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A pioneering composer of computer music, James Dashow (see Figure 1) was a co-founder of the Centro di Sonologia Computazionale at the University of Padova. He has taught at Massachusetts Institute of Technology (MIT), Princeton University, and the Centro para la Difusion di Musica Contemporanea in Madrid. For many years he was co-producer of a contemporary music radio program for Italian National Radio and Television (RAI). He lives north of Rome but lectures extensively in the U.S. and Europe. Mr. Dashow has received commissions, awards, and grants from numerous organizations. Most recently, he was awarded the prestigious Prix Magistère at the 30th Festival International de Musique et d'Art Sonore Electro-acoustiques in Bourges, France. His music has been recorded on Capstone, Wergo, BMG-RCA, Neuma, ProViva, CRI and other labels. Complete lists of the composer's works, recordings, and awards are available on his Web site, www.jamesdashow.net. His oeuvre includes works for tape (used here in the general sense to refer to fixed electronic media), live instruments plus tape, and instruments without electronics; but he uses the computer in composing even his purely instrumental music.

James Dashow visited the Center for Digital Arts and Experimental Media at the University of Washington in early March 2002 for a concert of his recent works and to conduct a master class. During the three days of his stay, we managed to have an extended interview-like conversation in front of a microphone on one of the islands just off the coast of Seattle. Several of the little restaurants on the island have their own pier nudging out into Puget Sound for customers (like us) who prefer to take their coffee or wine outdoors in the early spring sunshine. As we say in Seattle, "The mountain was out": Mt. Rainier rose majestically in all its splendor between the two mountain ranges (the Olympics to the west and the Cascades to the east) that

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An Interview with James Dashow

surround the city. These were the perfect conditions for an interview.

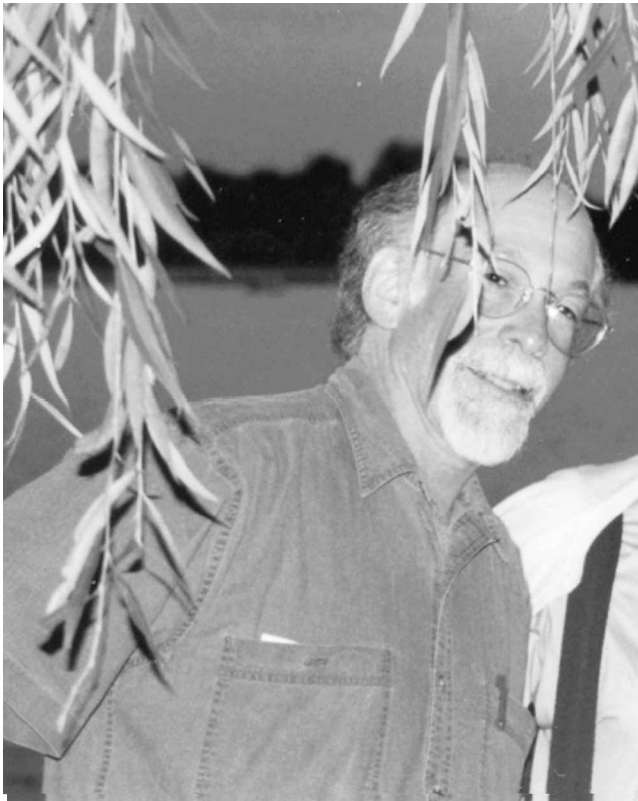
Richard Karpen: First of all, a belated congratulations on the Bourges Magisterium prize. Part of the prize was a concert of your works. Which pieces did you play?

James Dashow: Thank you. I shared a concert with Beatriz Ferreyra, who was the other Magisterium winner in the 2000 edition of the Festival. I chose a couple of scenes from my planetarium opera *Archimedes*; my radio piece, or "lyric satire" as I like to call it, *Media Survival Kit*; and the quadraphonic electronic piece, . . . *at other times, the distances*. These pieces are all from the last five years or so, except for one of the *Archimedes* scenes, which was originally composed in 1988 for a series of concerts in Italy. I have since considerably re-worked it, making it more compact to fit with the pacing of the opera as a whole, and intensified the timbral development of the sounds using the newer technology that has emerged since its original composition.

Karpen: Has the new technology changed the way you work? In the 1960s when you started to compose using computers, research and development of new technologies and techniques were central to the creative process for you and for your colleagues. You had to do your own audio hacking, as it were. You even wrote your own digital audio synthesis program, MUSIC30, as late as 1990.

Dashow: Well, that's a long story. The old saying about necessity and invention was at no time truer than during the early years of computer music. The idea of generating new kinds of sounds and modifying or tweaking sounds at any point along their dynamic evolutions were extremely suggestive to musical invention. I don't mean just building the frequency content of the sounds from scratch, which by itself was enough to trigger musical ideas of all sorts, but also playing around with the dynamic envelope: working directly on the attack and

Figure 1. James Dashow.



decay portions of each sound, and its composed movement in space.

I was lucky enough in the 1970s at Padova to be able to work already in a quadraphonic environment; all of these aspects of micro-sculpting sound were highly stimulating musically. The effects of all these tiny transformations when you accumulated them in larger-scale structures like phrases, extended passages, or entire sections of a work, were—*are*—definitely the stuff of musical discourse. The idea of making a piece out of these sound transformations was (and still is) very compelling. So it was necessary to learn enough programming in order to put your hands on these aspects of sound synthesis. Nobody else was going to do it for you; you had to become your own hacker.

Thinking about how sound can be made to evolve and move—to design programs that play with those kinds of dynamics—has been funda-

mental to my thinking about musical composition with (and even without) electronic sounds. But in those days of working at a computer center rather than in one's private studio, things were just plain slow. I learned early on that tiny modifications to a single sound that might render it more interesting or effective by itself were often covered up or destroyed when played in the full musical context with other things happening in the piece. But all that adjusting and re-adjusting of parameters and waiting around for a synthesis job to finish executing was extremely slow. But after a while, you definitely got a feel for things like the effect of a 0.01-sec difference in attack time, or a 10% sharper exponential factor in an envelope control.

Karpen: Why MUSIC30?

Dashow: MUSIC30 was also the result of necessity. Things began to change in Padova both for me and for my wife, and it was necessary for me to be in Rome more often because of my contemporary music radio program with RAI (Italian National Radio). I needed something in my own studio to allow me to continue working. Csound for the PC was only just getting started, and it was quite limited, so I decided to do something myself that would give me all the features that I had built into my expansion of Barry Vercoe's MUSIC360. I wrote MUSIC30 in the standard MUSICx syntax (what I like to call the "Howe-Vercoe syntax"), written for a PC accelerator board made by some very helpful people at a place in Wellesley, Massachusetts, that used to be called Sonitech. Their board was built around a Texas Instruments DSP chip, the TMS320C30, which was at the time the fastest floating-point DSP on the market. MUSIC30 does everything MUSIC360 did, with quite a few useful things added that reflect not only what I needed musically but also the ongoing development of audio synthesis techniques over the preceding decade (the 1980s). Within limits, I could even do real-time synthesis with real-time control over whatever parameters I wanted, which was ideal for trying out musical ideas and variants and so on. Nothing else approached that speed for several years. I now had the resources to do far more refinement than before—to play around a lot more.

At the Padova computer center, Manoli kicked everybody out regularly every evening at 7 PM, and the center closed until 8 AM the next day. Needless to say, being a “night person,” my new work hours with MUSIC30 in my own studio were far more convenient.

Karpen: Yes, I remember even when I was there Manoli’s famous cry, “Si chiude!” [“Closing time!”] disseminated general terror among composers forever doing last-minute things. Do you still spend a lot of time programming, or has your relationship to being your own technologist changed over the 35 years of your work in electronic and computer music?

Dashow: Making *Media Survival Kit* changed my way of working considerably. That piece was composed specifically for radio broadcast—it was commissioned by Italian National Radio—and, as a sort of tragic-comic satire, I wanted to use mostly live sources. I recorded the voices and most of the instrumental sounds through MUSIC30, even doing some real-time signal processing while recording. I told each of the voices what I was after and what I was about to do with some particular real-time effect, and they reacted to what they heard coming out of their earphones. I then reacted to what I heard them do by adjusting parameters, so there was a good deal of spontaneous interactive performance captured for the composition. Then, the recorded fragments were assembled with ProTools, which unfortunately I didn’t know how to use. I found myself back in that difficult situation of having to communicate with a technical person who, in this case, was accustomed to working only with guitar players and drummers. By the next piece, I had become familiar with Sound Forge and Samplitude, which have remained my primary assembly tools.

Karpen: Has the need then to invent new technology become perhaps less central to your compositional process? And if so, has this changed the nature of your artistic processes?

Dashow: Well, yes to the first part of your question and not exactly to the second. The kind of new technology I would like to invent is beyond my capabilities—at least to do so in a professional man-

ner. I still generate the basic sound material with MUSIC30, since I have built several “orchestras” (like in Csound and its relatives) that implement my Dyad System procedures for generating sounds based on specific intervals. Rather than inventing new technology, I find I am constantly inventing new ways to derive sounds from the Dyad System whose resources seem to be rather vast. But now, the sounds are subjected to signal processing using various plug-ins. The folks who make those things are far more proficient at audio programming than I could ever be. But certainly those years of having to do my own hacking has allowed me to understand what those plug-ins are up to and to use them more effectively than if I hadn’t had that programming experience.

Karpen: So the technology side, or rather the development of it, has taken a back seat to your musical use of the existing technology.

Dashow: That’s about right. After I finished making MUSIC30, I was delighted to return to being a user of the program and not forever hacking away at it. I still dig into MUSIC30 now and then when there’s a particular procedure I want to implement as a basic part of the system. For example, I realized my own version of granular synthesis that has a few extra control parameters relative to certain operations I like to do. I’ve also been in touch via electronic mail with a few plug-in makers about implementing some things that don’t seem to exist currently and that would be extremely useful. But yes, I certainly am more concerned now with musically using the technology I have at my disposal.

I am forever a student of electronic timbre, still fascinated by the kinds of sounds you can get only in the electronic realm. I think there’s a lot of new expressivity, new musical thought, yet to be discovered by combining varieties of electronic timbre in fresh and unexpected ways, and I spend a lot of time teaching myself to get a feel for the expressive-structural potential of these sounds, for the subtle and not-so-subtle differences between them, for their implications in various kinds of musical contexts. So I continue to concentrate on developing more and more my understanding of how to generate, transform, and ultimately use

electronic sounds: how to build interesting structures with the kinds of sounds I find expressive, how to make large-scale musical forms with these sounds, how to shape them, make them evolve, transform, and move—how to create an alive world out of musical sound.

Karpen: Certainly you have your own characteristic sound, or sounds. I can tell immediately when it's one of your works just by the richness of the timbral materials and the way you use them. What kind of procedures are you using now to develop your sound?

Dashow: Lots of different things. For example, I like to generate a variety of extremely rich transformations of my basic sounds by exaggerated reverbation decay times, say 20 sec or more. I can use a digital audio editor to snip out small chunks of the reverb tail and use those chunks as the basic pieces for making musical events of various dimensions. I often take the original sound with its exaggerated reverb tail fragment and run them through some severe compression that squashes the amplitude of the original signal down to that of the reverb tail. I use that sound as is, or as an impulse for convolving with some other sound. You get some very lovely timbral transformations that way, and yet the original frequency content, generated with MUSIC30, remains very much present. And now that I have six channels in my own studio, I am finding that complex diffusion of sound—and changing or mixing the perceived size of the space you are in—can be a very moving experience. Attention to where a sound is, in terms of position and how far away it seems to be, or the quality of space listeners are made to feel they are in, or changing that quality in time, as well as perceived movements in different kinds of three-dimensional spaces—all of these have become just as important for the composition as the detailed sculpting of the sounds themselves. And I should add that none of this would be possible without these real-time or near real-time working conditions that give me a tremendous amount of musical feedback, or electroacoustic experience. I find, too, that I spend most of my time learning more and more about the potential of just a few of the many tools I have; but

there are always new things out there, and I always find them tremendously stimulating.

Karpen: But getting back to your earlier comments, it would seem that the advent of real-time digital resources in your own studio has made important differences for you.

Dashow: Absolutely. I couldn't imagine doing anything similar with the technology we had available in the 1970s, for instance. You can develop a feeling for how certain kinds of sounds will interact, what kinds of expressive effects they produce, but with all the timbral variety available and the myriad ways of altering the expressive effect of a sound by changing some aspect of its dynamic. It really is impossible to conceive everything ahead of time; you just have to try it out and hear it, especially in the context of a whole phrase or a complex of several events. Real-time digital editing lets me do exactly that—and a lot of it. The same goes for experimenting with diffusion. I have no doubt that my sense of pacing, of form—of how to make electronic music—have all been considerably transformed with the arrival of real-time audio editing. But I am also convinced that the “do-it-yourself” experience of those early years was invaluable for gaining insight into electronic music procedures. I think any composer who wants to be genuinely effective in composing for the electronic medium would gain enormously by spending a year or two mastering one of the standard digital audio synthesis programs, like Csound or SuperCollider.

Karpen: You talk in terms of real-time audio editing. All of your electronic works are scored for pre-recorded media (tape, CD, and so on) with and without live instruments. As real-time computer processing and interaction becomes more ubiquitous, do you see yourself going in that direction at all in your composing?

Dashow: People have been asking me that for a good while now. Up until recently I have been answering an unconditional “no” to that question. My reason was that I spend a lot of time working on the details of each sound or succession of events. Letting live performers or some other kind of live input influence the timbre and dynamic

evolution of my sounds would interfere with the fine details that literally define the composition. You don't go into a restaurant and modify the cook's sauce by specifying the proportions of the ingredients.

One of the major reasons I developed my Dyad System is to integrate live instrumental sounds and carefully constructed electronic sounds . . . letting each have its own space to sound in its own characteristic fashion, yet complementary to each other, often fusing in musically expressive ways, both participating in their own way in the overall structure. My electronic music depends a great deal on accurate phrasing and precise timbral, dynamic, and spatial evolution. I don't want that to be interfered with by the uncertainties of the live sound; no matter how accurate the performer may be, the acoustic characteristics at what you might call a micro-level of the live sources will inevitably influence the characteristics of the electronic sound. In fact, from another point of view, that's what's potentially interesting about performers' interacting with real-time digital sound synthesis.

I give live performers opportunities to interpret, to do their kind of thing within the limits of their parts, but always within the context of the whole work—which means in cooperation with the electronic sounds as I've designed them. But I've heard a couple of very successful works (such as yours for violin and computer) that use SuperCollider as the medium of live input, and I am beginning to see how I could eventually compose for that kind of program. I can use a live source to control some of the fundamental parameters while precisely pre-programming the elaboration of those parameters with my sounds. My Dyad System actually would fit right into something of the sort.

The other question, of course, is portability. If you compose for a specific hardware/software setup, you might be limiting your performance possibilities. Composing for tape or for direct computer playback of pre-synthesized sound files avoids this problem.

Karpen: I want to ask you later about your Dyad System. But first, I have the sense that notwithstanding your early pioneering work as a stand-

alone computer composer-hacker, as it were, and your subsequent turn towards a more purely user-oriented practice, you've never lost sight of the music. The technology is to be developed for its musical effectiveness, and nothing else.

Dashow: I can't think of my work in any other way. The technology is useful only if it can serve musical ends. I started out as a composer and learned computers after having had a few years of practical compositional experience with traditional instruments. My fundamental attitude has remained the same over the years; if anything, it has become more focused. I believe now more than ever that composing means being aware of and developing structure (as elegantly and economically as possible) with as much craftsmanship as you have in the service of musical expressivity. And I can only confirm that old conclusion: the best craftsmanship is the kind you can't see while it is producing its magic.

Karpen: That's pretty compact; can you expand on that a little?

Dashow: I can try. First of all, for me there is no substitute for craftsmanship, in any artistic endeavor, and in music especially. Craftsmanship is the continuing mastery of the details of musicmaking, whether it's with electronic sounds or traditional musical instruments. You develop both skills and sensitivity to many, many aspects of composition, such as what it means to make phrases with electronic sounds or elaborations of sounds, the pacing of a work (which implies understanding the rhythmic sense, both locally and in the long run, of combinations of sounds), and the appropriateness to a musical context of kinds of intervals (both inside a sound and between sounds). And all this is nowhere more important than with computer-synthesized or assembled electronic music with its vast technical resources.

Unfortunately, the ease of using new audio technology (and the ease of learning programming) fools a lot of people into thinking that electronic music is made by turning the machine on and letting things happen. That's what I call the "Short Path," and it's the path to mediocrity—or worse, to incompetence, taken especially by that kind of "wan-

nabe" in our field, the technologically adept person who wants terribly to be a composer. Most of these folks just don't get it. They hear no difference between collections of sounds and genuine electronic music composition. They think they are getting "electronic music" out of their computer just by turning it on or putting together successions of whatever sounds they can make the machine spit out with some clever programming. These people don't seem to have the discipline or possibly not even the aptitude to learn musical craftsmanship, so they simply avoid it. It's not necessary, it's demonstrably irrelevant; why, just listen to all those pieces out there that sound just like the ones my machine can make!

The Short Path never gets to the music. At most it is a way of providing a little thrill of technological novelty.

Karpen: I often harrass my students about "being aware of and developing structure," as you put it. Obviously, you're not talking about being overly analytical before the fact, or some sort of strict adherence to a mechanical system.

Dashow: Of course not. The ideas of structure and of system have both been seriously confused with automated "non-think" generative processes of sound events. In fact, anything to do with structure or system has been grossly distorted by the unfortunate over-intellectualization of musical composition that took place in Europe and the U.S. during the 1950s through the early 1970s. This happened in parallel to the whole logical-positivist movement in Europe, the subsequent Anglo-American "analytical philosophy" with its narrow concentration on the perfect logical language as being the only way to express so-called "true statements," and the equally unfortunate distortion of the idea of structure in France. All of these things seem to have influenced composers on both sides of the Atlantic to do things that were taken to extremes; a lot of people began working pretty much exclusively on pre-compositional constructs that completely lost sight of what they were supposed to be doing: working with sound in time.

The inevitable reaction that set in has been equally extreme, and some of the effects of that re-

action are still being heard today. It's unfortunate that the idea of structure as defined by Jean Piaget didn't become the seminal influence for 20th-century composers. I don't remember the exact wording, but Piaget proposed an idea of structure as a whole, a self-regulating system of transformations. For him, the elements of a structure are not independent of their connections with each other. A structure is made up of things (for us, musical events), and their relationships to each other. This is an extraordinarily musical idea in my way of thinking.

Karpen: You used a Piagetian concept for your harp piece.

Dashow: That's *Reconstructions* for harp and electronic sounds. It was composed about the time I first read Piaget's book on structuralism, and I was immensely impressed how appropriate his ideas about structure are to musical understanding. I remember fairly well the quote; I wrote it in the score. He defines reconstruction as involving more and more varied combinations along with increasing freedom in the kinds of combinations. It seemed, and still does, an excellent definition of musical system and structure, but more than just a definition. It's a concept you can use as a practical working tool which you can translate into thinking about sound, into thinking about large-scale movements or transformations of musical materials while still being attuned to the details.

Karpen: I know only his work in child developmental psychology.

Dashow: Piaget was immensely important for that field; but he always saw all that work as a preparation for his philosophy. Ironically, his philosophical writings are pretty much ignored, and sadly so. It didn't make the mainstream largely because it throws up some very serious challenges to the mainstream that the standard practitioners (and their standard critics) would prefer to ignore. I don't think I would have known much about him if it were not for the fact that my wife is a university teacher and researcher in child developmental psychology; we have just about everything he's written at home.

Karpen: I want to get back to structure and system. How would you define them?

Dashow: True structure, to my mind, is an organic conception; true system is much like a framework or context within whose constraints you develop structures. By being aware of what you are building and how you are building it, you can constantly re-interpret, elaborate, be inspired by, and discover unsuspected ideas through the implications of what you have composed. And this makes for an organic (or highly flexible) structure, which I think is what makes for musically expressive compositions—whether the composer is aware of it or not, I might add.

Karpen: There are strong tendencies today not to be concerned with structure or system, both in the U.S. and in Europe. A lot of students and younger colleagues don't seem to care or pay much attention to that sort of thing, although recently I've been seeing some trends to the contrary. Obviously, you think issues of structure and system are still relevant.

Dashow: Obviously! I think one of the reasons a lot of younger composers are totally uninterested in questions of structure and system is owing to this pendulum effect of extreme attitudes I mentioned earlier; the extremes have just about killed any sense of validity of these ideas. Sadly understandable! But rather than repeat yet again the old mistake of "all or nothing" (or "the only way to do this is . . .") with respect to structure and system, these concepts can be used in a functionally appropriate fashion, within practical bounds (that is to say, not requiring structure and system—or the complete absence of them—to provide everything in a work). Their appropriate use is of fundamental importance to the art of composition. I personally find the idea of a poetics of structure to be valid and inspiring. When you get the structure and the good old gut reaction to coincide perfectly—well, that's great stuff, and I think composers should always aim for that. Structure and system give you a profound grasp on the form of your work, the overall form, the large-scale shaping of a composition, as well as a means for refining details into the kind of elegant

compactness that makes for the most convincing and expressive music.

The importance of keeping the overall form of a work under conceptual control can't be overestimated. But at the same time, the instinctive sense of shape and the means for perfecting that shape must continually influence each other during work on composition. You react to what you're doing while you're doing it, within an overall context of the musical ideas or form you are attempting to realize. When I say "form," I'm not referring to anything standard or fixed; I mean the shape of the whole composition, be it full of symmetries or asymmetries, what an entire work communicates or leaves the listener with when it's over. It's hard work.

But I am not saying that there is only one way to work with structure and system—on the contrary. Find a way that works for you, and develop it, understand it, get good at it. That's what accounts for the tremendous and magnificent variety of Western musical styles throughout history. Composers take or use what they need or find useful. And I am quite convinced that to ignore thinking about structure and system is simply to revive old errors, mistakes, and mediocrities—convinced because I hear a lot of pieces that do exactly that, unfortunately. Some composers have an extremely laid-back attitude toward structure and system and related notions, attributing no importance at all to any kind of structural awareness. But that's because they have mastered one structural idea that expresses what they want; working to develop further what seems so obvious to them doesn't really seem to matter. Sadly, because they attribute little or no importance to structural awareness, you hear in their work all too often a tendency toward sameness, and what I can only call missed opportunities in the composition, because there is no conscious exploring of structural possibilities. And perhaps even more regrettable is that young composers are coming out of their learning years with such teachers without having been guided toward this fundamental awareness that will, with time, mature into true compositional mastery.

Composers, I believe, must continue to hone their personal skills, and that means being aware of

what you are doing or want to do, getting very good at it by consciously practicing, and then learning to compose by focusing on the realization of musical ideas while maintaining a subsidiary awareness of these skills.

Karpen: Now you're getting into Michael Polanyi territory, if I remember correctly his terminology.

Dashow: Yes, I've been very persuaded by his notion of "tacit knowledge." To my mind, genuine musical composition hinges on a craftsmanship that has become second nature; you have absorbed it so well that you don't have to think directly about it. You don't focus primarily on it; your work makes use of this mastery so well that the work itself helps bring that craftsmanship to greater degrees of mastery—like performers who no longer have to worry about "grabbing notes," since they can do it without thinking, or rather they can invoke a highly perfected skill that allows them to concentrate on interpretation, on how they are going to grab the notes rather than on the actual technique of grabbing. I remember learning that attitude from playing jazz as a kid. I admired (and still do) Cannonball Adderley's total mastery of his instrument, which allowed him to concentrate exclusively on invention. And just listen to the rhythm of his phrasings, the extraordinarily subtle nuances he spins out over the changes!

Karpen: But specifically for your own work, how do you use your notion of structure in your music?

Dashow: Well, structure for me is the elaboration of my musical inventions in interesting and expressive ways. And almost always, the very invention of those ideas has involved being aware at the gut level of what I can do with them—the developmental possibilities implicit in them. That's what I mean by poetics of structure. For me, there are always different levels of structure, ranging from the more immediately perceived levels—let's say relationships between timbres, or intervals, or phrases and rhythms—to the less directly heard levels that provide longer-range relationships, more abstract, but which have powerful motivating effects on the way things are worked out, and on the shape of a piece as a whole, its final realized form—which is

what the listener will take away after a performance (and perhaps anticipate on a repeated hearing). I am very convinced that when a composer does pay attention to several levels of structure in this way, somehow the tension of working with these kinds of structure—the desire to make them all mesh into a cohesive or persuasive whole—this kind of emotional energy focused on structures, for want of a better description, saturates the work itself and has a lot to do with the expressivity of the piece. Or rather, the expressivity is as much a part of the structure as the other kinds of relationships. It's not just "all surface," as some people have suggested.

Again, adapting Polanyi to musical practice, we are usually aware of some levels of structure while focusing on others. I'm always aware of "energy levels" while composing—the sense of energy a particular structural level communicates or possesses, and the interaction of these energies between the various levels, how and in what ways they influence each other. That kind of constant awareness in the immediate background influences enormously my choices of materials for structuring events. It's almost as if this complex of energy levels is the piece itself, and my task is to make the appropriate choices of materials for structuring the musical events that reflect these energies. When I get into talking about this, it all of a sudden gets difficult to describe.

Karpen: You know what it is as long as nobody asks you about it, but if somebody asks . . .

Dashow: Exactly.

Karpen: Tell me a little about your Dyad System. I know you've been working on and with it for a long time.

Dashow: Well, let's see, the first glimmerings of it came in 1975 or so with my FM equations based on dyads; it didn't become a full-fledged pitch and electronic sound system until around 1985 or 1986. It's continually evolving.

Karpen: How does the system fit in within your structural practice?

Dashow: I invented my Dyad System to get a handle on some rather vast pitch/frequency resources,

based on the kinds of intervals and successions of intervals that are for me very expressive and stimulating. That is to say, it's a system in the sense that tonality is a system, or serialism (not *total* serialism, which I think was an error in radicalizing a good thing), or the total chromatic, or a selection of basic frequencies or a microtonal scale or what have you. These systems provide basic materials along with operational constraints—what I like to call the bricks of the building. But composers build the building, the complex structures of their pieces, in the way they wish, by choosing the best bricks for each part of the structures. The Dyad System, like any rich system, is a way of elaborating a certain sound sense, a certain way of hearing; the structure of my work is very much in terms of the potential and constraints of the system, again, like any rich system. It often provides unexpected but highly expressive relational possibilities that are simply ways of using the basic materials—the bricks—in an imaginative and, hopefully, convincing fashion.

In another way of putting it, the Dyad System (or, again, any system) is a framework for development. You can get from A to B, for example, in many different ways. (This kind of idea grew out of reading Feynman a long time ago.) That is, the A and B points are constants, but the routes between them can be vastly different or quite similar, depending on what you want to do at any particular point. And the nature of the route can, of course, change B into say B'—slightly different, according to the implications of the route you've followed. As far as I can tell, all successful and expressive musical compositions have had some sort of systematic basis consciously exploited to one degree or another, and the compositions that are less convincing are those that are unable to respond to the implications of their own initial ideas, implications that are simply there waiting for an imaginative exploitation of the systematic aspects of those ideas. Again, I'm not referring to automated aspects; I mean those aspects that are suggested by the very ideas themselves, the way they unfold, their interval or timbral quality, their rhythm, and so on. It makes the difference between things that sound exactly right and things that somehow just don't

work. That's always been the difference between those pieces where the composer fine-tunes the details and those that are produced by a so-called "top-down" process, where the details are not taken into account, only some sort of conceptual scheme for the entire work. The top-down process inevitably crashes after the first very few moments, because the process can't understand implications of musical materials as they evolve.

And that's where craftsmanship enters, I think. Mastery of the craft gives you a handle on, or sensitizes you to, the fine details that make for a successful composition. And at the risk of repeating myself, I want to say that a successful composition is not simply the relationships themselves; it's what those relationships, all those details together, produce. It's something that has expressivity, something that moves you, and you can't put it into words; something that makes you feel that you've just been in the presence of something alive, vital, maybe even refreshing, and you don't know why. I like to compare a successful composition to the tip of an iceberg: the composer's work is the tip that communicates to the listener the depths of the iceberg. Without that mastery, or with only a loose approximate sort of craftsmanship, you get a loose approximate sort of composition, ultimately uninteresting: no iceberg, and just slush on the surface.

At any rate, besides elaborating the intervallic possibilities of my system (and this means also the electronic sounds I can generate from the intervals), on a somewhat larger scale, I like to use the musical equivalent of "near rhymes" or "near equivalence"—things that resemble each other to one degree or another, where the degree and type of difference is part of the energy of the piece. I like to use sudden contrasts between chunks of events and then spend time in the composition "filling in the hole," that is, filling up of the difference between the two contrasts with the materials that would have formed a smooth transition or evolution between the contrast points. And as I mentioned, the sense I have of energy levels while doing this determines much about the expressive character of these choices, the nature of these near equivalences, and so on.

Karpen: That's almost a cubist kind of approach, taking event segments and re-arranging their succession without losing their identity.

Dashow: That's pretty accurate. Actually, my preferences are the abstract expressionists from the late 1940s and 1950s. I don't know why, but I find those Jackson Pollock paintings at the Guggenheim house in Venezia to be extremely moving. I try to go there at least once a year to see them.

Karpen: How do you explain the rhythmic structures of your pieces? They often sound worked out in fine detail. And now that you mention it, they do have an abstract expressionist quality to them.

Dashow: Good, that's definitely fine with me! How I get there is still a mystery for me, too. I invent rhythmic structures along with the pitch/timbral events, not separately, of course, but the rhythms are designed to support the intervallic and timbral developments, that is, they are subsidiary to the frequency relationships. Generally, the sense of the sounds and sound successions suggest rhythms to me; but I do spend a lot of time fine-tuning the rhythms, both the short-range immediately perceived rhythm of individual events, and (especially) the long-range rhythms of . . . well, let's call it rhythms of duration, the shape of the whole form . . . how long I am developing one kind of a thing or another, how fast an entire phrase or section seems to be going, how complex contrapuntally some section is, and how that changes the sense of perceived duration . . . and always with respect to how the piece "goes," the large-scale idea of the whole work.

Karpen: Do you have a solid conception of the entire piece before getting to work?

Dashow: I definitely do not know specifically how a whole piece is going to turn out ahead of time. I often begin with a sense of a few musical ideas that I know "belong" together, and I know from experience that very shortly after beginning a work, I will have composed a first sketch of how the piece should end, and then things begin to evolve both spontaneously and as a result of hearing what I've just put down on paper or generated with the computer. The first ideas are the seeds, and the rest

grows. And almost always, the seed ideas occurred to me while just fiddling around either with electronic sounds or with some of the possibilities of my Dyad System; and in the latter case, it's a matter of things occurring to me spontaneously in terms of dyads or trichords, textural things or intervallic things. As I said before, the Dyad System is a generalization of a way of hearing, in this case my own way of hearing, but is sufficiently rich to go along with other ways of hearing as well.

Karpen: Do you have any idea where your invention comes from?

Dashow: Nope, not a clue. By now, I know I get a lot of ideas when I'm relaxed and not actively thinking about any work in progress. One of the things that very much gets me in gear is reading in the morning. Reading a dozen or so well-written pages very much charges my compositional batteries, especially if I'm in the middle of a piece. When I'm between pieces, or stuck in a current piece, I've discovered to my constant amazement that all I have to do is put myself on a Rome bus going anywhere, especially the number 64 bus, and things begin to pop into my head. The traffic in Rome is so bad, and the bus ride is so annoying, that I withdraw into myself to endure the trip—it's best if I'm standing up hanging onto an overhead strap—and that's when things begin to happen. I wouldn't recommend that to everybody, however!

Karpen: Well, going to Rome sounds like a pretty good process, though.

Dashow: Sunday mornings in May or October especially, walking around the old parts of the city when the traffic is next to nothing is a beautiful experience. That I *would* recommend to everybody!

Karpen: You spoke of "duration" a moment ago; earlier you had told me that you were starting a series of pieces to be entitled *Soundings in Pure Duration*. Is that what you're working on now?

Dashow: I'm working primarily on my planetarium opera, *Archimedes*, but I've had and still have some independent commissions that I'm trying to satisfy at the same time. Most of these commissions are for live instruments with electronic sounds, but

I've found, as with . . . *at other times, the distances*, that the electronic sounds created for an instrumental piece can often be re-worked into a piece for electronic sounds alone. For instance, . . . *at other times, the distances* is a re-casting of the electronic sounds for my Koussevitzky-commissioned piece, *Far Sounds, Broken Cries* for twelve instruments and electronics. The piece I'm doing now, *Messages from Ortigia* is for bass flute (doubling alto flute), bass clarinet, viola, harp and multi-channel electronics, and in the meantime, I'm keeping an eye (or rather, an ear) out for re-structuring the electronics into a standalone piece. That will be my *Soundings in Pure Duration No. 1*. I'm really glad to have found a title that very much expresses my notion of making electronic music, and has a very satisfying pun in it, to boot. The next few electronic pieces will all be other *Soundings in Pure Duration*—numbered sequentially. This saves me that agonizing chore of coming up with a fresh title every time!

Karpen: Where does the title come from?

Dashow: It's from Henri Bergson, which I read in English. In French, you don't have the wordplay on "soundings." You know, it loses something in the original (as it were).

Karpen: How long have you been waiting to use *that* line?

Dashow: I'll never tell! But actually, I'm fascinated with the attempts everywhere and in all epochs to come to grips with time—what it is. Is it a physical thing, a psychological thing, can we say anything meaningful about it, or is it just a relational concept, and so on. The different ideas that people have come up with in something like 3,000 years of pondering are for me tremendously stimulating. I've only just started reading Bergson and am delighted to have found an original and provocative voice. Quite often, I'll come across a striking phrase by one writer or another that captures the essence of a piece I'm working on, or am about to do, or will even inspire a piece. The phrase acts sometimes as a guide for me toward the shape of an entire work. I've found several phrases like that in Michel Serres's work.

Karpen: Which pieces are those?

Dashow: The title for my seven-instrument piece, *A Sheaf of Times*, is from a Serres paragraph, as is the title for my piano and electronics piece, *First Tangent to the Given Curve*. I was lucky on that one; I recently found a different translation of the same paragraph that is far less poetically done. Irwin Lieb's book *Past, Present and Future* is another wonderfully suggestive and original book; there are a lot of phrases and paragraphs in there that feel like entire pieces to me.

Karpen: Your recent four-channel tape piece . . . *at other times, the distances* certainly shows for me what you mean about craftsmanship in the service of musical expression: it has an amazing sense of space, timbral variety, formal elegance, and a great deal of purely musical beauty. Can you talk about this piece? What's new for you in this work? How do you place it in the body of your work?

Dashow: Thank you. Well, with . . . *at other times, the distances*, I felt I was finally beginning to get the timbral quality I'd always been after. I think the primary factors were having real-time digital audio editing, which allowed me to spend still more time fine-tuning details and trying out things, and a handful of audio tools that were flexible enough to do what I needed. I generally tend to use a chain of three or four signal-processing modules to produce the effect I want, but without real-time listening and adjusting parameters on the fly, this would be impossible. For each one of my MUSIC30-generated sounds, I usually find a dozen or so ways of transforming or modifying them with some sort of processing. You know, something as (relatively) simple as a multi-band compressor can get you wonderful varieties of alterations of a single sound just by playing with, say, the crossover frequencies, or the different compression ratios in each band. And where you have the possibility of drawing your own compression curve, you can produce some stunning transformations of the original sound by designing unconventional curves. One of the things I'd like to see somebody develop is the possibility of dynamically changing the ratio or the crossover frequency in time via envelope control (synchronized to the duration of the sound being

treated), or by modulating the compression controls at audio rates.

I should add, too, that with this piece I began expanding my Dyad System approach; up to then I had used exclusively six-pitch collections, grouped as three dyads, and the intervals derived from each dyad were used as the bases for generating my sounds. Here I began using seven-pitch collections grouped as two dyads and one trichord, and eight-pitch collections grouped as two trichords and one dyad. These kinds of interval groupings provided me with fresh resources that not only yielded new and extremely expressive successions of electronic sound, but also suggested to me new ways of going about constructing musical form. The seven-pitch collections have become my preferred way of working.

Karpen: I note that you said “new successions of sound” rather than just “new sounds.”

Dashow: Yes, I think inventing “new sounds,” “new procedures”—what have you—is only part of the story, maybe like making new bricks, to continue the analogy from before. But you have to use them once you’ve got them. You have to create a musical context that makes effective use of the “new,” such that something that is more than just a “new sound” is created. How many times have we heard pieces where the only thing that happens for far too much time is one sound or one procedure? Even after all our experience with electronic music—and examples are everywhere available to learn from—too many composers still fall into the trap of equating time spent making a sound or process with its musical value. Sure, there may be a lot of work involved, but then you have to back off and listen critically to what that sound or process is doing musically.

After completing the phase of being an inventor, you must return to being the composer who evaluates your resources from a purely musical standpoint. Cooks may spend months developing a superb sauce, but they would never dream of serving only the sauce—or worse, pouring it over everything . . . at least not in any of the restaurants I’ve ever been to.

Karpen: You’ve obviously never been to some of the places on University Avenue in Seattle! One

place offers you a choice between “everything we have left over from yesterday in a bowl, with rice” and “rice in a bowl, with everything we have left over from yesterday.” It reminds me of much of the music I’ve heard recently.

Dashow: One of these days I really am going to see if there is some sort of relationship between cooks and composers.

Karpen: Count me in on the research! Think we can get a grant? [Laughter.]

Dashow: At any rate, when I say “successions of sound,” I refer simply to taking a lot of those “new” things and trying to make genuinely new musical ideas out of them, understanding the possibilities—the musical implications—of the newly invented things taken not singly but several in variously sized bunches, and seeing how they can fit together in different ways to make an expressive and stimulating work. It’s here where your ears and your craftsmanship and sensibilities are working the most. Whenever I conduct master classes, I always tell students that one of the most necessary things to learn (but also one of the hardest) for a professional is how to cut, unmercifully, your own materials. If it’s not right for the composition, cut it, and basta! Maybe it belongs in another piece.

Karpen: Now to your opera. You’ve been working for a number of years on a multimedia opera. What is the subject of this work, and can you talk a little about the new technologies involved?

Dashow: The opera is based on the life of Archimedes, or rather what is known about his life from Plutarch’s *Life of Marcellus*. I’ve interpolated, and—well, let’s say, developed—things that weren’t exactly there, but which make for good theater . . . poetic license and all that. The libretto, which has gone through a couple of editions, is by Cary Plotkin, with some additional poetry and materials by Ted Weiss. It is designed to be performed in a planetarium equipped with the new digital full-dome projection system. One such typical system, like the one at the Einstein Planetarium in Washington, D.C., is made by some folks in New Hampshire called Sky-Skan; the new Rose Planetarium in New York has another system. But they are all designed

around the idea of computer-controlled projection of five perfectly synchronized animated images on five different areas of the planetarium dome: north, south, east, west, and overhead. It's what I like to call "surround video." Along with this, many such installations have up to six channels of sound.

The point of departure for me was the integration of multi-channel electronic music with multi-screen projection of three-dimensional geometrical figures, but then the idea grew into following Archimedes through his life and using the dome to project different kinds of graphics for the various scenes. Some scenes are without electronic stagecraft—I let mime and dance do the theatrics. Planetariums typically have little or no space for live performers, so the actual performing forces to be seen will be Off-Broadway-sized. I had originally hoped to use a live chamber ensemble, but there's just no space, so the music will all be pre-recorded, and I am using all kinds of sound sources—not just my electronic sounds. In a couple of scenes, I am calling for a live chorus that I want to place around the outside of the dome; you hear them, but you don't see them. There are problems of synchronization between live singers and the sounds and the graphics to resolve. One scene calls for perfect synchronization between mime, electronic sounds, and computer animations on the dome. Archimedes moves his hands to describe some sort of geometric shape, and it appears on the dome, and begins to take on a life of its own, for example. I am looking into ways to get the motion of the mime into the computer that controls the projections, but that would still create problems synching with the pre-recorded music. At any rate, I've found a few possibilities, and am exploring ways to adapt them for the opera.

Another problem is lighting: in many instances, the actual candle power of the planetarium projections is not very strong, although you don't realize it in the darkened dome. However, a normal theater spotlight would drown out the images, so we have a real challenge there. Apparently, new projection technology is much more powerful, but I don't know who has installed it. Planetarium projectors are very expensive (not to mention the software for preparing the animations).

Yet another thing to take into consideration will be the precise positioning of sound with respect to an audience—either in the round or in an amphitheater kind of disposition. The acoustical space in a planetarium is marvelously dry, almost anechoic, so the control over sound diffusion can be crafted to a high degree. I'm hoping to have access soon to one of the new multi-channel digital reverbs and see how effective they are for maintaining the sound image for an entire audience while contributing true three-dimensional audio depth inside the dome, and even varying the sense of depth and space during the course of a scene.

Karpen: This sounds like a very complex project.

Dashow: That it is.

Karpen: What are some of the things that excite you the most about the convergence of visual, aural, and textual expression through digital media?

Dashow: I went to visit the Sky-Skan "demo dome" at their headquarters in Nashua, New Hampshire, and we played . . . *at other times, the distances* on their multi-channel system along with one of their demo animations, just to see what effect it would all make. Where the movement and rhythm and evolution of the sound did coincide with the motion of the images—by chance, of course—the effect was simply overpowering. It pulls you out of yourself into a three-dimensional sound-space that is truly fantastic, completely overwhelming, totally different from an IMAX experience, which still has the traditional audience on one side and watching an image on the other. Here, the image and the music are everywhere. The audience is in the action, not just watching it. This is genuinely new theater to my mind, and I think the possibilities of a real "multi-media" art are in the planetarium. If I were about 15 years younger, my ambition would be to become a *kappellmeister* for a planetarium, or as Chris Chafe once put it, a "planetariummeister."

Karpen: Do you have new kinds of conceptual notions to go along with this new media mix?

Dashow: Well, I doubt if my theatrical notions are really new, but I am optimistic that the electronic

stagecraft, that is, the resources of the planetarium, with electronic sound and live performers can together produce a new kind of theatrical experience. The way I've designed the actual succession of scenes is based on both theatrical and musical considerations; the graphics are considered to be main characters as much as the live performers. I came across a phrase in William James that perfectly sums up my sense of how *Archimedes* should be paced: as "a stream of metamorphosing tableaux and echoing images."

Karpen: This is going to require a lot of different kinds of resources. Tell me a little about the practical side of all this: for instance, how are you going about the process of producing it? What problems—technical, artistic, social, political—have you encountered in the process of working on and trying to produce performances of this work?

Dashow: Whew! Well, let's radically understate things and say there are lots of problems. My old and dear friend George Shirley, the justly famous and highly regarded tenor, one day sent me an electronic mail saying he would like to produce *Archimedes* at the University of Michigan School of Music where he teaches. (George Shirley was Stravinsky's tenor of choice when he conducted his recording of *Pulcinella*, and Boulez's choice for his recording of *Pelleas and Melisande*. I had had the privilege of working with him on one of my first pieces for live performer and computer-generated sounds back in 1976: *Second Voyage* for tenor and computer.) We have since encountered all kinds of unforeseen difficulties in trying to produce *Archimedes*, and of course most of them would be resolved with adequate financing, so guess what we're spending a lot of time doing? And as you know, ever since September 11, fundraising for the arts has become extremely difficult. As I heard one famous conductor put it, birds don't sing when the weather's bad.

Over the last few years, I've visited several planetaria in the U.S. and Europe and discussed the work with their directors of production. All of them—and I mean literally all of them—are tremendously enthusiastic about having *Archimedes* play at their sites. They know what their projection system can

really do, and they welcome the chance to use the system for artistic purposes. They are all pretty well tired of running the same sort of star show for audiences of children. But they don't have the financing to produce the graphics, which are very, very costly. Not only do you have to render the animated images for five screens, you then have to pass the rendered image data through the software that adapts them to the synchronized projectors and recalculates the images into continually changing spherical coordinates. An image that moves across a curved surface has to be constantly re-focused in order to maintain the illusion of a fixed unaltered shape. This second pass takes about as much computer time, if not more, as the original rendering. The planetaria will provide me with all theatrical services, rehearsal time, technical help, printing the programs and tickets, publicity, etc., but they don't have the resources to pay for material costs. But the enthusiasm of these people has been definitely encouraging.

I won't go into all the dead-ends we've encountered. Over the last couple of years, I've had people jump on the bandwagon and then jump off when something better came along that required less work and got them more funds. And we've run up against an unbelievable lack of imagination in the people who run traditional opera theaters. Many universities have their own planetarium installations. My greatest amazement has been at the failure of these academic departments to realize the value of a planetarium as a teaching device for things like molecular biology, chemistry, astrophysics, quantum theory . . . you name it. Putting three-dimensional images of models of things (which they do everyday on tiny little computer screens) on the planetarium dome would be a dramatic and highly suggestive way of teaching these disciplines and aiding in research. But no; for most folks, planetariums are those same old children's star shows. The shortsightedness I'm running up against in proposing the planetarium as a multi-cultural, multi-didactic center of learning and art is nothing short of awesome.

You recall I even half-jokingly suggested that your neighbor across the lake [Bill Gates] should build a state-of-the-art planetarium here in the Se-

attle area. It would be tax-deductible pocket change for him and would do wonders to enhance something that he is, needless to say, directly involved in: software, now being used for advanced artistic and didactic purposes.

Karpen: Yes, you and a few thousand others are knocking on that door.

Dashow: Well, the problem is finding his door to even start knocking.

Karpen: Well, *Archimedes* would certainly be a stunning way to inaugurate the—what shall we call it—the WindowGates Planetarium!

Dashow: Or “A Window to the Cosmos.” Do you think he’ll read this interview?

Karpen: I’ll send him a few copies! So where are you now with *Archimedes*?

Dashow: Compositionally, I’ve finished about half of it, mostly the first act, with lots of material sketched, and sounds developed and discovered, for the second act as well. It’s in pretty good shape. I have a couple of people working on flat-screen versions of the graphics for a couple of scenes, which will be premiered in New York in January 2003 at Merkin Hall and repeated while I am composer-in-residence at Jim Sain’s 12th Annual Florida Electro-acoustic Music Festival in April 2003 in Gainesville. Many of the scenes are composed to be standalone pieces as well, so I have been able to generate interest in the opera through performances at various festivals both in the U.S. and in Europe. George and I have discovered that there is a perfectly fine planetarium at the Detroit Science Center, just down the road from Ann Arbor, so we are aiming to do the first performances there. But notwithstanding the obstacles, I am tremendously turned on by this project. It’s been on the fire for a long time, but the delays have been to my benefit as audio and planetarium technologies have improved enormously over the last decade. I work slowly, so the extra time has meant I’ve been able to polish compositional details a good deal. And above all I think it’ll be a genuinely moving theatrical experience on many, many different levels. That’s certainly what I’m aiming for.

Karpen: I want a good seat at the *prima assoluta*!

Dashow: It’s yours!

Appendix

For more information about James Dashow, see www.jamesdashow.net, which contains, as mentioned previously, a discography and a complete list of works, among other things. Some of his Dyad System software is available there for download, as is his quadraphonic-to-octophonic panning method. A detailed description of the Dyad System can be found in Mr. Dashow’s articles “The Dyad System Part I” and “The Dyad System Parts II and III” in *Perspectives of New Music* 37(1) and 37(2), respectively. James Dashow has been previously interviewed by Curtis Roads in Mr. Roads’s anthology *Composers and the Computer* (1985); by Nicola Sani in the 1991 article “Un Computer Music Composer Americano a Roma” (*Computer Music* 13/14; reprinted in the book *Musica Espansa* by Francesco Galante and Nicola Sani, 2000); by Joel Chadabe for his book *Electric Sound: The Past and Promise of Electronic Music* (1996); and by Carlo De Pirro in *Vent’Anni di Musica Elettronica all’Universita’ di Padova, Il Centro di Sonologia Computazionale* (edited by Sergio Durante and Laura Zattra, 2002).

The following bibliographic sources for some of the references in the interview may be of interest for further perusal. The most famous of Michael Polanyi’s work is his *Personal Knowledge* (1958), but several later works refine and significantly develop of his most important concepts: *The Tacit Dimension* (1966), *The Study of Man* (1961), and *Knowing and Being* (1969), a collection of essays from 1959 through 1968. The relevant works of Jean Piaget are *Structuralism* (1968, English translation, 1970), *The Principles of Genetic Epistemology* (1970, English translation, 1972), and *Insights and Illusions of Philosophy* (1965, English translation 1971). A rare study of Piaget with respect to other 20th-century thinkers is *Piaget, Philosophy and the Human Sciences* (edited by Hugh J. Silverman).

The title *Soundings in Pure Duration* is found in Henri Bergson's *The Creative Mind* (English translation re-published in 2002). Other Bergson titles that have superb discussions of time, duration, and related problems are *Matter and Memory* and *Creative Evolution*, both of which can be found in English translations and are newly re-published. Much of Michel Serres's work has been translated into English. A good introductory selection of his work can be found in *Hermes: Literature, Science, Philosophy*. Two books of particular interest are *Genesis* and *The Natural Contract*.

Works on the problem of time number in the hundreds; three of the best panoramas on the sub-

ject are Charles M. Sherover's *The Human Experience of Time* (recently re-published after being out of print for 20 years), *Time and Space* by Barry Dainton (2001), and finally *The Voices of Time* edited by J. T. Fraser (second ed., 1981), which includes work from outside the Western tradition. The subtitle of Fraser's book speaks a great deal: "A cooperative survey of man's views of Time as expressed by the Sciences and by the Humanities."

The reference to Richard Feynman is his famous *QED: The Strange Theory of Light and Matter*, but also his genuinely fascinating *The Character of Physical Law*, both short and sympathetically written for non-physicists.

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