**Plus ça change: Journeys, Instruments and Networks, 1966–2000**

**Lawrence Casserley**

The intention of this article is to examine, from technical and philosophical points of view, key aspects of the work in which I was involved in the 1970s compared with that of the 1990s. How was it similar? How did it differ? Particular emphasis will be placed on the use of electronic means of sound production and processing in live performance and relationships between electronic performance and improvisation.

In 1966, I returned to Britain after 14 years in the U.S.A. In 1967, I joined the new Electronic Music course taught by Tristram Cary (please see Appendix 1 for a list of references to persons mentioned in the text) at the Royal College of Music (RCM) in London. From then onwards most of my work has involved electronic means.

One of the crucial concepts in my music at that time was the idea of journey. The idea of taking a sound on a journey occurred to me quite early in my electronic explorations and it is still a significant concept in my work. (The concept of journey had been present already in my instrumental writing.) I developed a form of progressive transformation using ring modulation that formed the basis of my first electronic work, _The Final Desolation of Solitude_ (1968–1969). The technique involves repeated modulation so that the timbre is progressively altered, while the morphology of the sounds remains recognizable. The most developed and clearest example of this technique is another early tape work, _Transformations I_ (1970), in which the repeated comparison of each generation of transformation with its original source points up the distance that has been traveled.

Equally crucial at that time was the conviction that, for me, electronic music would have to be primarily a performance medium, and that I would need to develop my own tools and instruments in order for this to happen. My second electronic work, _Solos, Commentaries and Integrations_ (1969) developed both these ideas. The piece consists of three layers: electronically transformed clarinet, percussion and electronic tape, and each layer is in three parts, which begin and end independently.

Through Tristram Cary, the RCM studio had a connection with Peter Zinoviev’s pioneering computer music studio in Putney, and the students made several visits there. During one of these (as far as I recall, in 1968) I created some sound material. The three tape sections are progressive transformations of this material. In 1969 I purchased a VCS1 (Voltage Controlled Studio), the first product of Electronic Music Studios (EMS) (London) Ltd and forerunner of the famous VCS3 (also called “The Putney”); this VCS1 became my first performance instrument [1]. I used the VCS1 to process the clarinet sound; in the first part, the clarinet is amplified and reverberated; in the second, it is ring modulated with a fixed frequency; and in the third, it is ring modulated with a slowly changing frequency controlled by the electronics performer. An equivalent journey of progressive transformation is taken in the percussion layer. Here is the germ of the idea of the electronic instrument and its performer each taking equal roles in the ensemble.

Later, I would evolve the idea of networks. These differ from my other electronic instruments in that they display a definite, usually quite complex behavior, which requires little or no input from an electronics performer. Typically, these would include multiple delays with multiple feedback paths and some form of processing built into these paths. These depend on an instrumental performer listening and responding to the delays; the “control” of the network comes from the acoustic performer’s responses to its behavior. A step in this direction is _Transformations III_ (begun in 1971, but not given its final form until 1982—during this period the network concept was developed, although I did not actually use this term until about 1992), for flute and live electronics. Here two delays, of 4 and 7 beats at 50 beats per minute, are used. The outputs are fed to three ring modulators, which perform modulations between live flute and delay one; between live flute and delay two; and between delay one and delay two. A different combination of these modulations is used in each section of the piece, but otherwise there is no input from the electronics performer.

These three concepts—of journey, performance and networks—have played a major role in much of my music ever since. I will examine their importance in some of my work in the 1970s and 1990s (I consider the 1980s a transition period between the two).

**The 1970s—Exploration and Promise**

The most important outlet for my work during the 1970s was the multimedia group Hydra. In 1970, I was invited to create a studio and teach classes at the Inner London Education Authority’s new Cockpit Arts Centre, a purpose-built theater and art center, working with both school groups and adult-

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**ABSTRACT**

The author has been using electronic means in performance since the late 1960s. In this article he compares his work in the 1970s and 1990s from both technical and philosophical viewpoints. How do these two periods differ? How are they similar? He concludes that, partly due to recent technological developments, he has been able in recent years to explore more deeply and broadly the aims that he established in the earlier period.

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education classes. One of my first students was the painter Eddie Franklin-White, who was also teaching and running a mixed-media resource center at Hornsey College of Art, London. The Cockpit’s theater encouraged cross-media experimentation, and Franklin-White and I collaborated on a piece for live electronics and light.

We made no attempt to form a direct equivalence between the sound and light, particularly as the use of space was central to our ideas. Indeed it was the concept of articulating space, physical and temporal, with both media that was the driving force. This eventually became the core intention of Dodman Point (1972). The original working title, used for performances at the Cockpit in 1971 and at The Round House in the 1972 International Carnival of Experimental Sound (ICES) Festival, was Sound, Light and Space. The piece is constructed as a series of “tableaux,” fixed points at which we had decided upon a specific combination of sound and light. Between the tableaux, sound and light would each follow its own logic for the journey from one fixed position to another, through a process of continuous transformation. The realities of the equipment available to us—three VCS3s for the sound, simple dimmer boards for the light—meant that a precise configuration required considerable fine adjustment. The tableaux became pauses, during which the performers gradually “tuned in” to the final setting. The settling down of the tableaux became an important element of the piece. Between the tableaux the transitions were worked out to a timed score with performers following stopwatches. The score was a list of instructions and timings for the performers.

Dodman Point represents one of the most detailed workings out of the “journey” principle in my work. I created what I called evolutionary patches on the VCS3, where each sound could gradually metamorphose into another. Each voice is in constant movement, following its own route, until the next point of rest, a tableau, is reached. This is a continuous process of transformation; in a piece lasting 60 minutes, only once does each player drop out to repatch the VCS3.

Another interesting aspect of Dodman Point was the spatial configuration used for the sound. One of several possible layouts for the Cockpit Theatre was in the round. We wanted the central “arena” to be the space that we were articulating with both light and sound. I adopted a tetrahedral loudspeaker array, skewed so that one speaker was on the floor, two were in a gallery halfway up the walls and the fourth was in another high gallery near the roof. I had built a mixer that made it possible to pan between any two combinations of speakers. This made possible a very flexible control of sound movements and a sculptural approach to the sound in space, in contrast to the surround approach used by most multi-speaker systems. Subsequently, we adapted this arrangement to suit different performance spaces.

As a result of these experiences, we formed Hydra, which was not a fixed ensemble, but rather a forum for collaboration between practitioners of different art forms. Over the years a number of visual artists, writers and musicians became involved to a greater or lesser extent. Eddie Franklin-White’s work at Hornsey produced a rich stream of experimental art (Rupert Morley’s work with polarized light and lasers and Gillian Olenksy’s smoke domes are prime examples) [2]. Musicians included Per Hartmann and Simon Desorgher. Sound poet Bob Cobbing was also a key element in some of the performances.

I first met Cobbing in the early 1970s, when I was teaching at Goldsmiths College, London, and he was poet-in-residence. The result was a collaborative tape version of Cobbing’s 15 Shakespeare Kykus and subsequently a fruitful relationship lasting a number of years. Later, while planning a performance at the National Poetry Centre in London, we decided to collaborate on a live work combining Cobbing with the resources of Hydra; this resulted in Hydrangea (1974) [3], for voices, instruments, live electronics and light.

This work stretches the word “hydrangea,” with a few embellishments, to a length of 1 hour. Cobbing wrote some visual poems for each section, and I created instrumental, electronic and light interpretations of the sonic material revealed; these interpretations are not meant to be “the same as” the original, but additional layers of response. For each section, the performer has a list of letters, a duration, a number of events and a “density vector,” an arrow indicating the general density shape (i.e. changes in the number of events played per unit of time) of that section. The player interprets these freely within the capabilities of the instrument. The electronic part, for two VCS3s, develops the electronic-instrument concept in that essentially only two patches are used, with certain simple variations. The patches were designed so that both could be set up on a VCS3 without major changes. One type, based on frequency modulation with and without filtering, is associated with vowels; the other, based on filtered and gated white noise, is associated with consonants. The indications for these performers are similar to those for the other instrumentalists.

The point of Hydra was to encourage collaboration and experimentation across media boundaries, and much of Hydra’s work was improvised or partially improvised. It is interesting to note that I had little contact with the free-improvisation scene in London at that time. Certainly, I was aware of groups such as AMM and the Music Improvisation Company and attended some of their concerts, but there seemed between them and me a great gulf fixed. With hindsight, that gulf appears merely a shallow ditch, but then it seemed impassable. A number of people with whom I was in contact (Hugh Davies and Barry Guy, for example) moved in both worlds. Other contemporary groups, such as Gentle Fire and Intermodulation were using indeterminate scores and/or group composition [4], but the Hydra approach, particularly in our later work, was in many ways closer to that of the free improvisers, but working across several media. Unlike Gentle Fire or Intermodulation, however, who frequently interpreted scores by Cage or Stockhausen, for example [5], we performed only our own material.

In one important respect, though, we differed from groups such as AMM: we were happy to use pre-composed, partly pre-composed or wholly improvised work as the context required. I think it is fair to say our work was much less purist, more hybridized, perhaps as a result of the cross-fertilization of ideas from several media. It must be said, however, that such cross-influences occurred in much of the work of the period. For example, Derek Bailey [6] describes how Tony Oxley’s connection with contemporary jazz and Gavin Bryars’s interest in contemporary composers fused with his own background in commercial music in the work of their trio, Joseph Holbrooke. In attempting to fuse in performance the very different experiences and priorities of music, poetry and visual arts, we were setting ourselves some very great challenges. Saying this, however, I am reminded of Bailey’s caveat in the above-noted passage: “The main distortion of this retrospective description...
is to greatly simplify the whole process and, most particularly, to give the development of the music a more deliberate, more calculated, intellectual character than it actually had” [7].

From our millennial perspective, it is too easy to regret the separation noted above, but I prefer to think that these separate strands have grown in their own ways until, in the late 1990s, it became obvious that their ever overlapping branches are just part of the rich culture of our time. With hindsight, I admit that it was easier for me at that time to accept and work with ideas from different media than it was to accommodate those from other forms of music. For example, I felt closer to much of the work of the sound poets than to that of many musicians of the time. Also, although I was doing a lot of performing, I still did not see myself primarily as a performer. Later I would realize that, for me, composition and performance are completely inter-related, but then I was a composer first and a performer only because it was necessary.

THE 1980S—THE SEARCH FOR A NEW WAY
Towards the end of the 1970s, I was becoming increasingly dissatisfied with the limitations of the available instruments; I was also becoming aware of the growing potential of microprocessors (I had been involved in a microprocessor-based design project between 1975 and 1977 [8]). I was convinced that real-time digital signal processing was the only way forward. In 1980 I had begun to compose "Angel Music" for oboe, percussion and live processing, but found myself unable to complete it to my satisfaction; I simply did not have the technical resources to realize my ideas. I would have to wait until the 1990s before I had the means to develop the signal processing instruments to resolve this impasse. (I am now preparing a new version of "Angel Music," utilizing the techniques I have since developed, for performance in 2002.)

One of the effects of my absorption during the 1980s with developing digital signal processing techniques was that I did less composing and more performing. The key events of the time were centered around my collaboration with Simon Desorgher and the Nettlefold Festival, which we founded together. Out of that came the ensembles Tube Sculpture (later reformed as Electric Tubes) and the Electroacoustic Cabaret. Both of these were cross-media concepts and both were collaborative and improvisatory in nature.

Tube Sculpture (founded 1984) features a new acoustic instrument, the giant panpipes, that Desorgher and I designed and built together. This instrument is played by two players and consists of about 150 pipes, ranging in length from 15 feet to a few inches. Half the set are blown flute-fashion by Simon Desorgher; the other half are made into percussion instruments, the longer ones fitted with drum heads, while the shorter ones form a tubular glockenspiel, played by myself. Not only was this instrument designed to be spectacular visually as well as aurally, it was intended as an instrument with electronic extensions integral to its nature. It was not until the 1990s that its full potential was realized in a new version of the electronic part of the instrument utilizing real-time digital signal processing [9].

The Electroacoustic Cabaret (founded 1985) evolved as a way of presenting contemporary music in a new way, an informal “cabaret” atmosphere; the collaboration with mime artists Ian Cameron and Linda Coggin, as well as with trombonist Alan Tomlinson, was a vital element. Later Hugh Davies and Biff Harrison became involved, as well as Paul Houlton as compere [10].

For me the vital experience of both these groups was learning to perform in different contexts and to interface with audiences in different ways. It was here that I began to accept myself as a performer, to find a different way to create new things. No longer was I just a composer, but more importantly, I developed a fundamentally different attitude toward the audience. Although we used a lot of electronic resources in Cabaret performances, my main instruments were invented or abstracted devices—monochords, motorcycles and unusual percussion objects.

THE 1990S—NEW CHALLENGES AND PROMISES FULFILLED
Two major events altered the landscape irrevocably for me: in 1989 Desorgher and I began to make performances in Peter Jones’ Colourscape, a walk-in sculpture of pure color; and in 1992 I was fortunate to be able to obtain one of the first IRCAM Signal Processing Workstations (ISPW) [11]. The first exposed me to a whole new way of interfacing with a completely new public. Colourscape is the generic title for a series of inflatable structures created by Jones and his associates since the 1970s. These consist of chambers of translucent plastic in primary colors coupled with opaque chambers, where the light from adjacent color chambers is mixed to produce a large range of colored vistas [12]. Unlike a typical music venue, which attracts an audience expecting a specific genre, Colourscape attracts a wide variety of the public, many of whom would not usually attend contemporary music concerts. Engaging with this new audience has been an important aspect of working in this exciting environment. Just as important is the fact that performers and audience are occupying the same space; there is no separation between “stage” and “auditorium.”

The second event allowed me, at last, to begin realizing concepts dating back 20 years [13]. One of the first benefits of the ISPW was to enable my network concepts to reach fruition. In 1987 I had created a music theater work, The Unending Rose, for the Electroacoustic Cabaret. One of the characters in this work is a monk “who kneels at a prayer desk and intones a long prayer on a bass flute, which spreads like ripples over water.” I extracted the monk’s music as a separate piece, which has been performed many times. The flute plays a melody, then repeats it a number of times with variations indicated in the score. My idea was that there would be a multi-tapped delay lasting the length of the melody—about 97 seconds—but delays of that length were not affordable (the rapid expansion in the capacity of digital memory chips was only just beginning), so I was always forced to compromise using available resources. In 1993 we performed The Monk’s Prayer for the first time in its intended form.

In 1990, Los Hijos del Sol premiered at the Gulbenkian Foundation in Lisbon. For this piece, I created a network out of Yamaha SPX processors and delay lines. This is really a very simple network: four delay/pitch shifts and two longer delay lines. Feedback from the two delay lines is set so that a sound reverberates through the system for about 2 minutes. Despite its simplicity this network allows the performer to delineate the four sections clearly by altering the input material—voice and the drums of the giant panpipes. Nothing is written in Los Hijos del Sol except the titles of the four sections—the network is the piece. Inherent in this idea is the journey that each sound takes as it passes through the network and the performer’s response to the transformed echoes.
Another important work is *Labyrinth* (1989, revised 1998), a music theater work I created for *Colourscape*. Once again, this was originally created with the limited resources available at the time. In revising the work in 1998, I utilized the full potential of the techniques I had developed on the ISPW, now transferred to Max/msp [14] on Macintosh computers. This is the most highly developed example of the network principle in my work to date. There are in fact two separate networks: one processes the sound of gongs, representing the labyrinth itself, and voice, representing the Minotaur; the second processes the flute, representing Theseus. The Theseus network is very similar to that used in *Los Hijos del Sol*, except that the delay and pitch-shift parameters change gradually through the piece. These changes, together with changes in the material on which the flute part is based, constitute the Theseus music.

The Minotaur network is more complex. I wanted something that was changing constantly, with a life of its own, so that every gesture of the Minotaur becomes multiplied and magnified to enormous proportions. In addition, I wanted the music to be dark and disturbing, as well as rather beautiful. There are three entry points to the network, one for the voice, one for the two lower gongs and one for the two higher gongs. Each of these is independently panned across three outputs, which are sent to three separate sub-networks; each sub-network consists of a delay line with four taps and four single sideband modulators, or frequency shifters, which are constantly ramping up and down. There is a feedback loop from the longest tap of each sub-network to the input of the next one. All of the parameters, the movements of the three panners and the 12 shifters, are controlled by random generators with carefully chosen limits. The result is a constantly moving continuum, ever changing, ever different but ever the same; the reverberating echoes simulate the echoing depths of the labyrinth. Only one control change occurs: at the climax of the piece, the shifters change rapidly from downwards shifts to upwards shifts, so that the end has a completely different character.

One feature of this system is that a very small amount of material played by the performer results in a massive amount of sound—an interesting exercise in self-restraint; as the piece progresses to its climax, more and more layers of sound are added. This is really the issue—I see networks of this kind as an intrinsic part of the instrument. The flautist in *Labyrinth* is not just playing the flute but playing an integrated flute-plus-processing network—just as the flute itself has an intrinsic behavior, so does the network attached to it. It is the combination of these two behaviors that constitutes the complete instrument and demands a very different playing technique as a result.

THE SIGNAL PROCESSING INSTRUMENT

The most significant development of my music in the 1990s has been the Signal Processing Instrument (SPI) control layout. The SPI control layout is a modular system that allows for the creation of complex, interactive musical pieces. The layout consists of several components, including a Wacom Graphics Tablet, Apple PowerBook, Peavey Fader, and Yamaha MFC40. The Wacom Graphics Tablet allows for the creation of custom control surfaces, while the Apple PowerBook serves as the central processing unit. The Peavey Fader is a foot-operated control module that provides additional control over the signal processing. The Yamaha MFC40 is a multi-functional controller that allows for the precise control of various parameters within the SPI system.
Processing Instrument (SPI), which extends the ideas of electronic instruments, most particularly in the way the performer can control its behavior. The instruments and networks discussed so far are all made for the specific requirements of particular pieces. I designed the SPI to be a general instrument for improvised music, capable of functioning in many different contexts. The original design and philosophy of this instrument have been discussed elsewhere [15,16], so I will confine myself to discussing its relation to the ideas above. The instrument has evolved noticeably since the original paper describing it, so I will begin with an update on these changes.

The fundamental idea behind the SPI, based on Simon Emmerson’s “local/field” concept [17], remains unchanged, although the implementation has developed significantly. The linear design from “local-to-instrumentalist,” through “local-to-computer-musician” to “field” has been replaced by a more integrated structure with multiple signal paths between the processing blocks (Fig. 1). The dedicated Fast Fourier Transform (FFT)–based, “local-to-instrumentalist” block has disappeared, but the remaining two blocks, the “Pad Instrument” and the “Long Delay Instrument,” now operate across all three areas, allowing much stronger integration between “local” and “field” processing. Both these instruments have been enhanced to provide more voices, a greater range of delay times (from milliseconds to several minutes), more feedback paths and a greater range of spectral processing. Some of the transformations achievable now are remarkably similar to those created by the FFT instrument in the original version. An important new development creates improved control of the “Long Delay Instrument”; I can now manipulate the range of the 35 delay taps with great precision around a delay buffer of about 2.5 minutes.

At the same time, I developed the physical arrangement of the controllers to improve gestural control of the instrument. Two DrumKat 3.5 controllers provide the primary interface to the “Pad Instrument,” which allows me to replay delayed sounds as I choose, thus imposing my own gestural impulses on them. At the upper left of Fig. 2 is a Wacom graphics tablet, which allows gestural control of the various spectral transformations, as well as manipulation of the long delay taps. At the upper right are an Apple G3 PowerBook, which now handles all the processing, and a Peavey PC-1600 fader controller, which is used mainly to control signal levels within the system. On the floor are a Yamaha MFC10 foot controller with four additional controller pedals. The five pedals (including the one on the MFC10) control, from left to right, pad instrument level, long-delay-to-pad level, long delay level, pad instrument feedback level and pad-to-long-delay level. The switches on the MFC10 set the transposition ranges of the pads and control various other functions.

First of all, the SPI is the most highly developed electronic instrument design I have achieved. Earlier instruments, utilizing the VCS1 and VCS3 synthesizers and tape-delay systems or, later, commercial-effects units, were constrained by the physical controls required. Performing meant turning knobs or sliding faders; the most gestural event possible was pressing a button. With computer systems, it became possible to map a whole range of physical controllers to whatever aspects of the process were needed. For example, the graphics tablet is operated by a five-button mouse, and each button selects a different set of parameters for the x and y axes. In addition, many of the problems of routing signals between modules are greatly simplified when all the modules are implemented within one computer. Now it is possible for me to “play” the processed sound in a way that is directly analogous to the way acoustic instrumentalists play their sounds. While I can still make the gradual transformations typical of the earlier work, I can also make strong gestural events that make this feel like an independent instrument, although the sounds are all derived from the acoustic instrument(s) used as input.

A less-expected result is that it has also become, particularly with the recent enhancements, a wonderful system for generating networks; but now there is a new capability to control dynamically the evolution of network behavior in many ways. This has proved an immensely valuable development; I will give some examples of different contexts in which I use this instrument:

- In a duet with an acoustic musician, e.g. Evan Parker or Agusti Fernandez. In this context I concentrate on processing the sounds created by the other musician, sometimes adding a small amount of vocal material; the emphasis is on the more gestural, “instrumental” aspects of processing.
- In larger groups, e.g. the Evan Parker Electroacoustic Ensemble or the various quartets with Parker, Joel Ryan and one other musician. Here I only process the other musicians, with a strong emphasis on gestural performance, although some network-like processes happen as well.
  - In solo work, in which I create the source sounds—generally voice, monochords and amplified metal instruments. Inevitably, if I am playing these other instruments I am not able to give the same amount of energy to controlling the processing, so the emphasis will shift toward the “network” concept. This means setting up system behaviors that I can play by means of the source instruments, but with the ability to shift network behavior as I wish, sometimes with gestural content too.
  - In a quartet with Melvyn Poore, Peter Cusack and Nicolas Collins, or in a duo with Keith Rowe. In these cases, because the other musicians are already making a strongly electronic or processed kind of sound, I have adopted a middle ground, where I can balance their sounds with my processed instruments, but also process their sounds when appropriate.
  - Within the group HyperYak, consisting of Michael Ormiston, an expert in Mongolian overtone singing; Jeff Higley, who plays Tibetan singing bells; Simon Desorgher, playing a variety of Western and ethnic flutes; and myself. In addition to processing, I use a small set of my percussion instruments, monochords and voice, which assist me in fusing the electronic sounds with the rest of the ensemble. It is significant that all these are improvising groups. The capabilities of the SPI have helped me to resolve my performer/composer dichotomy and to view their combination as the most effective area for my work.

Another aspect of the SPI is its relationship to the concept of “journey.” Earlier I talked of “progressive transformation”; in my discussion of networks I talked of each sound taking a journey through the instrument. Both these things can happen in the SPI. The multivoice design of the system, coupled with a variety of processes and feedback paths, enable many sound journeys to be set up; sometimes sounds can travel through these processes many times, becoming transformed progressively. But what is most interesting about this instrument is the way these journeys can be altered and shaped as they are happening, often leading to unexpected re-
sults. This is an instrument that allows me to both realize old dreams and create new possibilities.

There is one other aspect of my recent work that should be mentioned in this context. Having spent so much effort getting my hands into and controlling the internal workings of the process, I am now starting to make installations, in which I must construct networks are able to run without my intervention and make meaningful responses to people who do not understand their behavior. This is not only a technical but also a conceptual challenge; it is another new development of the composer/performer balance. What is clear to me now is that all these activities are complementary.

CONCLUSION

In investigating key elements in my work during the 1970s and 1990s, I have shown that the most important themes are similar in both eras. The 1980s were a transitional period during which I acquired new experience and developed new techniques. The technical developments of the 1990s have certainly provided me with better tools with which to implement these ideas. The frustration I felt in 1980 at the inability to achieve my aims is reversed in 2000, when I see great possibilities for future development. This is due not only to technological developments, but to my changed perspective on the roles of performance and composition in my work.

APPENDIX 1: REFERENCES TO PEOPLE MENTIONED IN THE TEXT

As many of the names mentioned will not be familiar to all readers, I have attached brief notes and given Web references where available.

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Annotated Bibliography

A number of existing resources provide much relevant background material, particularly:

Contemporary Music Review 6, Part 1 (1991), edited by Peter Nelson and Stephen Montague, is cited above (Emmerson [4]). Apart from Emmerson’s study of live electronic music in Britain, there are many other relevant articles, some by people mentioned in this text.


The European Free Improvisers site <http://www.shef.ac.uk/misc/rec/ps/efi/> is another valuable resource in this area.

Discography


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