World Futures

R. John Williams

In the 1950s and 1960s a vast number of Anglo-American institutions and strategic planners began turning more aggressively to the question of *the future*. This new field was called futurology.[1] But as recognizable as the future might have been conceptually to the new discipline (and as common as it is for us today to remember how deeply these institutions were concerned with predicting it), to frame the period in these terms may actually conceal the most transformative quality of the discipline's discursive practice. I want to argue, rather, that we can more productively refer to this period as having initiated a new mode of ostensibly secular prophecy in which the primary objective was not to foresee *the* future but rather to schematize, in narrative form, a *plurality* of possible futures. This new form of projecting forward—a mode I will refer to as World Futures—posited the capitalizable, systematic immediacy of multiple, plausible worlds, all of which had to be understood as equally potential and, at least from our current perspective, nonexclusive. It is a development visible, for example, in a distinct terminological transition toward futurological plurality and its correlates (figs. 1a–b). World Futures involved the consolidation of an oracular sensibility entirely at odds with previous, more singular visions of *the* future (singularities registered and adhered to, for instance, in phrases such as "Christ *will* return,"[2] "Capitalism *will*

1. For summaries of the futurology moment, see Nicholas Rescher, *Predicting the Future: An Introduction to the Theory of Forecasting* (New York, 1998), pp. 28–29, and Lawrence R. Samuel, *Future: A Recent History* (Austin, Tex., 2009), pp. 109–40.

2. David G. Bromley and Catherine Wessinger, "Millennial Visions and Conflict with Society," in *The Oxford Handbook of Millennialism*, ed. Wessinger (New York, 2011), p. 199; my emphasis.

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come to an end,"[3] and so on).[4] But if the rise of World Futures developed as part of a massive institutional and political system designed to embrace and capitalize on the presumed value of inflecting the present with the specter of many potential futures, it would be wrong to think of this new temporality as having emerged wholly within the domain of Western rationality and establishment conservatism. As I hope to demonstrate, much of the discursive power of this transition had to do with an overarching countercultural commitment to the presumed nonlinearity of "Eastern" temporalities and their role in philosophically engaging institutional commitments to World Futures.[5] It was a transformation, in short, as Orientalist and literary as it was computationalist and organizational—the combination of which, I argue, has come to constitute a pluralist temporality of global capital.

One way of quickly visualizing the type of transformation I am describing here would be to see it as a macrocosmic, institutional version of what happened when Jorge Luis Borges (who is, in many ways, a prophetic prefiguration of World Futures) encountered the medieval polymath Ramón Llull's geometric mandala in 1937.[6] Llull had designed his "thinking machine," as Borges called it, in the late thirteenth century as a means of fusing Arabic combinatorial mathematics with his own ideological commitments to Christian theology.[7] In his *Ars Compendiosia*

3. Richard Schmitt, *Introduction to Marx and Engels: A Critical Reconstruction* (Boulder, Colo., 1987), p. 203; my emphasis.

4. While these phrases no doubt serve as flattened caricatures of both Christianity and Marxism, they nonetheless continue to serve as markers of these systems' respective futurological singularities.

5. The term *Eastern* here is, of course, a discursive construct (and having said as much, for the sake of readability, I will refrain in much of this essay from placing it and other terms like *Oriental*, *Western*, and *Occidental* in scare quotes with the understanding that I do not myself think of these as social or cultural essences). As we shall see, for many of the figures examined in this essay, *Oriental* could be applied to everything from Arabic mathematics to Japanese Zen Buddhism.

6. See Jorge Luis Borges, "Ramón Llull's Thinking Machine," trans. Esther Allen, *Selected Non-Fiction*, trans. Allen et al., ed. Eliot Weinberger (New York, 1999), pp. 155–59.

7. For more on Llull's background, see Anthony Bonner, *The Art and Logic of Ramon Llull: A User's Guide* (Boston, 2007), pp. 1–25; Ramón Llull, *Selected Works of Ramon Llull (1232–1316)*, trans. and ed. Bonner, 2 vols. (Princeton, N.J., 1985), 1:1–89; Fernando Rodríguez Mediano, *The Orient in Spain: Converted Muslims, the Forged Lead Books of Granada and the Rise of Orientalism* (Boston, 2013), p. 39; and Ahmed Y. al-Hassan, "Transmission of Islamic Science in

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Inveniendi Vertatem (1274), Llull identifies sixteen qualities of God (God is represented by the central letter "A" and his sixteen qualities by the surrounding letters "B"–"T" along the edge of the mandala), drawing out and writing an accompanying essay on each of the eighty possible paired combinations of attributes (fig. 2).[8] The product of these essays generated, for Llull and his followers, a number of theological insights: that God's goodness, for example, could be understood in relation to his greatness, or that his virtue had some relation to his truth, and so on. What struck Borges about Llull's mandala, however, was the idea that if one were to "load the machine differently," abandoning the "futile" univocality of Llull's Christian theology (today, he explains, we might enter into the mandala categories like "*Entropy, Time, Electrons, Potential Energy, Fourth Dimension, Relativity, Protons, Einstein*"), the device could be quite useful as a *literary* tool for developing stories of complex variety.[9] What for Llull had been designed to produce a unified, theological singularity would become for Borges a dizzying narrative plurality. Of course, one need only point to Borges's "Garden of Forking Paths" (with its Chinese narrator's tale of a "chaotic novel" marked by " 'various future times' "),[10] or his "The Library of Babel" (with its hexagonally infinite universe of every possible book),[11] or even his frequent allusions to and rewritings of *The Thousand and One Nights* (with the Sultana Scheherazade's intimations of an "infinite" book) ("GFP," p. 74), to see how this Orient-inflected "machine" and its algorithmic possibilities would continue to haunt him throughout his career. As he repeatedly told interviewers in the final years of his life, "I know firstly that there will be many futures. . . . I know that many futures are about to come. Why speak of *the* future? That has no meaning."[12] The question this

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the West," in *Science and Technology of Islam*, vol. 4 of *The Different Aspects of Islamic Culture*, ed. al-Hassan, 2001, unesdoc.unesco.org/images/0013/001345/134503eo.pdf, pp. 146–47. On the Eastern origins of combinatorics algorithms, see *Combinatorics: Ancient and Modern*, ed. Robin Wilson and John J. Watkins (New York, 2013), pp. 3–108.

8. For more on Llull's device and its relation to Arabic mathematics and (eventually) computer programming, see Bethany Nowviskie, "Ludic Algorithms," in *Pastplay: Teaching a Learning History with Technology*, ed. Kevin Kee (Ann Arbor, Mich., 2014), p. 150; Ken Hillis, Michael Petit, and Kylie Jarrett, *Google and the Culture of Search* (New York, 2013), pp. 91–104; and Donald E. Knuth, *Generating All Trees*, vol. 4, fasc. 4 of *The Art of Computer Programming* (Boston, 2006), pp. 56–60.

9. Borges, "Ramón Llull's Thinking Machine," p. 157.

10. Borges, "The Garden of Forking Paths," trans. Helen Temple and Ruthven Todd, *Ficciones*, trans. Temple et al. (New York, 1993), pp. 75, 97; hereafter abbreviated "GFP."

11. See Borges, "The Library of Babel," trans. Anthony Kerrigan, *Ficciones*, pp. 58–66.

12. Borges, "The Nightmare, that Tiger of a Dream," interview by Willis Barnstone, *Borges at Eighty: Conversations*, ed. Barnstone (Bloomington, Ind., 1982), p. 148. See also Borges, "Borges and I," interview by Daniel Bourne, Stephen Cape, and Charles Silver, *"The Last Interview" and Other Conversations*, trans. Kit Maude (Brooklyn, N.Y., 2013), p. 129.

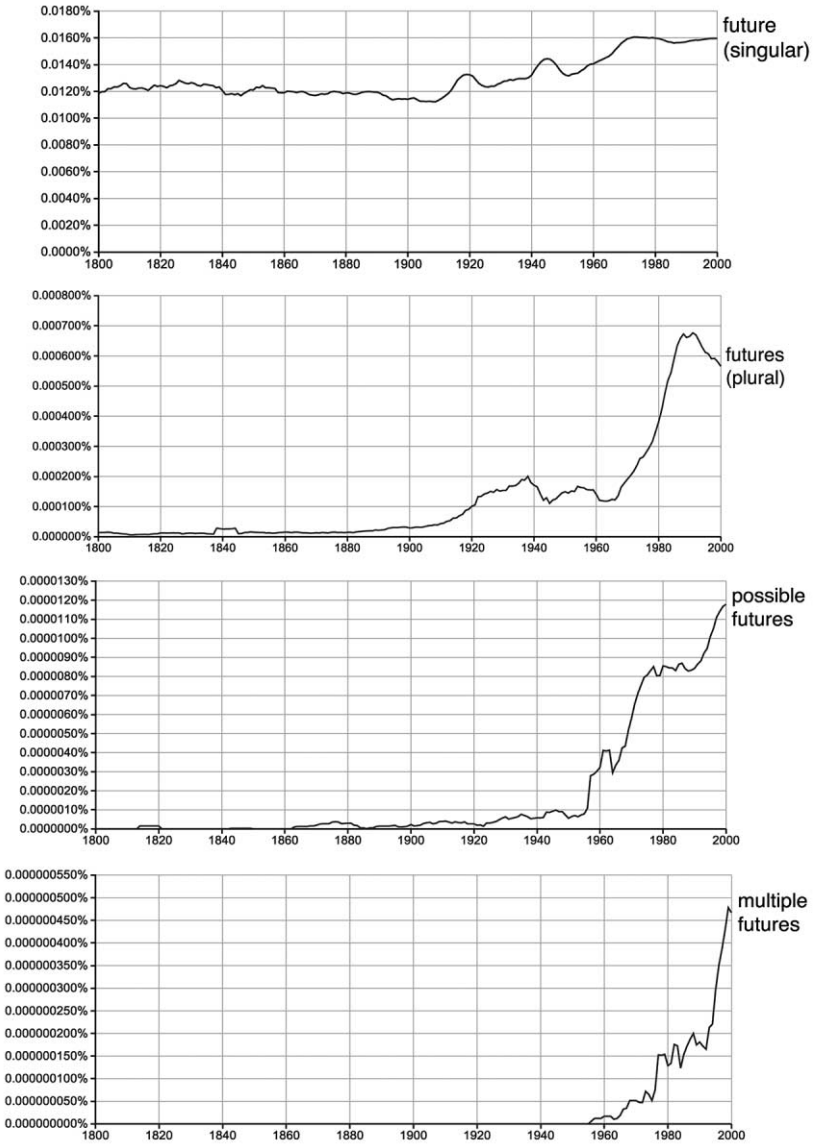

FIGURE 1A. Google Ngram visualizations showing frequency of letter, word, and phrase combinations between the years 1800 and 2000 among more than twenty million books. Note that while the word *future* as for "the future" (not shown here) remained more or less constant, its plural variants increased dramatically after the 1950s. Also, although the individual data sets graphed for the plural *futures* are smaller than for the singular *future* (notice the percentages to the left of each graph), the transformation illustrated here in terms of *future* as world-envisioning ontologies is even more dramatic considering the fact that most of the pre-1900 usages of *future* graphed here had to do with the grammatical tenses (future perfect, future progressive tense, and so on).

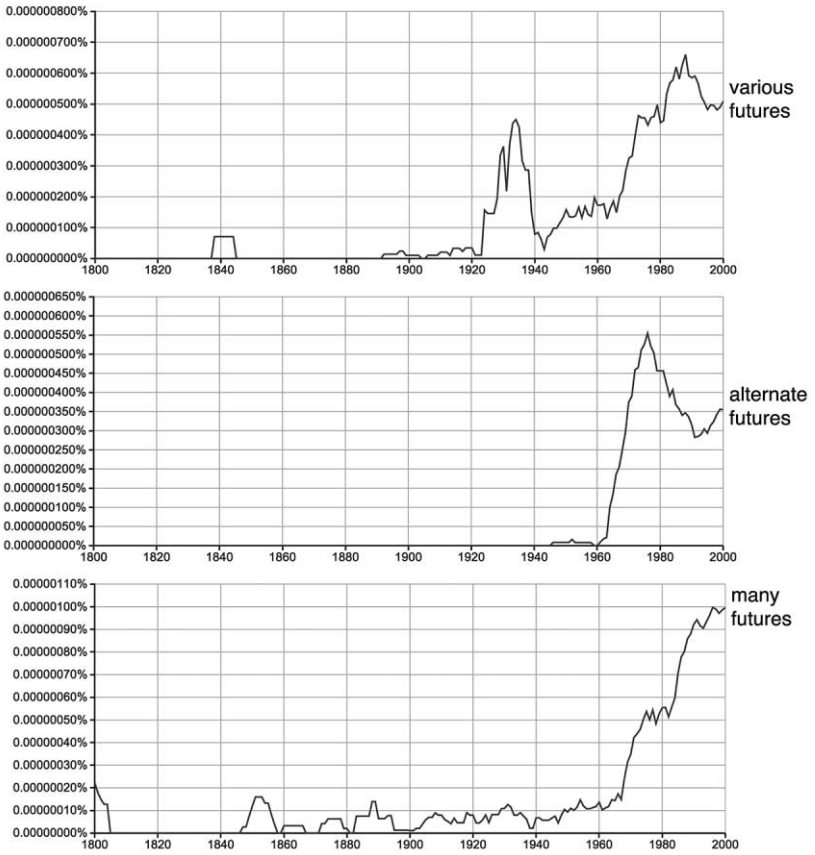

FIGURE 1B.

essay attempts to answer, then, is what happens when a whole series of multinational corporations, think tanks, and other "globally minded" individuals not only accept the techniques of narrative plurality that Borges located in Llull's mandala but also the ostensibly Eastern metaphysics he associated with it. Or, even more urgently, what are we to make of the fact that a quasi-religious regime of World Futures has come to dominate the business landscape at precisely the moment when it has become clear that our planet—and its rapidly changing climate—is headed toward a singularly and catastrophically fiery future?

The Antinomies of World Futures

We can track the development of World Futures, roughly, in two interrelated phases: the first (perhaps predictably) computational, rationalist,

FIGURE 2. Mandala combinatoric illustration in Ramón Llull, *Ars Magna, Generalis Et Ultima* (Lyon, 1517).

secular, and cybernetic; the second (more surprisingly) narratological, charismatic, avant-gardist, quasi-religious, and generally committed to various Oriental philosophies—a development I will refer to as the rise of Oriental Systems Theory. The trajectory of the first of these phases is by now a familiar story of accelerated computational dominance within American institutions devoted to military and political research. Aided by developments in mechanized calculation, the secular oracles of a future American century, most notably in organizations such as Princeton's Institute for Advanced Study, the RAND Corporation, and national laboratories at Oak Ridge and Los Alamos (as well as, of course, the Manhattan Project before them), began positing questions about the future during the mid-1940s that would have not only been unanswerable a generation before (climate modeling, nuclear war games, election forecasts) but also unaskable—shelved as irrelevant because ostensibly incalculable. Indeed,

if there is one thing on which all recent accounts of the origins of the digital universe agree, it is that the calculations on which the earliest computers cut their teeth were not only military/industrial but intrinsically futurological as well.[13] However, insofar as these early machines (the ENIAC, the EDVAC, the MANIAC, the JOHNNIAC) inspired a growing confidence that future possibilities could be measured, analyzed, and managed, the overarching ambition of their early designers and operators was still firmly rooted in the desire to locate a single, most likely future—still the Laplacian dream of a calculative, oracular singularity.

But a funny thing happened on the way to computing the most likely future. It happened gradually within several institutions over about a decade and in the context of thousands of research projects on forecasting and military industrial probabilities. It involved a kind of unexpected pushback, not against the computer as such, but against the idea that mechanical calculation—and even (or even especially) powerful modes of computerized calculation—could serve as a means of identifying a *singular*, most likely future. Consider, for instance, the reaction against what was known as the Monte Carlo method of computational simulation by one of its principal architects at the RAND Corporation in the early 1950s, the young strategist Herman Kahn.[14] Earlier in his career, Kahn had enthusiastically embraced the task of running Monte Carlo simulations. Because the algorithms required thousands of random numbers as a way of sampling a given probability (and because truly random numbers are technically impossible to generate mathematically), Kahn reportedly "astounded" the RAND purchasing department by ordering one hundred thousand paperclips for the purpose of keeping track of the numbers he was literally pulling out of a hat (*SG*, p. 17).[15] However, given the increasing

13. See George Dyson, *Turing's Cathedral: The Origins of the Digital Universe* (New York, 2012), pp. 166–67, 173; Paul E. Ceruzzi, *A History of Modern Computing* (Cambridge, Mass., 2003), p. 31; and William Aspray, "The Institute for Advanced Study Computer: A Case Study in the Application of Concepts from the History of Technology," in *The First Computers: History and Architecture*, ed. Raúl Rojas and Ulf Hashagen (Cambridge, Mass., 2002), pp. 189–90.

14. See Nicholas Metropolis and Stan Ulam, "The Monte Carlo Method," *Journal of the American Statistical Association* 44 (Sept. 1949): 337–38; Dyson, *Turing's Cathedral*, pp. 190–91; Brian D. Ripley, *Stochastic Simulation* (New York, 1987), pp. 2–4; and B. Bruce Briggs, *Supergenius: The Mega-Worlds of Herman Kahn* (New York, 2000), p. 17, hereafter abbreviated *SG*.

15. See James Gleick, *The Information: A History, a Theory, a Flood* (New York, 2011), pp. 326–28; Dyson, *Turing's Cathedral*, pp. 197–99; and Harald Niederreiter, *Random Number Generation and Quasi-Monte Carlo Methods* (Philadelphia, 1992), pp. 164–65. Kahn was only twenty-five years old when he arrived at the RAND Corporation in 1947 (his official title was computer), but he quickly became the institution's foremost expert on Monte Carlo methods, playing a key role in streamlining their implementation of RAND's new John von Neumann Numerical Integrator and Automatic Computer (JOHNNIAC) machine, and in promoting the methods in the larger field of applied mathematics, teaching several courses on the subject

number of random digits the systems needed, the hat quickly became impractical, and so RAND eventually built "an electronic roulette wheel" with a "random frequency pulse source" that provided roughly one hundred thousand pulses per second, passing through a "binary counter," which was then relayed into an IBM punch card and, finally, a table of random digits.[16] The resulting publication, *A Million Random Digits* (1955), looks almost like an avant-garde work of art, with hundreds of pages of certifiably random numbers—the first book ever, as far as I can tell, guaranteed by its authors to signify nothing (fig. 3).[17]

But it did signify something. In fact, in any given simulation, it might signify a *lot* of things. For Kahn, who by the mid-1950s had spent roughly half his career at RAND working on Monte Carlo algorithms, these computerized systems analyses eventually came to seem like precisely the wrong approach insofar as they reflected the attempt to locate a single, most-likely future, when what they more accurately reflected was an inherent *plurality*.[18] As Kahn would later reflect in *On Thermonuclear War* (1960), it was at about this time that he and some of his colleagues at RAND experienced a "breakthrough":

> About six or seven years ago there was a "technological breakthrough" at The RAND Corporation. . . . The nature of the breakthrough was simple. In the early days at RAND most studies involved an attempt to find the "optimum" system, given some reasonably definite set of circumstances, objectives, and criteria. The emphasis was on comparing thousands, sometimes tens of thousands, of different systems under idealized conditions; then the "best" one would be picked. . . . Naturally the high-speed computer often played a central role in all this.

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at UCLA; Briggs credits Kahn with bridging the application of Monte Carlo "from Neumann and Ulam to its wide acceptance among applied mathematicians in the 1950s," finding a series of "ingenious shortcuts" that reduced "the number of required computer runs" for each simulation (*SG*, pp. 17, 18).

16. RAND, *A Million Random Digits with 100,000 Normal Deviates* (New York, 1955), p. xi. For more on the development of the machine, see Willis H. Ware, *RAND and the Information Evolution: A History in Essays and Vignettes* (Santa Monica, Calif., 2008), pp. 87–89.

17. For an excellent discussion of RAND's volume as prefiguring and reflecting the avant-garde art of the 1960s, see Joshua Shannon, "Uninteresting Pictures: Art, Fact, and Technocracy, 1968," in *The Global Sixties in Sound and Vision* (New York, 2014), pp. 227–44. See also Gleick, *The Information*, p. 327; Alex Abella, *Soldiers of Reason: The RAND Corporation and the Rise of the American Empire* (New York, 2009), pp. 147–48; and Leonard Mlodinow, *The Drunkard's Walk: How Randomness Rules Our Lives* (New York, 2008), pp. 84–86.

18. Briggs notes that around this time Kahn abandoned the massive tome on Monte Carlo methods he was writing (a book that would have certainly established him for the remainder of his career as *the* expert in the field), expressing both frustration with the method's limitations and apparent boredom with the entire subject: "I find the task tedious in the extreme" (*SG*, p. 19).

02050	60293	89508	23859	34236	70213	08267	55578	19985	11758	12954
02051	06037	86587	36344	12416	13524	09130	65426	29304	08873	56225
02052	25632	13524	57632	87444	65152	71058	64613	89559	01118	98238
02053	94460	83122	76454	53563	92331	62550	38093	43805	97589	24078
02054	12540	79405	29446	06578	31575	19190	74074	04586	74193	01181
02055	02331	83240	53172	23747	26085	72458	58064	20691	29234	85682
02056	48393	39276	17039	89852	22422	77039	20070	48035	16690	89265
02057	61385	00248	22390	68775	92648	11210	93587	15687	64163	10242
02058	78932	05609	31235	20612	84902	98495	66312	97424	83807	73521
02059	99220	61604	62650	68913	07647	33703	24027	62199	05708	46105
02060	55553	66890	80157	99671	82651	00075	74615	91675	22060	41813
02061	31336	80419	71780	29060	80911	42108	54403	79158	10985	93390
02062	09538	33425	41918	24861	08634	48095	44795	73970	49346	65607
02063	51460	93804	43004	95032	53033	95204	24943	35105	62883	52681
02064	53256	36861	57142	16633	55050	74601	47264	00969	87620	28653
02065	71675	21972	98949	21223	75178	72871	94939	98330	82243	20716
02066	34336	97424	99288	13631	89535	50628	78236	35042	40816	60656
02067	27342	55929	67797	86776	49748	02827	81437	14668	58338	76609
02068	38345	25247	13256	51571	45541	27981	13803	29984	20620	92380
02069	22560	36762	21282	87887	03235	83008	04994	29775	31036	72816
02070	95591	39396	09822	61543	42761	12639	52684	91672	32707	41723
02071	72667	07183	66893	04268	59693	94191	99771	01888	90158	09822
02072	44108	47372	69000	91372	18177	06238	04626	86327	70550	23250
02073	27924	57774	57048	48706	43723	69553	02144	69977	22781	49438
02074	44902	90544	49249	72622	96976	00474	06750	73478	90066	01349
02075	61307	24664	72974	92124	01712	29119	99038	03148	43849	99265
02076	97513	78143	22502	23056	38425	64482	29545	08609	25640	53630
02077	85292	51335	70315	43274	63531	42427	52732	66680	89050	53913
02078	39887	69075	02925	76392	08474	07483	60108	53274	34627	38635
02079	49433	62755	24671	01700	59664	06557	32721	77493	05795	65442
02080	45320	44444	47294	88421	02028	21581	80977	00664	55540	06615
02081	22707	83544	13085	05276	35970	19358	03540	82845	92878	56993
02082	34568	77909	28900	10060	36579	72135	77545	83324	95439	56870
02083	73080	22691	50789	11893	02449	83778	48568	53701	48746	40742
02084	17314	13679	69465	25633	96670	19213	60158	64369	10492	71559
02085	35094	82979	46676	71710	39778	63988	40342	90035	53621	29764
02086	55018	13928	15426	24178	49172	72302	31529	24446	39614	04446
02087	96585	27043	05748	76571	12373	24679	97982	13667	58865	12095
02088	78829	83572	80225	04603	10151	71642	12681	69504	00127	67813
02089	69970	88516	48919	15520	63762	41365	35153	69603	22503	47588
02090	14140	05257	96007	70855	16266	55231	34995	75108	68530	33565
02091	56210	15118	95463	65385	27557	53322	66179	02100	78345	50118
02092	39453	04638	73383	78554	79812	44969	46521	45818	88235	36488
02093	10599	34216	79931	54692	82531	35659	23886	52967	91775	83554
02094	22854	98237	34088	43752	87802	87123	75458	26899	63612	05609
02095	01188	01085	80033	30475	05596	56063	93657	33055	59822	55124
02096	53561	63339	81327	05247	11954	90415	40134	17161	88530	19329
02097	44528	53621	10156	39254	31661	12001	27998	73814	63527	31999
02098	64271	24369	14112	34138	06490	61966	72833	62303	78095	78409
02099	31783	24390	16927	93170	74442	29724	99410	73401	03433	87605

FIGURE 3. Sample page from *A Million Random Digits with 100,000 Normal Deviates.* Image courtesy of The RAND Corporation.

> Sometimes our researchers took a curious pride in the prowess of their high-speed computers. They would make such remarks as, "More than a million campaign calculations went into this analysis." Or, "This is the first analysis done by man in which 10,000,000 multiplications were made." Or even a more extreme boast, "These results came out of a complicated calculation performed by the most modern of high-speed computers using the most advanced mathematical techniques available. Do you want to argue with an electronic machine backed up by all the resources of modern science?" The only possible answer to that question is, "Yes."[19]

As we shall see, the scare quotes around "technological" register, in Kahn's characteristic irony, the fact that what he is actually pushing back against is the very notion of computationalist dominance in the complicated field of prediction and strategy—instead arguing for a more interrogative and narratological model of systems analysis and futurological projection. "The new viewpoint is different," he went on, arguing that "major attention is [now] focused on the uncertainties" (*OTW*, pp. 119, 120). The accounting for apparent randomness in potential events became not simply a tedious step toward locating a single, most-likely future but a formal quality of the plurality of futures as such.

It is important to note that his reaction against Monte Carlo-style computational analyses was hardly the only instance during the mid- to late twentieth century in which the increasingly dazzling powers of mechanized computation, rather than fulfilling the Laplacian promise of total prediction and futurological singularity, led instead to a radically proliferating system of bifurcation and chaotic plurality. It may be useful to point to some of the more salient examples, the most famous of which is Edward Lorenz, who, while processing meteorological data on what was at the time a cutting-edge computer at MIT in 1961, casually rounded off a few decimal points (.506127, for instance, entered as .506), assuming the difference would be negligible in his modeled forecasts.[20] When he returned to the machine, however, he discovered that although his models had begun at roughly the same point when he entered the numbers, a radical bifurcation had gradually emerged, such that the error, so small initially, had proved catastrophic (fig. 4). The critical ingredients for those

19. Herman Kahn, *On Thermonuclear War* (1960; Princeton, N.J., 1967), p. 119.

20. See Edward N. Lorenz's own reflections on the process in "On the Prevalence of Aperiodicity in Simple Systems," in *Global Analysis*, ed. M. Grmela and J. E. Marsden (New York, 1979), p. 55 and *The Essence of Chaos* (Seattle, 1993), p. vii. See also Gleick, *Chaos: Making a New Science* (New York, 1988), pp. 16–31.

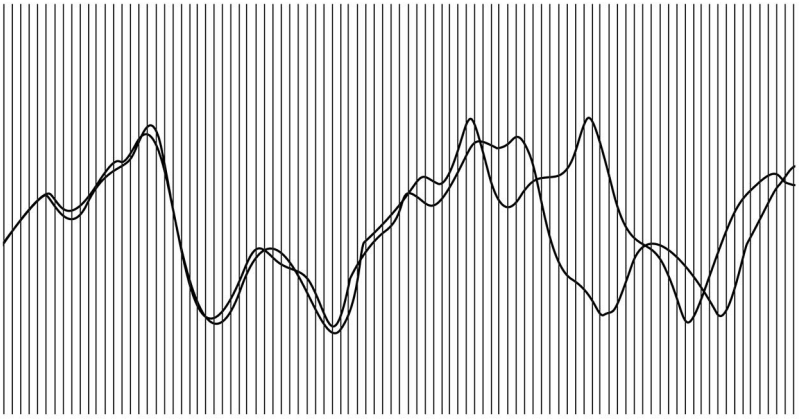

FIGURE 4. Reconstructed image (by the author) of Edward Lorenz's 1961 printout, charting the diverging paths that emerged following a small discrepancy in the data set for his computerized meteorological model (as depicted in Gleick, *Chaos*, p. 17).

turbulent paths, he later explained, had already been determined by an acute sensitivity to initial conditions—a sensitivity that, when applied to complex atmospheric conditions, made accurate long-term futurological thinking impossible.[21] After Lorenz's discoveries, in other words, the term *linearity* no longer held in attempts to articulate the spatial and temporal dynamics of three-dimensional systems, even in cases where a system's variables exist in relatively simple, finite time and space.[22] His "strange attractor" visualizations of differential equations are able to chart paths that seem to be moving in recursive, rhythmic oscillation—and appear to take on beautiful, recognizable patterns (often in the shape of a figure eight or butterfly)—but that, in fact, never actually repeat themselves and are fundamentally unpredictable (fig. 5).[23]

21. See Lorenz, "Deterministic Nonperiodic Flow," *Journal of the Atmospheric Sciences* 20 (Mar. 1963): 130–41. After his 1972 talk titled "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas?" Lorenz's concept came to be known (and has gone on to become a pop-cultural cliché) as "the butterfly effect"; see Lorenz, *Essence of Chaos*, pp. 179–82.

22. A number of scholars have speculated that the fractal pluralities imagined in "The Library of Babel" are somehow a precursor to Lorenz's "dynamical systems," the most enthusiastic being Thomas P. Weissert, "Representation and Bifurcation: Borges's Garden of Chaos Dynamics," in *Chaos and Order: Complex Dynamics in Literature and Science*, ed. N. Katherine Hayles (Chicago, 1991), pp. 223–43; for a strong corrective to metaphorical readings of chaos theory, see Stephen H. Kellert, *Borrowed Knowledge: Chaos Theory and the Challenge of Learning across Disciplines* (Chicago, 2008), pp. 130, 144–45.

23. See Gleick, *Chaos*, pp. 121–53.

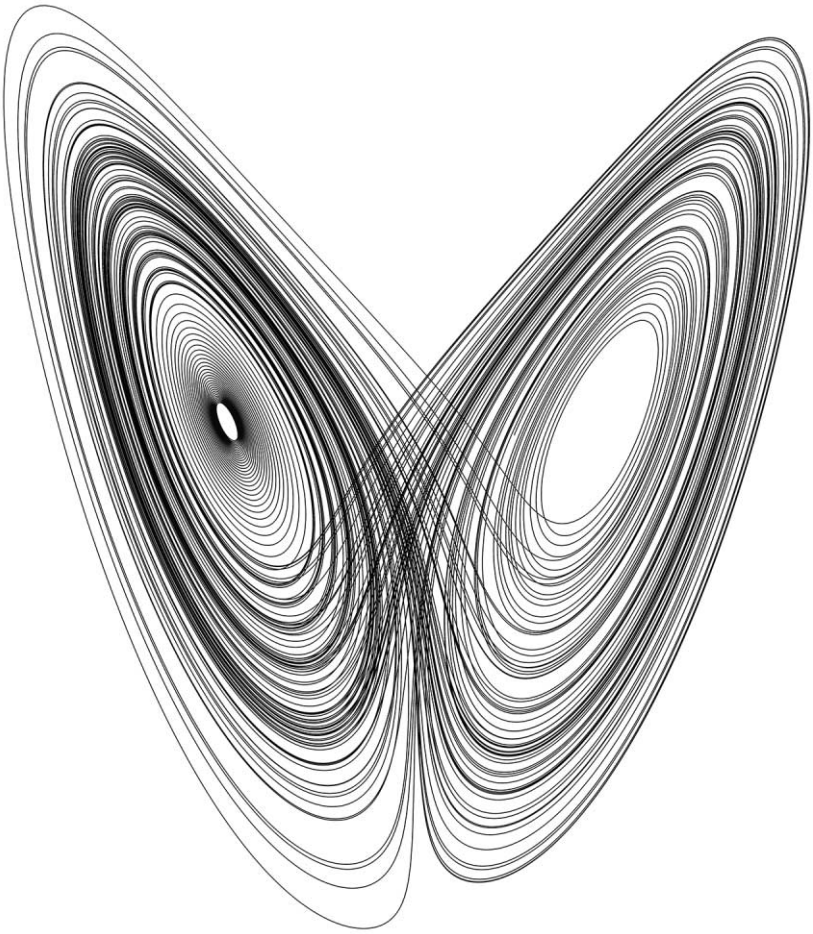

FIGURE 5. Lorenz "attractor" produced by a group of nonlinear equations in which three variables, at any moment, determine the location of a point in Cartesian space. Here the determined paths evidence a seemingly recursive, fractal pattern (resembling the wings of a butterfly), even as the paths remain "chaotic" and unpredictable. Image: Wikipedia.

A very similar revelation about the infinite complexity of simple, three-dimensional systems emerged in Benoit Mandelbrot's computerized search for fractal geometries at IBM in the 1960s and 1970s.[24] Having intuited a patterned "self-similarity" in the scaled geometries of certain dynamical

24. See A. K. Dewdney, "Computer Recreations," *Scientific American* 253 (Aug. 1985): 16–24; Gleick, *Chaos*, pp. 83–118, 161–240; and Benoit B. Mandelbrot, *The Fractal Geometry of Nature* (1977; New York, 1983).

systems (illustrated, for example, in the way the jagged form of a given coastline at the cartographic level seems to reproduce itself at the microscopic level), Mandelbrot eventually developed a simple equation he could run through thousands of iterations on IBM's computers, the visualizations for which revealed a curiously recurring set of forms no matter how many iterations he ran through the machine.[25] However, Mandelbrot's formula also exposed an infinitely unpredictable variation in the forms in which those intricate patterns emerged. One can zoom in anywhere within the graphed numbers and discover new patterns, again and again, forever (fig. 6).[26] Thus, for all the fractal self-similarity that seemed to manifest itself within these computerized visualizations, what the computer-generated Mandelbrot Set finally revealed was an endlessly complex unpredictability at *every* level of magnification—not a system of forecastable organization, in other words, but one of infinite and immeasurable complexity.

Oriental Systems Theory

As anyone familiar with countercultural religiosity in the West may have already guessed, these results have been frequently cited in conversations on the systems-theoretical proclivities of "Eastern" spirituality.[27] In the 1960s, for example, John Cage frequently made use of RAND's *A Million Random Digits*, comparing it favorably to the ancient Chinese *Yijing* (using the two together as a means of generating chance and unpredictability in his compositions).[28] Cage's colleague Jackson Mac Low,

25. Mandelbrot's equation is $f(z) = z^2 + c$. See David Feldman on the "intrinsic creativity" that seems to emerge from this simple iteration (David P. Feldman, *Chaos and Fractals: An Elementary Introduction* [New York, 2012], p. 352).

26. A number of computer-generated animations illustrating this magnified complexity are available online; see for example, "Deepest Mandelbrot Set Zoom Animation ever–a New Record! 10^275 (2.1E275 or 2^915)," 26 Jan. 2010, www.youtube.com/watch?v=0jGaio87u3A &feature=youtu.be, and youtu.be/0jGaio87u3A, and "Deep Mandelbrot Zoom 10^1006 [720x1280]," 22 Nov. 2012, www.youtube.com/watch?v=ohzJV980PIQ&feature=youtu.be

27. For more on two other significant modes of Oriental Systems Theory—the one an obsession with flux and presentness (as evidenced in everything from the international Fluxus movement [1965–1978] to Ram Dass's *Be Here Now* [1971]), the other an attempt to connect Eastern religious forms to the realm of quantum mechanics—see David Kaiser, *How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival* (New York, 2011), and Samuel Avery, *Buddha and the Quantum: Hearing the Voice of Every Cell* (Boulder, Colo., 2011).

28. See John Cage, *Silence: Lectures and Writings* (Middletown, Conn., 1973), pp. 10, 17, 35–36 and "Interview," in *Art, Performance, Media: Thirty-one Interviews*, ed. Nicholas Zurbrugg (Minneapolis, 2004), p. 105. See also Roger Lipsey, *An Art of Our Own: The Spiritual in Twentieth-Century Art* (Boston, 1988), p. 123.

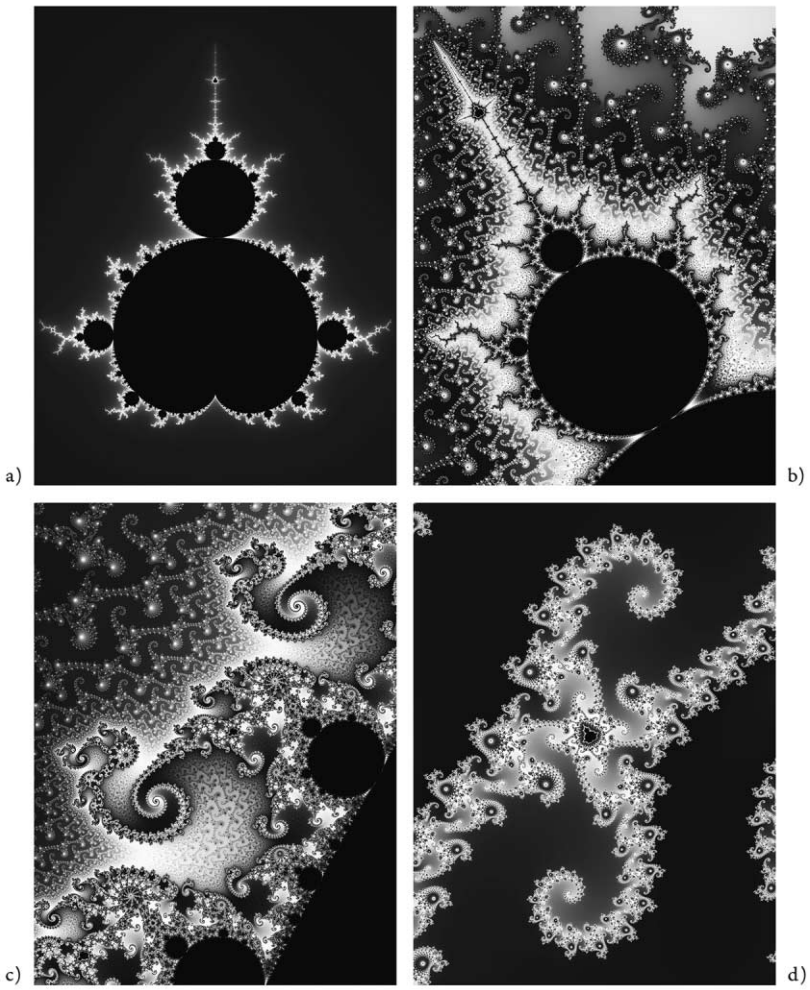

FIGURE 6. Mandelbrot Set standard view (a), and "zoom sequence" magnifications (b), (c), and (d). Here the computerized sampling of complex numbers by way of the relatively simple equation $f(z) = z^2 + c$ produces an infinitely unpredictable series of complicated patterns. The relative darkness or lightness of each pixel is here representing the degree to which the results of the operation tend towards infinity or not. Image: Wikipedia.

fellow student of D. T. Suzuki, similarly took advantage of RAND's volume to generate what he described as a performative Buddhist poetics in which "'spontaneous actions continuously flow,'" [29] creating a "series of

29. Jonathan Stalling, "'Listen and Relate': Buddhism, Daoism, and Chance in the Poetry and Poetics of Jackson Mac Low," in *Writing as Enlightenment: Buddhist American Literature into*

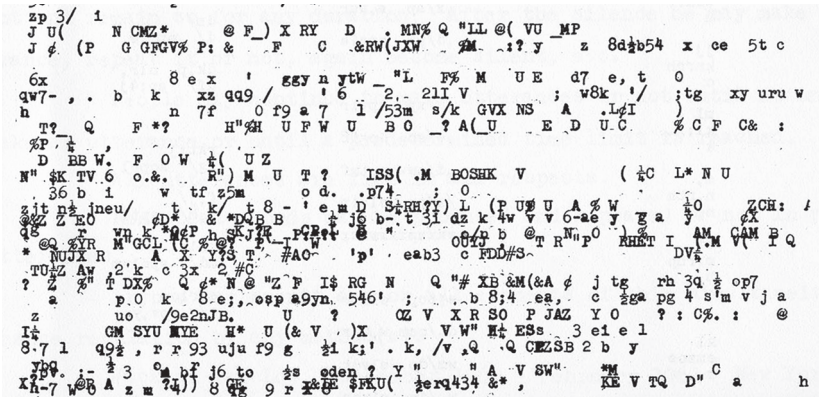

FIGURE 7. Excerpt of what Jackson Mac Low described as a "Buddhist" performance piece, created by assigning sequences of numbers to the keys of a typewriter and then typing as dictated by a page in *A Million Random Digits* (see figure 3). According to Mac Low, "The Zen Buddhist motive for use of chance (&c) means was to be able to generate series of 'dharmas' (phenomena/events, e.g. sounds, words, colored shapes) relatively 'uncontaminated' by the composer's 'ego'" (quoted in "Museletter," *L=A=N=G=U=A=G=E* [April 1978], p. 26). Image: *An Anthology of Chance Operations* (New York, 1963) p. 78; used by permission from the estate of Jackson Mac Low.

'dharmas'" that are "'uncontaminated' by the composer's 'ego'" (fig. 7).[30] A parallel move emerged in books like Stephen J. Laumakis's *Introduction to Buddhist Philosophy*, in which Lorenz's discovery of chaotic systems is described as something that the Buddha himself had long since "awakened to on the night of his enlightenment."[31] What Lorenz calls the butterfly effect, Laumakis explains, is merely a belated confirmation of the Buddhist notion of *paticca-samuppada* (interdependent arising), wherein the universe is "composed of a series of interrelated systems or processes," and even the "smallest variations" within a system can produce "exponentially large deviations."[32] Mandelbrot's visualizations were also quickly

the Twenty-First Century, ed. John Whalen-Bridge and Gary Storhoff (New York, 2011), p. 96. See also Ellen Zweig, "Jackson Mac Low: The Limits of Formalism," *Poetics Today* 3 (Summer 1982): 85, and Michael O' Driscoll, "By the Numbers: Jackson Mac Low's Light Poems and Algorithmic Digraphism," *Time in Time: Short Poem, Long Poems, and the Rhetoric of North American Avant-Gardism, 1963–2008*, ed. by J. Mark Smith (Quebec, 2013), p. 116.

30. Jackson Mac Low, "Museletter," *L=A=N=G=U=A=G=E* (Apr. 1978): n. p.

31. Stephen J. Laumakis, *An Introduction to Buddhist Philosophy* (New York, 2008), p. 121.

32. Ibid. Connections between Buddhism and Lorenz's discovery abound in discussions of each; see Gary Gach, *The Complete Idiot's Guide to Understanding Buddhism* (New York, 2004), p. 327; Matthieu Ricard and Trinh Xuan Thuan, *The Quantum and the Lotus* (New York, 2001), pp. 151–54; and Joanna Macy, *Mutual Causality in Buddhism and General Systems Theory: The Dharma of Natural Systems* (Albany, N.Y., 1991), p. 19. For more on the countercultural fascination with Eastern philosophy in the West and new forms of networked, technocratic

assimilated into discussions of Eastern religiosity; his illustrations of fractal geometry were almost immediately referred to as mandalas, and the darkened silhouette shape of his findings were described, in the words of Lou Marinoff (among others), as "a fractal Buddha, seated in the lotus position in the midst of a lotus flower" (fig. 8).[33] Many introductory volumes on Buddhism today include references to and images of Mandelbrot's famous visualizations, which, as one author asserts, "upsets the paradigm of an orderly universe running like clockwork," reflecting instead an "interbeing" in which the "Buddha nature" becomes visible.[34] A whole genre of Buddha-inflected representations of the Mandelbrot Set, known as Buddhabrots, have emerged recently, aesthetically confirming, presumably, the correlative intricacies of these religious and computational systems (fig. 9).[35]

Decades before these more recent iterations of what I am calling Oriental Systems Theory, one of the most striking parallels between the notion of complex, pluralized futurity and the presumably "other" temporalities of Eastern religiosity had already emerged in a crypto-Oriental, guru-authored book: P. D. Ouspensky's *In Search of the Miraculous: Fragments of an Unknown Teaching* (1949).[36] In detailing his interactions with George Ivanovich Gurdjieff, Ouspensky describes his own spiritual search as being primarily motivated by a singular, futurological aim: " 'I formulated

corporatism, see R. John Williams, *The Buddha in the Machine: Art, Technology, and the Meeting of East and West* (New Haven, Conn., 2014), pp. 174–217; Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago, 2006), pp. 31–51; and David L. McMahan, *The Making of Buddhist Modernism* (New York, 2008), pp. 241–65.

33. Lou Marinoff, *The Middle Way: Finding Happiness in a World of Extremes* (New York, 2007), p. 161. Mandelbrot himself wrote a blurb for William J. Jackson, *Heaven's Fractal Net: Retrieving Lost Visions in the Humanities* (Bloomington, Ind., 2004), pp. 76–77, 238. Arthur C. Clarke similarly referred to Mandelbrot's fractal geometry as a series of "Mandalas" (Arthur C. Clarke et al., "The Colors of Infinity," ed. Clarke et al., *The Colors of Infinity: The Beauty and Power of Fractals* [London, 2004], p. 171). See also Mehrdad Garousi, "The Postmodern Beauty of Fractals," *Leonardo* 45 (Feb. 2012): 30.

34. Gach, *The Complete Idiot's Guide to Understanding Buddhism*, p. 327. See also Patrick Ophuls, *Buddha Takes No Prisoners: A Meditator's Survival Guide* (Berkeley, 2007), p. 148, and *A Companion to Buddhist Philosophy*, ed. Steven M. Emmanuel (New York, 2013), p. 181.

35. For explanations and examples of Buddhabrots, see Wikipedia, s. v. "Buddhabrot," en.wikipedia.org/wiki/Buddhabrot; Melinda Green, "The Buddhabrot Technique," *Superliminal*, www.superliminal.com/fractals/bbrot/bbrot.htm; and Thanissaro Bhikku, "Faith in Awakening," *Tricycle* 15 (Summer 2006): 70–117.

36. See P. D. Ouspensky, *In Search of the Miraculous: Fragments of an Unknown Teaching* (New York, 1949); hereafter abbreviated *ISM*. There are passages wherein Ouspensky shows George Gurdjieff claiming an explicitly Eastern genealogy for his pluralist temporalities (see pp. 3, 6–7, 60–61), arguing at one point that he understands Buddhism better than do actual Buddhists (see pp. 62–63).

FIGURE 8. Images of Mandelbrot Set and Buddha figure placed together in William Joseph Jackson, *Heaven's Fractal Net* (Bloomington, Ind., 2004), p. 238. Image courtesy of Indiana University Press.

my own aim quite clearly several years ago. . . . I said to myself then that I want *to know the future*. . . . A great deal was connected for me with this question'" (*ISM,* pp. 99–100). But rather than simply confirming Ouspensky's implied link between Eastern religiosity and the search for futurological singularity, Gurdjieff throws cold water on the idea. To really "'know the future,'" Gurdjieff counters, one would have "'to know the present in all its details, as well as to know the past'" (*ISM,* p. 100). Furthermore, any such possibility is complicated not only by the fact that "'at present we have not sufficient material at our disposal to discuss this question seriously'"—and not only by the fact that the universe is itself a

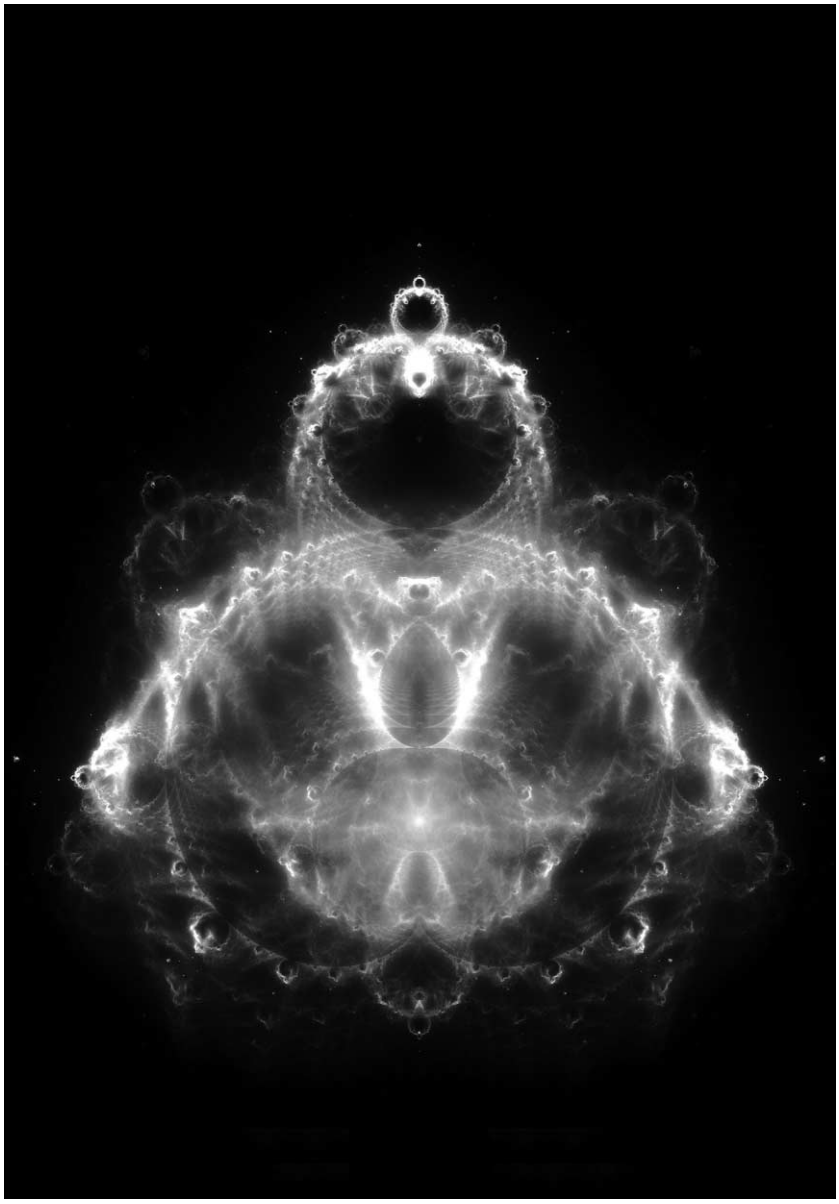

FIGURE 9. "Buddhabrot" illustration of Mandelbrot equation. Here the seated Buddha-like form, Richard J. Bird argues, is perhaps evidence "that the existence of the Mandelbrot Set was known in former times in some other way" (J. Bird, *Chaos and Life: Complexity and Order in Evolution and Thought* [New York, 2003], pp. 108–9). Image: Wikipedia.

series of plural systems ("we live not in one world, but in *several* worlds," not " 'one cosmos' " but several "cosmos*es*"); but there is also the problem that the "human machine" (as Gurdjieff repeatedly calls it) is an inherently "plural" entity (*ISM*, pp. 100, 75, 205, 75; my emphasis). " 'People are machines,' " Gurdjieff insists, machines marked most fundamentally by an "absence of unity," with " '*no permanent and unchangeable I*. . . . There are, instead, hundreds and thousands of separate small I's. . . . *Man is a plurality*. Man's name is legion' " (*ISM*, pp. 50, 59).[37] Fundamentally, then, the human machine's plurality is one of systematic integration: " 'In the human machine everything is so interconnected, one thing is so dependent upon another, that it is quite impossible to study any one function without studying all the others. In order to know one thing, one must know everything' " (*ISM*, pp. 104–5). Thus, in a passage that seems almost like an uncanny prehistory of Lorenz's computational experiments, Gurdjieff argues that the problem isn't so much that Ouspensky's desire for futurological certainty is unimportant as that it is fundamentally impossible: " 'It is impossible to foretell the future for [human] *machines*. Their direction changes every moment. At one moment a machine of this kind is going in one direction and you can calculate where it can get to, but five minutes later it is already going in quite a different direction and all your calculations prove to be wrong' " (*ISM*, p. 101). For Gurdjieff—countering, again, the Laplacian promise of computational predictability—the calculative, mechanical nature of human beings and their worlds makes them *less* predictable rather than more so (see *ISM*, p. 154).[38]

In order to maintain and come to understand the "very complex machine" that was the human being and its cosmic temporality, Gurdjieff's spiritual methods (which he called "the Work") revolved around an ostensibly ancient and Eastern mandala symbol known as the enneagram (with obvious resemblances to Llull's *Ars Magna* device), created by placing an irregular hexagram over an equilateral triangle and circumscribing both

37. For more on Gurdjieff's plural worlds and the " "man-machine" " complex (*ISM*, p. 59), see G. Gurdjieff, *The Herald of Coming Good: First Appeal to Contemporary Humanity* (Paris, 1933), pp. 35–36; *Transcripts of Gurdjieff's Meetings, 1941–1946* (London, 2008), p. 167; and *In Search of Being: The Fourth Way to Consciousness* (Boston, 2012), pp. 29–81. See also Sophia Wellbeloved, *Gurdjieff: The Key Concepts* (New York, 2003), pp. 133–34, and Erik Davis, *TechGnosis: Myth, Magic, and Mysticism in the Age of Information* (New York, 2004), pp. 159–65.

38. Naturally, one of the more dangerous aspects of Gurdjieff's doctrine is his claim to know, exclusively, how one might escape one's own "machine" nature (demanding, of course, total obedience), which, as Roger Friedland and Harold Zellman have shown, led to a number of psychological and physical abuses among the cultlike following he had in Europe and America; see Roger Friedland and Harold Zellman, *The Fellowship: The Untold Story of Frank Lloyd Wright and the Taliesen Fellowship* (New York, 2007), pp. 42–92, 103–5, 240–49, 423–26, 619.

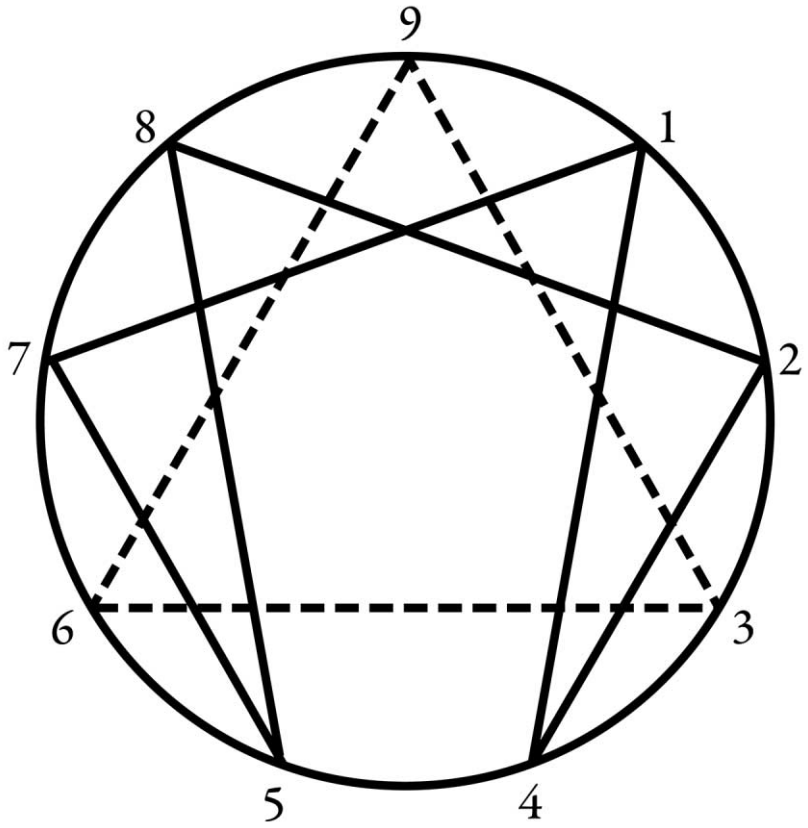

FIGURE 10. George Gurdjieff 's enneagram (re-created by author) as depicted in P. D. Ouspensky, *In Search of the Miraculous* (New York, 1949), p. 288.

within a larger circle (fig. 10) (*ISM*, p. 56).[39] Rather than implying a linear flow of time, the enneagram, like many Eastern mandalas, signaled recursive multiplicity and reverberating points of interaction, typically as a tool for meditation or "sacred geography."[40] As another of Gurdjieff's disciples, J. G. Bennett, later wrote, the enneagram "can best be understood" as illustrating a fundamental "defect in the principle of causality," allowing

39. See Wellbeloved, "The Work," *Gurdjieff*, pp. 223–24. On the potential link between Llull's algorithmic devices and Gurdjieff's enneagram (as well as the potential Sufi origins of both), see Wellbeloved, *Gurdjieff*, pp. 66–67, and Simon Parke, *The Enneagram: A Private Session with the World's Greatest Psychologist* (New York, 2008), pp. 23–32.

40. See Elizabeth Ten Grotenhuis, *Japanese Mandalas: Representations of Sacred Geography* (Honolulu, 1999). See also Chögyam Trungpa, *Orderly Chaos: The Mandala Principle* (Boston, 1991), and Michael R. Butz, *Chaos and Complexity: Implications for Psychological Theory and Practice* (New York, 1997), which directly connects Trungpa's "mandala principle" to Lorenz's chaos theory; see p. 209.

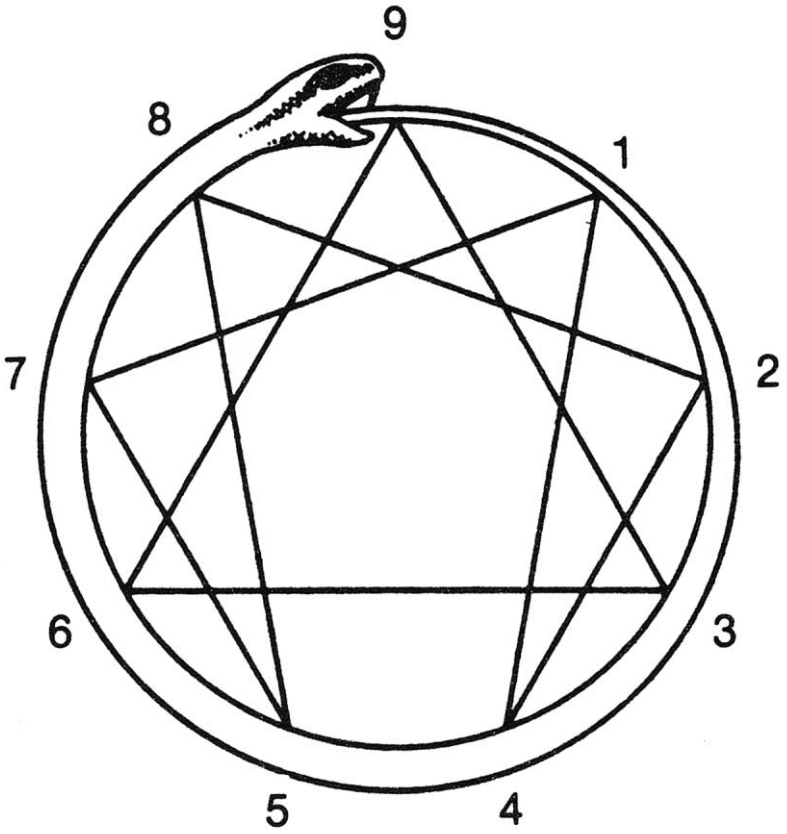

FIGURE 11. The enneagram as "usually drawn," according to J. G. Bennett, with the "serpent Chronos that devours itself by its own tail." Portrayed in this way, Bennett argues, the enneagram draws attention to the "defect in the principle of causality" adhered to in the "artificially contrived" view of A→B causality (Bennett, *Enneagram Studies* [New York, 1990], pp. 16–19). Image courtesy of the J. G. Bennett estate.

adepts to visualize those "tendencies to deviation [that] are so varied as to be unpredictable" —which is why, Bennett says, the symbol was anciently drawn "in a circle representing the serpent Chronos that devours itself by its own tail" (fig. 11).[41]

Enneagrammatic Cybernetics

Consider, as a prime example of the new temporality offered by this Oriental Systems Theory, the journey from computational Monte Carlo

41. J. G. Bennett, *Enneagram Studies* (York Beach, Maine, 1990), pp. 17, 18, 17.

simulations to Gurdjieffian metaphysics made by one of the most influential business and management experts in the world, Stafford Beer. A number of studies on Beer's cybernetics have emerged recently, focusing on either his role in developing an integrated economic system for Chile's newly elected socialist government in 1972 (Eden Medina's *Cybernetic Revolutionaries*) or else on his role in second-wave British cybernetics more generally (Andrew Pickering's *The Cybernetic Brain*).[42] What I want to trace, however, is the particular metaphysics of futurological plurality that emerged in Beer's attempts to employ cybernetics as a management technology. How, in other words, did Beer's intimacy with computationalist cybernetics come to be framed in the context of an Orientalized temporality?

After spending much of the Second World War in India as a commander in the British Army, Beer took a job at the Samuel Fox steel company (a subsidiary of United Steel in England), running their Operational Research and Cybernetics Group. His earliest tasks involved tracking statistical indices for measuring productivity and forecasting, all of which employed methods derived from the new cybernetic interdisciplinarity promulgated by Norbert Wiener at MIT.[43] He was also indebted to a number of innovations in statistical computation as developed at RAND, with Monte Carlo simulations running through many of his experiments. One of his earliest inventions at United Steel in the mid-1950s was the Stochastic Analogue Machine (SAM), designed to solve one of the same problems we encountered above for Kahn: how to produce a series of random numbers (or, as Beer called it, a "mechanical simulation of stochastic flow") from within a system that did not rely on mechanical, math-oriented processes but would still be legible to those same mechanical processes.[44] Beer's SAM offered a solution by attaching a "source of random variation" to the computational apparatus: a rotating cone and sieve system through which ball bearings would randomly fall, signaling to the machine a random distribution that could then be statistically analyzed via Monte Carlo

42. See Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (Cambridge, Mass., 2014). See also Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago, 2011), pp. 215–308.

43. See Stafford Beer, *Cybernetics and Management* (1959; New York, 1964), pp. 3–4; hereafter abbreviated *CM*.

44. See Beer, "The Mechanical Simulation of Stochastic Flow," *How Many Grapes Went into the Wine: Stafford Beer on the Art and Science of Holistic Management*, ed. Roger Harnden and Allenna Leonard (New York, 1994), pp. 61–72. The term *stochastic* refers to "a series of events separated by random time intervals, for which it is none the less possible to specify both the average interval and the ultimate pattern to which the frequency of these intervals will tend to conform in the long run" (*CM*, p. 43). For more on Beer's SAM, see *CM*, pp. 195–202.

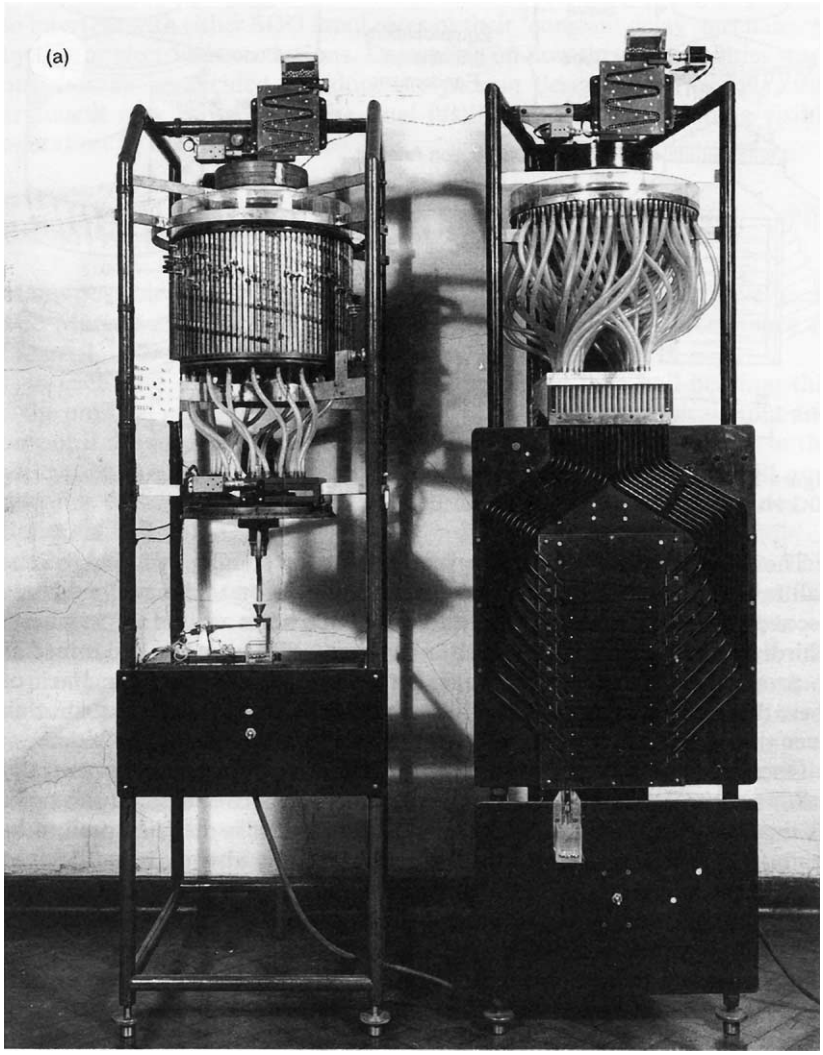

FIGURE 12. Photograph of Stafford Beer's Stochastic Analogue Machine. Image: *Cybernetic Serendipity*, ed. Reichardt (London, 1968), p. 12. Courtesy of the Institute of Contemporary Arts.

algorithms (a bit like attaching an actual roulette wheel to the computer) (fig. 12).[45]

Such a pluralizing black-box approach to forecasting was critical for Beer, as he explained in his influential volume *Cybernetics and Management* (1959). The spectrum of systems complexity, he argued, varied from

45. Beer, "The Mechanical Simulation of Stochastic Flow," p. 63.

the most simple and deterministic (a window catch or a basic machine-shop layout) to the most probabilistic and "exceedingly complex" (the brain, an economy, a company) (*CM*, p. 43). When understood in terms of prediction, the exceptional complexity of large, probabilistic systems radically frustrated any attempt at futurological singularity, even if the use of computer models seemed inherently grounded in the need for conjectural precision.[46] "Many people seem to imagine," he writes, "that problems of whatever kind will ultimately yield their secrets to ever-larger computers, so long as the stores can be made sufficiently extensive, the output punches fast enough and the supply of programmers inexhaustible. This is delusory" (*CM*, p. 20). As a way of illustrating just how "delusory" such an approach was, Beer returned again and again in his writing to a simple mathematical expression, one that allowed for the calculation of possible states within a system of interrelated parts: $v = n(n - 1)$. Here the variety (v) in a system is determined by the number of entities (n) times the number of entities minus one.[47] If, for example, as Beer explained in *Decision and Control* (1966), one begins with a system containing seven "dissimilars," we might start by asking about their "assemblage," that is to say, their relative placement and function within the system (*DC*, p. 247) (fig. 13). We may notice that the seven dissimilar entities are "recognized as related" and thus "begin" to see the systematicity of their interactions (*DC*, p. 248). "Begin" is an important word for Beer because the very next question leads us to the *number* of relations, which requires a bit more care and attention. If, for instance, we assume that the connection D → E (their relation, that is) is the same as the connection (relation) E → D, then among the seven elements we can use the expression $v = \frac{n(n-1)}{2}$ to arrive at the number 21. But of course one cannot necessarily assume that the relation D → E is the same as E → D (Beer gives the example of "nephew" and "uncle" as requiring two distinct perspectives from which to understand a single "connection" or "relationship") (*DC*, pp. 248, 250). In this case, "the reason for dividing by two has vanished," and the variety (v) is therefore 42 (*DC*, p. 250). But if we understand those 42 relations

46. See Beer on the use of computer modeling to generate "sets of possible eventualities" (Beer, *Decision and Control: The Meaning of Operational Research and Management Cybernetics* [1966; New York, 2000], p. 90; and see pp. 90–100, 205–22; hereafter abbreviated *DC*).

47. In terms of introductions to general systems theory, few mathematical expressions have had greater impact. Beer's several efforts to explain $n(n\text{-}1)$ can be found in *CM*, pp. 10–11; *DC*, pp. 250–51; *Brain of the Firm: The Managerial Cybernetics of Organization* (London, 1972), pp. 39–50; *Designing Freedom* (1974; Toronto, 1993), pp. 15–20; *Platform for Change* (New York, 1994), p. 33, hereafter abbreviated *PFC*; *Beyond Dispute: The Invention of Team Syntegrity* (New York, 1994), pp. 17, 204–5; and "A Technique for Standardizing Massed Batteries of Control Charts," *How Many Grapes Went into the Wine*, p. 38.

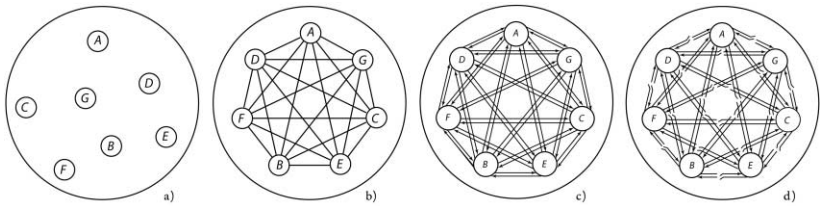

FIGURE 13. Illustrations of relative complexity for a system with seven dissimilars, including (a) a "collection" of dissimilars, (b) the articulated "relations" among those dissimilars, (c) the number of possible relations, as formulated in $n(n\text{-}1)$, and (d) the number of "total possible states" of that system when each relations is expressed in binary terms (that is, 2^{42}, or over four trillion) (Stafford Beer, *Decision and Control: The Meaning of Operational Research and Management Cybernetics* [New York, 1966], pp. 246–51). Re-created by author.

as being integral to an overall system of connectivities that may either switch on or off (as in binary 1s and 0s), then what we really have is an "exceedingly complex" system in which the "number of distinguishable states" now consists of "forty-two 2s, all multiplied together," which turns out to be over four trillion (4,398,046,511,104) (*DC*, p. 251). If a mere seven entities can generate a system with over four trillion "possible states," how many more potential futures might a system generate with hundreds or thousands of component entities?

Faced with these parameters of exceeding complexity in management systems, Beer's vision of strategic planning required acknowledging the irreducible multiplicity of possible outcomes. When charting, for example, the moment when a system had entered a new state as part of a sequential process (the dot labeled "now"), Beer advocated the use of statistical models to make available *several* potential outcomes, such that "instead of producing merely single-figure forecasts (and who can foretell the future with that kind of precision?), [the model] produces a joint parameter distribution," illustrating, at least implicitly, "the inherent uncertainty of all forecasting" (*PFC*, p. 439) (fig. 14).[48] Managers must learn to coordinate, in his words, the "NOW system" with an inherently plural "*FUTURES* system," and this in "deliberate contrast to the many schools of thought that base their conception of inventing the future simply on forecasting it" (*PFC*, pp. 447, 444; my emphasis). Beer objected strenuously to the "forecasting approach to long-range planning" because "it assume[d] that there is '*a* future' out there, lying in wait for us. This is not true, surely" (*PFC*, p. 445; my emphasis).

48. The technical term for what Beer is illustrating here is *Bayesian probability*, which relies on the values of prior distributions when encountering unknown parameters; see also *DC*, p. 222.

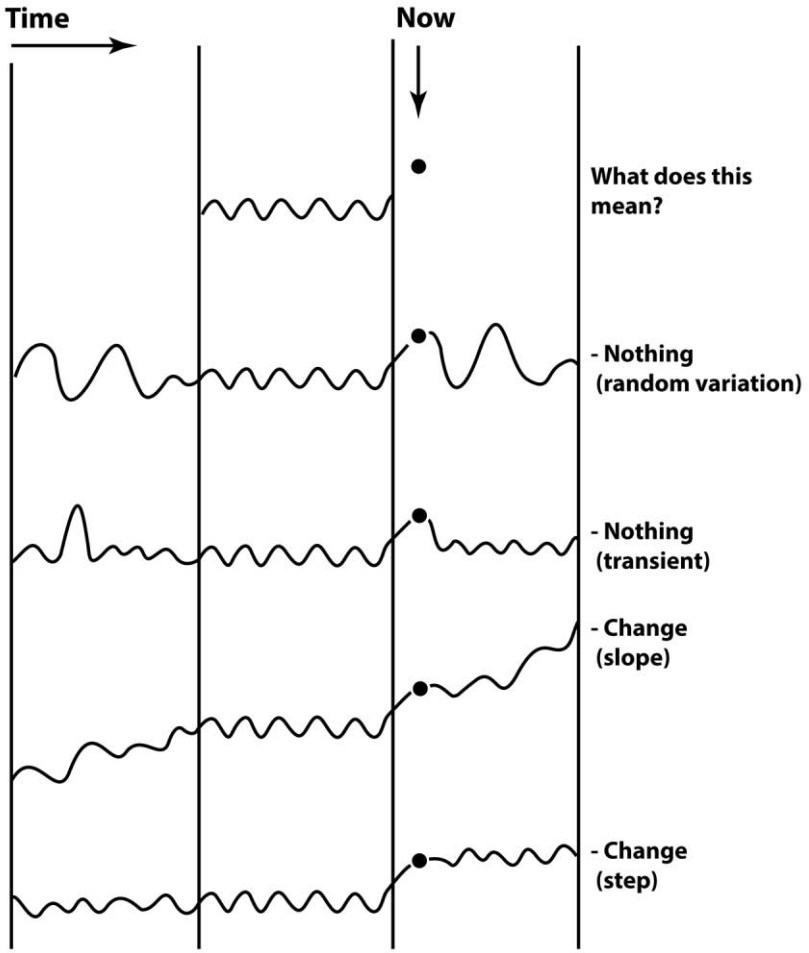

FIGURE 14. Beer, visualization of using statistical calculations to assess multiple "future alternatives" (Beer, *Platform for Change* [New York, 1975], p. 440). Re-created by author.

As Pickering has shown, Beer valued these futures-oriented feedback systems not only for their "performative" and "ontological" practicality but also for what he believed were their ancient Eastern origins.[49] Beer is

49. Pickering, *The Cybernetic Brain*, p. 25. Pickering argues that in Beer's thinking this pluralized vision of "futures" required a "performative ontology" of systems modeling rather than the presumed finality of epistemological "representation," arguing that in these situations the systems "are so complex that we can never fully grasp them representationally." In such situations, "present knowledge is anyway no guarantee of future behavior." The goal for management, then, was to try "getting along performatively" with systems that resist the meager (Cartesian) epistemologies of representation (ibid., pp. 25, 23).

most famous today for the cybernetic synergy, or cybersyn, economic program he was employed to develop for Salvador Allende in 1972 (and which ended before it could ever become operational with the brutal coup that brought Augusto Pinochet to power in 1973), but it is worth remembering that Beer was also at this time turning most enthusiastically to Eastern forms of religious expression.[50] From the early 1970s on, references to the Bhagavad Gita, Oriental mandalas, Hinduism, Buddhism, and so on punctuate nearly all of his writings (see *DC*, p. 299).[51] He even radically changed his appearance and lifestyle during this period, sporting a long beard, renouncing material possessions, writing poetry, taking up abstract painting and tantric yoga, and generally doing everything he could to cultivate an Orientalized "guru" persona.[52] "I am embarking on a new model of time," he wrote in 1980, clarifying what he believed were the origins of this new temporality: "The Western world has largely ignored models of reality from the East (despite their great antiquity, or perhaps because of it)." Which East did he mean? All of them: "Despite the various names of the Eastern philosophies, they share much—because they spread historically from India through China to Japan—and I shall not attempt to draw distinctions. . . . I am content to refer to the whole approach as *yogic*." This "yogic" temporality, Beer maintained, was "a far cry from the 'ever-rolling stream' of daily experience and Newtonian physics alike."[53]

Beer's overarching approach, then, had as much to do with the presumably plural temporalities of an all-encompassing Orient as it did with the calculative disciplines of cybernetic computation and statistical probabilities. During one of his trips to Santiago in 1972, Beer reports that he visited a "mystical mission known as Arica," where "a Buddhist monk resident with the mission presented me with an elaborate triple stage

50. See Pickering, *The Cybernetic Brain*, pp. 258–66. The most comprehensive account of Beer's time in Chile can be found in Medina, *Cybernetic Revolutionaries*. See also Oscar Guardiola-Rivera, *Story of a Death Foretold: The Coup against Salvador Allende, September 11, 1973* (New York, 2013), pp. 203–14.

51. See, for example, Beer, "May the Whole Earth Be Happy: Loka Samastat Sukhino Bhavantu," *Interfaces* 24 (July–Aug. 1994): 83–93; "Holism and the Frou-Frou Slander," *How Many Grapes Went into the Wine*, p. 14; and "Below the Twilight Arch—A Mythology of Systems," *How Many Grapes Went into the Wine*, p. 150. See also Pickering, *The Cybernetic Brain*, pp. 12, 74, 284–96.

52. Medina, *Cybernetic Revolutionaries*, p. 17. See Steve Morlidge and Steve Player, *Future Reading: How to Master Business Forecasting* (New York, 2010), p. 43, and Andy Beckett, "Santiago Dreaming," in *The Mechanical Mind in History*, ed. Phil Husbands, Owen Holland, and Michael Wheeler (Cambridge, Mass., 2008), p. 214. See also Pickering, *The Cybernetic Brain*, pp. 12, 74, 284–96.

53. Beer, "I Said, You Are the Gods: The Second Annual Teilhard Lecture," *How Many Grapes Went into the Wine*, pp. 384, 385, 384.

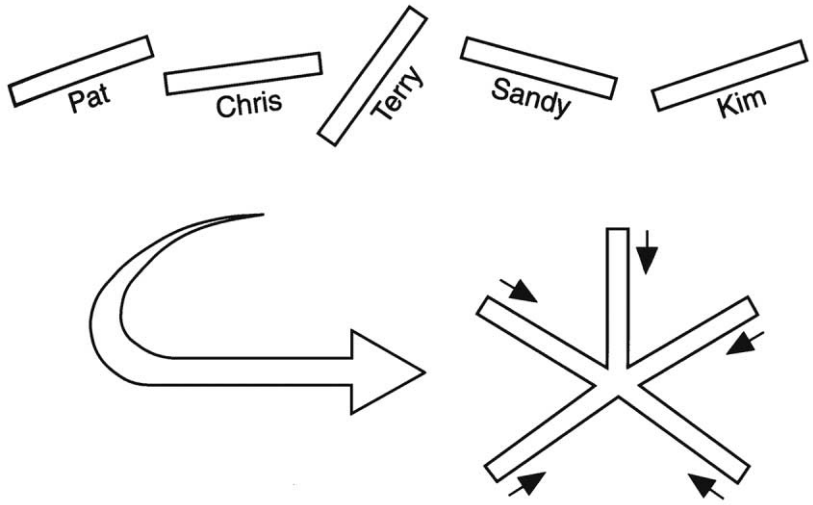

FIGURE 15. Beer, "Creative Synergy: Five Friends Gather for a Serious Talk," in "World in Torment: A Time Whose Idea Must Come," *Kybernetes* 33, nos. 3–4 (2004): 794 (image courtesy of Emerald Group Publishing).

mandala, made of colored felts and threads, which he described as a personal communication from him to me based on what he had known of me 'for ever.'"[54] Beer immediately "recognized the enneagram," which he had already encountered in some of his esoteric studies and artistic endeavors. In the early 1980s Beer set out to develop a proprietary "organizational technology" that would exploit the seemingly cosmic significance of these Eastern insights, a technology he called Team Syntegrity. In Team Syntegrity the members of a given organization are brought together to generate ideas and discuss planning, but before speaking as an entire group, members are divided into modular units that develop topics individually and then route what they decide are the more important themes through a complex chain of interactions and further discussions (figs. 15–16). The "magic" of the process is located in the structured-but-nonhierarchical (and distinctively Gurdjieffian) geometry of the groups' various interactions. Beer describes a conversation with one of his collaborators, Joe Truss, in which the two realized, suddenly, that the icosahedral form they

54. Beer, *Beyond Dispute*, p. 203.

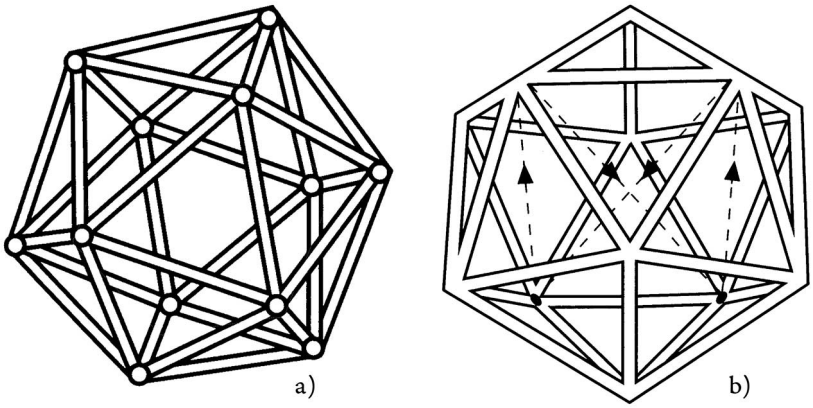

FIGURE 16. Beer, "The Icosahedron: (a) Featuring its Twelve Vertices; (b) Featuring the Internal Braces," in "World in Torment: A Time Whose Idea Must Come," *Kybernetes* 33, nos. 3–4 (2004): 795. Image courtesy of Emerald Group Publishing.

were using to structure Syntegrity conversations must have been coded, esoteric wisdom in the form of the enneagram:

> Joe was rolling a model [icosahedron] across the floor, when he suddenly saw it. . . . [He] came to my house late at night to show me his discovery, and he was very excited . . . "Do you see what this means? The icosahedron is the actual *origin* of the enneagram, and the ancients knew it. Could it not be possible that the plane [two-dimensional enneagram] figure was coded esoteric knowledge?" Obviously (now!) it could. . . .[55]

The term *Syntegrity*, rhyming, as it does, with *Tensegrity*, already reveals Beer's debt to R. Buckminster Fuller, who had for years been arguing that "all systems are polyhedra."[56] Indeed, while the sleek design and networked systematicity of Beer's "operations room" for cybersyn's controllers has often been compared to the spaceship aesthetics of Stanley Kubrick's *2001: A Space Odyssey* (1969), I would argue that an even more compelling case could be made for its debt to the futuristic designs and philosophies of Fuller, whose own visions of cutting-edge technologies and world "scenarios" were saturating countercultural efforts to reformulate a new tempo-

55. Ibid., p. 206. The final ellipsis in this quotation is Beer's. See also Pickering, *The Cybernetic Brain*, pp. 292–300.

56. R. Buckminster Fuller, *Synergetics 2: Explorations in the Geometry of Thinking* (New York, 1979), p. 82.

FIGURE 17. "Operations Room" designed by Product Development Group of the Institute for Technological Innovation, INTEC, Santiago, Chile, 1972–1973. Image courtesy of Gui Bonsiepe.

rality in postmodern experience during the 1960s and 1970s (fig. 17).[57] It may seem odd to place Fuller within the trajectory of what I have been calling World Futures given his very noble, decades-long attempts to synthesize a global, holistic vision of humanity's future, but in the context of his "anticipatory design" projects and the pluralistic, ostensibly Einsteinian metaphysics that underscored them, Fuller's contribution to this discursive transformation should not go overlooked.[58] Ever since his decision, after an acute personal crisis in 1927, to dedicate himself to the scientific possibilities of "ephemeralization" (meaning, as he clarified, " 'Doing the Most with the Least' "),[59] Fuller had been attempting to think in terms

57. Illustrating some of this influence, both Beer and Kahn used Fuller's distinctive word *synergy* in their presentations before the US House Committee on Science and Astronautics; see *The Management of Information and Knowledge, Eleventh Meeting: Proceedings before the Committee on Science and Astronautics, U.S. House of Representatives,* 91st Cong. (1970), pp. 29, 59. On Kubrick's film as a possible source for the ops room design, see Medina, *Cybernetic Revolutionaries*, pp. 1, 121.

58. Fuller, *Cosmography*: *A Posthumous Scenario for the Future of Humanity* (New York, 1992), p. 18; hereafter abbreviated *CPS*.

59. Joachim Krausse and Claude Lichtenstein, " 'How to Make the World Work,' " in Fuller, *Your Private Sky: R. Buckminster Fuller, the Art of Design Science*, ed. Krausse and Lichtenstein (Zürich, 1999), p. 16.

of "synergy" about the future of humanity.[60] The four-dimensional house, the Dymaxion car, the geodesic dome, and Spaceship Earth—not all of these inventions were equally successful, of course, but it would be difficult to overstate their collective cultural impact. Indeed, when the editors of the massive *Encyclopedia of the Future* (1996) conducted a survey of "professional futurists" regarding the " 'most influential futurist in the history of the world,' " Fuller came in at the top of the list, above even more obvious candidates such as Leonardo Da Vinci, Isaac Newton, and H. G. Wells (Kahn, interestingly enough, came in second).[61] One of his most visually stunning utopian ideas (and the one that seems to have also inspired Beer's operations room and its designed structure for the performative management of multiple possible futures) emerged in 1964, at the very beginning of America's fascination with his geodesic utopianism, when the US Information Agency asked Fuller to design a building and exhibition for the upcoming Expo '67 in Montreal. What he submitted to the committee was no mere architectural curiosity but a geometric fantasy of epic narrative and global integration. He called it the World Game.

World Game Scenarios

According to Fuller's original plan, America's exhibition at Expo '67 would be housed inside a four-hundred-foot-diameter geodesic dome. Visitors would enter the building by way of thirty-six "external ramps and escalators leading in at every ten degrees of circumferential direction," whereupon they would look up and see a one-hundred-foot-diameter world globe suspended high from the ceiling.[62] Every few hours the globe would begin to slowly transform itself into an icosahedron (a "polyhedron with twenty [equilateral] triangular facets"), gradually lowering itself to the floor of the structure:

> Slowly the 100 foot diameter icosahedronal Earth's surface will be seen to be parting along some of its triangular edges, as the whole surface

60. Fuller, "Tetrascroll," *Your Private Sky*, p. 501.

61. Medard Gabel, "Buckminster Fuller and the Game of the World," in *Buckminster Fuller: Anthology for a New Millennium*, ed. Thomas T. K. Zung (New York, 2001), p. 123. See George Thomas Kurian and Graham T. T. Molitor, "One Hundred Most influential Futurists," *Encyclopedia of the Future*, ed. Kurian and Molitor, 2 vols. (New York, 1996), 1:1077.

62. Fuller, "World Game: How It Came About," *Fifty Years of the Design Science Revolution and the World Game* (Carbondale, Ill., 1969), p. 111, hereafter abbreviated "WG." See also Fuller, "The World Game," *Ekistics* 28 (Oct. 1969): 286–91 and "Geosocial Revolution," *Utopia or Oblivion: The Prospects for Humanity* (New York, 1969), pp. 182–86. Excellent analyses of Fuller's World Game can be also found in Felicity D. Scott, "Fluid Geographies: Politics and Revolution by Design," and Reinhold Martin, "Fuller's Futures," in *New Views on Buckminster Fuller*, ed. Hsiao-Yun Chu and Robert G. Trujillo (Stanford, Calif., 2009), pp. 160–74, 176–90.

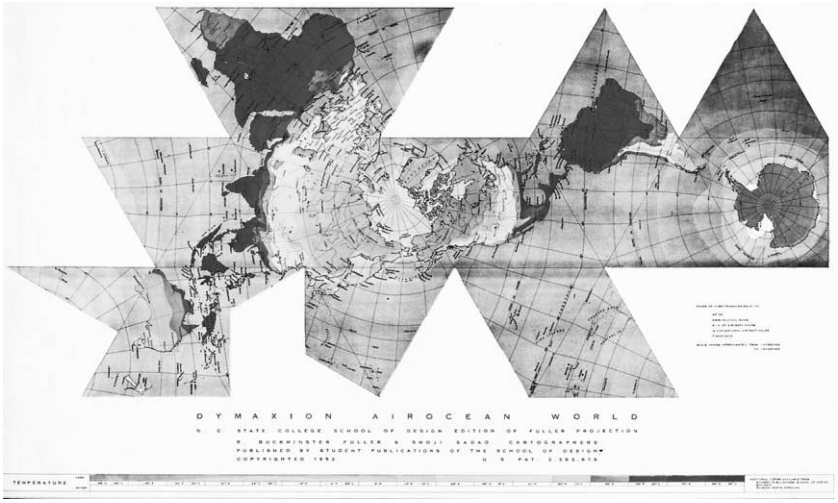

FIGURE 18. Buckminster Fuller's "Dymaxion Air Ocean World Map." Image: *Establish a Select Senate Committee on Technology and the Human Environment Hearings before the Subcommittee on Intergovernmental Relations*, Washington D.C., 1969, p. 17.

> slowly opens up mechanically as an orange's skin or an animal's skin might be peeled carefully in one piece. With slits introduced into its perimeter at various places it would be relaxed to subside into a flattened-out pattern as in a bear skin rug. . . . The visitors would realize that they were now looking at the whole of the Earth's surface simultaneously without any visible distortion. ["WG," p. 112]

Once flattened out, this "football field sized" reproduction of Fuller's Dymaxion world map would suddenly light up, having been "wired throughout [with] mini-bulbs" and connected to an "extraordinary computer facility" located in the basement of the structure ("WG," pp. 112, 111) (fig. 18). In a visually arresting "photogenic" display of lights and computer-animated graphic spectacle,[63] Fuller's map would then convey "various, accurately positioned, proportional data regarding world conditions, events, and resources" ("WG," p. 112). Positioned around this cartographic data field, different teams of scholars, inventors, and other luminaries would engage in "a great world logistics game" designed to generate futuristic scenarios, with the primary objective of making it "possible for anybody and everybody in the human family to enjoy the total earth without any

63. Quoted in *Establish a Select Senate Committee on Technology and the Human Environment: Hearings before the Subcommittee on Intergovernmental Relations,* 91st Cong. (1969), p. 5.

human interfering with any other human and without any human gaining advantage at the expense of another" ("WG," p. 112). Once Fuller and his design specialists had entered into the computers "all the known inventory and whereabouts of the various metaphysical and physical resources of the Earth," it would be only a matter of time before game participants found a way to "make the total world work successfully for all of humanity" ("WG," p. 112).

The US Information Agency rejected Fuller's proposal, approving only a two-hundred-fifty-foot-diameter geodesic dome for the expo, but the structure itself became so popular that two years later Fuller had returned to argue for an even more ambitious World Game proposal. Now a research professor at Southern Illinois University (SIU), Fuller convinced the Illinois legislature to commit four million dollars to the development of the World Game project (assuming he could get matching funds from elsewhere) (see "WG," p. 112). He presented the information before the US Senate in 1969, generated some initial databases and animated visualizations, and toured throughout the world looking for donors and speaking to students about the project (fig. 19). While Fuller's initial hope for a massive descending globe that would convert, icosahedrally, into a Dymaxion map

FIGURE 19. Screenshot from video recording of Fuller explaining his World Game scenario system to students at Boston College, 2 May 1970, item 1b, box 133, subseries 5, R. Buckminster Fuller Collection, Stanford University Library, Stanford, Calif.

never fully materialized, he did manage to have an enormous basketball-court-sized map printed and to establish a center for World Game development at SIU. On a very abstract, superficial level, Fuller's World Game was supposed to generate an ideal, singular future around which humanity could rally and begin planning for a more perfect world. In practice, however, and in an even deeper philosophical sense, the World Game falls explicitly within the development of World Futures. What for Fuller made the World Game so capable of transcending politics was that during game play "no one scenario had an a priori metaphysical or empirical claim over any other."[64] Scenarios would continue to emerge, that is, until the ostensibly apolitical computer declared a winner—or, rather, until the computer could demonstrate, finally, that *one* of these scenarios was the most desirable for the greatest number of people.

Such was the fundamental flaw at the core of Fuller's World Game: the very mechanism responsible for calculating and demonstrating so many possible futures was also supposed to generate, in some unspecified manner, the data that would allow us to arrive at a singular, most desirable outcome for the "whole earth."[65] On one level, then, it would seem that Fuller radically misunderstood or at least aggressively bracketed the consequences of his own computerized systems theories' generating, as they inevitably would, scenario after scenario, with millions of potential outcomes. In a deeper sense, these possibilities for pluralized temporalities and multiple futures were at the very center of Fuller's metaphysics. In his dozens of presentations on the World Game concept during the late 1960s and early 1970s, Fuller elaborated on what these multiple variables and computer-generated outcomes revealed about the pluralistic nature of Einsteinian reality; the "Universe," he wrote, "is a sequentially evolving *scenario* and cannot be conceived in one 'picture' or 'sculpture' sense."[66] The "Scenario Universe," was an "aggregate of non-simultaneous and only partially overlapping events," a complicatedly nonsingular fabric that could not be contained in any "single picture" because "one frame of the scenario does not tell the story that is told by the scenario."[67] "Scenario,"

64. Martin, "Fuller's Futures," p. 180.

65. The computer, Fuller argued, would be an "anti-body" to humankind's impulses toward self-extinction, revealing finally the "ways and means of serving the best interests of all men for the longest foreseeable ages" ("WG," p. 118). Fuller's confidence in the computer is an ongoing theme in his writing; see Fuller, *Operating Manual for Spaceship Earth* (1969; Zürich, 2008), p. 138; *And It Came to Pass—Not to Stay* (1976; Zürich, 2008), p. 94; *Critical Path* (New York, 1981), p. xxvii; and "Keynote Address at Vision 65," *Utopia or Oblivion*, p. 128.

66. Fuller, "Word Meanings," *Ekistics* 28 (Oct. 1969): 222; my emphasis.

67. Fuller, audio recording of lecture at Boston College, 2 May 1970, item 1b, box 133, subseries 5, R. Buckminster Fuller Collection, Stanford University Library, Stanford, Calif.

for Fuller, was an inherently plural and "only partially overlapping" series of space-time experiences; scenario always meant *scenarios*.[68] In a round-table discussion on Fuller's World Game theories held in San Francisco in October 1970, a student asked, "Mr. Fuller, if we knew enough, could we not predict the future, of matter and energy, I mean, if our knowledge was great enough?" To which he responded, immediately, "No, because the Universe is a non-simultaneous scenario and not a collection of things. . . . It is an aggregate of non-simultaneous and only partially overlapping transformations."[69]

In June and July of 1969 Fuller conducted an official World Game seminar at the New York Studio School of Painting and Sculpture, explaining to the participating scholars and artists that the World Game employs "general system logistics" as a "scientific means for discovering the expeditious ways of employing the world's resources so efficiently and omniconsiderately as to be able to provide a higher standard of living for all of humanity"—the emphasis being explicitly on "ways," as what emerged most forcefully in the published *World Game Report* following the seminar was a series of "scenarios" marked not by any single, overarching narrative but rather by a seemingly endless stream of provocative questions.[70] Many of these questions were followed by relevant data ("What is the present rate of literacy?" before a table of world literacy statistics), but the vast majority of them were either simply listed without any attempt at an answer or were patently metaphysical and generally unanswerable anyway ("What is pain?" "When is a game a game?" "What is thinking?" "How many questions have you had?" "How many thoughts?").[71] With such a pluralizing, scenario-generating philosophy at the core of his utopian geometrics, it is no wonder that Fuller never came close to describing how we were to reach the moment when, during the World Game, we would know we had arrived at the conclusion—the moment when finally " 'we

68. Similar definitions of *Scenario Universe* are everywhere in Fuller's writing after the late 1960s; see Fuller, *Earth, Inc.* (Garden City, N.Y., 1973), pp. 71, 87, 106; *Education Automation: Comprehensive Learning for Emergent Humanity* (1979; Zürich, 2010), p. 170; *Synergetics: Explorations in the Geometry of Thinking* (New York, 1975), pp. xxvi, 60, 76, 81, 85–86, 242, hereafter abbreviated *S1*; *CPS*, pp. 38–41, 105, 236–37; *Critical Path*, pp. 27, 154–57; and *Synergetics 2*, pp. 65, 69, 130.

69. Fuller, recorded video presentation of World Game Seminar in San Francisco, 19 Oct. 1970, item 3a, box 134, subseries 5, R. Buckminster Fuller Collection, Stanford University Library, Stanford, Calif.

70. As Fuller explains in the published report, "Once we knew what mankind had and what he needed to have, we began to experiment with the way he could go about getting his needs. These 'ways' we called *scenarios*" (Fuller, *World Game Report*, ed. Mary Deren and Medard Gabel [New York, 1969], n. p.).

71. Ibid., n. p.

must obviously adopt the policies indicated by the computer'" ("WG," p. 116). Although he never admitted it, Fuller's own metaphysics precluded the possibility of a World Game winner.

The Ørientalized Synergy of Fuller's Scenario Universe

Fuller's entire approach was less the dream of a singular future than it was an endlessly proliferating series of stories—something more like the Sultana Scheherazade's technique in the *Thousand and One Nights*, forestalling destruction by generating yet another scenario, every night another narrative universe of possibilities. Indeed, the analogy here is not arbitrary. Although Fuller seldom spoke in the Orientalized idioms of his fellow countercultural gurus, he was just as willing to attribute his more metaphysical insights to the occult traditions of the Orient. In *Synergetics* (1975), Fuller reflects on the special significance of the prime-number sequence 7, 11, 13:

> We know 7 x 11 is 77. If we multiply 77 by 13, we get 1,001. Were there not 1,001 Tales of the Arabian Nights? We find these numbers always involved with the mystical. The number 1,001 majors in the name of the storytelling done by Scheherazade to postpone her death in the *Thousand and One Nights*. . . . If we multiply the first four primes, we get 30. If we multiply 30 times 7, 11, and 13, we have 30 x 1,001 or 30,030, and we have used the first seven primes. . . . The eighth prime is 17, and if we multiply 30,030 by 17, we arrive at a fantastically simple number: 510,510. That is what I call an SSRCD Number, which stands for *Scheherazade Sublimely Rememberable Comprehensive Dividend.* [*S1*, p. 772]

And for the metaphysically inclined, the number 1,001 did seem to conceal considerable treasures. How else to explain the "symmetrical mirror pyramid display" that emerges, in a nearly perfect numerological palindrome, when 1,001 is multiplied to the tenth degree (fig. 20)? Fuller was even struck by how the digital appearance of "1001" seemed to hint at a "binary yes-no sequence," which "looks exciting because we are very close to the binary system of the computers" (*S1*, p. 775). Such insights were, for Fuller, deeply occult ("hidden" and "always involved with the mystical") and part of an ancient, Eastern systems theory: "I think the Arabian priest-mathematicians and their Indian Ocean navigator ancestors knew that the binomial effect of 1,001 upon the first four prime numbers 1, 2, 3, and 5 did indeed provide comprehensive dividend accommodation of all the permutative possibilities of all the 'story-telling-taling-tallying,' [of] computational systems." But in order to "guarantee their own security and advantage," these ancient

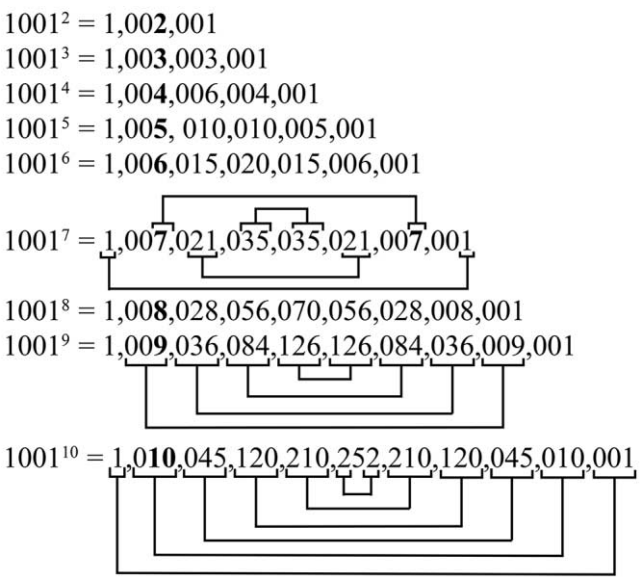

FIGURE 20. Buckminster Fuller, *Binomial Symmetry of Scheherazade Numbers*, illustrated here in what Fuller calls a "symmetrical mirror pyramid display" (Fuller, *Synergetics* [New York, 1975], p. 772).

Eastern mathematicians "deliberately hid their knowledge, their mathematical tools and operational principles" (*S1,* p. 772).

This hidden knowledge included more than just neat tricks with prime numbers. Indeed, Fuller's notion that something mathematically and ontologically critical in the ancient East had been lost during the Western Dark Ages and was only now coming to light through his own revolutionary geodesic scenarios eventually came to underscore his entire worldview, operating as the fundamental core of what he called his "epistemography."[72] The initial clues to the mathematical "retrogression" into which the Western world had fallen, Fuller explained, could be found in the clunky calculation-inhibiting numerals of the Roman Empire and in the relative belatedness with which the Western world adopted the Arabic cipher—in other words, the zero (Ø) column or place marker in calculative processes that had been critical to Oriental mathematical methods.[73] (For Fuller there was a direct, historical connection from the abacus to

72. Fuller, *Synergetics 2*, p. 31. Fuller's *Untitled Epic Poem on the History of Industrialization* (New York, 1962) was published in conjunction with his position at Harvard and already contains the kernel for his originary Oriental narrative of the lost "cipher" (ibid., p. 138). For another summary of this same grand narrative, see Fuller, *Education Automation*, pp. 197–98.

73. Fuller, *Critical Path*, p. 33.

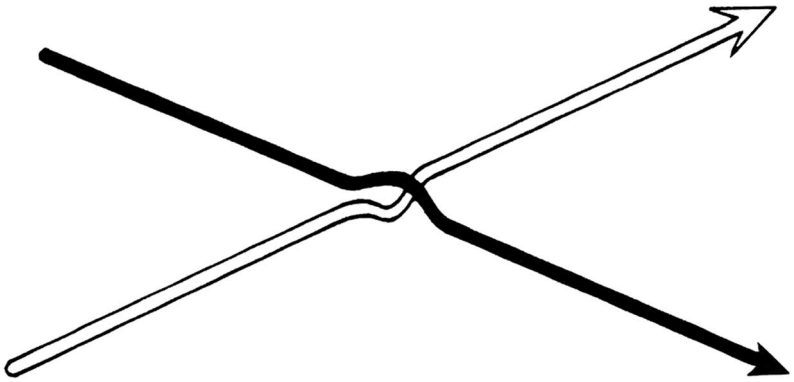

FIGURE 21. Fuller, *Lines Cannot Go through the Same Point at the Same Time*, illustration of what Fuller described as an "Interference Phenomenon," whereby "no two actions can go through the same point at the same time" (Fuller, *Synergetics*, p. 254). Image courtesy of the Estate of Buckminster Fuller.

Arabic numerals and, in a more covert-but-still-homophonic form, the hermetic esoterica of "'abracadabra'" [*S1*, p. 736].) What "broke asunder the Dark Ages" (*S1*, p. 738), according to Fuller's narrative, was not so much European enlightenment as it was a reemergent Øriental mathematics, the absence of which had kept the Western world in a state of calculative stagnation, as similarly evidenced in the Euclidean "retrogression" of planar geometry (*CPS*, p. 100). The very notion of a flat, two-dimensional triangle was a constraining fiction. No such triangles exist in nature, Fuller insisted, since no two lines can ever genuinely intersect (they always overlap or "superimpose" each other, even at the microscopic level) (fig. 21). And if all triangles are in fact incipient "tetrahedral" (four-sided, three-dimensional) structures, then any geometry that does not account for this three-dimensionality is ultimately reductive and false. Notice, for example, how Fuller diagrammatically unpacks the physical qualities of any real "triangle," revealing, at its core, an implicit three-dimensional, tetrahedral inflection, which would then, of course, give rise to any number of similarly constellated relationships in nature (see *S1*, pp. 4, 5) (fig. 22).[74] Here, then, in an ordered (but totally unpredictable) process was the basis for *all reality*, coded, again, in that classic symbol of Eastern philosophy: "The same inflection pattern," Fuller wrote, can be found in that "most profound symbol of the orient: yin-yang. Long ago human minds of the orient must have discovered . . . tetrahedra, and symmetry."[75] *Synergy*

74. Later he again asserts, "triangles are inherently open" (*S1*, p. 326).
75. Fuller, *Synergetics 2*, p. 119.

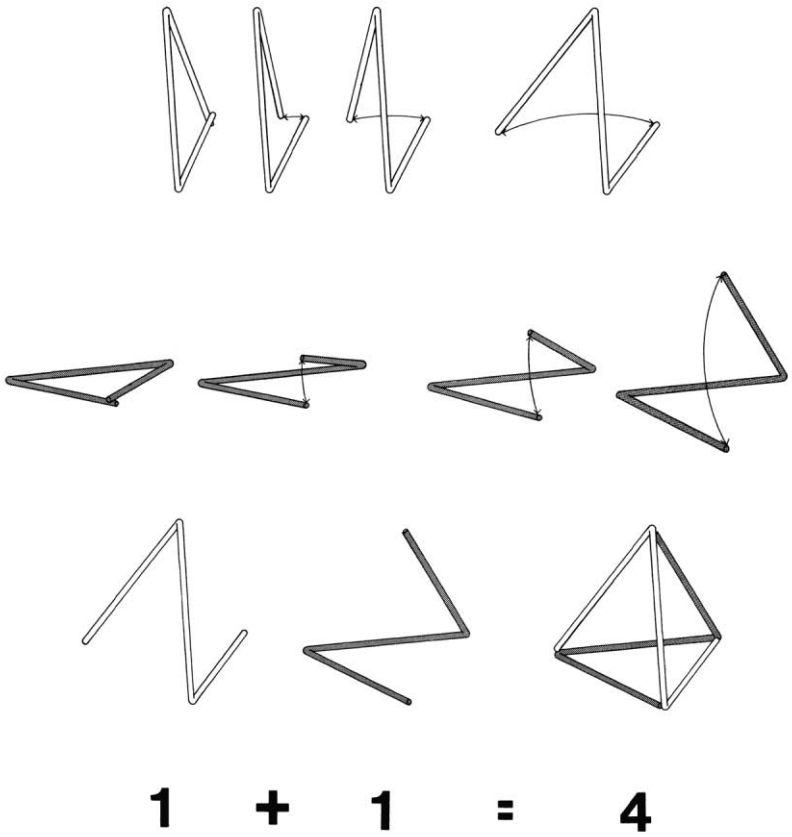

FIGURE 22. Fuller, *Triangle and Tetrahedron: Synergy (1+1 = 4)*, an illustration of how every triangle, when unfolded to reveal its implicit structure (and placed alongside its opposite) gives rise to a tetrahedron, a figure "volumetrically embraced by four triangles," such that "one plus one seemingly equals four" (Fuller, *Synergetics*, p. 5). Image courtesy of the Estate of Buckminster Fuller.

itself—undoubtedly Fuller's favorite word, now marked iconographically as a yin-yang—revealed exactly this process, whereby the "behavior of whole systems [is] *unpredicted* by the separately observed behaviors of any of the system's separate parts" (fig. 23).[76]

Furthermore, if for Fuller this back-to-the-Ørient "epistemography" implied the recognition of an endlessly pluralizing tetrahedral system for

76. Fuller, *Operating Manual for Spaceship Earth*, p. 78; my emphasis. This notion of synergy as unpredictability inherent in part-specific observation is repeated in nearly every one of Fuller's books; see Fuller, "How to Maintain Man as a Success," *Utopia or Oblivion*, p. 226; *EA*, p. 28; *CP*, pp. 159, 251; and *SI*, pp. 1–3, 13. For more on the yin and yang, see Fuller, *Cosmography*, pp. 137–38, 217.

FIGURE 23. Fuller's designated symbols for *Integrity* (a geodesic sphere) and *Synergy* (the yin-yang) (Fuller, *Synergetics*, pp. 692–93, image courtesy of the Estate of Buckminster Fuller).

any true ontology, it was just as much a part of any valid epistemology. Points or events that occur in any life, even when apparently linear or chronological, are in fact successive stackings of constellated experiences, which, it turns out, are similarly governed by tetrahedral patterns somehow coded into that magical Arabian number 1,001 and its exponents (fig. 24). In his first public presentation on the diagram illustrating these structures (based, as were Beer's demonstrations of systems complexity, on the equation $\frac{n(n-1)}{2}$) Fuller noted, with breathless enthusiasm, "I find this chart to be one of the most exciting I've been able to put on paper."[77] That excitement never wavered, and he would go on to include it in nearly all his publications and presentations afterward. Having unlocked these occult mysteries of the ancient East, Fuller claimed, "I am confident that I have discovered nature's own coordinate system."[78] Thus, just as Beer thought of his cybernetic futures as confirming the enneagrammatic temporalities of Gurdjieff's Oriental Systems Theory, Fuller's pluralistic "scenario universe" operated on the premise of his having recovered the occult mathematics of an ancient East. However, to see how these notions came to infiltrate so many of the world's largest corporations today, it will be necessary to turn more directly to the generative worlds of the cold war think tank.

The World Question Center, or How We Learned to Stop Worrying and Love the Kahn

On 28 November 1969 around thirty students and faculty members from the University of Brussels gathered together to clothe themselves in

77. Fuller, "The Music of the New Life," *Utopia or Oblivion*, p. 72. Jonathan Massey provides further evidence for situating Fuller's metaphysics within the trajectory of Oriental Systems Theory, demonstrating that Fuller directly borrowed a great deal (both architecturally and metaphysically) from Claude Bragdon, the architect-designer and translator of Gurdjieff's star pupil, P. D. Ouspensky; see Jonathan Massey, *Crystal and Arabesque: Claude Bragdon, Ornament, and Modern Architecture* (Pittsburgh, 2009).

78. Fuller, *Cosmography*, p. 31. Fuller was so enamored with this equation that he included it in nearly every one of his publications after the mid–1960s (usually with the accompanying chart); see ibid., pp. 62–64, 132–34; *OM*, pp. 76–77; and *SI*, pp. 122–23, 234, 495, 549.

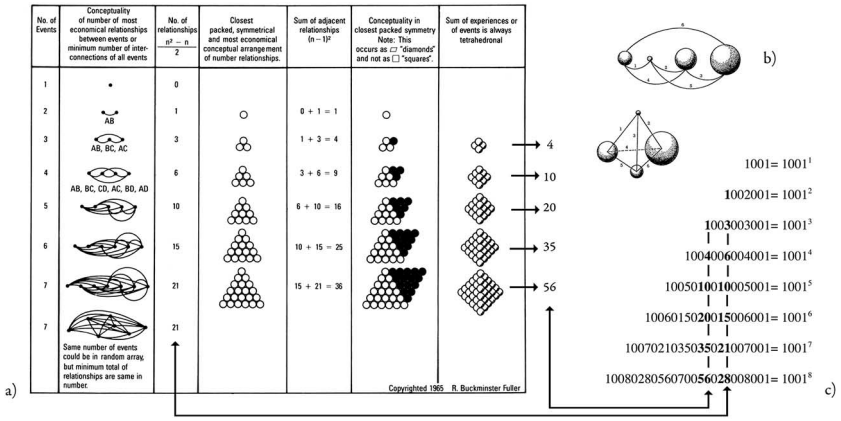

FIGURE 24. Fuller diagrams: (a) Table illustrating *Underlying Order in Randomness*, as published in several texts in the 1960s, including *Operating Manual for Spaceship Earth* (1968); (b) Illustration of the Linear Tetrahedron, demonstrating Fuller's belief that "events" or "points" in life experience are implicitly constellated in tetrahedral form—an assumption that formed the basis for Fuller's entire "epistemography"; and (c) *Table of Successive Powers of the Scheherazade Numbers*, in which Fuller's "tetrahedral progressions" have been drawn with arrows (by the author) to their corresponding sets in (a). Images courtesy of the estate of Buckminster Fuller.

a *plural* garment. It was at the Wide White Space gallery in Antwerp, and the pink silk, seemingly liturgical collective dress had been designed by the American performance artist James Lee Byars, whose recent years in Japan had inflected his ongoing art installations with a Noh-like aesthetic of meditative ritual and solemn authority. The dozens of yards of pink silk (with carefully measured head-sized holes cut for each participant) had been sewn together by a Chinese tailor in New York, and Byars had carried the massive garment with him in his suitcase as he crossed the Atlantic.[79]

79. I am indebted to the staff at the Balch Art Research Library at the Los Angeles County Museum (LACMA), as well as to the Conceptual Art Study Center at the Berkeley Art Museum and Pacific Film Archive (BAMPFA) for providing me additional materials on Byars. Some of the Berkeley Art Museum's tapes of Byars's conversations were also recently transcribed and made available in conjunction with the first significant posthumous Byars retrospective in Mexico City and New York (at Museo Jumex and the Museum of Modern Art [MOMA] respectively); see James Lee Byars et al., *James Lee Byars: ½ an Autobiography* (exhibition catalog, Museo Jumex, Mexico City, 19 Nov. 2013–13 Apr. 2014). On Byars's time in Japan and subsequent Orientalized aesthetic, see Howard Junker, "James Lee Byars: Performance as Protective Coloration," *Art in America* (Nov.–Dec. 1978): 109–10; Thomas McEvilley, "James Lee Byars and the Atmosphere of Question," *ArtForum* 19 (Summer 1989): 52–54; and Byars, *Mr. Byars and 12 Facts (A Short Biography)* (1970) and "James Lee Byars, April 1970," in *Artists Talk, 1969–1977*, ed. Peggy Gale (Nova Scotia, 2004), p. 52.

Like many of the artist's previous plural-garment projects—performed in Japan, the United States, and Nova Scotia (*100 in a Hat, Three in a Pants, Four in a Dress, 100 in a Dress,* and so on)—this version would also embody a characteristic mix of playful ridiculousness and ceremonial earnestness.[80] But whereas Byars's earlier works had alternately perplexed or inspired only small and local audiences (many had dismissed him as a Duchampian "dandy,"[81] with a narcissistic "personal liturgy," while others hailed him an artistic "shaman,"[82] a "dharma diva,"[83] with a taste for the prophetic),[84] this particular plural garment installation had been prepared for a special occasion. It was to be broadcast on Belgian television that evening as part of what Byars called the World Question Center (TWQC).[85]

After unveiling the plural dress, Byars arranged the participants in a circle, positioning himself and four women next to him near the top of the ring (fig. 25). As the cameras began rolling, the participants sat in silence for almost a full minute. In the black-and-white video of the event, recorded from the broadcast in 1969, the pink garments appear white—more than vaguely religious, almost cultish. Suddenly, a woman's voice (a Belgian student named Monique Francois) in thickly accented English soothingly recites a series of "questions" that Byars had composed ahead of time. They are odd, but provocative—not at all unlike the questions generated just a few months earlier in New York at Fuller's World Game seminar. The effect, in this case, is hypnotic: "Do you have an affection for questions? . . . Which questions have disappeared? . . . Is all speech interrogative? . . . Maybe questions don't exist?" The camera pans slowly in front of the participants, who look on with blank expressions. After

80. For more on Byars's plural (sometimes also referred to as participatory) garments, see Carter Ratcliff, "James Lee Byars: Art in the Interrogative Mode," in *The Perfect Thought: Works by James Lee Byars*, ed. James Elliot (Berkeley, 1990), pp. 54–55, and Elliot, "Notes Toward a Biography," in *The Perfect Thought*, pp. 87–91.

81. Ratcliff, "James Lee Byars," p. 58.

82. Junker, "James Lee Byars," p. 110.

83. See Dave Hickey, "Detroit Dharma Diva," *James Lee Byars: Work from the Sixties* (exhibition catalog, Michael Werner Gallery, New York, 4 Nov.–27 Nov. 1993), p. [1].

84. See Matthias Frehner, "To the Prophet of Contemporary Art with a Head for Heights," in Frehner et al., *Im Full of Byars: James Lee Byars—Eine Homage/A Homage* (exhibition catalog, Milton Keynes Gallery, Buckinghamshire, UK, 11 Apr.–21 June 2009), p. 16; Thomas McEvilley, "James Lee Byars—A Study in Posterity," in *Im Full of Byars*, p. 101; and "Art Viewers Mystified, Intrigued by Ritual: Shrouded Model, Strips of Paper Mean—What?" *Pittsburg Post-Gazette*, 26 Oct. 1965, p. 21.

85. See Jef Cornelis, *The World Question Center*, *UbuWeb*, www.ubu.com/film/byars_world-question.html; hereafter abbreviated *TWQC*. His own reminiscences on the event can be found in Byars, "The World Question Center," interview with David Sewall, in *James Lee Byars: ½ an Autobiography*, pp. 69–86.

FIGURE 25. Screenshots from James Lee Byars, *World Question Center* performance at the Wide White Space gallery in Antwerp, Belgium, 28 Nov. 1969.

two minutes of voiceover, the camera cuts to a close-up of Byars, sporting his familiar wide-brimmed hat, a microphone dangling from his neck. "I am the self-appointed World Question Center," he says, looking directly into the camera. The point of this endeavor, he explains, is to "ask for questions" by telephoning scholars, artists, and celebrities around the world and asking them the things they are asking themselves that are "important for their own evolution of knowledge" (*TWQC*). With the assistance of the Belgian telephone company, a team of people behind the scenes would be running a kind of telethon, amplifying the phone calls over loudspeakers, thereby allowing Byars to communicate from within the plural garment circle to those on the line.

It is perhaps not entirely surprising, given Byars's repeated request for questions regarding the "evolution" of knowledge, that the vast majority of those he calls offer questions about the future. But it is remarkable how neatly the questions articulated during the performance line up with themes present in the burgeoning field of late 1960s futurology—a discipline that thrived on the basic premise of World Futures. To point to only a few examples: Cage's phone call reveals that he has been "extremely interested in the work of Buckminster Fuller" and wonders whether by "following his plans" we can arrive at the question of how to "make a world that works for living rather than killing." Jean-Pierre Faye in Paris asks, "Is there going to be a revolution in the United States, and if that is the case, what sort of revolution?" Futuristic speculations are also offered by Arthur C. Clarke, who muses over the "impact of the communications revolution," while professional futurologist Robert Jungk asks how we might "enhance imagination" for future generations. The most disappointing aspect of the event for Byars, however, was that his real "guest" of honor—the person he was most looking forward to calling to ask for questions—had written to say he would not be available for the call. As Byars comments, "I would like to say that we received a telegram from Herman Kahn. I was hoping that we would be able to get him on the telephone but unfortunately he is involved in government meetings at this time, and his question was . . . 'What will a fully human being look like in the postindustrial era?'" (*TWQC*).

Khan's absence from the event is especially ironic because he was, I would argue, the principle source of inspiration for the entire performance. Indeed, whereas a number of critics have read Byars's piece as a comment on late 1960s communalist utopianism (as manifested, the argument goes, in everything from the plural dress to the embracing of a global village by way of telephonic networks), the truth is that TWQC is more an explicit homage to Kahn than it is any allusion to countercultural

collectivities.[86] If Belgium's King Baudouin had been watching the proceedings via broadcast, he would have recognized the homage immediately—and, in fact, would also have recognized Byars. It had only been six months since Baudouin had visited Kahn's new think tank in upstate New York, the Hudson Institute, for a weekend briefing, coincidentally the same day that Byars had arrived at the institute to begin his artist-in-residence tenure as part of the infamous "Art and Technology" program sponsored by the Los Angeles County Museum of Art.[87] All those present in the room at Hudson were shocked by Byars's refusal to take off his hat during the briefing (the artist was sensitive about his balding head), but far from feeling uncomfortable about the situation, Byars described the meeting as powerfully catalytic in developing what would very soon become *TWQC*. "The first thing Herman Kahn said," Byars later recalled, "[to] the King of Belgium, was '*What is the question*?'" It was a "gorgeous" moment, Byars explained, for this was precisely (whether Kahn knew it or not), "Gertrude Stein's death-bed sentence." A lifelong admirer of Stein, Byars suddenly thought to himself, "I'm really in the right place."[88] Over the next few months (June–July 1969), Byars would wander the halls of the institute, stopping into offices, sitting in on meetings, speaking frequently with Kahn—all the while carefully observing the Hudson Institute's frenetic proclivity for articulating multiple questions about the future.

Byars seems to have been more than a little starstruck by Kahn's charismatic style and prodigious intellectual talents (one of his favorite things to say about the experience was, "'I fell in love with Herman Kahn because I realized he could speak four hundred words a minute'"), but he was also certainly aware that Kahn had become, in Byars's own words, "extremely controversial."[89] As the author of the breathtakingly macabre *On Thermonuclear War*, Kahn had served as a model for the titular character in Kubrick's *Dr. Strangelove* (1964). However, rather than recoiling from any association with Kahn's think tank politics, the visual spectacle of Byars's TWQC broadcast offered more than a passing resemblance to the war room scenes in *Dr. Strangelove*, wherein a circle of military

86. For example, see Brian Holmes, "The Artistic Device, or, the Articulation of Collective Speech," *Ephemera: Theory and Politics in Organization* 6 (Nov. 2006): 413, and Ratcliff, "James Lee Byars," pp. 54–55.

87. See "James Lee Byars," in *Art and Technology: A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1967–1971*, ed. Maurice Tuchman (New York, 1971), p. 58. See also *James Lee Byars: ½ an Autobiography*, pp. 69–71.

88. Byars, "James Lee Byars, April 1970," p. 55; my emphasis. See also *James Lee Byars: ½ an Autobiography*, pp. 69–70.

89. Byars, "James Lee Byars, April 1970," pp. 55, 59. See also "James Lee Byars," in *Art and Technology*, p. 59.

dignitaries listens in on a series of phone calls between the US and Russian presidents—the effects of which are, like Byars's TWQC, both hilarious and deeply serious.[90] Kahn's politics, in other words, were more or less irrelevant for Byars. What he admired about Kahn and the Hudson Institute were the dynamic new structures of intellectual experience that he encountered and hoped to model—the celebrated collection of futures rather than the celebration of any future collectivities.

In casting his Kahn-like TWQC performance in an aura of quasi-religious iconography (elevating this proliferation of futurological questions into the realm of an Oriental Systems Theory), Byars was dramatizing in ritualistic detail what many were already saying about Kahn's special vision: that he had become *the* grand guru of the new futurology.[91] In an interview with David Sewell a few years later, Byars would make this connection even more explicit. Kahn's administrative and intellectual style is "wonderful," Byars argues:

> [He's] like Hachidai Sanjin in Japan . . . [who] always insisted, since he was very busy as the great teacher of the country, that he would meet seven area guys at one time and demand all of them speak at once. It's wonderful. Herman speaks so rapidly, and he carries three or four tape recorders around his neck. Almost always, he wears them like you see Tibetans with all those skullcaps. Herman wears Sonys like that,

90. Byars reveled in every line of connection he could draw between Kahn's think tank aesthetics and his own performance projects. "Thrilled," he telegraphed to Maurice Tuchman, the "Art and Technology" curator, after arriving in Antwerp, "they call me the skinny Herman Kahn" (Byars, telegraph to Tuchman, MOD.001.001, folder 1, box 1, Art and Technology Records, Modern Art Department, LACMA Balch Art Research Library, Los Angeles [ATR]). In discussing ways his art might be exhibited at LACMA, Byars suggested, "Mr. Kahn would come out and do something (maybe . . . for one of our lectures)," or, if not that, perhaps a "life-size photo of Herman Kahn" at the museum could be set up (folder 2, ATR).

91. References to Kahn as a guru, oracle, prophet, and so on proliferate in the 1960s and 1970s. In an article in *Life*, William A. McWhirter referred to "the Great Kahn" as a "300-pound oracle," with adepts who, "like monks," come from all over the world as others "might have gone to the Maharishi" (William A. McWhirter, "The Think-Tank Man," *Life*, 6 Dec. 1968, pp. 110, 110B, 121, 118; hereafter abbreviated "TTM"). The *Los Angeles Times* described Kahn as the "guru of his very own Hudson Institute" (James Real, "RAND vs. the Urban Crisis," *Los Angeles* Times, 30 June 1968, p. O20); he was similarly labeled "the guru of the futurists [and] the post-industrial era" ("A '1990 Conference' Discusses 1972," *Business Week*, 12 Feb. 1972, p. 18); the "demiurge of the Hudson Institute" (N. R. Kleinfield, "A Glimpse of the Year 2000: Companies to Mine the Moon, Build Still Smaller Cars," *New York Times*, 10 Jan. 1982, p. NES78); the "high priest of the [futurology] cult" (John Gellner, "War," *Globe and Mail*, 6 Jan. 1968, p. A6); the "practising prophet of the computer age" (Ze'ev Schul, "Peace Prospect Dim, Kahn Says," *Jerusalem Post Reporter*, 26 Mar. 1970, p. 8); "America's pre-eminent Doomsday prophet" (Adam Raphael, "Bright Hopes of a Doomsday Prophet," *Guardian*, 9 Feb. 1972, p. 2); and an example of the new "technocrat as prophet" (Basil Clancy, "Technocrat as Prophet," *Irish Times*, 1 Feb. 1973, p. 11).

> and keeps televisions on his knees . . . He has an absolutely sensational sense of the media and can run with it. I've seen him run up Hudson Institute carrying three tape recorders, two briefcases, a couple of television sets, catching a helicopter to quickly go to Washington for a face-to-face.[92]

Notice here that, for Byars, Kahn's quasi-Oriental authority is marked by a simultaneity of narrative plurality (hearing from "seven area guys at one time and demand[ing] that they all speak at once"). Kahn's "sonys" (which, as Byars knew, was Kahn's means of tracking his "stories") are draped about him like Tibetan ritual skullcaps, and all the narratives they make possible are concentrated in his charismatic aura, with the think tank becoming a kind of modern, secular ashram with its own commitments to forms of authorial transcendence and prophetic vision. Such was the minimalist drama of TWQC: the corralling of seemingly endless future possibilities into the dynamic, feverish space of the postwar think tank.

The Thousand and One Scenarios of the Great Kahn

There can be little doubt that Kahn appreciated Byars's homage. When asked a few years later, as reported in *Herman Kahnsciousness* (1973), "What do think tanks think about anyway?" he would answer with his own pages-long list of Byarsian interrogatives. Some of Kahn's questions are think-tankishly provocative and important ("Should the U.S. import all the oil it needs, saving its own for an emergency?" "How do nuclear-war survivors form local governments in order to get society going again?"), but just as many are preposterous and jokey ("Typewriters sleep in the beautiful office buildings—we sleep in what we go home to—can the situation be reversed?" "Should you hire a cleaning lady who's so lousy that she hires a cleaning lady for her own apartment?").[93] These latter questions will come as no surprise to those familiar with more recent scholarship on Kahn, which has done much to revise the traditional, caricatured vision of him as an austere merchant of death (*On Thermonuclear War* was described by one critic as a "tract on mass murder: how to plan it,

92. Byars, audio recording, BAMPFA tape 2003_7-1-1b. See also the partial transcription in *James Lee Byars: ½ an Autobiography*, p. 76. The Japanese figure Byars is most likely referring to here is Kukai (774–835 CE), sometimes referred to as Kōbō-Daishi or O-Daishi-sama (there is no historical person by the name Hachidai Sanjin, and Byars is most likely either mangling or simply misremembering the pronunciation).

93. Quoted in Jerome Agel, *Herman Kahnsciousness: The Megaton Ideas of the One-Man Think Tank* (New York, 1973), pp. [164–67].

how to commit it, how to get away with it, how to justify it").[94] It turns out that Kahn was also motivated at times by more avant-gardist impulses and held views not entirely opposed to those of the peaceniks he sometimes scolded (see *SG*, pp. 295–300).[95] But even this fuller version of Kahn as an establishment figure flirting with countercultural ideals doesn't really capture the more radical influence he had as one of the primary architects of World Futures. As I hope to illustrate, what really mattered for Kahn about this interrogative mode was the *narrative* technique he developed as a means of performing it.

As we saw above, while at the RAND Corporation, Kahn turned away from the calculative methods of Monte Carlo algorithms, looking instead toward noncomputationalist and nonsingular modes of constructing governmental responses to nuclear war. Although it would be difficult to pinpoint any particular methodology at work in *On Thermonuclear War* (Kahn's disciplinary methods were, to put it mildly, rather scattershot), this fanwise narration of possible outcomes is undoubtedly the book's most trenchant feature. Phrases like "many possible," "multiple," "a number of," "varying," "different," "many," "several," and "depending on," punctuate nearly every page of the volume (see *OTW*). Indeed, it was precisely this projection of civilizational futures *beyond* thermonuclear war that so enraged Kahn's critics (who felt that any speculation about moving on after tens or hundreds of millions had died was sick and twisted). Kahn, however, insisted that "*there are indeed many postwar states that should be distinguished*," and that "it is valuable to think through many possible wars to their termination points" (*OTW*, pp. 19, 163). Of course, not everyone at RAND appreciated Kahn's approach in *On Thermonuclear War,* but because of the book's success he suddenly found himself in a position that he could start his own center. In 1962, having grown tired of focusing exclusively on nuclear war, Kahn founded the Hudson Institute in order to project and analyze futures of all kinds.[96]

During that same year, Khan's efforts to focus more expansively on the question of futures caught the attention of Daniel Bell, who (having already eulogized the world-constructing singularities of past centuries in

94. James R. Newman, "Two Discussions of Thermonuclear War," review of *On Thermonuclear War* by Herman Kahn, *Scientific American* 204 (March 1961): 197.

95. For more on Kahn's relation to cold war panics, countercultural ideals, and avant-garde interventions, see Sharon Ghamari-Tabrizi, *The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War* (Cambridge, Mass., 2005), pp. 46–60, 71–75.

96. See ibid., pp. 281–309, and Neil Pickett, *A History of Hudson Institute* (Indianapolis, 1992), pp. 5–6.

The End of Ideology in 1960) had been working with Bertrand de Jouvenel on the "'Futuribles project'" in Paris with funding from the Ford Foundation (*SG*, p. 287).[97] After visiting the Hudson Institute, Bell and de Jouvenel became even more excited at the pluralist premise of Kahn's take on futurology (as de Jouvenel would later explain in a lecture to the RAND Corporation, the goal was "*possible futures*, with an emphasis on the plural").[98] During the mid-1960s, Bell expanded his interest in the proliferation of possible futures by heading up the American Academy of Arts and Science's "Commission on the Year 2000,"[99] asking Kahn to develop a comprehensive "framework for speculation."[100] By this time, Kahn's Hudson Institute had already become a hotbed of innovative futurological thinking. Internal institute documents from 1962–1964, for example, show there were reports on "Alternate Futures for Eleven Areas plus Seven Worlds," "Twenty-Three Worlds of the Early 1970s," "Alternative Worlds," and, of course, "World Futures" (*SG*, p. 449). What was unique about these worlds, however, was less the emphasis on globality than the technique Kahn had begun using to articulate them—a technique he decided to call (in what is either a direct homage or else remarkable coincidence with Fuller's metaphysical universe) scenarios. Thus, while the more schematic outline Kahn eventually submitted to Bell for his commission certainly reflects the institute's pluralizing approach to futurology (setting out, as it does, a "'multifold trend'" for the future),[101] it was in the much larger and more influential volume *The Year 2000: A Framework for Speculation on the Next Thirty-Three Years* (1967) that Kahn and his Hudson colleague Anthony J. Wiener brought the scenario onto the world stage.[102]

What did Kahn mean by scenario? In *The Year 2000*, he and Wiener introduce scenarios as "attempts to describe in some detail a hypothetical sequence of events that could lead plausibly to the situation envisaged"—realist narratives, in other words, that "in impressionistic tones"

97. See Ida R. Hoos, "Problems in Futures Research," in *The Study of the Future: An Agenda for Research*, ed. Boucher (Bethesda, Md., 1977), p. 133, and Daniel Bell, *The End of Ideology: On the Exhaustion of Political Ideas in the Fifties* (Glencoe, Ill., 1960).

98. Bertrand de Jouvenel, "FUTURIBLES," RAND Corporation, Jan. 1965, p. 1, www.rand.org/content/dam/rand/pubs/papers/2008/P3045.pdf

99. Daniel Bell, "The Year 2000—The Trajectory of an Idea," in *Toward the Year 2000: Work in Progress*, ed. Bell and Stephen R. Graubard (Cambridge, Mass., 1997), pp. 1–13. This book was originally published as "Toward the Year 2000: Work in Progress," a special issue of *Daedalus* 96 (Summer 1967).

100. See Kahn and Anthony J. Weiner, "The Next Thirty-Three Years: A Framework for Speculation," in *Toward the Year 2000*.

101. Ibid., p. 73.

102. See Kahn and Wiener, *The Year 2000: A Framework for Speculation on the Next Thirty-Three Years* (New York, 1967); hereafter abbreviated as *Y2K*.

provide a "feeling for events and the branching points dependent upon critical choices" (*Y2K*, p. 262). They are used to "dramatize and illustrate" the "larger range of possibilities that must be considered in the analysis of the future," forcing the analyst to "deal with details and dynamics that he might easily avoid treating if he restricted himself to abstract considerations" (*Y2K*, p. 263). Kahn described the practice as taking "God's view," generating stories that are "Big. Aerial. Global. Galactic. Ethereal. Spatial. Over-all . . . miniature masterpieces, *Finnegan's Wake* written on the head of a pin" (quoted in "TTM," pp. 110B, 110B–23). The most important element of the scenario, however, was that it was always generated as a multiplicity, as one of several possible outcomes—never as a prediction or forecast but as a suite of conjectured possibilities. (*Scenario* for Kahn, as for Fuller, always meant scenario*s*.) As William McWhirter recounts, "One of Kahn's favorite stories is that of the Sultana Scheherazade, who kept her husband awake and thereby withstood her execution by telling him one story after another for 1,001 nights. In the same manner, Herman Kahn may feel that, by inventing one Scenario after another, he is holding back the changes that would seal our doom" ("TTM," p. 126).

But if the scenario technique's most distinctive feature was that it always generated an array of constellating possibilities, there were a number of formal elements within the stories themselves that set them apart as a distinctive genre. For example, in addition to being generally short stories (with most hovering at around two to three pages), the scenarios in *The Year 2000* are consistently marked by phrases that emphasize the conditionality of the narrative diegesis:

> "Within the advanced states there *might be* . . ."
> "The Soviet Union . . . *may emerge* as . . ."
> "Japan *could be* isolated and rearming . . ."
> "To some degree the United States *might follow* . . ."
> [*Y2K*, pp. 251, 257, 261, 260; my emphasis]

They are also, in *The Year 2000*, almost always told in the present tense:

> "By 1972 it *appears* as though . . ."
> "In 1987 a struggle *breaks out* in Mexico . . ."
> "In 1985 fighting *spreads* to Iran . . ."
> "NATO in 1969 *is allowed to* continue as a formal alliance . . ."
> [*Y2K*, pp. 295, 297, 305, 281; my emphasis]

There are a few exceptions to this present-tense narration (one short story in *The Year 2000* uses the more traditional, future past-tense grammatical voice of speculative fiction, as do a number of Hudson Institute official

reports), but even in these cases the narratives are always framed within a whole panoply of nondiegetic, paratextual materials, with dozens of charts, graphs, tables, and diagnostic phrases such as "the distinguishing marks of this world are . . ." or "this world is characterized by . . ." (*Y2K*, pp. 253, 257).[103]

The total effect of these generic qualities is both awkward and powerful. On the one hand, all these grammatical and paratextual distantiations constantly interfere with readerly flow and diegetic continuity (we are never allowed, that is, to lose ourselves for long in any of these stories, as we are continually reminded of their organizational constructedness). As Kahn admits, "only the great novelists and prophets can impart an intense sense of drama and excitement," and while "we hope that in this venture into speculation we have not been so austere as to exclude this flavor entirely," the scenario is, nonetheless, primarily a "methodological device" designed for "making assumptions and contexts explicit" and for "systematic comparison of various alternative policies" (*Y2K*, p. 6). On the other hand, the presiding voice of the scenarios—framed continually within the commanding presence of think-tank authorship—evokes a kind of narratological immanence, in which the objective is to produce all the generative force and didactic energies of myth. But not *just* myth; the narratives themselves are always in discursive conversation with their "alternate" narratives, such that what is finally achieved by the scenario set is a kind of metamyth. As Kahn himself would explain in the final pages of *The Year 2000* in a reference to Johann Wolfgang von Goethe's *Faust* (a story, he notes, with such "poetic ambiguity and complexity that it raises the legend to the level of archetype or myth"), the whole point of the scenario methodology is to "safeguard" against the modern organization's Faustian inclinations to "control rather than to comprehend" and to think "manipulatively rather than empathetically, normatively, or mythically" (*Y2K*, p. 410). And the only way to think "mythically" now, he concludes, is

103. The exception to the present-tense narration in *The Year 2000* is Wiener's "Capture the Flag" story (see *Y2K*, pp. 352–57), which is quickly followed up with an explanation that "Wiener's short story above is another attempt to speculate. . . . It is [included] to suggest something of the impact possible future patterns of international relations might ultimately have" (*Y2K*, p. 357). For more examples of future past-tense speculative scenarios at the Hudson Institute, see Raymond D. Gastil, *Postattack Scenarios* (Harmon-on-Hudson, N.Y., 1964), for which an annex was also published that year citing a number of popular speculative fictions—George Stewart's *Earth Abides* (1949), Nevil Shute's *On the Beach* (1950), Peter Bryant's *Red Alert* (1958), and Burdick and Wheeler's *Fail Safe* (1962)—as directly influencing the "construction of [their] scenario" (Elisabeth Crawford, *Postattack Scenarios: Annex I, Objectives and Methodology* [Harmon-on-Hudson, N.Y., 1964], p. 22).

to "improve our understanding of future possibilities and the long-term consequences of alternative policies" (*Y2K*, p. 413).

The scenario's overarching goal, in other words, was to generate both methodologies and metamythologies of plural futurity, even (or especially) when faced with a "paucity of actual examples" (*Y2K*, p. 263). "Plausibility," Kahn explained, "is a great virtue in a scenario," but one should also "expect to go on being surprised" (*Y2K*, p. 264). Sometimes "*wild* speculation is needed to provide an imaginative perspective" (*Y2K*, p. 357). All of which meant that he was never unduly bound by the heavy pressures of facts or history and could thus sell his pluralized futures with all the breathless enthusiasm of a guru mythologist. And sell them he did. In conjunction with the research he conducted for *The Year 2000*, Kahn began the Corporate Environment Study (CES), wherein for a mere 12,000 dollars corporations could send their planners and CEOs to the Hudson Institute for seminars and learn phase one of the secrets of scenario planning, as well as get access to Kahn's own scenarios on "The Future of the Corporation" (phases two and three cost 14,000 and 16,500 dollars respectively). Corporations that bought into the program included over sixty of the world's most powerful: XEROX, Banco Nacional de Mexico, IBM, Ford, MITRE, Coca-Cola, GE, Time, Mobile Oil, Chemical Bank, Prudential Insurance, Volvo, Ciba-Geigy, Mitsui, Nissan Motors, and many others (see *SG*, pp. 304–5).[104] However, in terms of the consolidation of scenario planning as a vehicle for World Futures and its role in Oriental Systems Theory, the most powerful and important of CES's attendees was undoubtedly Royal Dutch/Shell.

Pierre Wack and the Orientalized Metaphysics of World Oil Futures[105]

The same year (and possibly the same month) that Byars was developing his World Question Center at the Hudson Institute, two representatives from Royal Dutch/Shell had also arrived to participate in Kahn's CES.[106] Ted Newland, based in Shell's London offices, and Pierre Wack,

104. See also Pickett, *A History of Hudson Institute*, p. 16.

105. Much of my research for this section was collected at the Pierre Wack Memorial Library (PWML), which, when I visited it in 2012, was housed in a crowded basement at Green Templeton College at Oxford University. Since then, the entire Wack collection has become part of the Oxford Futures Library at the Saïd Business School, and a rudimentary cataloging system is now online. My references to the archive will reflect their current location.

106. For memories of Newland's and Wack's interaction with the Hudson Institute I am indebted to former Hudson employee Gail Neale (neé Potter); see Gail Neale, email to author, 12 Dec. 2013; Art Kleiner, "Consequential Heresies," manuscript, p. 8, blue shoebox 2, drawer D1,

from Shell Français, had, like Byars, come to the institute with the aim of doing much more than simply getting briefed on Kahn's vision of corporate futures.[107] They wanted to know the technique and to find ways to make it their own. At the time, Shell's oil conglomerate had been cruising along for several years using calculative forecasting methods created by one of its own internal departments, the Unified Planning Machinery, which provided annual estimates and statistics for projected trends. Aggressive geopolitical maneuvering during the 1940s and 1950s had allowed Shell and its six global competitors to maintain a fairly steady balance in the westward flow of oil, with projections for both cost and distribution nearly always falling within the clean lines of calculated growth. However, in the late 1960s a few managers at Shell were beginning to realize there were signs of turbulence ahead (specifically, the development of OPEC and a subsequent pushback by a number of Arab countries against the 50 percent standard profits previously granted for extracted crude). Thus, when Shell sent Newland and Wack to Hudson, what they wanted was a clearer sense of how they might navigate the complexities on the horizon.[108] Newland had been to the Hudson Institute before and had convinced a number of Shell's managers that Kahn's scenario methods could be useful in navigating the rapidly evolving reconfiguration of global oil management, but Newland was also, as business historian Art Kleiner puts it, a bit too "crusty and erratic" to be the face of a whole new planning department at Shell.[109] They needed someone, like Kahn, with more charisma and energy (someone who could be Shell's new guru of planning), and so in 1969 they set out to recruit the magnetic Frenchman Pierre Wack to come to London to help with Shell's adaptation of Kahn's methods.[110]

The legend of how Wack and his team used scenario planning to allow Shell to respond more flexibly to both the 1973 and 1979 oil crises has become so popular in histories of management and strategic planning, it

Pierre Wack Memorial Library, Oxford (PWL); and Pierre Wack, "Wack @ Curemonte: Transcript from Tape 1/Side A to Tape 5/Side A," pp. 48–49, blue shoebox 1, drawer D1, PWL.

107. The most comprehensive account of Royal Dutch/Shell's adaptation of Kahn's scenario planning is in Kleiner, *Age of Heretics: A History of the Radical Thinkers Who Reinvented Corporate Management* (New York, 2008), pp. 121–54. For description of the larger history at Shell, see Keetie Sluyterman, *Keeping Competitive in Turbulent Markets*, vol. 3 of *A History of Royal Dutch Shell* (New York, 2007), pp. 222–23.

108. See Ian Skeet, *OPEC: Twenty-Five Years of Prices and Politics* (New York, 1988), pp. 15–156, and Kleiner, *Age of Heretics*, pp. 143–44.

109. Kleiner, *Age of Heretics*, p. 133.

110. References to Wack as the "guru" of scenario planning are, of course, legion; see, for example, "Guru: Pierre Wack," *The Economist*, 29 Aug. 2008, www.economist.com/node/12000502

is perhaps unnecessary to retell it here.[111] But it is worth noting that the manner in which Wack appropriated Kahn's scenario methods was a kind of corporate managerial version of Byars's mysticism-inflected homage to the "grand guru" at Hudson—offering a powerful consolidation, as it were, of the correlative visions of World Futures and Oriental Systems Theory.[112] It was not simply that Wack constantly framed his discussions of scenario planning in terms of Kahn-style *what-if* questions (though this did become one of the most salient features of scenario planning discourse).[113] Nor was it that he consciously crafted his multiple futures as a way of "jolting" Shell managers out of what he called their "mental models" so as to reframe their perspectives according to the evolving exigencies of oil distribution (the World Questions of Oil, as it were). What I want to draw attention to here, rather, is that for Wack scenario planning eventually came to serve as the culmination of a mystical journey into Eastern temporalities that he had begun while still a student in France during the Second World War. The story, as he told it later, was that in 1943—penniless, hungry, and suffering from tuberculosis—he had responded with enthusiasm when a friend invited him into the well-fed circle of Gurdjieff and his disciples at their Institute for the Harmonious Development of Man, at Fontainebleau.[114] The hours he spent with Gurdjieff over the next months would be transformative, leading him to "see that higher states of consciousness could exist" (quoted in *SP*, p. 262). Wack became so entranced by these new doctrines at the time that he later remembered having stayed inside, sitting and quietly listening to Gurdjieff speak while people outside celebrated the Allied liberation of France, ringing bells and kissing in the streets.[115]

111. See Kleiner, *Age of Heretics*, pp. 121–54, and Angela Wilkinson and Roland Kupers, *The Essence of Scenarios: Learning from the Shell Experience* (Amsterdam, 2014), pp. 1–112.

112. Wack referred to Kahn as an "enormously stimulating man" (Wack, "Transcript—GBN Scenario Planning Seminar, 19 April 1993," p. 4, general folder 85, drawer B4, PWL. At various times Wack attempted to distance his methods from Kahn's, usually by claiming his own were more relevant and rigorous (ibid., p. 32).

113. As Peter Schwartz (who held Wack's job at Shell between 1982 and 1987) explains, "The scenario process [begins] with a series of 'what-if' stories, each with a different name . . . 'what if our worst nightmare took place? . . . What if our most desired future came to pass? . . . What if a completely unexpected series of events changed the structure of our industry?'" (Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* [New York, 1996], pp. xiv–xv).

114. For details on Wack's interaction with Gurdjieff, see Kleiner, *The Age of Heretics*, p. 134; Wack, "Wack @ Curemonte," pp. 52–53; as well as Wack's reminiscences in "Pierre," *Svâmi Prajñânpad: Biographie*, ed. Daniel Roumanoff (Paris, 1993), pp. 262–66, hereafter abbreviated *SP* (unpub. trans. Eve Wack).

115. See Eve Wack, *Pierreve (1977–1997)*, manuscript, p. 68, blue shoebox 2, drawer D1, PWL.

Gurdjieff died in 1949, and Wack began a global search for a guru who could continue his training in esoteric mysticism. During the 1950s, while working variously as an editor and marketing planner in Paris, Wack traveled to Burma, Thailand, India, and Japan, visiting dozens of ashrams, Zen gardens, and spiritual masters. One of the most powerful encounters he had was with Zenkei Shibayama, the Roshi of Nanzen-ji in Japan, who so impressed Wack he was tempted to stay on for "at least a couple of years," which, he thought, would be necessary to "make real progress" (quoted in *SP*, p. 262). But in France at that time anyone who had not begun working for an organization full time by the age of thirty-nine would not be guaranteed a pension, and so in 1960 Wack returned to France and took a job with Shell Français (choosing them over Michelin, he said, because only at Shell could he take his vacations during the ideal traveling season in India).[116] It was on one of those annual trips to India that he discovered the guru he would most celebrate during the next three decades of his life, Svamiji Prajnanpad, who taught that the universe is governed by "change, change, everywhere and always," an "infinite number of different things . . . go on changing," adding a "new dimension to the array of differences," such that "nothing remains constant. Everything is in flux."[117] Furthermore, Svamiji explained, faced with this infinite complexity, one must expand one's "faculty of perception," cultivating the "art of seeing" so as to move beyond the "petty self" that tends to get "projected onto everything else."[118] For Wack, Svamiji's esoteric teachings would become the very basis for his later conversion to Kahn's scenario planning methods, and the Svamiji was more than happy to confirm the connection. "That is your yoga," he told Wack in the early 1970s, after learning about his scenario work at Shell in London, adding, "it will be the test that will allow you to . . . see, establish relations, see through and be one" (quoted in *SP*, p. 263). And it was precisely because of this spiritual possibility, Wack later wrote, that "I launched myself into this activity with an enormous zeal I wouldn't have had if I had not been set afire by the taste, the sensation of 'seeing'" (quoted in *SP*, p. 263). The Svamiji's doctrine would become, for Wack, a "personal and operational" vision that "transformed my professional life" (quoted in *SP*, p. 264).

This spiritualized sense of the scenario method as a manifestation of esoteric "seeing" informed Wack's entire approach to planning. When it came time to actually write the scenarios, for example, Wack would pack

116. See Kleiner, *Age of Heretics*, p. 136.
117. R. Srinivasan, *Talks with Swami Prananapada* (India, 1977), p. 14.
118. Ibid., p. 54.

his team into a Volkswagen bus and drive them to what he described as an "austere monastery" in the southern countryside in Lurs, France, where they could be entirely secluded for weeks at a time, their "small rooms about the size of railway compartments."[119] It was necessary, he later explained, to "go into the green" ("green" was here offered apparently without irony, despite the oil futures under consideration) where he and his team could talk, burn incense, and meditate without telephones, offices, or home life, so as to allow "the intensity of the process to increase without breaking."[120] One is tempted to argue that the whole thing sounds rather like the plot of Peter Brook's film adaptation of Gurdjieff's life story, *Meetings with Remarkable Men* (1979), in which the guru's spiritual journey throughout the East is portrayed as culminating at the monastery of the Sarmoung Brotherhood, where the sacred dances of the enneagram are performed (fig. 26). The implied connection here is not entirely arbitrary. Wack never abandoned his early enthusiasm for Gurdjieff and would specifically make interviewing what he called "Remarkable People" (now gender neutral, although his teams remained staffed primarily by men) a central component in the research leading up to each scenario. Indeed, by the early 1980s (after Brook's film appeared), the phrase "Remarkable People" had become so central to Wack's writing and methodologies that it is difficult to find a text by or about him without several references to it—and it would go on to become a central feature of scenario-planning methods as taught in business management training everywhere.[121] As Wack would explain in a lecture to the Global Business Network in 1993 (an organization founded by former Shell team employees, offering scenario writing to businesses throughout the world), what he meant by "Remarkable Person" was someone who had cultivated the "art of seeing," a person who in Sanskrit would be known as a "*rishi*"; "*rishi* means

119. Wack, "Wack @ Curemonte," pp. 74–78. Wack also notes that later in the 1980s they attempted to hold the scenario writing retreat at Esalen in Big Sur, California, but were turned off by the touristy crowd sharing the location with them (ibid., p. 80).

120. Wack, "Speech & Interviews 'Re: Phillippe LeBoyer,'" pp. 4–12, blue shoebox 5, drawer D2, PWL. Wack's scenario-team colleague Napier Collyns remembers him as a "natural systems thinker," who "invariably had a stick of incense glowing," as a means of aiding his "contemplation" of multiple futures (Napier Collyns and Hardin Tibbs, "In Memory of Pierre Wack," *Netview* 9, no. 1 [1998]: 3).

121. On "Remarkable People" as central to the development of scenario methods, see Kleiner, "Consequential Heresies," pp. 3–5 and *The Age of Heretics*, p. 135; Kees van der Heijden, *Scenarios: The Art of Strategic Conversation* (New York, 2005), p. xix; Thomas J. Chermack, *Scenario Planning in Organizations: How to Create, Use, and Assess Scenarios* (San Francisco, 2011), pp. 94, 97; George Wright and George Cairns, *Scenario Thinking* (New York, 2011), pp. 50–54; and Schwartz, *The Art of the Long View*, pp. 73–78. As Kleiner notes, "of all mystic leaders, [Gurdjieff] has been the most influential in business circles" (Kleiner, *The Age of Heretics*, p. 56).

FIGURE 26. Screenshots from Peter Brook, *Meetings with Remarkable Men* (1979).

'seer,' . . . the one who sees all around," which is, he insisted, "the best definition of a scenario builder I know."[122]

What all of this means is that when Wack presented his multiple futures to the managers at Shell, the narratives, charts, and graphic visualizations he deployed were not simply the calculative estimations of a set of forecasts;—they were, for Wack, *spiritual* documents. It would not be unreasonable, when looking at Wack's charts from the early 1970s (which were, according to his nondisclosure agreements with Shell, the only documents he could publicly distribute in his publications as a senior lecturer of business at Harvard in the 1980s), to see the forking rivers and geometric shapes as only so many representations of Buddhist flux and esoteric mandalas (fig. 27).[123] Certainly the way he described his narrative approach would suggest as much: "The future is no longer stable,"[124] he told Shell's management team, and the most effective (and affective) way to approach that increasing "complexity"[125] is to "accept uncertainty . . . and make it part of our reasoning."[126] The "organic" art of scenario writing offered the corporation the opportunity for "something very precious; the ability to *reperceive* reality," describing "different worlds, not just different outcomes in the same world."[127] If his team had not learned the scenario method from Kahn, he concluded, "we would really push for inventing it" because, in the end, "we mean more than just scenarios. We mean a whole nervous system, we mean the *global scenario*."[128]

Global Capital and the Orientalized Metaphysics of World Futures

Wack's success at Shell and later appointment at Harvard set the stage for the adoption of scenario planning as a management technology in businesses around the world, such that it has now become an official part of the "corporate culture" of Apple, IBM, Disney, General Electric, AT&T, Toyota, Ford, Nissan, Mercedes, Xerox, Cisco, American Express, and

122. Wack, "Transcript," p. 14.

123. On Wack's nondisclosure agreement with Shell, see Wack, "Transcript," p. 17 and "Wack @ Curemonte," p. 9.

124. Wack, "Scenarios: Uncharted Waters Ahead," *Harvard Business Review* (Sept. 1985): hbr.org/1985/09/scenarios-uncharted-waters-ahead

125. Wack, "Scenarios: Shooting the Rapids," *Harvard Business Review* (Nov. 1985): hbr.org/1985/11/scenarios-shooting-the-rapids/ar/1

126. Wack, "Scenarios: Uncharted Waters Ahead."

127. Wack, "Scenarios: Shooting the Rapids."

128. Wack, "Changing Gear in Planning," manuscript (–1980), MS #3CG205, p. 29, PWL; my emphasis.

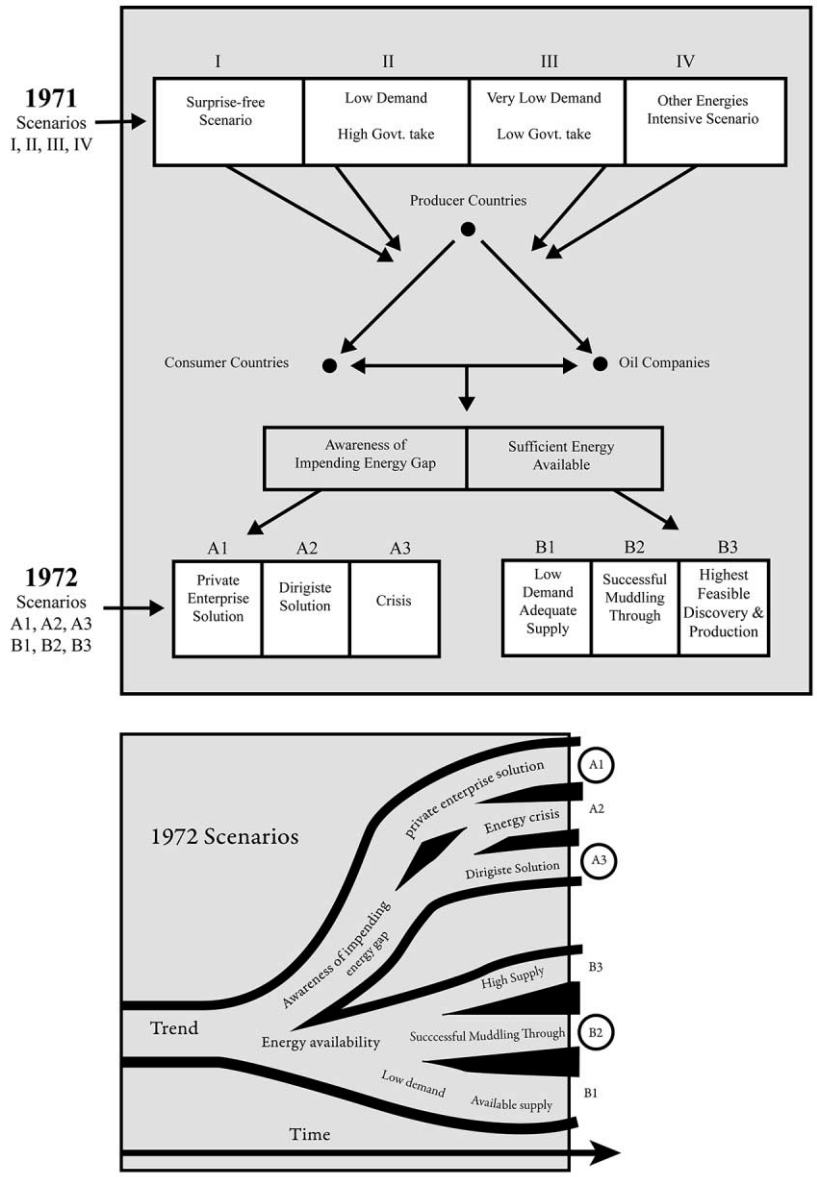

FIGURE 27. Charts designed by Pierre Wack for Royal Dutch/Shell Group Planning, *Scenarios for 1973 Planning Cycle* (1973), re-created (by the author) from Wack, "Scenarios and the Gentle Art of Re-Perceiving," drawer 3, oil folder 20, PWL, Oxford Futures Library, Saïd Business School.

hundreds of others.[129] And there is certainly no shortage of enthusiasm for its quasi-religious virtues among its practitioners. Indeed, it is striking how frequently the methods of World Futures are portrayed in scenario planning official reports and handbooks as being capable of initiating new ways of thinking, heightened creativity, paradigm shifts, new mental models, aesthetic experiences, even, frequently, new beliefs.[130] It is certainly no coincidence, I would argue, that the individuals charged with the development of scenario planning at Shell following Wack's tenure—and, in fact, those most involved in the codification of scenario planning as a management technique in the larger business community—have been deeply invested in the temporalities associated with Oriental Systems Theory.[131]

Nowhere is this convergence more strikingly illustrated than in the development and publication of Shell's *Global Scenarios* in 1992. The head of Shell's scenario planning team at that time was Joseph Jaworski, previously head of the American Leadership Forum (ALF), an organization that in the 1980s offered training, educational retreats, and transformative experiences to corporate leaders. Jaworski had come to believe, as he later wrote, that "the Western scientific-materialistic worldview—our underlying belief system, which has prevailed in the West for over two hundred years . . . is no longer adequate for the issues our society is facing" (*S*, p. ix). Jaworski turned instead for inspiration to "the teachings of Taoism, Buddhism, [and] the Neo-Platonists," which he portrayed as correlating directly with the chaos theory and quantum nonlinearity discovered by contemporary physicists (*S*, p. 88).[132] As he was gathering his team for the 1992 scenarios at Shell, Jaworski happened to see Bill Moyers's PBS

129. See the appendix.

130. See Joseph Jaworski's Jungianly titled *Synchronicity: The Inner Path of Leadership* (San Francisco, 2011); hereafter abbreviated *S*. For further examples, see Woody Wade, *Scenario Planning: A Field Guide to the Future* (New York, 2012), pp. 10, 57; Chermack, *Scenario Planning in Organizations*, pp. xix, 151–81; Kees van der Heijden, *Scenarios: The Art of Strategic Conversation* (New York, 2005), pp. x–xiv; Mats Lindgren and Hans Bandhold, *Scenario Planning: The Link between Future and Strategy* (New York, 2003), p. 25; and Schwartz, *The Art of the Long View*, pp. 52, 108, 137–38, 193–97.

131. This was certainly the case for what was arguably the most influential scenario planning organization of the 1990s, the Global Business Network (GBN), whose clients included BP, Shell, Statoil, Pacific Gas and Electric, AT&T, Volvo, the International Stock Exchange, to name only a few. For more on the countercultural and crypto-Buddhist commitments of members of the GBN, see Fred Turner, *From Counterculture to Cyberculture*, pp. 180–94, and Schwartz, *The Art of the Long View*, pp. 92–98. McKenzie Funk also describes Schwartz's having studied Tibetan Buddhism; see McKenzie Funk, *Windfall: The Booming Business of Global Warming* (New York, 2014), p. 43. Perhaps the most vivid example is the techno-Buddhist sci-fi "Rim Trilogy" of novels by former GBN scenario planner Alexander Besher, including *Rim* (1994), *Mir* (1998), and *Chi* (1999).

132. Jaworski is especially influenced by David Bohm's Oriental Systems-inflected *Wholeness and the Implicate Order* (New York, 1980), p. 29.

interviews with Joseph Campbell, whose fascination with Eastern religiosity and perennialist mythology struck him as the perfect paradigm for what he hoped to accomplish with the scenarios (see *S*, pp. 155–60).

But who could translate that sense of myth into the "most crucial part of the entire process . . . the line-by-line writing of stories"? Jaworski knew he needed a "Remarkable Person" to write the narratives, a "top-notch wordsmith and organizer," someone who could "mediate between 'experts' on the team," and yet still convey what he felt were the necessary "theological" values of the scenario writing process (*S*, pp. 154, 155, 161). It was not long before he discovered Betty Sue Flowers, who had edited and produced Moyers's interviews with Campbell and put together the subsequent publication, *The Power of Myth* (1989).[133] By early 1992 Jaworski had asked her to "come to London to take on this responsibility" (*S*, p. 155).[134] A year later Flowers would describe the writing process that summer as having been an " 'exciting' " experience, full of " 'high stress' " and " 'high intensity.' "[135] For each meeting with the Shell team, having collected the necessary data, she would write a draft of several pages (alone, in her office), at which point the scenario team would " 'tear them apart.' " For every round of revision, a " 'team' " close reading would occur, resulting in " 'highly nuanced stories' " in which " 'every word mattered' " ("SFC," p. 150). She was constantly " 'lobbied—all over' " by various factions within the corporation: " 'every sentence I wrote,' " she explained, " 'was faxed around the world to these different interested parties' " ("SCF," p. 154). As the member of the team with "poetic vision" ("SCF," p. 148), Flowers saw her role as being that of a literary translator for these corporate mythologies, to both "distill" and "animate" the stories—to give them "the intense, imagistic brevity of poetry" and in this way facilitate a kind of rigorously corporate "literary criticism."[136]

133. After having succeeded in a fairly traditional academic career into the 1980s (with publications on Browning, Rossetti, and other Victorian poets), Flowers's work at Shell propelled her into the lucrative world of scenario writing. She would go on to write three more sets of scenarios for Shell, as well as scenarios for the CIA, the World Bank, Wall Street, IBM, Exxon, and the Global Business Network (to name only a few)—which is not to say, of course, that Flowers's own politics are necessarily aligned with those of the corporations she's worked for. On the contrary, Flowers is more like Kahn insofar as she believes these scenarios serve to counter the modern corporation's Faustian impulses, generating a better world overall (in my own interviews with Flowers, I found her to be sensitive, genuine, and progressive).

134. See Joseph Campbell, *The Power of Myth*, ed. Betty Sue Flowers (New York, 1988).

135. Robbie E. Davis-Floyd, "Storying Corporate Futures: The Shell Scenarios," *Corporate Futures: The Diffusion of the Culturally Sensitive Corporate Form*, ed. George E. Marcus (Chicago, 1997), p. 158, hereafter abbreviated "SCF." The chapter is a transcription of two interviews Davis-Floyd conducted with Flowers in 1992 and 1993.

136. Flowers, "The Art and Strategy of Scenario Writing," *Strategy and Leadership* 31, no. 2 (2003): 30, 31, 32.

Flowers ended up authoring a text of over two hundred pages, which was then presented to and adopted by all of Shell's many subsidiary organizations.[137] Only a small sixteen-page document, however, was made accessible to the public, with presentations to dozens of organizations and governments throughout the world.[138] The cover image for the 1992 scenarios features a close-up view of one of Mandelbrot's famous visualizations of his fractal equation, which is then reproduced throughout the text in different colors (a blue Mandelbrot illustration, for example, corresponds to the "New Frontiers" scenario, in which increasing liberalization and market deregulation "leads to dramatic economic growth in poor countries," while a red Mandelbrot corresponds to a "Barricades" scenario, in which "people resist liberalization") (fig. 28).[139] The narratives themselves are told in Herman Kahn's mythological present tense, with all the usual markers of think-tank immanence: "New Frontiers," begins the first scenario, "is a story of growth, turbulence, and change" (*GS*, p. 6). It is a future of unbridled capitalism and vast economic growth: "By 2020, developing countries account for 70% of world output," which "leads to a high level of foreign investment in developing countries" (*GS*, p. 7). "In New Frontiers," the story concludes, "rich and poor alike recognise their economic, social, and environmental interdependence" (*GS*, p. 10). By contrast, in "Barricades" we enter a world of "constricted market . . . only partially open to new entrants." At some point "a crisis blows up" and "new political alliances demanding energy self-sufficiency and environmental protection pass draconian regulations" (*GS*, p. 12). As a result, "by 2020, the world is deeply divided," marked by "widespread poverty" and "environmental degradation in poor countries" (*GS*, p. 13). Naturally, few people reading the scenarios as constructed here would conclude that "Barricades" is a better world than "New Frontiers," and the document hammers home the point with a large, bold-font quotation by Ryuzaburo Kaku, the CEO of Canon: "Today there is only one entity whose effort to create stability in the world matches its self-interest. That entity is a corporation acting globally" (quoted in *GS*, p. 9).

137. Jaworski notes that after completing the scenario set, "for the following twelve months, the scenario team traveled to more than fifty of the operating companies, meeting with their management teams for two- and three-day workshops" (*S*, p. 169).

138. Flowers wrote two confidential versions of the 1992 scenarios: a "longer book" of about two hundred pages, a "summary book" of about sixty-five pages, and a shorter sixteen-page pamphlet for the larger public ("SCF," pp. 150). Public versions can be found online at www.shell.com/global/future-energy/scenarios/previous.html

139. Shell International, *Global Scenarios 1992–2020*, p. 6, 7, 11, s06.static-shell.com/content/dam/shell/static/future-energy/downloads/shell-scenarios/shell-global-scenarios19922020.pdf; hereafter abbreviated *GS*.

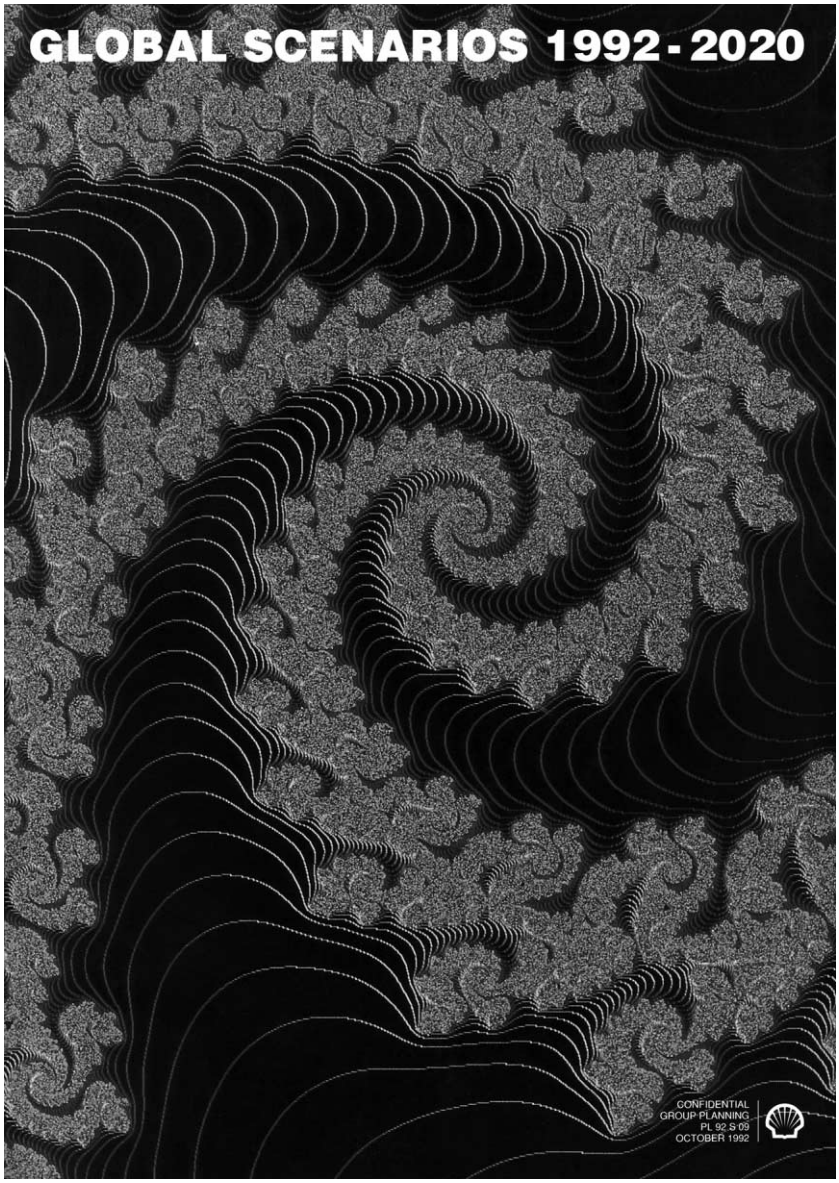

FIGURE 28. Cover design for Royal Dutch/Shell's *Global Scenarios 1992-2020* (London, 1992). The flyleaf of this confidential version includes the following explanation: "the cover illustration, a series of fern-like spirals heading off into the distance, is a detail of a Mandelbrot set, named after its discoverer and the father of fractal geometry, Benoit Mandelbrot. Fractal geometry provides a common language to characterize certain complex systems studied in chaos theory. Chaos theory is now being applied in fields as diverse as physics, weather forecasting, economics, cardiology, and traffic planning as a way of dealing with data that cannot be used to predict the long-term future—not because we don't have computers big enough to do the job, but because after a time, small variations in initial conditions (like rounding of decimal places when we calculate with irrational numbers like *pi*) result in sudden and significant transformations." Image courtesy Shell Group Planning. Compare with figure 6.

As Jaworski later wrote, the guiding principle behind Ryuzaburo Kaku's idealistic faith in the power of the "corporation acting globally" was a concept Kaku had come to speak to the Shell team about during their planning: *kyosei*, roughly translated as "symbiosis" or sometimes "living together for a common good" (*S*, p. 164). As Kaku would frequently explain, *kyosei* had a deep history in the systems-oriented world of Buddhist tradition. He liked to remind audiences, as he did for Shell, that Canon was named after the Buddhist goddess of mercy, *Kannon*.[140] No doubt everyone on Shell's scenario team believed (as do the members of every other scenario team working today) that the multinational corporation, equipped with its own narrative mythologies of World Futures, is our best hope for the golden promises of that global symbiosis. Advocates of scenario planning frequently argue that it helped "end apartheid in South Africa" (after some former Shell planners teamed up with professors at the University of Western Cape in 1991 to publicize "possible futures") and that it necessarily creates "increased responsibility" within the corporation (by forcing them to "discover the need to take care of their industry as a whole").[141]

However, like many other religious systems, the symbiotic relation between World Futures and its attendant metaphysics in Oriental Systems Theory also has a darker side.[142] It might be nice to imagine, for example, that Shell's commitment to World Futures is merely a manifestation of its willingness to support clean energy and environmental responsibility and that of the multiple scenarios generated in *Shell Energy Scenarios to 2050* the one that the company was really willing to see through to its difficult conclusion was "Blueprints" (in which carbon-capture technologies and local political actions "begin to address the challenges of economic development, energy security and environmental pollution") rather than its ugly companion "Scramble" (in which "immediate pressures drive

140. On *kyosei* as a mode of Buddhist "systems thinking," see Rajogopal, *Systems Thinking and Process Dynamics for Marketing Systems Technologies: Technologies and Applications for Decision Management* (Hershey, Penn., 2012), p. 294. See also Masanori Funakura, "Kyosei, or Association in Shared Environment—From the Viewpoint of Ecosemiotics," in *Kyosei, Culture and Sustainable Technology*, ed. Massimo Negrotti and Fumihiko Satofuka (New York, 2006), p. 174.

141. Stewart Brand, *The Clock of the Long Now: Time and Responsibility* (New York, 1999), p. 118. See also Adam Kahane, *Transformative Scenario Planning: Working Together to Change the Future* (San Francisco, 2012), pp. 1–17.

142. Scenarios also played a key role in the post-9/11 Bush-Cheney doctrine of "preemption"; see Annie McClanahan, "Future's Shock: Plausibility, Preemption, and the Fiction of 9/11," *Symplokē* 17 (Winter–Spring 2009): 41–62. See also David Mason, "Tailoring Scenario Planning to the Company Culture," *Strategy and Leadership* 32, no. 2 (2003): 25.

decision-makers" and "gas emissions are not seriously addressed until there are major climate shocks").[143] But as McKenzie Funk has reported, in February 2008 Shell was already "scrambl[ing] ahead of its rivals" with bids for 2.1 billion dollars on leases in the Arctic, where thawing temperatures meant (they hoped), more locations for potential drilling.[144] In July of that same year, Shell abandoned its 33 percent stake in the world's largest wind farm, London Array, as well as nearly all of its financial commitments to solar and hydrogen energy.[145] As Funk has shown, one of the unacknowledged consequences of Shell's method for developing "multiple versions of the future" was that it allowed the company to imagine—and ultimately take advantage of—the looming catastrophe of global warming as a market "opportunity."[146] The reality of the situation is sobering; a mere fifteen of the energy companies listed in the appendix, all of whom have ostensibly committed to the symbiotic goals of World Futures, together cause over 20 percent of manmade carbon emissions.[147] It is enough to make one wonder, finally, if the Orientalized spirituality at the heart of World Futures (so far as corporate managers are concerned) is a mere cover for an ideology that would remove political concerns altogether, imbuing corporate interests with an ethos that is ostensibly beyond critique.

"Contingent, Even Though It Is Certain"

In attempting to make sense of the geopolitical effects of the regime of World Futures, it will be useful to distinguish, finally, between the radically incalculable uncertainty allowed for in Oriental Systems Theory and the simultaneous valuation of a spiritualized ethos that would posit global corporate domination as a kind of serene deity hovering over every conceivable world. As we have seen, the invocation of this spiritual systems thinking implied a postcomputationalist recognition that no organization

143. Shell International, *Shell Energy Scenarios to 2050* (The Hague, 2009), pp. 4, 13, 4, s00.static-shell.com/content/dam/shell/static/future-energy/downloads/shell-scenarios/shell-energy-scenarios2050.pdf

144. Funk, *Windfall*, p. 56.

145. See ibid., p. 58.

146. Ibid., pp. 42, 56.

147. Richard Heede, "Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854–2010," *Climate Change* 122 (Jan. 2014), pp. 229–41, reports the percentage of man-made carbon emissions by the following corporations as follows: ChevronTexaco (3.52 percent), ExxonMobil (3.22 percent), Saudi Aramco (3.17 percent), BP, Royal Dutch/Shell (2.12 percent), Pemex (1.38 percent), ConocoPhilips (1.16 percent), Petroleos de Venezuela (1.11 percent), Peabody Energy (.86 percent), BHP Billiton (.52 percent), Anglo American (.5 percent), RWE (.47 percent), Rio Tinto (.41 percent), Statoil (.3 percent), and Sasol (.24 percent).

(or thing even) could ever fully transcend the messy battles for potential worlds going on at every turn. As such, this new interest in Eastern temporality was consistent with broader epistemological shifts in the postwar era. It is no accident, for example, that the rise of World Futures coincided with an antifoundationalist turn in analytical philosophy, particularly in the nominalist irrealism of Nelson Goodman.[148] What Goodman eventually came to theorize as "ways of worldmaking" began in the 1950s in an effort to deal more rigorously with the problem of induction—a longstanding, Humean dilemma with obvious implications for not only our ability to "forecast" but also for any attempt to theorize knowledge in general.[149] Goodman's conclusion was that any predicated form (any projected vocabulary we construct for some *thing* out there, even before we ever encounter it) is already a kernel of worldmaking—already a fully correlated pact between subject and object—an ontological condition we can never escape, though we go on making and making. "Shouldn't we now return to sanity," Goodman asks in *Ways of Worldmaking* (1978), "from all this mad proliferation of worlds?"[150] His answer is, no, of course not, because you can't. There are, necessarily, "many worlds if any," and it matters very little whether it's a scientist, artist, or even computer generating them; the worldmaking process is an endless, linguistic dance of proliferation and entrenchment.[151] It might be nice, in other words, to imagine a situation in which, as Borges's narrator in "The Garden of Forking Paths" suggests, we "*impose upon* [*ourselves*] *a future as irrevocable as the past*," but as any good historian already knows, there is little in the past that is ever fully "irrevocable" ("GFP," p. 70). We create new and more complex stories about the past all the time, with effects as dramatic in the present as those of any futuristic scenarios. In a sense, then, there was something both historically and epistemologically intuitive in this turn toward what Gottfried Wilhelm Leibniz, hundreds of years earlier, had called the "ancient error" of the "Orientals" who, he thought, suffered under a "primitive" belief in the constantly destabilizing possibilities of

148. Goodman's philosophy is of course part of a longer constructivist trajectory that continues in Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, 1970); Peter L. Berger and Thomas Luckman, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (Garden City, N.Y., 1966); and Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton, N.J., 1979).

149. See Nelson Goodman, *Ways of Worldmaking* (Indianapolis, 1978) and *Fact, Fiction, and Forecast* (Cambridge, Mass., 1983).

150. Goodman, *Ways of Worldmaking*, p. 20.

151. Goodman, *Of Mind and Other Matters* (Cambridge, Mass., 1984), p. 125. See Goodman, *Languages of Art: An Approach to a Theory of Symbols* (Indianapolis, 1968), pp. 165–69 and, on the notion of entrenchment, see *Fact, Fiction, and Forecast*, pp. 84–99.

uncertain, competing realities (the dueling gods of Zoroastrianism being, for Leibniz, the most egregious example).[152]

But if the rise of Oriental System Theory implied a spiritualized willingness to embrace the world-constructive uncertainties of a multiplicity of potential futures, it is worth asking why, as Verso Press so cleverly puts it (in a promotional blurb on their new "Futures" series), today it has become "easier to imagine the end of the world than to imagine that you don't know the rest of the quote."[153] Here, again, it will be useful to point to Leibniz, whose fascination with the Chinese *Yijing* (in stark contrast to his generally ethnocentric characterization of Asian religiosity) offers a striking parallel to the contemporary corporate investment in Oriental Systems Theory. In 1701, only a few months after having developed his own system of binary mathematics, Leibniz received a letter from a Jesuit acquaintance containing a copy of an eleventh-century Chinese diagram of the sixty-four hexagrams in the oracular *Book of Changes* (or *Yijing*). Almost immediately, he recognized that the articulated progression of yin-and-yang combinations—interpreted as so many zeros and ones—mirrored perfectly his own system of binary calculation (fig. 29).[154] Such a coincidence, he argued, suggested that the primitive systems of mystical numerology developed by the Chinese (whom he was eager to convert to Christianity) were consistent with the doctrine of an omnipotent Christian God (whose ex nihilo act of creation—generating a "one" from a "zero," as it were—had given rise to a mechanistic and singular universe of infinite, calculative precision).[155] Leibniz's theological justifications of singular-world futurity relied on two key assumptions, neither of which were upset by his understanding of the *Yijing*: first, the notion of an infinite number of potential worlds that God *might* have created but did

152. Gottfried Wilhelm Leibniz, *Theodicy: Essays on the Goodness of God, the Freedom of Man, and the Origin of Evil*, trans. F. M. Huggard, ed. Austin Ferrer (Eugene, Oreg., 2001), p. 71.

153. "The Future Later: McKenzie Wark Takes over the Verso Blog," 23 Feb. 2015, www.versobooks.com/blogs/1867-the-future-later-mckenzie-wark-takes-over-the-verso-blog. The joke only works here because Fredric Jameson's original insight ("It seems to be easier for us today to imagine the thoroughgoing deterioration of the earth and of nature than the breakdown of late capitalism; perhaps that is due to some weakness in our imaginations" [Fredric Jameson, *The Seeds of Time* (New York, 1994), p. xii] has become streamlined into a truth so obvious it is now a cliché—usually articulated as, "It is easier to imagine the end of the world than it is to imagine the end of capitalism" (Mark Fisher, *Capitalist Realism* [Hampshire, 2009], p. 2).

154. See Claudia von Collani, "The First Encounter of the West with the *Yijing*: Introduction to and Edition of Letters and Latin Translations by French Jesuits for the 18th Century," *Monumenta Serica* 55 (2007): 241–43. For a literary riff on Leibniz as a prefiguration of contemporary corporate guruism, see Tom McCarthy, *Satin Island* (New York, 2015), p. 49.

155. Franklin Perkins, *Leibniz and China: A Commerce of Light* (New York, 2004), p. 116. See Richard J. Smith, *The I Ching: A Biography* (Princeton, N.J., 2012), pp. 178–79.

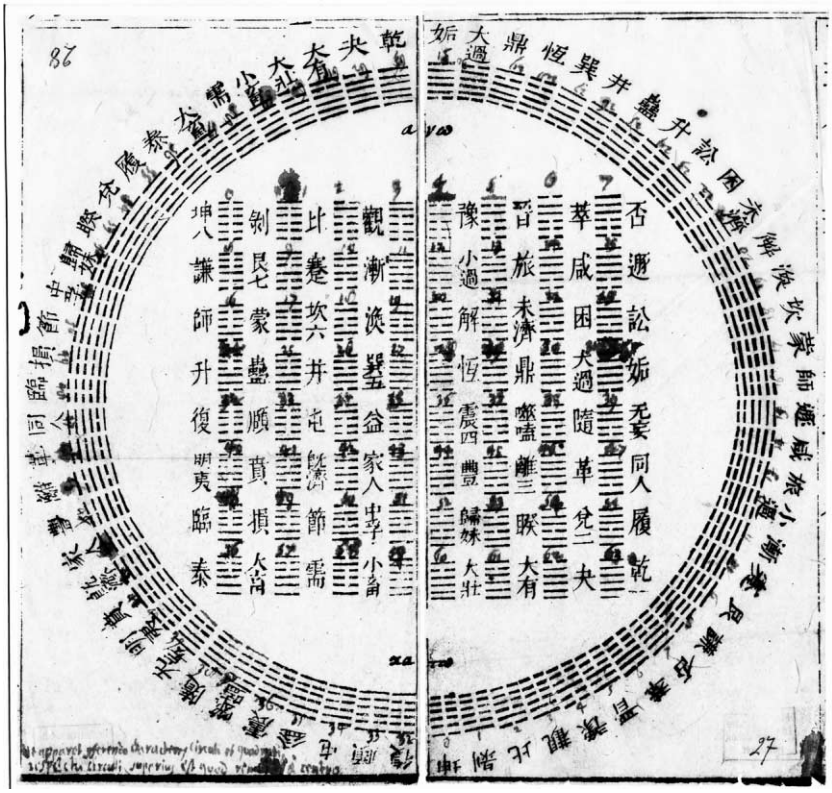

FIGURE 29. Diagram of *Yijing* hexagrams sent by a Jesuit priest to Leibniz, 1701. The Arabic numbers inked in near each set were added by Leibniz. Image courtesy Miedersüchische Landersbibliothek.

not; and, second, a total-picture theodicy that would nonetheless allow for the contingencies of what we perceive to be free will. As he argues in "On Freedom and Possibility" (1680), "there are an infinity of possible things which, nevertheless, do not exist"—the reason for their nonexistence being the simple fact that "God does not choose them."[156] And while there are, as he writes in "On Contingency" (1686), "an infinite number of series of possible things,"[157] God's having selected the things that *do* exist implies that the resulting sequence of, as he writes in "Primary Truths" (1686), their "future states" must have been necessarily accounted for in

156. Leibniz, "On Freedom and Possibility," *Philosophical Essays*, trans. and ed. Roger Ariew and Daniel Garber (Indianapolis, 1989), pp. 19, 21.

157. Leibniz, "On Contingency," *Philosophical Essays*, p. 29.

advance.[158] Faced with arguments that such a system would imply that God had predetermined even our most evil acts, Leibniz argued, vaguely, that our potential path in life is "contingent, even though it is certain."[159] What might feel like multiple possible futures is in fact a reality of singular perfection, in which "the wisdom of God, not content with embracing all the possibles, penetrates them, compares them, weighs them one against the other" and chooses, with a comprehensive wisdom we cannot fathom (because we are never witness to the totality of justifications), a "universal" and "Pre-established Harmony."[160]

Such are the multicultural (and quasi-theological) aspirations of global capitalism, for which, so far, the regime of World Futures has functioned as a pluralistic layover on the way to a metaphysical, corporate singularity. But we need not go as far back as Leibniz to see this dilemma dramatized in haunting detail.[161] Consider, as a parting image, the Swedish artist Gunilla Klingberg's *Wheel of Everyday Life*, commissioned and installed at Rice University's art gallery (just four miles from Shell Oil's US headquarters in Houston, Texas) from 31 January to 17 March 2013. One of a series of works Klingberg has been performing for over ten years in cities around the world, the *Wheel of Everyday Life* is described in its program guide as a "cosmological diagram" in the form of a sacred "mandala" (fig. 30).[162] As most visitors rather quickly realize, the content of the kaleidoscopic pattern below them (painstakingly installed on the gallery floor with computer-generated vinyl printouts) consists entirely of contemporary corporate logos—a virtual labyrinth of ubiquitous brands and

158. Leibniz, "Primary Truths," *Philosophical Essays*, p. 33.

159. Leibniz, "Discourse on Metaphysics," *Philosophical Essays*, p. 33.

160. Leibniz, *Theodicy*, pp. 267, 157.

161. An alternate ending for this article (because, of course, there might have been *several*) would have included an analysis of Philip K. Dick's own manic flirtations with Oriental Systems Theory (especially his use of the *Yijing* as a literary compositional device) and his 1955 short story (published the same year as RAND's *Million Random Digits*) "Captive Market," in which a shrewd businesswoman named Edna, because of her "deep" and "inner" penchant for introspection, discovers a "hole in the warp of time" through which she can visit the future. When her "customers" in this post-nuclear-war future (suffering wretchedly through a hellish wasteland of radioactive ash and rampant insects and afflicted, especially, by the heat of the "unshielded sun") tell her that they've built a rocket and are leaving earth, her response is to deploy her special talents to " 'scan . . . ahead,' " "cast[ing] about, looking this way and that, peering with her deep inner sense, into the various 'aheads,' " locating and *choosing*, finally, a different future in which their rocket crashes back to earth, effectively forcing these poor residents of the future back into their wretched state as an eternally captive market (Philip K. Dick, "Captive Market," *"The Minority Report" and Other Classic Stories by Philip K. Dick* [New York, 2002], pp. 49, 43, 44, 40, 45, 49).

162. Kimberly Davenport, foreword to *Gunilla Klingberg: Wheel of Everyday Life* (exhibition catalog, Rice Gallery, Houston, Tex., 31 Jan.–17 Mar. 2013), p. 7.

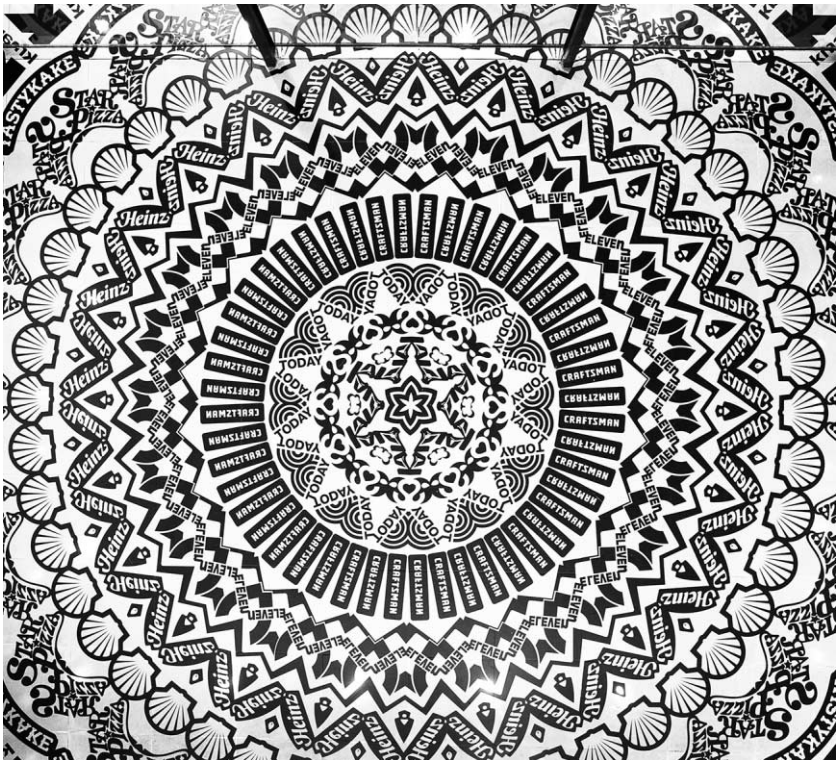

FIGURE 30. Overhead view of Gunilla Klingberg, *Wheel of Everyday Life* (2013); commissioned by the Rice University Art Gallery, Houston, Texas (photo: Nash Baker © nashbaker.com).

registered trademarks (Lala foods, Craftsman, 7-Eleven, Heinz, Kmart, and, of course, Shell). But whereas Klingberg intended for the installation to conjure up, in her words, "a sense of loss" and a realization of "how deeply advertising has entered into our lives,"[163] one cannot help wondering if, in the end, what was conveyed to visitors as they "began to recognize the language of the logos" was, rather, the eternal serenity of a quasi-religious corporate *Logos*.[164] When, for instance, Rice Gallery hosted an afternoon of yoga and Tibetan meditation led by a local guru (the participants breathing deeply on their yoga mats over the *Wheel of Everyday Life*), it seems unlikely that even the most gentle strains of consumerist melancholia threatened to overshadow what the program guide described

163. Ibid.

164. Kelly Klaasmeyer, "Rice Gallery, Branded," in *Gunilla Klingberg: Wheel of Everyday Life*, p. 12.

as the transcendent "interconnectedness" of the corporate logos that "link us all together."[165] What we must ask now, then, is whether or not these irenic spiritualities are in fact deterring us from articulating forms of futurity that might counter this seemingly irrevocable slide into a world of catastrophic singularity. There may be worlds still available to us that we have yet to imagine, but they will almost certainly require a more radical "thinking machine" than we have been utilizing thus far.

APPENDIX

Making every effort here to exclude those organizations who use the term *scenarios* to refer to merely event-specific contingency planning rather than the more global narratives outlined above, the following is a partial list of organizations that since 1969 have either developed scenario sets internally or paid for those developed by a consulting firm (in alphabetical order).[166]

ABB Group
Accenture
Advanced Micro Devices
Advanta
Aetna
Allstate
Amerada Hess
American Century Investments
American Express
AMP
Anglo American
Apple
ARCO
Arthur D. Little
AT&T
ATCO
Austrade
Autodesk
AutoNation
Avery Dennison
Baxter
BBVA Bancomer
Bechtel
Bell Canada
BellSouth
BHP Billiton
Bilbao Metropoli
Boeing
BP
Bristol-Myers
British Airways
British Telecommunications

165. Ibid., p. 15.

166. Sources consulted for this list include information about participating organizations in reports by *Hudson Institute: Report to the Members, 1969* (New York, 1969), pp. 1–2; Global Business Network "WorldView Members" listed at www.gbn.com (archived, 2001); as well as references to participating organizations in a number of scenario-planning studies, such as van der Heijden, et al. *The Sixth Sense: Accelerating Organizational Learning with Scenarios* (New York, 2002); Woody Wade, *Scenario Planning: A Field Guide to the Future* (New York, 2012); Peter Schwartz, *The Art of the Long View* (New York, 1991); Thomas J. Chermack, *Scenario Planning in Organizations: How to Create, Use, and Assess Scenarios* (San Francisco, 2011); van der Heijden, *Scenarios*; and Tom Hindle, *Guide to Management Ideas and Gurus* (New York, 2008).

BUPA
California Energy Commission
Campbell Mithun Esty
Campbell Soup
Canadian Pacific Limited
Capital Research and Management
Cargill
Cemex
Centura Health
CGU
Chemical Bank
ChevronTexaco
CIA (United States)
Cisco
CitiGroup
Clorox
Coca-Cola Company
Columbia Gas
ConocoPhilips
Cooperfund
Corning Glass Works
CRSS
CSIR
CSIRO
Cultor (Danisco)
Dain Rauscher Wessels
De La Salle Institute
Deere & Company
DeNora International
Department of Trade and Industry/
Department of Health
DeTeMobil Deutsche Telekom
Deutsche Bank
Directlink Technologies
Disney
Dow Chemical
Dow Corning
Duke Power
DuPont
Eastman Chemical
Eastman Kodak
Ecopetrol
EDS
Electric Power Research Institute
Electricité de France
Electrolux
Eli Lilly
Embratel
Epresa Geral de Fomento
Ericsson
Ernst & Young
Eskom
ExxonMobil
Fannie Mae
Federal Express
Fiat
First National Bank
First Union
Fletcher Asset Management
Fluor Corporation
Ford Motor Company
Freddie Mac
General Electric
General Mills
General Motors
GlaxoSmithKline
Gulf & Western Industries
Hamilton Securities
Health Care
Heineken
Hewlett-Packard
Homestake Mining
Honda Motor
Honeywell
Huyck Corporation
Iberdrola
IBM
ICL
Imperial Oil
INA Corporation

Information Access Company
Inland Steel (Ispat Steel)
Innovation Associates
Intel
ISCOR Steel
JCI
JDS Uniphase
John Wiley & Sons
Kellogg Company
Kerr McGee
KinderCare
Klabin Irmãos & Cia
Kooperativa Forbundet
L'Oréal
Labbatt, Ltd.
Landmark Communications
Laredo National Bank
Leo Burnett
London Stock Exchange
Lowe Group
Lucent Technologies
Marine Midlands Banks
Mattel
Matsushita Electric Industrial
MDS
Mercedes
Metropolitan Life
Midland Walwyn (Merrill Lynch)
Mitre Corporation
Mitsui
Mobil (ExxonMobil)
Monsanto
Motorola
MTN
Nakamae International Economic Research
National Education Association
National Westminster Bank
Nissan
N M Rothschild & Sons Ltd.
Nokia
Nomura Research
Novo Nordisk
OK Petroleum
Old Mutual
Pacific Bell Information Services
Pacific Gas & Electric
Pan American
PanCanadian
Peabody Energy
People's Bank
Perot Systems
Petrobras
Petroleos de Venezuela
Piaggio Veicoli Europei
Pioneer Hi-Bred International
Pirelli
Pitney Bowes
Port of Rotterdam
Principal Financial Group
Procordia AB
Proctor & Gamble
Prudential
Reuters
Rio Tinto
Royal Dutch/Shell Oil
Royal Pakhoed
Rubbermaid
RWE
Saatchi & Saatchi
San Tomo Group
Sandia National Laboratories
Sasol
Saudi Aramco
Sceptre Resources
Scottish Enterprise
Sears, Roebuck & Co.
SENCO Products
Siemens Westinghouse Power

Signet Banking
Singapore Airlines
South African Breweries
Southern California Edison
Standard Chartered Bank
State Compensation Insurance Fund
State Farm
Statoil
StoraEnso
Sun Microsystems
Swedbank
Sydkraft
TBWA Worldwide
Teijin Limited
Telia
Texaco
Texas Utilities (TXU)
Thomson CSF
Thyssen Group
Time Inc.
Toyota
TransCanada Pipelines
Trygg Hansa
Unilever
Union Carbide
United Aircraft
United Distillers
United Parcel Service
Unocal
UPS
Vattenfall
Violy, Byorum & Partners
Visa
Volkswagen
Volvo
Westinghouse Electric
Wieden & Kennedy
World Bank
Xerox
Zurich Financial Services