—a play, for example, or a story or even a flyer found on the street—as substances to be manipulated for their acoustical underpinnings. With new forms of technology, electricity was introduced into this art form, which made it substantially different from the earlier literary experiments. Even artists who did not use electro-acoustics in their sound poems were often influenced by the sounds produced by these methods.

During the sixties and early seventies, past works and ways of working with the sonic aspects of language were rediscovered in the archives of the Dadaists, the Italian and Russian Futurists, and other experimentalists. These early linguistic, 'oddities' or 'jokes', as they had been derisively defined by narrow-minded critics, were

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re-examined in the more serious light made possible by the liberating effects of the new media technologies. Linguistic artists discovered complex historical and intricate artistic ties connecting their work with these earlier efforts. These artists thus developed a clearer theoretical understanding of their own works. This gave rise to a very expressive and varied art form which could not be described in any clear fashion. *Text-sound composition* is just one of the more well-known terms used to describe the technological aspects of this work and to isolate it both by history and connotation from *sound poetry*.

An international festival of text-sound composition was organized in 1968 by Fylkingen, in which practitioners from France, England, Germany and Sweden held a 3-day performance of works at the Museum of Modern Art in Stockholm. The festival was designed to present material which would not be allowed at a conventional poetry reading or a concert of contemporary music (such as an electronic or tape music concert). Though several sound poetry festivals had occurred in the world before 1968, this was the first one to deal exclusively with works utilizing modern technological developments in the manipulations of vocal material, hence its title, the *International Festival of Text-Sound Composition*. In this first festival, papers were presented and seminars were held about relevant linguistic-artistic research. Invited performers had access to the Electronic Music Studio of Sweden to produce new works, and records containing some of this work were published [14].

Partially as the result of the financial difficulties inherent in such a festival, the seventh festival held in London in 1974 shifted its emphasis from technological to *unassisted* vocal manipulations. The title of the festival was also changed to *Sound Poetry*. At that time 'sound poetry' became accepted as the term to describe all aspects of this kind of work. When subsequent festivals were held in Toronto in 1976 and then New York in 1980 many features of music and performance art were also included. The term 'sound poetry' continued to be expanded to include almost anything orally linguistic which could be found in historical or modern literature, music, theatre, etc. As a term defining a festival, sound poetry has lost its precise quality. Festivals since the 1980 *12th International Festival of Sound Poetry* have modestly attempted to focus on particular aspects or areas of this art. Poetry readings, concerts and performances which include pieces that can

broadly be called sound poems are more common now than the festivals.

Sound Poetry Performances

Sound poetry performances have more in common with other intermedia performance styles evolving since the 1950s than with the activities of conventional poetry readings, since a sound poem is performed rather than merely read out loud [15]. Vocalizations are projected off the page as a theatrical gesture and their existence as an acoustical event is the essence of the work. The 'text' for such performances can range from a formal sort of notation similar to music notation to absolutely no text at all.

Many people who work in sound poetry produce visual poetry as well. The visual aspect of language parallels its sonic aspects in that both are non-semantic, *concrete* dimensions of language [16]. Since written words signify certain acoustical sounds, the alteration of the visual aspects of language can also signify a parallel acoustical alteration. Such visual differences can be formal and quite precise or they can be subjective and improvisational.

The early acoustical poetry of the Italian and Russian Futurists and the Dadaists made use of alterations in typography to indicate acoustical interpretations. These notations were limited generally to such things as using letter size to indicate dynamic range, spaces to indicate pauses, boldness for emphasis, falling letters for falling pitches, etc. Many of the visual aspects were meant to be interpreted subjectively. In the forties, the French Lettrist movement developed a type of sound poetry which made use of numbers to indicate a particular vocal sound and had a sort of dictionary or vocabulary of sounds made by the voice. Poems were composed using this vocabulary and often borrowed forms of musical notation as well [17]. By such means, a poem could be performed the same way that it would be read. Many of their poems were performed by speaking choral groups. Since the Lettrists' work, other formal experiments in sound-poetry notation have been attempted [18]. However, many of these experiments have been limited to the works of their originators. Sound poets are highly individualistic, and a subjective approach to notation is generally the rule. The use of formal notational procedures seems to contradict the idea that sound poetry is an attempt to break away from the constraints the written word has placed upon poetry.

In the 1950s a heretical splinter group of Lettrists known as the Ultralettrists extended the Lettrist vocabulary to include amplified vocal sounds. Their work had a raw, improvised vitality to it. The most active proponent of this method was François Dufrêne who produced over seventy works which he called *crirhythmes*. These were vocal electro-acoustic improvisations often superimposed a few times on tape. They were often composed spontaneously, and Dufrêne refused to use any score or text for these individual expressions of his own voice [19].

In England, Bob Cobbing developed a technique of reading visual scores which has had a wide influence on sound poets in that country since the fifties. For Cobbing, a text has visual and acoustical elements which can be explored in performance as a kind of dance [20]. Cobbing's 'new' symbols produced by multiple typed letters or the deformations created by a mimeograph machine which was not "operating properly" provide a message which can be interpreted and realized, much like the forgotten words in other cultures which were incorporated into their rituals [21]. An example of one of Cobbing's texts is *15 Shakespear-Kaku* (1972), a page of which is shown in Fig. 1.

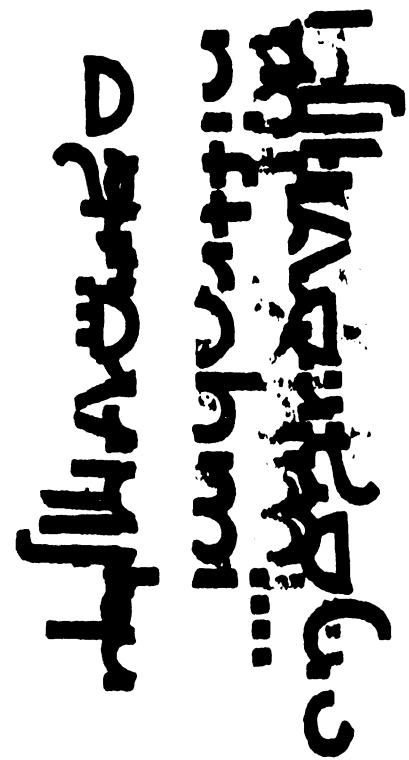


Fig. 1. One of the 'texts' from Bob Cobbing's *15 Shakespear-kaku* (London: Writers Forum, 1972). This visual notation provides the starting point for a vocal and gestural improvisation. It can also act as a score for realization on tape. The fragmented typography can suggest a variety of electro-acoustic fragmentations which can be superimposed on one another.

The notes for the 1974 tape realization of this piece are as follows:

... voice in the next room,
voice heard through the static
on the radio transmitter. Not
clear enough to hear exactly
what is being said, but a voice so
urgent that we have to listen, to
work with it, to wait beside the
receiver with pencil and paper
for the 'message' to get through,
but not now the neat phrases of
Heurtebise, Cocteau's car radio
wrecked on the dump [22].

For Cobbing, the text is the starting point which generates the work [23]. He and his colleagues have used materials other than traditional texts for scores as well. For example, The Konkrete Canticle, a sound poetry performance group which included Cobbing, Paula Claire and Bill Griffiths, often performed a work of Paula Claire's called *Stone Tones* (1974) in which rocks were passed among the performers and 'performed' as a result of their feel and appearance [24]. A photograph of Cobbing and Griffiths performing this piece is shown in Fig. 2. Claire has also composed other pieces generated from texts made from bark rubbings, vegetable materials, electronic circuitry designs, microphotography, etc.

Another English sound poet, Clive Fencott, has been working with extended writing forms for several years to generate visual acoustic works. His *The Legends of Jack O'Kent* (1976), written while he was an active participant of Cobbing's Experimental Poetry Workshop [25], is a retelling of a legend told to him as a child by his grandfather about a stone throwing contest between the Devil and a Welsh legendary hero known as Jack O'Kent [26]. English and Welsh words distilled from several texts related to the legend were handwritten, typed and juxtaposed with other visual material to produce several pages of text. Some had the linear 'top-to-bottom' words and letters. A few pages resembled tombstone rubbings (see Fig. 3). These texts were then used for performances which had both elements formally derived from the worded text and improvisational interpretation of the visual aspects of the text.

Fencott's performances of his texts ranges from highly rhythmic readings of the words to paroxysmal cries and wildly gesticulating movements. Over the years he has developed a wide pallet of vocal gestures and an intense theatrical attention to his texts. Fencott is currently working on an extended performance novel titled *The Manual of the Permanent Waver*, which he generated from a

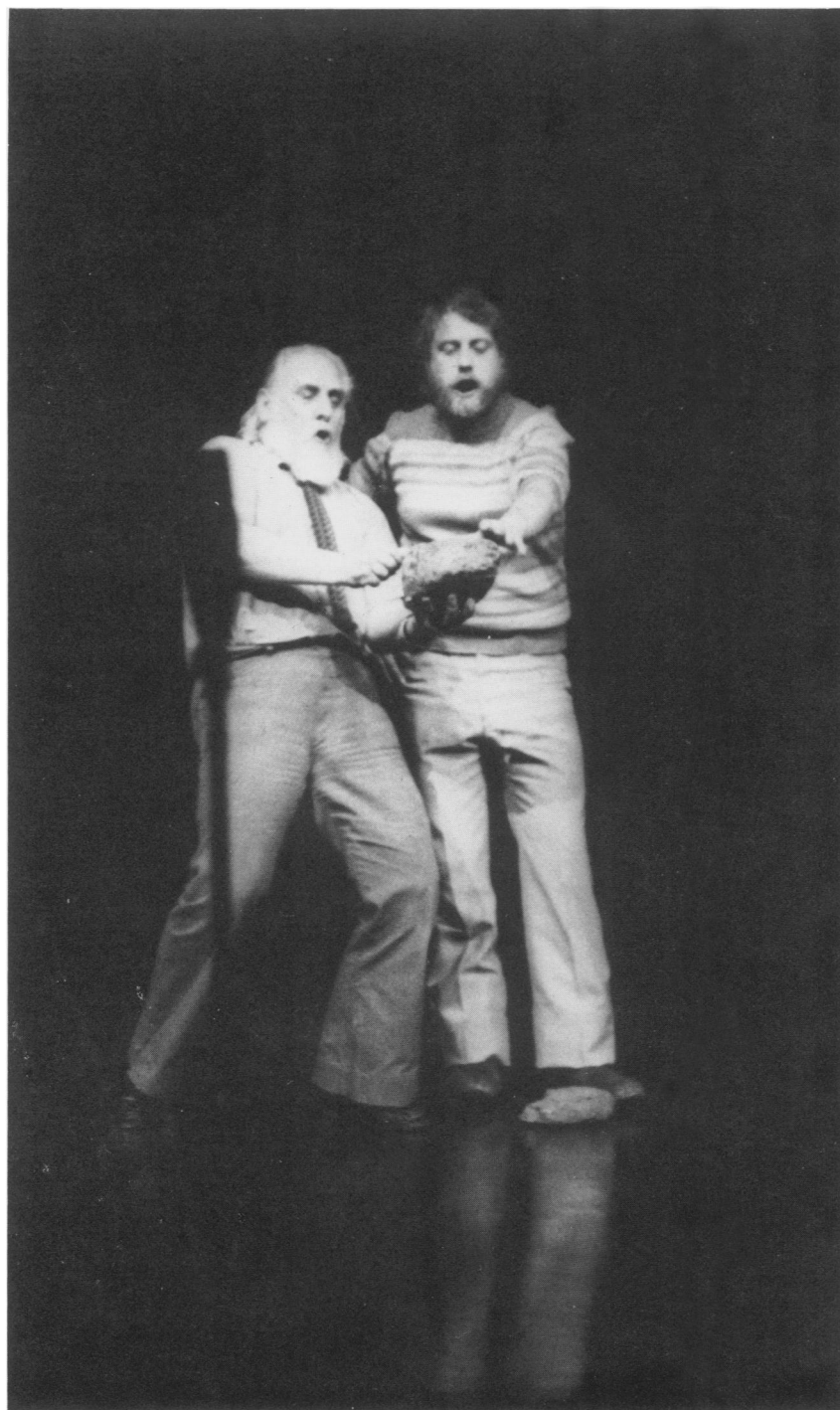


Fig. 2. Bob Cobbing and Bill Griffiths performing a rock in Paula Claire's *Stone Tones* at the 1978 11th International Sound Poetry Festival, Toronto, Canada. The rock acts as a three-dimensional graphic score. Irregular patterns upon the rock's surface as well as the rock's shape, weight and feel provide cues for vocal and gestural realizations.

hairdressing manual used in the 1930s. With aid of computer programmer and saxophonist Stephen Moore, Fencott has used a small home computer to transform the actual letters of the text into a wide variety of visual forms. A computer or video display and slides showing these transformations are used in performance as texts and scores for both vocal and musical interpretation (see Fig. 4). Here again Fencott uses a text to generate both formal and improvisational structures.

For other sound poets, the text may have an ambiguous role or even fade from existence, as with the work of François Dufrêne. For another French sound poet, Bernard Heidsieck, the text is a reference point or 'a jumping-off' ground, as it is for the English sound poets. But unlike for the English, Heidsieck's text is "nothing more than a simple score" [27]. Improvisational aspects are not the result of some 'message' hidden in the visual appearance of the texts but of the

work could be performed by someone other than the artist, to Heidsieck the text suggests a particular interpretation which requires the use of multiple recordings of his own directed reading. The text is just a preliminary sketch for the piece; the real *score* or *meta-text* is the finished tape. In performance the tape provides him with the real cues for timing, enunciation, dynamic control, theatrical realization, etc. The dormant written words of the text are reactivated by squeezing out their acoustical juices in structures provided by recordings.

However different Heidsieck's use of texts is from the English poets', he does make occasional use of the visual aspects of his texts in performance. His work *Vaduz* (1974), for example, is a poem composed of repetitive lists of the races of the world (see excerpt in Fig. 5). A photograph of a performance of the work is shown in Fig. 6. Heidsieck recites the poem as he unfurls a long single roll of paper on which the text is written. A recording of several readings of the text is played simultaneously. The recording becomes more complex as the piece progresses: the number of his different readings on the tape increases and tape echo is used to increase the density of the recordings. The piece ends with the sounds of a large crowd applauding, shouting and whistling.

Heidsieck has been working for the past couple of years on a set of 26 pieces which he calls *Deriche Le Robert*. Each piece represents one of the 26 letters of the alphabet and is inspired by the listings in the French dictionary *Le Robert*. In the realization of these pieces, he intends his performances to fit the texts "like a glove" [28] and to reveal concise slices of life, as many of his pieces do. The pieces make occasional use of props (such as a telephone and a desk for an office scene) and a certain amount of theatrical movement. Heidsieck's delivery is very intense and in these particular pieces he often tightly clutches the typewritten pages of text and shakes with intensity as if he might self-destruct in a loud explosion at any moment. The use of tape in the performance also increases the tensions of the reading. As with most of Heidsieck's work, these pieces are self-contained short plays with a dynamic energy all their own.

Although there are many different ways in which artists perform sound poems, several serious problems with attempting to perform electro-acoustic works tend to recur. Along with the more obvious pitfalls of expense and equipment failure there is the problem of a lack of equipment which can manipulate the

il y a autour de Vaduz des Slovaques

il y a autour de Vaduz des Magyars

il y a des Slovènes

il y a des Ligures

des Vénitiens

des Italiens

il y a des Provençaux

il y a des Savoyards

il y a tout autour de Vaduz des Lorrains

des Alsaciens

il y a autour, autour de Vaduz,

il y a des Polonais

il y a des Grands-Russes

il y a des Ruthéniens

il y a autour de Vaduz des Tziganes

tout autour de Vaduz des Ukrainiens

tout autour de Vaduz des Monténégrins

tout autour de Vaduz des Roumains

tout autour de Vaduz des Serbes

et il y a autour de Vaduz des Serbo-Croates

il y a des Macédoniens

il y a autour de Vaduz des Albanais

il y a des Grecs

et des Siciliens

des Toscans et

des Sardes

des Néfoussas et des Berbères

il y a des Andalous autour de Vaduz

il y a des Espagnols

il y a des Catalans

Il y a autour de Vaduz des Basques

tout autour de Vaduz des Occitans

et des Auvergnats

il y a tout autour de Vaduz des Français

tout autour de Vaduz des Bretons...

Fig. 5. Excerpt of Bernard Heidsieck's *Vaduz*. From *Poesie Sonore Internationale* (see Ref. [1]). The text provides a simple score only and is not meant to provide information about vocalizations or gestural movements. Such details are worked out with a recording which is played simultaneously during the performance. The tape therefore acts as the real source of cues which one would conventionally find in a visual score.

voice in real time. Sound poetry is meant to be experienced, not trapped in a record, tape or rare radio broadcast.

In the late sixties and early seventies, most artists who wanted to perform their work electro-acoustically were limited to performing with tapes or to treating the voice with microphones and amplifiers only. Many sound poets examined *extended vocal* techniques which had become more accessible as a result of electronic explorations and could be produced without the unreliability, weight and expense of complex electronic gear. When these sound poets 'went *acoustic*' in the mid seventies, most research into expanding vocal resources electro-acoustically was left up to the musicians

working at places like the Columbia University Center for Computing Activities [29] and L'Institut de Recherche et de Coordination Acoustique/Musique [30].

The technological approach has generally been rejected by sound poets for aesthetic as well as economic reasons. Many of the sound poets have become so involved in the acoustical aspects of speech that they have little use for an expensive technology to produce what they believe they can already do with the unaided voice. I believe the quest, however, is to find out what unknown aspects of the voice can be captured by electro-acoustics while keeping the price low and the reliability factor high.

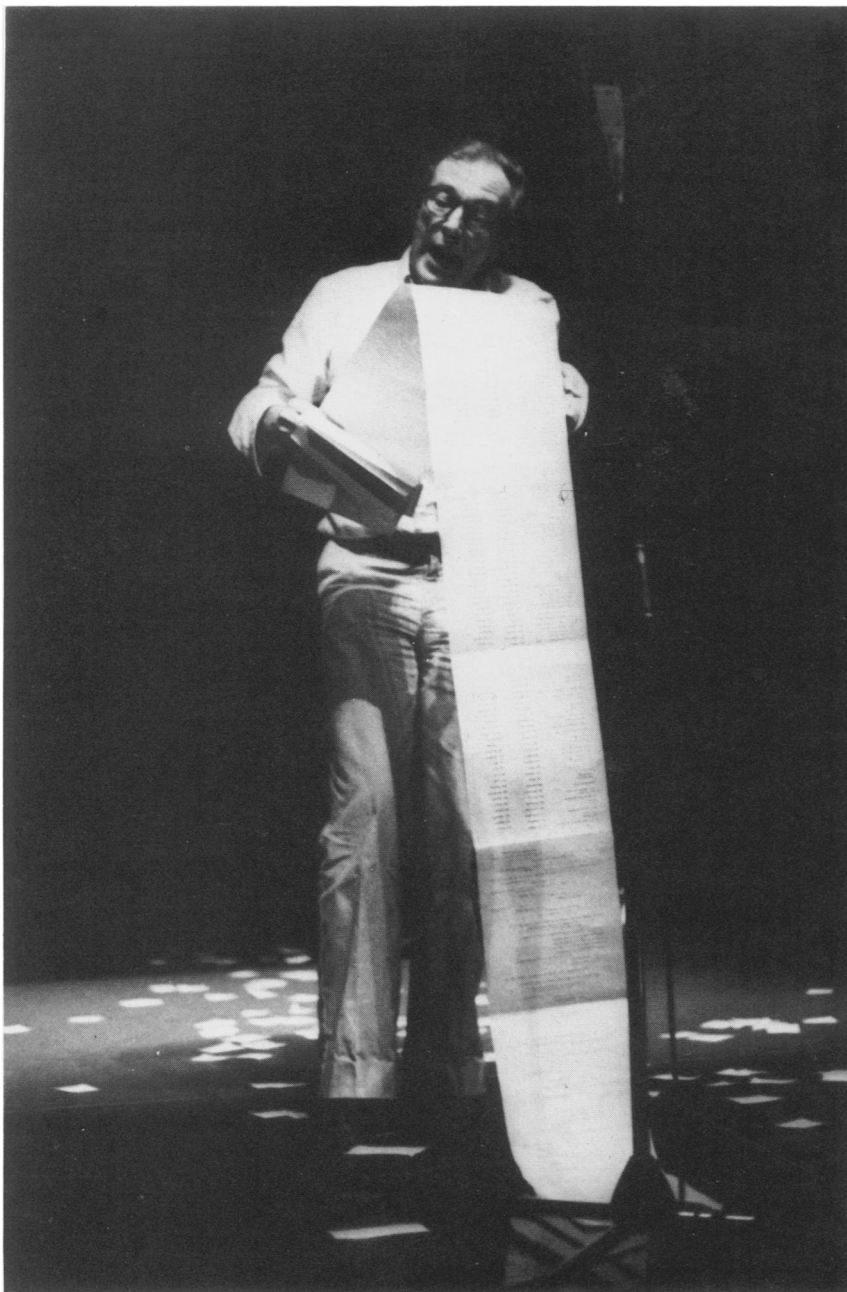


Fig. 6. Bernard Heidsieck performing *Vaduz* at the 1978 11th International Sound Poetry Festival. The text is written on a long sheet which is unrolled during the performance to provide a dual function of text and prop.

II. CONNECTIONS TO ADVANCED ELECTRONIC TECHNOLOGIES

Practical Considerations and Electro-Acoustical Aesthetics

In 1979, after several years of working with tape methods, I started experimenting with small microprocessor circuits as a possible means of manipulating speech material in real time which would have the flexibility of tape manipulation. Non-real-time tape manipulation could achieve some effects not easily produced on conventional analog synthesizers in real time. Isolating fragments of speech, shortening or increasing their durations, linking them together in a variety of

permutations to build up multilayered structures of choral polyphonies, repeating voice patterns and producing retrograde (backwards) speech and pitch change are examples of non-real-time manipulation of speech.

I found that real time manipulation of speech was generally limited to tape echo, which is rather uninteresting in its simple form and requires heavy and expensive equipment for more interesting effects. Real time analog synthesizer techniques could be used either for modulating (adding to) or filtering (subtracting from)—here too, the complexity of the effect was proportional to the weight and cost of the equipment.

My intention was to build a voice-manipulating computer which would offer the widest variety of flexibility yet would not be too difficult to transport to a performance. I was aware that by using the small eight-bit microprocessors available to me at the time I could never approach the quality of sound which could be produced at a typical computer-music studio. My resources were modest so I limited my system design to building small circuits inexpensively, as a self-taught mechanic might built parts for a hot rod. In California's San Francisco Bay Area, there is a vast support structure of electronic specialty shops, surplus and computer 'flea markets' or 'swap-meets' where one can obtain new and used computer parts at low cost. Building digital devices for artistic purposes has become a not-so-uncommon practice, a folk art of sorts [31]. Sound poets have often experimented with second-hand technologies and misused them for their own purposes.

I am reminded of the French sound poet Henri Chopin whose work developed a few years after complex tape recorders had been constructed in the French and German electronic-music studios in the early fifties. These new tape recorders had multiple tape heads, complex tape paths, revolving heads, and other special devices. Chopin, by contrast, stuck matchsticks in the erase heads of his old worn out second-hand tape recorder, poked his fingers in and out of the tape path, and otherwise molested the machine to produce his multilayered *poesie sonore* pieces. Rather than studying the methods developed on professional machines he found unique solutions to compositional problems on very basic equipment. Though the majority of Chopin's work is a non-semantic variety of sound poetry, his work is difficult to define as a kind of music. It is rather something individual to Chopin's character and personality. His work may have lacked the clean or pure sound of some of his electro-acoustic predecessors but his bouillabaisse of *vocal micro-particles* [32] and acoustical parasites certainly had the emotion and richness of a highly developed art form. Through his bricolage methods he duplicated several techniques which had previously been done on more expensive equipment [33]. When his old tape recorder was no longer functional, it took him some time before he could get the sounds he wanted from his brand new replacement.

Raw or crude sound manipulations such as those developed by Chopin are a part of sound poetry aesthetics. This rawness can be viewed as a result of

circumstance, exhibitionism, inexperience, or the attempt to mask bad art with bad noise; but it can also be seen as a rejection of the limits which producing a pure sound puts on sound poetry, perhaps because the concept of a pure sound might have more to do with music than with sound poetry. The area between distortion and intelligibility appears to be a valid sound-poetry subject. What we have in sound poetry is the *barbarian* approach to art as Matthew Arnold conceived it [34]. In this approach, language is treated in a highly individual and brutal manner to release it from the centuries of complacency and aesthetics which the written word has placed upon it. The written word, the foundation of our modern culture, has castrated the power of the spoken word. Much of written poetry elicits about the same kind of response as a daily newspaper. Barbarian art, though, is an *art in danger*; it is always on the verge of falling into a morass of unintelligible anarchy and crankiness. But it is only by taking such chances that artists can also produce exciting, vital and alive art.

As pointed out earlier, sound poetry is difficult to define and there is always the somewhat incorrect tendency to identify it with one of the more established arts such as poetry or music. In America, sound poets are often grouped with experimental musicians. Sound poetry is therefore examined with many of the same critical tools used on music. Since the turn of the century, assumptions about the aesthetic viability of a musical piece have been increasingly connected with the complexity of its formal processes. As the use of current technologies became more prevalent in the sound arts, the aesthetics of formal complexities shifted to become an aesthetics of the complexities of technological process. Thus the idea that the best way to do a piece was to use the most complex technological process currently available became a widely held belief. The narrowness of this approach can lead to an over-specialized way of working which eliminates other ways of thinking and eventually distances the work from the human experience. Ultimately a piece must exist on its own and the methods used to produce it should become invisible.

Applications of Digital Sound Manipulation in Text-Sound Composition

The particular sonic effects I became interested in while developing equipment involved the fragmentation of speech. It was intriguing to me that a word which had particular semantic sense while

whole could produce a variety of sonic environments when fragmented. I was also interested in finding different ways of generating fragmented texts to read as well as in studying more obvious speech patterns. I wanted to show that an ordinary word said in performance could create a particular view of the world through sound.

I have used my digital equipment (described in Appendix A) in one configuration or other for the production and performances of my pieces since 1979. I still use as well several old tape manipulation techniques for the production of my pieces. My philosophy has always been to use whatever is available for my work; generally this means modifying existing equipment or building something I cannot afford to buy; distorting its functions to fit my needs. I often deal with hardware that barely works; I collect objects from various sources, customize them in some fashion and juxtapose them with other bits and pieces of things. I generate the texts that I use for my pieces in the same way: found texts and other refuse are combined together and rewritten. In this way, both content and process become integrated in my work.

One of the first works in which I made extensive use of my digital equipment was a set of performance pieces titled *Earthworm* (1980). My intention with this work was to produce a set of pieces that could be performed a variety of ways from a single text. Thus, I could work out different techniques for using my voice-manipulation system in performance to learn what was practical. I had done tape pieces since the early seventies and began doing real-time performances of my work in 1978. Since most of my performance pieces had been 'live' versions of my tape pieces, I found it hard to do a performance of a particular piece more than a few times. Performing these works was like trying to reconstruct a tape piece; such an activity seemed pointless since I had already solved the problems which made me want to do such a piece in the first place. But creating performance pieces with limited life spans led to the problem of developing equipment, since there was never enough time to find out what worked. Producing pieces which could be performed a number of different ways appeared to be an answer to both of these problems, and my intention was realized with *Earthworm*.

Earthworm was a long text which I had generated around the theme of "The West." I wanted to produce a document which would have the appearance of some fragmentary text ostensibly about

the Western Frontier in America as compiled in the far distant future. In this way, history and quasi-historical details would be compressed together like layers of leaves and twigs which fall each season and are mixed by earthworms. I collected a variety of found texts about the lives of the famous Western heroes Wyatt Earp and John 'Doc' Holliday from conventional historical accounts and from their modern Hollywood retellings. I then 'mixed' these texts with the aid of a computer randomizing program (a sort of digital earthworm effect) along with other texts describing the frontier dentistry technology used by Doc Holliday and a text about new photolithography techniques used in the Silicon Valley of Santa Clara (where Wyatt Earp had a cattle ranch around the turn of the century) to construct a particular kind of integrated circuit known as a *bubble memory*. The irregularly sized fragments of texts produced by this method were then used to generate a text which began with a very fragmented visual structure (see Fig. 7). The piece ended with the fragmentary paraphrasing of an obscure South American Indian frog myth which I thought might have had a North American variant. The relationship began with similarities to Cobbing's work and ended with similarities to Heidsieck's. Part of the point of the piece was to deconstruct and reconstruct several texts from the same material to imitate the transformation of a myth from one variant to another. The chaotic mixture of well-known and very obscure personal references made the text interesting enough for me to want to perform it a variety of ways.

After working out several technical problems with *Earthworm* I determined the minimum configuration of equipment necessary for the performance. I found that it was most effective to make only subtle changes in the real-time sound text so that the words would be more or less intelligible, since minor sound effects were easier to control. More elaborate manipulations of fragmentary texts would have been difficult to control successfully while I was performing the texts. I started working on a series of tape pieces which were experiments with mixing fragmented texts with more narrative elements. The processes which were more difficult to perform were recorded on tape. My intention was to be able to produce a mix of manipulations so that it would be difficult to distinguish the performed manipulations from those which were recorded.

What is Man? (1981) was my first attempt in a set of works which I later

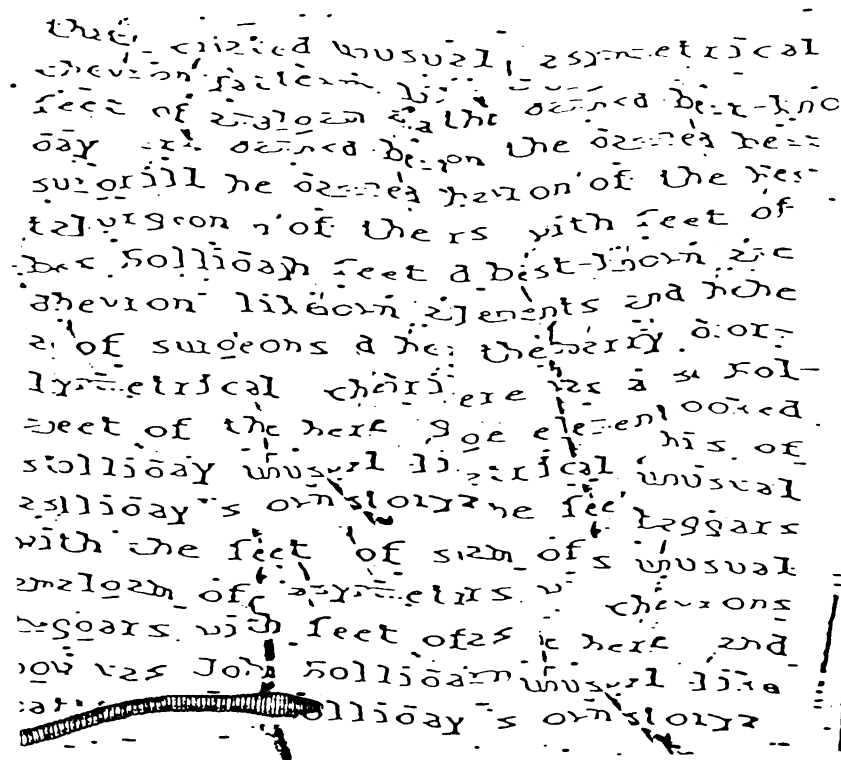


Fig. 7. A page from *Earthworm*, a text-score by Larry Wendt. Completed text published in *Cenizas* No.6, guest-edited by Mike Crane (San Francisco: Romax, 1980). Electro-static copier distortions provide cues for electro-acoustic realizations. The visual score ends with more conventional text forms which can be read in a variety of ways depending on the electronic manipulation equipment available.

called *World-Class Technology* This was to be a whole set of satirical parodies about living and working in San Jose, California. The title came from a story that I read in the local newspaper around

the time I began the work. The then-mayor of San Jose had invited the Queen of England to visit the city's sewage treatment plant as a prime example of what had made San Jose a leader in

'world-class technology'. This led me to think of several parodies about visiting sewage plants, high technology and the quality of life in San Jose.

The title of my piece *What is Man?* came from a religious pamphlet published by a local fundamentalist church. Parts of the text of the pamphlet were 'mixed' with my *earthworm* computer program along with material taken from a bulletin published by the San Jose—Santa Clara Pollution Control Plant explaining the workings of their world-class waste treatment plant. The generated text was then edited for readability and several readings were made, modified heavily by my digital equipment, and superimposed upon one another on tape. In performance, I began reading the text from a podium like a minister with very subtle processing to yield a dark, primarily inexplicable lecture on the meaning of man and existence. The text ended with the phrase "What is Man?" On the tape, the word "what" was repeated several times in a digital loop and transformed/replaced by the sound of ducks quacking and then geese honking. The honking sounds were mixed with a recording I had made in a large reverberant cathedral of a procession of carhorns celebrating a wedding in the streets outside. I manipulated this recording to give it a sort of choral cosmic honking sound. During the performance, I also manipulated the phrase "what is man?" with my voice manipulation equipment to change it into a crude honking sound. The pitch and duration of this sound were controlled by the amplitude and the length of the words I was reading. The piece ended with my controlling the honking sound with a 'squeaky' duck toy.

Another piece of mine in this series was *Broken Crystals* (1983). A photograph of a recent performance of this work is shown in Fig. 8. In this more conventional story I play the part of a man working in Silicon Valley, California, who fails at his job as a grower of bubble memory crystals. Flies start hatching out of the crystals, and the whole bubble memory market collapses after the President of the United States orders the bombing of Silicon Valley with toads to get rid of the flies. In performance, I played a dense tape containing environmental sounds, some of which were processed by my equipment. This tape was an acoustical ground or background which provided me with the cues and timing for reading the text. The actual text was mostly memorized and had little practical function in the performance. Real-time manipulation of my voice was limited to a low-level retrograde effect. This mixed

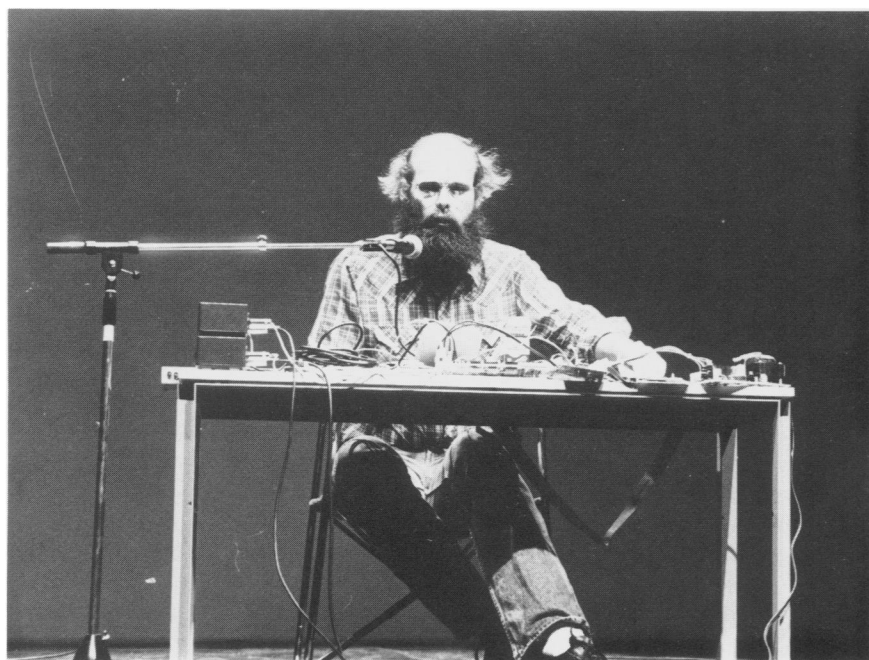


Fig. 8. Larry Wendt performing *Broken Crystals* with his digital vocal manipulation system at the PHONE II Festival, Centre Georges Pompidou in Paris, France, 1984. The equipment can function both for vocal manipulation and as a visual prop. (Photo: Françoise Janicot).

with other digitally manipulated readings on the tape so that it was difficult to distinguish what was being done in real-time and what was on tape. I usually counted some objects such as paper clips during the entire piece. The piece ends with the protagonist being so exhausted by his job that he is now counting paper clips in Lodi, California. (See Appendix B for the full text of *Broken Crystals*.)

In composing this work, as well as many of my other story-like pieces, I began with a collection of sounds which I have accumulated over a period of time. These sounds can be mere recordings of natural events, they might be electronically processed from natural sounds, or occasionally they might be purely 'synthetic' in origin. They all have some feature which I have found 'peculiar' or interesting and to which I have associated some fragmentary idea about a text. It is generally easier for me to find texts for sounds rather than the reverse. In this regard, my technique parallels somewhat the use of visual artifacts by the English sound poets: however, acoustical artifacts have a narrower application at this level of composition in that they are only useful to me as 'text generators'. This process also categorizes me more as a writer rather than a musician.

After gathering enough of these ideas to generate a story, I usually write a rough version of a text. I then arrange the sounds I have collected on a recording in the order in which they relate to the text. Additional acoustical materials (accentuated peculiarities of the original material, processed spoken text fragments, etc.) are used to give the recording dimension and balance. The completed tape then provides an acoustical structure by which I revise the text, taking advantage of the previously unrealized acoustical features. The completed tape may then provide me with additional ideas on how I might perform the work.

I have also used these digital sampling techniques on tape pieces which focus on just a few effects and which function as studies for me. They are less developed versions of the composition technique just described and usually focus on a particular acoustic or semantic process. In this regard, I have also been interested in hardware which can synthesize speech rather than just reproduce it from digital sampling. Recently, I constructed a device from inexpensive talking clock parts which was a five-voiced *random number speaker*, each voice being programmed to turn on and off in a particular pattern. This configuration resulted in a device which could produce random words (within the finite set of words

which a clock might say) within a formal structure. The device was constructed so that it could be plugged into a sound system and turned on. It would then produce a piece [35] and turn itself off. I sent this device to a performance which I could not attend as a sort of *sound-poet-in-a-box*. I have intentions to expand this device to include some kind of motor control to produce a real robot sound poet which would dance as it speaks.

Another device I have constructed and used is a *text-to-speech* synthesizer which allows one to use a keyboard to type texts which the synthesizer attempts to say. One such study of mine using this device was *Starting From Maya* (1984). The text for this piece was an excerpt of transliterated Mayan writing. I typed the text into the text-to-speech synthesizer and it pronounced it with English phonemes to generate nonsense words. I then rewrote the texts several times, gradually replacing the nonsense words with the real words and phrases which the sounds reminded me of. I made two variations on the texts and the two resulting synthesized voices were superimposed upon one another in a sort of question-answer catechism.

My most recent configuration of equipment for my performances is quite portable and I can handle it along with personal luggage by myself. I have used it for local performances and have also taken it to Europe for performances there. Though it is fairly compatible with most of the audio systems I have encountered while travelling, more work has to be done in order to get the best audio results with widely varied systems. More critical, however, is the problem of controlling several complex events during a performance; my system is much easier to use if I am manipulating someone else's voice during a performance or using it in a non-real-time studio situation. Presently I am working on a vocabulary of effects which can be selected during the performance with a minimum of physical movement or thought. I am also exploring other means of system control such as touch-sensitive film. Some kind of speech recognition device is ultimately needed here, such as key words which could trigger particular effects. By also adding pitch and amplitude sensing [36], one might be able to develop some sort of emotional sensing device which would respond to the particular way a text was performed.

The construction and use of this kind of hardware has allowed me to deal with the smallest aspects of vocal articulation with an awareness and flexibility I could never achieve with tape techniques alone.

The human voice is still a largely untapped reserve for the artist. Using this kind of digital sampling technology on the voice provides a wide palette of acoustical-emotional colors which can be used by either the musician or the poet. I believe these digital techniques can give vocal manipulation an immediacy that often is lacking with other electro-acoustic methods. With these techniques the poet can mold a human utterance into a sound object limited in form only by the imagination, allowing thought to become sound and sound to become thought.

REFERENCES AND NOTES

1. A good analysis of the technological aspects of text-sound composition and the historical significance of electro-acoustic poetry can be found in Nicholas Zurbrugg, "Marinetti, Boccioni and Electroacoustic Poetry: Futurism and after", *Comparative Criticism: A Year-book*, Vol. 4 (Cambridge: Cambridge University Press, 1982).
2. In 1978, I compiled a general bibliography including an extensive listing of recordings published to that date. This was published in *The Poetry Reading*, eds. Stephen Vincent and Ellen Zweig (San Francisco: Momo's Press, 1981) pp. 328-344. The pioneering Master's thesis, Stephen Ruppenthal, *History of the Development and Techniques of Sound Poetry in the Twentieth Century in Western Culture* (San Jose, California: Department of Music, San Jose State University, 1975) is still one of the best sources of information available in English on sound poetry history. The only book-length history of sound poetry which has been published so far is Henri Chopin, *Poesie Sonore Internationale* (Paris: Jean-Michel Place, 1979). A shorter general history in English can also be found in the article, Stephen Ruppenthal and Larry Wendt, "Vocable Gestures: A Historical Survey of Sound Poetry", *Art Contemporary* No.9 (San Francisco, 1977). The most extensive recorded anthology of sound poetry to date is *futura, Poesia Sonora* compiled by Arrigo Lora-Totino (Milan: Cramps Records, 1979). This seven-record set also contains a large booklet with historical and biographical notes translated into English. This collection, however, lacks representation from America, Canada and Sweden. The record *10 + 2:12 American Text Sound Pieces* ed. Charles Amirkhanian (Berkeley, California: 1750 Arch Records, 1975) is an out-of-print American anthology which can still be found in several record shops in the San Francisco Bay area.
3. Bengt Emil Johnson, "Fylkingen's Group for Linguistic Arts and Text-Sound Compositions", *FYLKINGEN International Bulletin* 2.1969 (Stockholm: FYLKINGEN, 1969) p. 13.
4. An examination of the Fylkingen facilities of the late 1960s with photographs and biographies of the individuals there at that time can be found in Bengt Emil Johnson, Sven Hansell and Harvey

- Matusow, "Fylkingen", *Source* Vol. 4, No. 2 (Sacramento, California: Composer Performance Editions, 1970).
5. Johnson [3] p. 14.
 6. These BBC experiments can be found on the tape Brion Gysin, *The Brion Gysin Show "Where is that Word"* (Dusseldorf: S-Press Tonband Verlag, tape 32) and on the record Bob Cobbing, *ABC in Sound* and Ernst Jandl, *Sprechgedichte* (London: Writers Forum, 1969).
 7. François Dufrêne was the first to explore electro-acoustic techniques for the production of sound poetry. A collection of his works can be found on three cassettes titled *Oeuvre Desintégralé* (Antwerp: Guy Schraenen, 1976). He also wrote a detailed essay on the history of sound poetry, "Le Lettrisme et toujours pendant". *Opus International* No. 40-41 (Paris: Editions Georges Fall, 1973). A small record of examples, *L'Antonmatopek I*, edited by Dufrêne was co-published with the article (Dufrêne died on 12 December, 1982). Henri Chopin, among other works, published the first review in France (1958) for audiopoems with his *Cinquième Saison* (nineteen numbers from 1958-1961). He also did the first international review for sound poetry with his *Review OU* (thirteen numbers from 1964-1972). Eleven records were also published in particular issues of *OU* and they contain works from the original practitioners of electro-acoustic poetry. Chopin's most recent record of his own work is *Poesie Sonore* (Brussels: IGLOO IGL 013, 1983). Bernard Heidsieck was also an early originator in this area beginning in the late fifties. Early recordings of his works can be found in *Poèmes Partition D2 + D3 Z*, two records and a book (Ingatestone: Collection OU, 1973) and *Partition V*, six records and a book (Paris: Le Soleil Noir, 1973). Heidsieck's most recent record is *Puissance B* (Verona: Edizioni Lotta Poetica, 1983). A recent publication of photographs of poets in performance has been produced by Heidsieck's wife, Françoise Janicot, which contains many examples of sound poetry performances, *Poésie en action* (Loques a Nèpe: Paris, 1984).
 8. Some of Paul de Vree's pieces from the sixties can be found on the cassette, *Poemi audio-visuali* (Brescia: Edizioni Amodulo, 1970).
 9. Several cassette recordings of Jackson MacLow's work have been published by the New Wilderness Foundation in New York. See also *The 8-voice Stereo-Canon Realisation (11/25/73) (for Kathy Acker)-August 1973-of the 'Black Tarantula Crossword Gathas'* (Dusseldorf: S-Press Tonband Verlag, No. 33).
 10. Charles Amirkhanian, *Lexical Music* (1750 Arch Records: Berkeley, 1979).
 11. John Giorno has done many anthologies of recorded poetry under his Giorno Poetry Systems label. In 1983, he published his 15-year anniversary *Dial-A-Poem LP, You're a Hook* (New York: GPS 030, 1983). The earliest record of his own poetry was *Raspberry, Pornographic Poem* (New York: Intravenus Mind, 1967). He is now publishing poetry video works as well.
 12. The term 'sound poetry' has been in English vocabularies at least since the 1930s when Eugene Jollas discussed various aspects and published the poetry of such writers as F.T. Marinetti, Kurt Schwitters, Teo van Doesburg, Hugo Ball, Hans Arp, Tristan Tzara, etc. in his archtypal little magazine *Transition*. Jollas made the literal translation of the term "Lautgedichte" as it appeared in the Dadaist poet Hugo Ball's diary, "Flucht aus der Zeit" and published "Hugo Ball: Sound Poems" in *Transition* No. 25, Fall (Paris: Shakespeare and Co., 1936).
 13. Hugo Ball, *Flight Out of Time*, ed. John Elderfield, trans. Ann Rains (New York: Viking Press, 1974) p. 70.
 14. A total of eight record anthologies were published by Fylkingen from 1968 to 1978: *No. 1 Stockholm Festival 1968* (RELP 1049), *No. 2 Stockholm 1968* (RELP 1054), *No. 3 Stockholm 1969* (RELP 1072), *No. 4 Stockholm 1969* (1073), *No. 5 Stockholm 1969* (RELP 1074), *No. 6 Stockholm 1970* (RELP 1102), *No. 7 Stockholm 1970* (RELP 1103), and *Text-Sound Festivals-10 Years* (RELP 1010).
 - There are literally thousands of sound poems, many of them significant, which have never been pressed as records. Many are circulated as small edition cassette publications or privately owned tape duplications from the master recordings. Since a complete listing of works produced after 1969 does not exist, it is difficult to grasp the actual material being produced. Some indication of the enormity of the field can be calculated, however, from the material collected until 1969. A "very incomplete" list of a few hundred text-sound pieces can be found in the *Fylkingen Catalogue of Text-Sound Compositions*, ed. Sten Hanson (Stockholm: FYLKINGEN, 1969). This list can then be augmented with the titles of several hundred other sound poems extracted from the *International Electronic Music Catalog* compiled by Hugh Davies (New York: GRM/Independent Electronic Music Center, 1968), which is a listing of almost all electro-acoustic works produced in this century until 1966.
 15. There have been several anthologies of visual poetry published since the sixties, some of the more general ones include: *An Anthology of Concrete Poetry*, ed. Emmett Williams (New York: Something Else Press, 1967). *Concrete Poetry: A World View*, ed. Mary Ellen Solt (New York: Indiana University Press, 1967). *Visual Poetry Anthology: 133 poets from 25 countries*, ed. g.j. de rook (Utrecht: Uitgeverij Bert Bakker Den Haag, 1975). *Tecken: Lettres, Signes, Ecritures*, eds. Roberto Altmann, Ann-Marie Björklund, Eje Högestätt and Elisabeth Liljadahl (Malmö, Sweden: Tryckerigruppen, 1978).
 - Bob Cobbing and Peter Mayer, *Concerning Concrete Poetry* (Writers Forum: London, 1978).
 16. Further examinations of language-orientated performance art can be found in the following: *The Poetry Reading* [1]. Ellen Marcia Zweig, *Performance Poetry: Critical Approaches to Contemporary Intermedia* (Doctorate Dis-
- sertation for English Language and Literature, Ann Arbor, Michigan: The University of Michigan, 1980).
- Dick Higgins, *A Dialectic of Centuries: Notes towards a Theory of the New Arts* (New York: Printed Editions, 1978).
- Performance in Postmodern Culture*, eds. Michel Benamou and Charles Caramello (Madison, Wisconsin: Coda Press, 1977).
- Open Poetry*, eds. Ronald Gross and George Quasha (New York: Simon & Schuster, 1973).
17. See *La Poésie Lettriste* by Jean-Paul Curtay (Paris: Editions Seghers, 1974). See also "LETTTRISME: Into the Present" Stephen C. Foster, ed. *Visible Language*, Volume XVII, Number 3 (Cleveland, Ohio: Visible Language, 1983).
 18. One such example can be found in Ernest Robson, *Prosodynic Print: an Orthographic Way of Writing English Prosody* (Parker Ford, Pennsylvania: Primary Press, 1975).
 19. "Le Lettrisme et toujours pendant" [7]. Gil J. Wolman and Jean-Louis Brau were also important figures in the Ultralettrist activities. Greil Marcus, a writer of criticism on rock and roll music has pointed out to me in correspondence the involved relationship between Wolman and Brau and the cultural roots of the English punk movement, which he discovered while working on a book about punk. There is much which could be said about the sound and aesthetic similarities between these two groups.
 20. Bob Cobbing, "Music for Dancing," *Stereo Headphones* No. 4; ed. Nicholas Zurbrugg (Suffolk, England: Zurbrugg, 1971). "Both visual poetry and sound poetry incorporate elements of rhythm. One can move inwardly to a sound poem or interpret it in outward movements or dance. One can, by empathy, enter into the spatial rhythms of a visual poem, or can give it full muscular response. So both sound and visual poetry are steps to the arena. Visual poetry is the plan, sound poetry the impulse; visual poetry the score and sound poetry your actual music for dancing."
 21. Bob Cobbing, "An Approach to Notation" in *Bob Cobbing & Writers Forum*, Peter Mayer, ed. (London: Ceolfrith Press, 1974) p. 38. As Basil Bunting put it (*Agenda*, Autumn/Winter 1973) "... history points to an origin that poetry and music share in the dance that seems to be part of the makeup of homo sapiens, and needs no more justification or conscious control than breathing. Notation is not an essential for exploration along these lines, but it does have its uses. It performs the same sort of function as the verbal/diagrammatic representations of an American-Indian ritual chant/dance, for example. Speaking of this, Jarome Rothenberg has remarked that it is 'all poetry, all poet's work' for in Navajo experience poetry and music and dance haven't suffered separation."
 22. Mayer [21] p. 13.
 23. Mayer [21] p. 13. "These notations seek to stimulate rather than dictate. Often, the first spontaneous reaction is the best guide to procedure; though experience does bring increasing potential for

- successful interpretations. They may also be used as scores for tape-recorder/electronic studio treatment."
24. Paula Claire, *Stone Tones*, in *Writers Forum Folders* No. 15 (London: Writers Forum, 1974). Also: Paula Claire, *The Development of My Sound Poetry, 1961-83*. The International Concrete Poetry Archive Publication No. Two (Oxford, 1983).
 25. Cobbing's Experimental Poetry Workshop has been active in London for over 30 years.
 26. P.C. Fencott, *The Legend of Jack O'Kent* (Toronto: grOnk, 1978).
 27. Bernard Heidsieck, "Why Poesie Sonore?" in *Kontextsound*, ed. Michael Gibbs (Amsterdam: Kontexts Publications, 1977) p. 9. "Thus the poem with its perpetual preoccupation with communication resolves itself, concentrated itself, in the shout, in the phoneme, in the chains of phonemes, in the sound. Fleeing in this way from the page, and, in a word, having become 'active' again, it has used those means, the electric, electroacoustic techniques, which were at hand, and which are those of our daily sonorous bath."
 28. Bernard Heidsieck, correspondence with the author, 10 August 1984. The text for letter "k" of *Derviche/Le Robert* has recently been published in *Lotta Poetica* series 2, Number 10, ed. Anne Guglielmi (Verona: Lotta Poetica, 1984).
 29. Charles Dodge produced a number of speech compositions at this facility between 1972 and 1975 which have been collected on his album, *Synthesized Speech Music* (New York: CRI SD 348, 1976).
 30. IRCAM is a facility near the Centre Georges Pompidou in Paris funded largely by the French government to conduct research into the digital production of music. *CHANT* is a computer program produced there which can be used to synthesize a wide variety of speech effects. Examples of what can be done with this program can be found on the record, *IRCAM—un portrait* (Paris: IRCAM 0001, 1983), as well as a small "Soundsheet" published with the article by Xavier Rodet, Yves Potard and Jean-Baptiste Barrière, "The CHANT Project: From Synthesis of the Singing Voice to Synthesis in General" *Computer Music Journal* 8 Number 3 (Cambridge, MA: The MIT Press, 1984) pp. 15-31.
 31. The concept of computer music as being a form of folk music is not new and can be found described on the liner notes to Laurie Spiegel's album, *The Expanding Universe* (Vermont: Philo Records, 1980).
 32. This is Chopin's term for acoustical material of vocal origins which can be isolated by tape recorder techniques such as overdubbing and splicing. See "Open Letter to Aphonic Musicians (1)", Henri Chopin, *Revue OU* No. 33 (Paris: OU, 1968).
 33. Claude Levi-Strauss, *The Savage Mind* (Chicago: The University of Chicago Press, 1970) p. 16. "The 'bricoleur' is adept at performing a large number of diverse tasks; but, unlike the engineer, he does not subordinate each of them to the availability of raw materials and tools conceived and procured for the purpose of the project. His universe is closed and the rules of his game are always to make do with 'whatever is at hand', that is to say with a set of tools and materials which is always finite and is also heterogenous because what it contains bears no relation to the current project, or indeed to any particular project, but is the contingent result of all the occasions there have been to renew or enrich the stock or to maintain it with the remains of previous constructions or destructions."
 34. Matthew Arnold, "Culture and Anarchy", *The Portable Matthew Arnold*, ed. Lionel Trilling (New York: Viking Press, 1956) pp. 531-533. The nineteenth century English critic and poet Matthew Arnold divided English society into three metaphorical classes: The Barbarians, the Philistines and the Populace. According to his metaphorical view of the origins of culture, it was the Barbarians who had "reinvigorated and renewed our worn-out Europe... The Barbarians brought with them the staunch individualism... and that passion for doing as one likes, for the assertion of personal liberty." The Barbarians became the aristocratic class of Arnold's society. They were differentiated from the middle-class Philistines who were wholly occupied "with the things of itself and not its real self... it is a machinery, and industrial machinery, and power and pre-eminence and other external goods, which fill its thoughts, and not an inward perfection", and the working-class Populace, "the raw and half-developed".
 35. *Numeric Analysis and Invariant Time Domains* (1984).
 36. This could be similar to the work done in music by such people as David Behrman, George Lewis and others for the past several years. George Lewis, for example, is presently working with a system made up of four inexpensive digital synthesizers controlled by a small personal computer. The computer is also interfaced with hardware which can sense amplitude and pitch variations from acoustical performers. The system can therefore produce musical material as a reaction to what is being performed.

GLOSSARY

Analog—an event which has continuous or discontinuous self-similarity as a result of its own inherent structure.

Amplitude—the intensity of change in an event.

Bit—The smallest digital element, a sort of *slot*, which has a binary existence as only two values such as "on-off", "true-false", "1-0", etc. An arrangement of eight of these bits in a logical row is known as a byte. For an 8-bit microprocessor, the byte is the basic manipulative feature of encoding and processing a value.

Digital—The process of breaking up an analog event into discrete packages of information according to some external and uniform process.

Digital sampling synthesizer—This is a synthesizer which has the capability of recording a sound digitally and then playing it back. This instrument differs from a strict *digital synthesizer* and an *analog* (or *voltage controlled*) *synthesizer* in that the sounds from a *digital synthesizer* are the results of various mathematical operations or *algorithms* performed by the instrument, whereas those from an *analog synthesizer* are the results of particular characteristics of electronic circuits. Some of the better digital synthesizers allow one to both record sound and to generate sound from material and algorithms already programmed into the instrument.

Electro-acoustic literature—Any language-based material which has to be listened to in order to be perceived. It differs from *acoustic literature* in that it uses electro-acoustic methods in its production. In earlier electro-acoustic works these methods were merely the use of a highly amplified microphone and simple recording, but most of what can be called electro-acoustic literature makes use of much more complex manipulations.

Extended vocal techniques—Producing those sounds which the voice can make which do not normally belong to the vocabularies of speech or singing. This is a widely researched area which still has unlimited potentials. In music, *extended vocal techniques* are usually presented in highly formal contexts which make use of commonly accepted emotion-sound constructs, whereas in sound poetry such techniques are explored for their linguistic functionality.

Filter—A device which can extract specific information from an event which is dependent on its frequency. There are several kinds of filter functions such as *low-pass*, *band-pass* etc. A *low-pass* filter, for example, would only allow material to pass up to a particular frequency, whereas a *band-pass* filter would only allow a particular range or *band* of frequencies to pass. Another important feature describing a filter is its efficiency or *Q* which is simply a ratio value describing how well a filter is effecting the frequency it is set for.

Gating—A type of effect which can be likened to rapidly turning the volume up and down on an amplifier.

Integrated circuit (IC)—A small plastic or ceramic package containing a particular electronic circuit that is a sort of building block which can be connected to other devices.

Pure sound—A sound of wide dynamic range and timbral richness which contains no parasitic elements such as inaccurate harmonic distortions, "hash", or noise interferences, accidental noises, etc. Somewhat derisively compared to refined *white sugar* by an acquaintance of mine, though a more generous comparison would be to a rather fine and expensive wine with a rich bouquet and complex aftertaste. If a *pure sound* is analogous to fine wine then a *garbage sound* is cheap wine with a screw cap for a lid. It is the sound of the telephone, the cassette recorder and heavy traffic. It is everywhere pervasive in this modern society of ours and we have become deaf as a result of it. By offsetting the acoustical environment in which it is found, however, we can hear it as a new sound which is unique and vital.

Real time—A manipulation of an event which occurs more or less at the same time as the event. This is opposite of *non-real time* which requires time to prepare the manipulation which is played back at some later time.

APPENDIX A DIGITAL SAMPLING SYNTHESIS TECHNIQUES

Though there were some microprocessor-based voice manipulation systems on the commercial market when I began my work in this area. I was not aware of their capabilities. I built what could be loosely described as a *digital sampling synthesizer*. Through the process of designing such equipment myself, I had hoped to discover some things which could expand my art. In this way, my constructions could parallel my interests and development as a sound poet.

The digital sampling synthesizers currently on the market allow the user to record by digital means a sample of sound which can be played back at different pitches through a basically conventional organ/synthesizer keyboard. On elaborate systems score editing software allows a complex piece to be produced: the timbre of the recorded sound can be manipulated, *choralling* effects can be produced with one sound, or multiple sounds can be recorded for multiple voicings. Theoretically one can digitally sample a single note from a large ancient organ and perform a Bach fugue producing the same kind of sound but with an instrument which is quite small (and less expensive). One could also produce musical entertainments from the sounds of sheep and chickens with one of these instruments. The use of this method has invaded the popular music scene and it is being used with increasing frequency by such people as Laurie Anderson and the English pop group The Art of Noise.

Since I began working in this area, a number of products have become available for personal computers which would allow for digital sampled speech. These devices are generally intended for creating vocal sounds for such applications as games and often lack the software necessary for sound poetry. A poet could write software more applicable to his or her needs but the limited sound quality of these devices tempts one to start from scratch anyway.

As a result of these considerations, my technical starting point was the brute force approach of building something which would record a sound into a computer's memory and play it back much like a tape recorder. This was done by equipment which could sample a small fragment of the sound, convert it into a value to be stored in a microprocessor's memory for manipulation, and then reconvert the value into sound again. Common tape recorder effects such as echo, tape loops, splicing effects, pitch changes and retrograde effects can be produced digitally in real time.

I became interested in these digital recording effects mainly because they were relatively easy to produce with my inexpensive personal computer. I programmed these effects into my computer and built some converters to get the sound in and out. By pressing a particular key on the keyboard, a certain effect would occur to the sound I was digitally sampling. This consumer-type equipment, however, eventually proved inadequate for my needs for a number of reasons: (1) it was too large to carry; (2) the hardware did not operate fast enough; (3) interfacing other devices to this system was

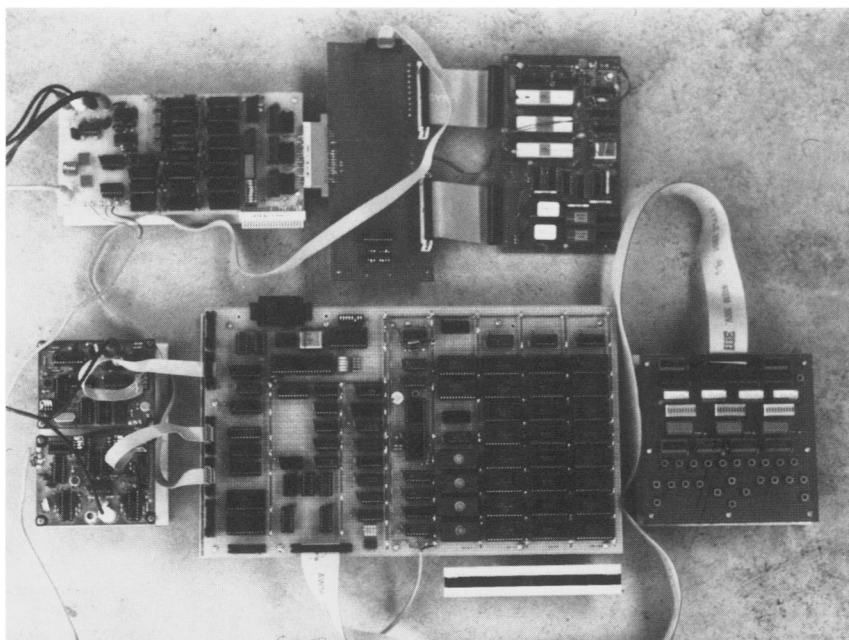


Fig. A.1. Photograph of the completed digital vocal manipulation system without mixer or playback system. The system includes two microprocessors, a special function keyboard, and signal processing hardware.

difficult—interfacing circuits had to be built which took up more space; (4) the standard typewriter-like keyboard was too large. Therefore, I constructed an inexpensive microprocessor system with all the features I wanted.

Besides producing tape-recorder effects, my system also includes a microprocessor controlled filter-amplifier combination which allows for signal processing effects similar to those one can produce with an analog synthesizer. These effects include random and complex filtering effects, 'gating' and panning effects. The system is controlled by a small handbuilt keyboard which has bars of *light emitting diodes (LEDs)* to indicate the functioning of the microprocessors, thereby eliminating the need for a large cathode ray monitor. The use of small pushbutton switches on a board allows for the selection of effects: a sequence of buttons is pressed to allow for more effects than single buttons could produce. The completed system is quite small and can be carried in a couple of 35 mm camera cases such as those used for shipping cameras by air. Figure A.1 shows the complete system next to a 6-inch ruler. This system is still very much a 'work in progress'. A great deal of software remains to be written for it and some improvements are needed on the hardware.

APPENDIX B TEXT FOR *BROKEN CRYSTALS* (1983) BY LARRY WENDT

A few years ago, I got this job with a firm called Crysteck, out in, you know, the valley—the Silicon Valley. They hired me to grow these little garnet crystals, about, oh, the size of your thumb. They were to be used in making bubble memories. It was a good job, a fine job, a wonderful job, with many great benefits and large stock sharing options in bubble technology.

When I first came on board there, and that's how they described working there, they stuck me off into this little dinky room with no

windows and a rather large blast furnace in the corner. There were no tools or anything. Just a couple of pairs of rusty fingernail clippers and a dented Chinese wok with a hole in it.

At first I spent hours trying to cheer the place up, even putting up posters outlining everything from the biochemical mechanisms of the Krebs cycle to atypical Hungarian phoneme constructions and a combination what to do in case of a sneak nuclear attack and/or earthquake done in tastefully chic black velvet, but it really didn't matter much, and I was soon caught up in the excitement of my work. So I really didn't care if my room was small and blank, I had this whole empire of crystals before me to seize and to control ruthlessly, and anyway, there were always these promises of a new office with adjoining hot tub and personalized racket ball court which was to be built for me in the very near future, but it was the crystals which really made my small cell more bearable.

Yes, it was the art of growing crystals which really interested me about the job anyway. I had grown crystals since high school though I never really thought I could make a living at it, but, here I was, I can even own my very own condominium now. I'd grind up these powders real fine and spread them out real thin, it's a very time-consuming process to be sure with lots to go wrong, but when everything is right, it's really great, and there's nothing quite like it.

I'd been working for the firm about three or four months, when I started to have these problems, a large number of my crystals would come out all broken; not only were they broken, but all these little flies would hatch out of them. They'd fly all around in my small office and get into things, like my lunch, and my hair, and generally mess up an already overcrowded situation. I'd come in to work in the mornings and they'd all be there waiting for me, pleadingly, with those jewel-dusted eyes of theirs, it was getting impossible to get anything done, if you know what I mean.

I had gotten to know some of the other

crystal growers at Crysteck, we'd often go out during our lunch breaks and sail around the Bay a couple of times, and though these growers didn't like to talk about it much, they were having problems with their crystals too. There were vague rumors about nervous breakdowns and heavy drug or alcohol use; however, most growers kept quiet about their problems.

A year went by and the situation intensified and pretty soon the halls of Crysteck were just crawling with flies, you couldn't hardly step anywhere without squashing a million or so of the little buggers, and the flies started to get larger too, and it wasn't long before they were about the size of small geese. Word also started to trickle in from the other bubble memory manufacturers in the valley that they too were having a problem with their crystals. And then

Texas put a ban on all the bubble memories imported from the valley.

Our situation just got worse and worse. Pretty soon the flies started to make lewd comments at us while we worked. We kept telling them to leave but they acted like they owned the place. They would bully and intimidate the secretaries in the front office with their demands for more paperclips and thumbtacks. And they'd run around the halls playing out scenes from their favorite cop programs on TV. One day, we all arrived to work to find the flies playing computer games and listening to rock and roll.

That was the last straw; with that, old man Crysteck came out of his office, livid with rage, fired us all, chained up the doors, and flew off somewhere to raise seaweed and never to be heard from or seen again.

The President of the United States declared the Silicon Valley a disaster area and began using B-52's to drop giant, ugly Cane Toads imported from New Guinea all over the place. But it was never made clear what the toads were suppose to do, they just sort of sat around and hung out a lot and fostered the overripe tomato look which you so often see now in the shopping centers around in the valley here. Meanwhile, the bottom dropped out of bubble memories.

I've since sold all my stock. It wasn't worth much of anything anyway. I'm into ordinary memory now, or at least until the Japanese corner the market. After looking around for a long time, I also got a new job last week, this time counting paper clips in the town of Lodi up in, you know, northern California. I think it will go better for me this time.