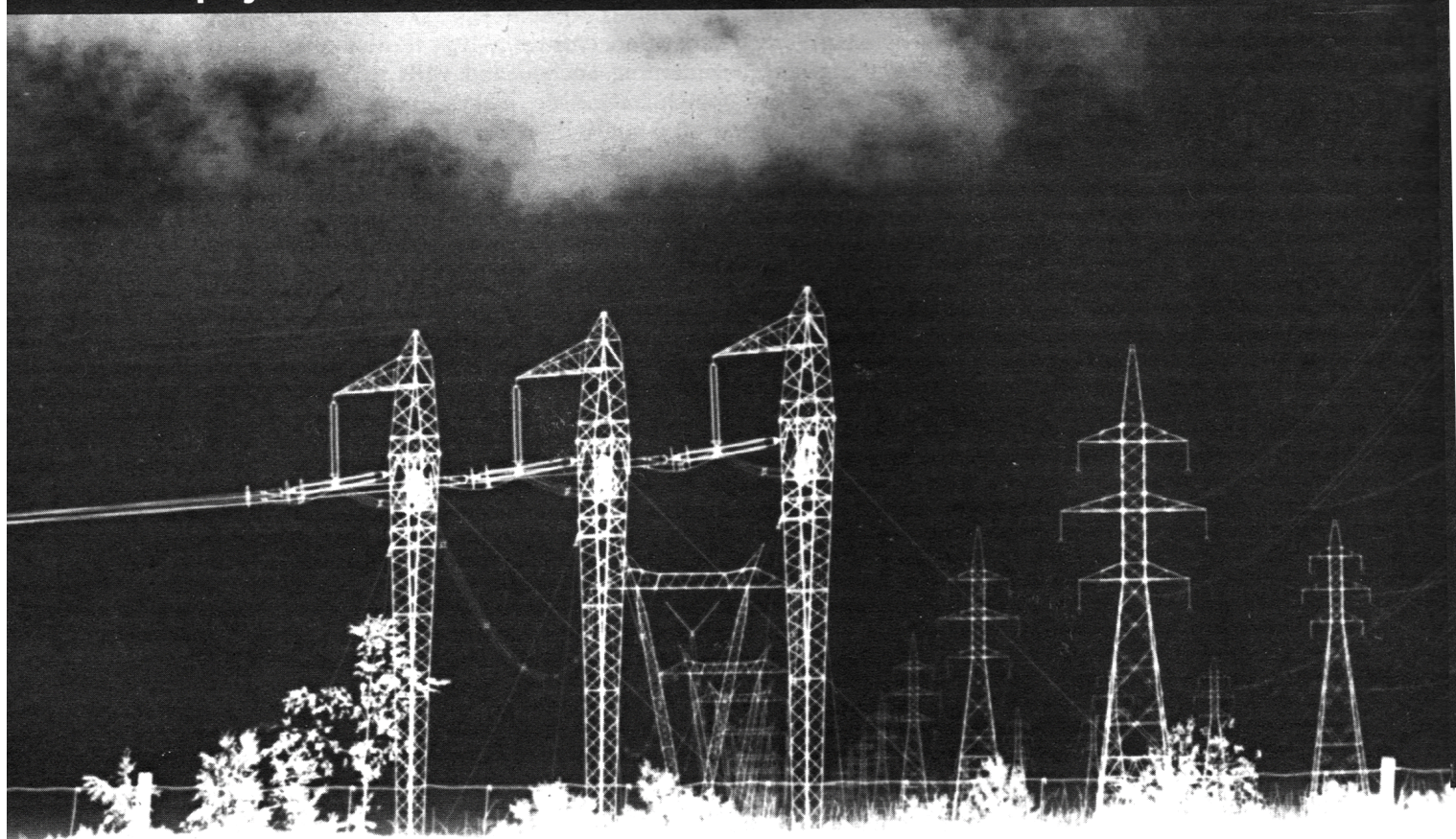


Composer Helen Hall's creative exploration of electromagnetic radiation and its physical effects has resulted in a prize-winning film



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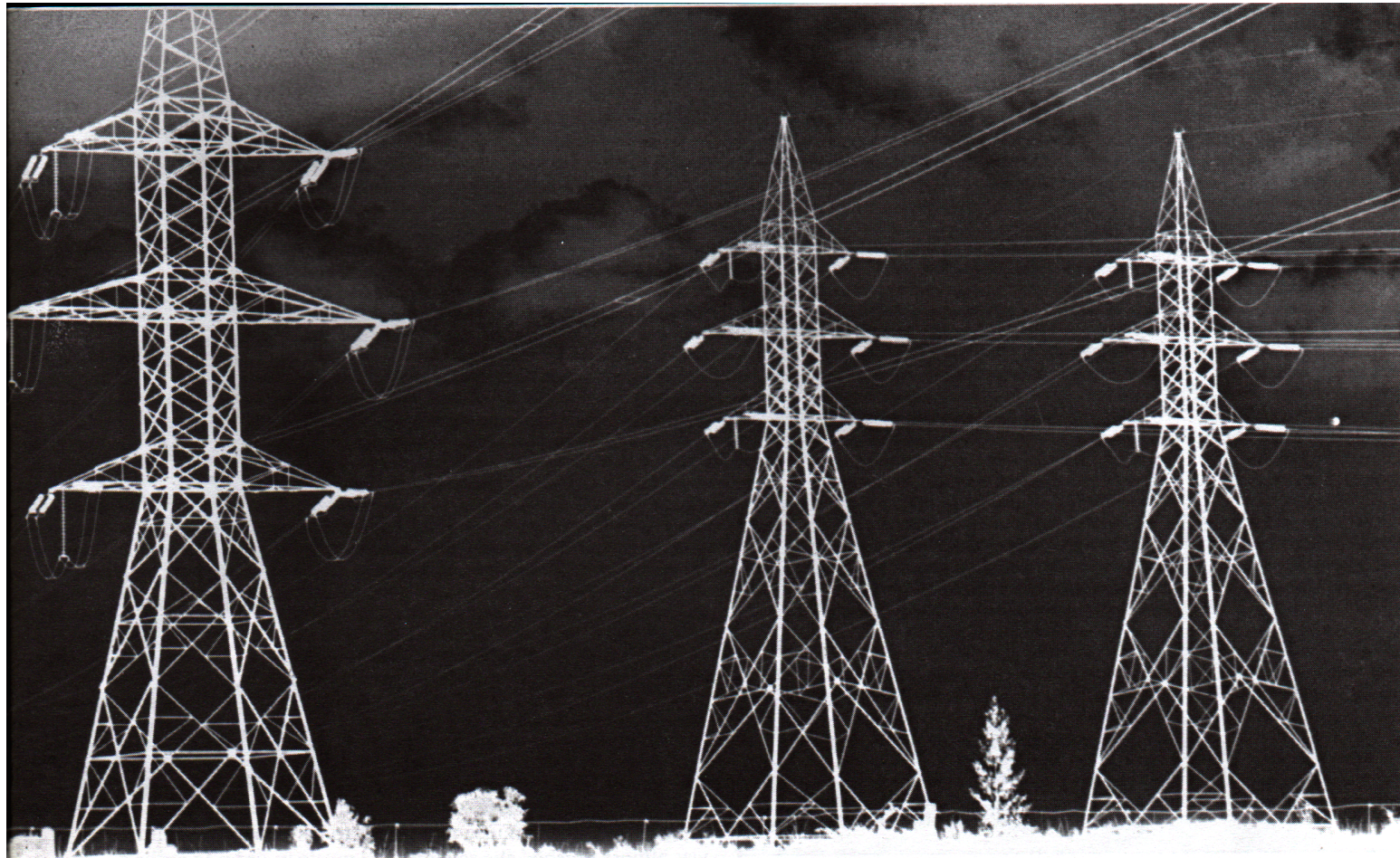
Sensing Energy at Another Level

by Gayle Young

Montreal composer Helen Hall has recently expanded her scope to include work in film and theatre. Her first film, *Powerlines*, is an exploration in a hybrid documentary/musical form. Her first theatre production, *Body Weather*, for string quartet, actors, and sound system and visual environment completely surrounding the audience, will be performed in Belgium in the coming year. Hall, who also teaches sound design at the National Theatre School in Montreal, is working on her second film, *Zero Point*, a feature documentary about new forms of energy. Hall maintains that all of this work is really an extension of her music into different media.

MW  *Powerlines* is a thirty-five-minute poetic documentary about the mystery of electromagnetic fields, the promise of new energy, and the dangers of electromagnetic pollution. An artistic interpretation of a scientific subject, the film integrates advanced scientific research and ancient knowledge of energy with music, image, and dance. Film as a medium deals with sight and sound, and *Powerlines* uses film to address the invisible and inaudible waveforms between sight and sound, those that vibrate too slowly to be perceived as light, too fast to be perceived as sound. In making electromagnetic radiation visible and audible, the film vividly describes the effects of the invisible forces around us.

At the 1999 International Festival of Films on Energy in Lausanne, Switzerland, *Powerlines* won the International Jury Award. The Grand Prize was won by another Canadian film, *Power*, a documentary by Magnus Isacson and Glen Salzman about Hydro Québec and the flooding of First Nations' territory near James Bay. Thus, Canadian films critical of the use of energy won both the top awards. Among the many films



Still from Helen Hall's film *Powerlines*.

shown at the festival were a documentary on global warming, and a film that described the process that led to the disastrous flooding of the Oder River in Germany. There were also educational films about the scientific aspects of energy use, and films that discussed energy alternatives such as wind and solar power.

A journalist who had shown a documentary about global warming at the festival told Hall that *Powerlines*' strong impact derives from its being so personal, so unique. Hall, in contrast, believes that a film by a recognized journalist has a public credibility denied to more personal arts-based films: people listen to what journalists say. Reflecting further, Hall concluded that being in the arts means that her work is based to some extent on intuitive knowledge. But, she wondered, when something comes from intuitive knowledge and experience, how is it then understood by other people?

Hall's film stood out from the others for its unique combination of documentary integrated with intuitive personal vision. *Powerlines* is more than a film about pollution; it addresses changing cultural paradigms of the late twentieth century, locating itself at the transition into a global electronic culture and exploring what happens when we leave the familiarity of the visible and audible world to enter a world where our bodies sense energy at another level. Our understanding of the world based on sense perceptions, on seeing and hearing, has been brought into question in the twentieth century. Science has explored infinitely huge and unimaginably tiny elements of matter in the universe. Throughout the process of making her film, Hall consulted with scientists and researchers actively involved with

In the last few years we have filled the spectrum between light and sound with artificial electromagnetic radiation. We can't feel it, so most of us are not aware of it.

Electromagnetic radiation is radiant energy in the form of invisible waves moving through space and matter. This radiation interferes with our cellular processes because even at low levels it can knock electrons out of molecules and atoms, leaving an unpaired electron known as a free radical. Free radicals damage cells by interacting with cell membranes and building up electrostatic charges that disrupt cell processes.

—Helen Hall, from the script of *Powerlines*

advanced concepts of energy, including Andrew Michrowski, Glen Rein, Eldon Byrd, Daniel Sdiscu, and Dr. Bernard Grad. While the body's electrical systems have been understood for thousands of years in Oriental medicine, scientists who work with advanced concepts of energy are adding to the knowledge. Hall's film describes the body's electrical systems and the vast implications of advanced scientific research into the invisible circuitry within and around us. Current research confirms what we already know intuitively—that we are part of the world around us, and that what we do to it, we do to ourselves. Our understanding of a predictable cause-and-effect world of Newtonian physics—on which we rely in our everyday lives, and for driving our cars—is being fundamentally challenged.

Why would a composer make a film?

Hall has always been intrigued by the way that sound affects us physically. Her interest in physics and acoustics attracted her to the precision that is possible only with digital technology. She began working with computers in the early 1980s to obtain greater precision with the tunings of her music, but soon became aware of a paradox: while she was working with computers to explore tuning systems she could sense that electromagnetic radiation from the computer was interfering

A vast network of power lines now covers the entire earth, threaded across continents and under oceans, and it is forever changing the way we live.

Telephone and television satellite transmitters cover the earth from space. Military satellites cruise by every point of the earth every hour and bounce radar beams off the surface. Military services of almost every country use all points of the electromagnetic spectrum for communication and surveillance.

As the environment becomes flooded with electromagnetic radiation, all our senses are swamped with energy and information. While the entire world becomes electrified we are being overloaded by a vast world of electronic images, lights, and sounds, as huge amounts of information travel around the world at the speed of light and interact with the millions of electrical processes in every living cell of our bodies.

—Helen Hall, from the script of *Powerlines*

with the electrical systems of her body and making her sick. At a certain point she became so sensitive to electromagnetic radiation that she couldn't be in the same room with televisions or computers without having severe reactions. For a while she resisted a strong desire to have everything around her unplugged, but over the years she has gradually been able to add more and more machines to her "electromagnetic radiation room."

Through this experience she has become highly sensitized to her surroundings and learned to sense things that affected her even when they were invisible and inaudible. She discovered that she was affected by everything around her. It was then that she began to sense her surroundings as energy. Working with tunings based on the overtone series, she began to perceive music as an "energy system." She experiences and thinks of music as a coherent energy system, and environmental factors that cause adverse physical reactions as incoherent energy systems, or the worst form of noise.

For Hall there had always been a separation between work as a composer and the condition of her health. She felt that writing music was a necessary form of "willful autism," in which she shut out all her other senses and focused on an intense, internal sound-based creative process. About ten years ago she began to feel the need to combine music with other art forms and to bring her interest in the sciences and arts together within film and theatre.

When Hall stood under high-tension power lines in a windswept field near Oka, Quebec, while on location with *Powerlines*, she was again faced with the paradox that at the source of whatever was informing her music was something that was making her sick. Hall found that her musical voice was coming from the same source as that which her body was reacting against as electromagnetic radiation. Both her music and her sensitivity seemed related to a form of instinctual

knowledge, a form of intelligence embedded deeply in the cells of her body. She gradually came to trust this intuition, realizing that rather than processing noise to extract the message, she would have to turn off the message to receive more of the noise. When there is something harmful in the environment, it's the noise that alerts her to its presence.

The music

Sound has a fundamental role in *Powerlines*. The dance and the visuals all came originally from the music. The rhythm of the scene-changes and the timing of the dance and visuals are based on musical considerations. When Hall began the film, she conceived it as music translated into dance and light.

The music was completed before the film was shot. The form and meaning of the film were in the music. She understood the entire film as if it were a piece of music. She drew a graph showing the elements of the music, sound, lighting, dance, text, and drama, each indicated on a different level, with time on the horizontal axis running from left to right. The different elements of the film were shown on the vertical axis, like instruments in an orchestral score.

At this point the entire film was still structured around the music, but Hall gradually let go of the concept of music as the fundamental form of the film. Editing the visuals, Hall worked in complete silence, with the soundtrack in her imagination. She reached a point where there was a struggle between music and image: she had to decide whether a scene should be longer because the music required it to be. When the editing was almost finished she re-wrote the music in order to strike a balance between the images, location sound, sound effects, and music. She did not want the music to dominate the dance or the visuals. In the process of making the film she had to find a balance between all the elements. In the final stages of this process she wrote the script, which says in words what couldn't be said with images, sound, music, and dance. The script is spoken by Hall and, through the film's first part, threads through each scene and transitions between them, and in the second part, is thematically linked with the images.

It was here that film as a medium began to take form on its own terms. Hall realized it was the film that mattered and the music had to be part of it, had to become film music. The music had to adapt because the film was trying to communicate beyond music and dance. Hall thought of herself as a composer, but she was becoming a filmmaker.

Conceptually, the fundamental unit of the film is the waveform: sound as waveform, light as waveform, and film as a medium that combines the two. Electromagnetic radiation is also a waveform: Hall can feel it, unheard and unseen, but as palpably present as noise. In her attempt to make electromag-

With no understanding of the relationship of electromagnetic fields with living organisms, we have created an energy field of total chaos at the subatomic level.

In 1900 the Quantum Theory marked the beginning of a search by scientists to unravel the mystery of how radiation interacts with matter. Einstein's Theory of Relativity added to this knowledge, stating that radiation travels at the speed of light. Before this there was an assumption in the laws of physics that there would be no interaction between invisible silent energy fields and living things.

The way we understand ourselves and the world now is based on a biochemical model. But scientists are telling us that the really essential activity is taking place at the subatomic level, within the realm of physics.

—Helen Hall, from the script of *Powerlines*



Dancer Jocelyne Montpetit in Helen Hall's film *Powerlines*.

netic radiation audible, Hall recorded the amplified sounds of media signals that flood the atmosphere around us all the time, and included them in the music. She also used a device that amplifies radiation from electronic sources. When this device is held over a fax machine, for example, it makes a sound like the static of a radio tuned between stations.

The soundtrack for *Powerlines* is a series of interlocking pieces for solo and multi-tracked cello, and layers of rhythmic sounds. The music alternates between dense, high-energy cello and the austere, mechanical rhythms of computer-based samplers and sequencers. The harmonic structure of the music is based on the sixty-cycle frequency at which electrical power operates throughout North America, and this pitch becomes a drone played on the cello throughout *Powerlines*. The music uses contrast between string sounds and sound produced by electronic equipment. Sounds from the environment are closely integrated with the music as part of the score. Every sound in the film is part of the music. There is no distinction between music and soundtrack.

The Images

Marielle Nitoslawska, Director of Photography for *Powerlines*, has developed a skilled and expressive way of working with light in combination with static camera positions, which produces images very close to those Hall hoped for in this film. The collaboration worked well because Nitoslawska is highly

There are swirling fields of electromagnetic energy surrounding the body. Scientists working with energy are studying the essential role of the body's magnetic fields.

Oriental medicine is based on the belief that energy is the basis of all forms of life and matter in the universe. Energy in the body is a dynamic force in constant flux, flowing through invisible channels called meridians.

If our bodies send and receive information electrically, then what kind of information are they receiving from the electronic smog we live in?

—Helen Hall, from the script of *Powerlines*

sensitive to music. Much of the intent of the film is expressed through music, and Hall found that she could describe to Nitoslawska the qualities of the music planned for a particular scene as a way of portraying the qualities of the image she was looking for, and Nitoslawska could understand what she meant.

The Dance

Jocelyne Montpetit, the choreographer and dancer in *Powerlines*, has studied in Japan with Min Tanaka and with Hijikata, the founder of butoh, a slow-moving dance form which developed in Japan after the Second World War. Training in butoh requires years of work to break down the illusion of separation between a person and the environment. Dancers can then openly respond to everything around them: weather, stars, radio waves, other people. When Hall first saw a butoh performance in 1980 she felt that it expressed in movement what radiation must feel like, as if she were seeing the emotional and spiritual effects that the bombings of Hiroshima and Nagasaki had on a culture deeply rooted in meditation.

Montpetit's own dance, though not butoh, is rooted in the same desire to respond without differentiating between external and internal realities. In their first session together in preparation for the film, Hall described to Montpetit the adverse reactions she experiences when exposed to electromagnetic radiation and requested that the dance scenes express what electromagnetic radiation felt like. Montpetit was able intuitively to achieve this, successfully conveying the sense of a living organism responding to artificial radiation. The vital fact that electromagnetic radiation affects organisms has been overlooked in our society, the assumption having been made that no interaction would occur.

The dancer navigates as if she were blind and deaf, trying

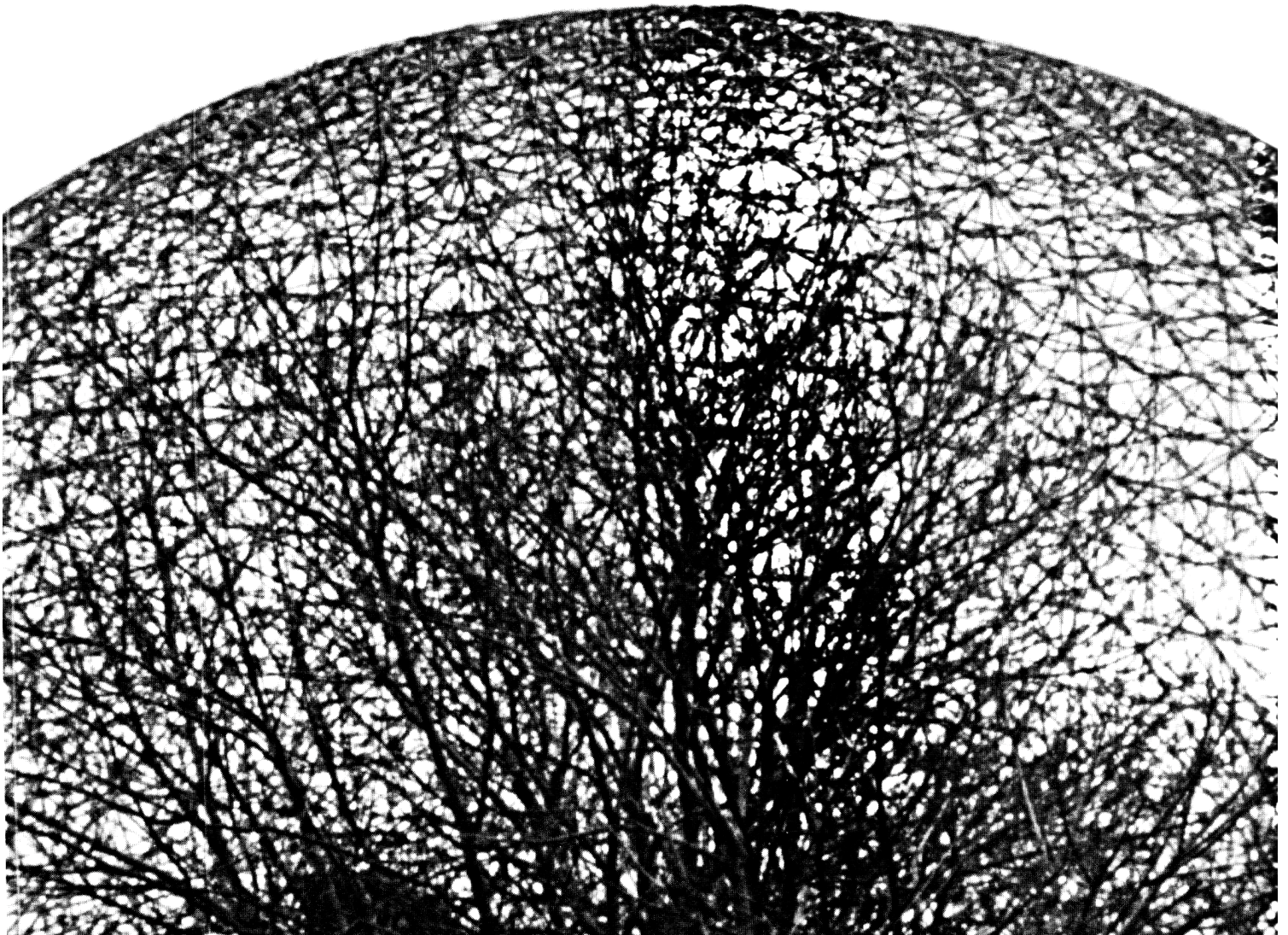
to find her way within a threatening environment, unseen and unheard. It must be sensed by other means. This implies a level of knowing that goes beyond sight and sound, to another level of sensing. The image of finding our way, trying to achieve a positive direction, or at least of avoiding danger, speaks to the cultural conditions of our time.

Positive Disintegration

Powerlines breaks down the traditional separation between documentary and artistic filmmaking, as well as that between viewers and subjects. A documentary film about poverty, for example, or about people exercising unjust power over others, clearly identifies specific people as victims. The audience iden-

Faced with information overload, we have no alternative but pattern recognition.

—Marshall McLuhan



tifies with the struggle, such as that between the Cree of James Bay and Hydro Québec, which abused the rights of those who lived on the land that was flooded. Traditional documentaries are not directly threatening to viewers, because there are clearly identified victims and oppressors, and events happen in specific locations. But in cases of environmental sensitivity, the victims are decentralized and are not an easily identified group. Radiation is not limited to a specific place. It is happening everywhere; we can't get away from it. There are no clear solutions. A film about invisible electromagnetic pollution raises the question: is it real? To most, no; to Hall, yes.

It is difficult to accept this as the reality in which some people live. A 1995 film, *Safe*, by Todd Haynes, deals with envi-

ronmental illness, and points out that it affects people from every economic bracket—you can't buy protection from it, nor can you escape it. In one scene in *Safe*, a wealthy woman whose immune system is breaking down receives delivery of a couch that makes her sick, and she says, "Even my new couch is totally toxic." One reviewer of the film, who could not accept this, quoted the incident as an example of the filmmaker's sick sense of humour.

At the festival in Switzerland, *Powerlines* was controversial because it falls outside the usual form of film documentary. In the festival catalogue it was listed as "documentary/fiction," but to many viewers it seems esoteric and mystical, with a dream-like quality. For Hall, however, the film is completely

Synopsis of Powerlines

Scene 1: *Powerlines* opens with complete darkness—visual silence. The sounds of St. Catherine Street in Montreal on a Saturday night, and the staccato sounds of flickering neon signs are followed by images of neon signs. A single, high-tension line of music builds density and intensity through this part of the film.

Scene 2: High-tension power lines—that originate in James Bay—are panned slowly in a frozen November field. The scene has a surreal and ominous beauty—large steel structures and power lines set in a landscape of field and sky. A harmonic drone of string sounds is combined with the sound of the sixty-cycle hum of power lines. This is the only time in the film when sound and image are linked at a literal level.

This scene is intercut with dance sequences portraying the effects of radiation on the body, filmed in a large, empty room in a decaying warehouse. The sound of wind, power lines, and a static, harmonic drone based on the sixty-cycle hum of power lines is combined with the sounds of high-voltage electric sparks. During the dance scenes, minimalist expressionistic music for solo cello is woven into the soundtrack.

Scene 3: The high-tension power lines reach the city of Montreal, seen from across the river. The soundtrack includes sounds of the river, the sixty-cycle hum of power lines, and narration.

Scene 4: Images of a transformer station are intercut with dance sequences, filmed in high-contrast black and white, and in extreme close-up. The soundtrack weaves together the low-frequency electrical sound of the transformer station, alternating with solo cello—intense, rhythmic, relentless music.

Scene 5: We see the city at twilight, just as street lights and lights in office buildings are coming on. This part of the film describes the electromagnetism of the city—traffic lights, street lights, fluorescent lights in office buildings, neon signs. The film moves inside to the exploding world of information technology—computers, fax machines, modems, VCRs, and antennae.

A densely layered soundtrack weaves sounds and music together, making radiation audible. Computer imaging in two and three dimensions makes the radiation visible, simulating electromagnetic radiation from satellite dishes, antennae, and microwave towers. The soundtrack gains density and intensity with layers of sound—the intense, static noise of computer hard drives, the rhythmic tapping of computer keypads, the repeated melodies of modems, the static drone of dial tones, shortwave radios, radar, static from radio and television, high-voltage electrical sounds, electronic beeps, alarms, and the wincing hum of fluorescent lights. Layers of sound form staccato rhythms that alternate with music for solo cello. The dancer is seen sitting alone in a room full of computers. The scene ends with a car trip through the city at night, along a strip of St. Catherine Street where there is a high concentration of neon.

Scene 6: We see a street corner with a window full of TV monitors showing non-stop music videos, then "mosaic images" from television in Brussels, a split screen that shows clips from sixteen television stations all over Europe. This is followed by six layers of images from television—CNN International in Europe. Fast editing and a dense, high-

energy soundtrack create a feeling of information overload, implying the physiological effects of media, as huge amounts of information travel around the world at the speed of light, interacting with the millions of electrical impulses in every living cell in our bodies. The soundtrack has intense, rhythmic, staccato layers of environmental sounds: TV static, dial tones, computers, modems, keypads, and electronic beeps and alarms. The scene ends with a climax of fast, flickering images.

Scene 7: We see into the cells of our bodies. This part of the film describes coherent energy systems, and what is known scientifically as "bio-electromagnetics." The voice-over explains the intercellular communication which takes place with very high frequency electrical signals, and information stored by the energy fields of the body. The scene begins in silence and darkness, followed by a dance sequence filmed in high-contrast black and white, with contrasting shadow and light. We hear multi-tracked layers of natural and artificial cello harmonics—melodic, haunting, and sparse. At this point the soundtrack begins to move out of a linear progression and into a sound field, or texture.

The dance sequences are in overexposed colour, emphasizing the ethereal quality of light. They are intercut with images of organized coherent energy systems: a cross-section of the DNA molecule, acupuncture points, the biosphere structure in Montreal. The biosphere is a gigantic architectural structure designed by Buckminster Fuller in the 1960s. Fuller based the patterns of the structure on the invisible circuitry of nature, and the way living forms regenerate. The structure is a model of energy systems. The film then zooms into the sub-cellular level—to somatids. Somatids were discovered by scientist and inventor Gaston Naessens, who invented a very high-powered microscope that makes it possible to study living tissue at a resolution previously unknown to us. While the standard microscopic images of cells are static and dead, Naessens's microscope has the resolution to show living tissue, and in this tissue he has observed a subcellular particle which he calls a somatid, or "tiny body." Somatids are electric and magnetic living condensers of energy. Naessens has found these particles in all forms of life, and believes that the electrically charged, luminous somatid is the bridge between energy and matter—the absolute ground zero of life.

The film zooms in again to show laser patterns that underlie the structure of cells. These patterns, known as lissajous figures, are produced in response to just-intonation frequencies from a specifically designed keyboard interfaced with a laser-scanning device. This system was developed by Barbara Hero—a musician, mathematician, and visual artist—in close collaboration with scientists. Hero's keyboard is a matrix of frequency ratios. The fundamental of a harmonic series is tuned to a specific frequency with the use of computer software, and then by pressing different keys of the keyboard, different ratios, or intervals, are produced in relation to that fundamental. Each frequency ratio produces a specific shape. For example, the ratio 1/1—unison—forms a circular pattern. The size of a cell is taken to be its wavelength, and when cell measurements in microns are translated into frequencies and brought into the range of hearing, the result is pure, harmonic intervals.

The film ends with a transition into pure energy and light.

documentary. There are no fictional elements at all; it is based on her life experience.

Showing the film in public brings Hall face to face with people's cultural assumptions. At the festival, some viewers

One of the symptoms of my condition when I'm in environments that are hostile to my immune system is an inability to process information. As a result of this I'm compelled to find underlying patterns and structural principles. Then I look for the resonant point where they meet with personal experience.

—Helen Hall

realized that *Powerlines* comes from a personal reality that falls outside shared European cultural norms. As one filmmaker pointed out, there *are* people who live in different worlds, such as First Nations people in North America. People like Hall may indeed live in a different world, but it is one without geographical definition—it runs parallel with familiar everyday reality.

Hall has been considering the cultural implications of the film—and her sensitivity—for some time. She believes that we are in the midst of a cultural process of what she calls “positive disintegration.” The boundary around the self is disintegrating, and susceptibility to chemical and electrical pollution is not the only indication of this. We are also losing the historical sense of individual privacy, as our transactions are everywhere recorded by computers and video cameras, as genes are spliced across species, as organs are transplanted and body parts replaced. We are affected increasingly by factors that come into our bodies and minds from outside, over

We can't simply turn off the vast electrical networks around us to make ourselves safe, but we can find out more about them.

What happens when our senses tell us that everything we understood about the world around us is no longer true?

—Helen Hall, from the script of *Powerlines*

which we have no control and against which we cannot defend ourselves. Our cultural immunity is vanishing under the influence of electronic media. The boundaries between ourselves, other people, and our environment are breaking down. Someone adversely affected by pollution knows—a little more clearly than the rest of us—that the elements that condition our existence can collapse at any point. There is no assurance that the future will correspond with expectations based on past experience.

Disintegration does have a positive side, however. As dualities begin to dissolve—inside/outside, us/them, here/there—changes take place in our perceptions, and our thinking and feeling are reintegrated. We learn to move with chaos as a way of transforming it. It's like the paradox of gravity: to defy it, you have to understand it and work with it. By experiencing the fragility of our condition, the constant possibility of transition and change, the loss of familiar reference points, we learn to trust our inherent intuitive perceptions. This experience resonates with one of the principles of systems theory, which describes the fluidity of the boundaries of the organism and the environment.

While working on *Powerlines* Hall began researching possi-

ble solutions to the problems inherent in current methods of energy production and use. Her next film, *Zero Point*, will document the current state of new energy science and the ongoing search for alternatives to existing ways of generating energy. Most scientists in this area are working in isolation without support from industry or government. Significant progress is being made, however, particularly in India and Japan where research into clean decentralized forms of energy has more support. Most of the processes being studied are infinite, nontoxic and renewable. If they come into use they could stop further deterioration of the environment by making current methods obsolete.

Hall believes that the new systems are related to a shift away from a limited cause-and-effect worldview, and that research confirms what many cultures already know intuitively: that we are part of the world around us. Artificial electromagnetic radiation is similar to chemical pollution, both resulting from outmoded thinking patterns and misplaced values. Our awareness that impermanence and insecurity are inescapable is intensifying as the cause-and-effect worldview is challenged and more interactive models are validated. Hall sees this as a hopeful positive result of the often-uncomfortable disintegration we are currently experiencing.

[Editor's Note: *Powerlines* was written, directed and produced by Helen Hall with the assistance of The Canada Council, Conseil des arts et lettres du Québec, National Film Board of Canada, and Main Film. *Powerlines* is available on VHS video from Domino Film and Television International Ltd., 4002 Grey Ave., Montreal, Quebec, Canada, H4A 3P1. Phone: 514-484-0446; fax: 514-484-0468.]

Helen Hall's article entitled “Bridging Language” in MUSICWORKS 38 describes her use of vocal acoustics in composition. The cassette for this issue includes excerpts from her pieces Winter Trees and Stoicheia.

Gayle Young is a composer, musician, and instrument builder. She has written music for film, dance, and visual art installation works. Since 1990 she has completed several large-scale site-specific sound works and organized exhibitions of sound-based installations. She is the author of The Sackbut Blues, a biography of the Canadian electronic music pioneer Hugh Le Caine, and has been the editor of MUSICWORKS since 1987.

RÉSUMÉ FRANÇAIS

L'exploration créatrice de la radiation électromagnétique artificielle et de ses effets ont conduit la compositrice Helen Hall à la réalisation de son film *Powerlines*. Sur le plan conceptuel, l'onde est l'élément de base du film : le son et la lumière comme formes d'onde; le film comme médium alliant les deux formes d'onde. La radiation électromagnétique est également une forme d'onde; inaudible et invisible, sa présence se fait pourtant sentir. La trame sonore de *Powerlines* est construite à partir de la fréquence du courant électrique utilisé en Amérique du nord – 60 cycles –, que l'on peut entendre ici au violoncelle et dans des enregistrements de sons environnementaux. Dans le film, chaque son fait partie de la musique; il n'y a aucune distinction entre la musique et la trame sonore. Au début, Hall concevait son film comme la transposition de la musique en danse et en lumière; la danse et le contenu visuel provenant de la musique. Mais à mesure que le travail évoluait, elle a senti le besoin d'atteindre un équilibre entre tous les éléments. Bien qu'elle se considérait d'abord comme une compositrice, elle devenait progressivement une réalisatrice.