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Environment between System and Nature: Alan Sonfist and the Art of the Cybernetic Environment

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This paper examines the role of systems thinking in environmental(ist) art and activism through a close reading and contextualization of *Army Ants: Patterns and Structures*(1972), an installation by Alan Sonfist, one of the leading figures in U.S. land art and environmental art of the 1960s and 1970s. It challenges a commonly held retrospective understanding of "environmental art" as being inherently about bringing nature into art (or into the gallery) by showing how important systems thinking, which blurred the natural-cultural divide, was to Sonfist and other artists of the time. It suggests that these two understandings of the environment -- one focused on nature, the other on systems -- were both allied and in tension, and that the unexpected technical problems faced by *Army Ants* can be attributed at least in part to a failure to acknowledge those tensions. Similarly, the paper suggests, the legacy of glossing over these different understandings of the environment has been at the root of broader conceptual problems with environmental art and activism.

Keywords: environmental art, land art, environmentalism, ecology, cybernetics, systems theory, Alan Sonfist

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Alan Sonfist is an environmental artist and landscape designer whose work in the 1960s and 1970s tread the blurry line between two conceptions of the environment: one centered on nature, the other on systems and cybernetics. Much of his work from this early period, when something called the "environmental movement" was still emerging, can be aptly described as "environmental art" both because it made use of natural objects and processes (taken from "the environment") and because the pieces themselves could be described as "environments," as Sonfist himself sometimes did.[1]

But what kind of environments were they, and what did Sonfist and others who used the term "environment" in this context mean by it? The answers shed light both on the history of the distinct but interrelated art movements that have gone under the names of earth art, land art, ecological art, and environmental art and on the place of systems thinking in the environmental movement. They suggest that the environment has been an enormously productive concept but also one whose multiple and contradictory meanings have made it possible to avoid certain hard questions about humans, nature, and the relationship between them.

One of Sonfist's best-known installations from this period, *Army Ants: Patterns and Structures* (1972), provides a particularly clear window onto the intersections of art, systems thinking, and environmentalism in its varied forms and meanings. Sponsored by the Architectural League of New York, the installation opened in March 1972 in the gallery of the Automation House on Manhattan's Upper East Side. At the time, Sonfist was a "blue-eyed, bushy-bearded, and soft-spoken" 25-year-old artist just beginning to exhibit his work in solo shows. For the Automation House installation, he constructed a 16- by 24-foot, sand-filled, plastic-lined enclosure within which he released between one and two million army ants of the species *Eciton hamatum*.[2] At the center of the

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[1] Although Sonfist resists being labeled an "environmental artist" (personal communication, 16 Dec. 2013), he is often described as such, as well as being described as a land artist, earth artist, or eco-artist. See, for example, Alan Sonfist, ed., *Art in the Land: A Critical Anthology of Environmental Art* (New York: Dutton, 1983); Baile Oakes, ed., *Sculpting with the Environment: A Natural Dialogue* (New York: Wiley, 1995); Sue Spaid, *Ecovention: Current Art to Transform Ecologies* (Cincinnati, Ohio: Contemporary Arts Center, 2002); Ben Tufnell, *Land Art* (London: Tate Publishing, 2006); Jeffrey Kastner and Brian Wallis, *Land and Environmental Art* (New York: Phaidon Press, 2010); Robert Rosenblum and Alan Sonfist, "Introduction: Interview with the Artist," in Alan Sonfist, *Nature, the End of Art* (Florence, Italy: Gli Ori, 2004), pp. 8-16; Jeffrey Kastner, ed., *Nature* (London: Whitechapel Gallery; Cambridge, Mass.: MIT Press, 2012).

[2] For contemporary press coverage of *Army Ants*, see Richard F. Shepard, "Going Out Guide," *New York Times*, March 1, 1972, p. 26; "Talk of the Town: Ants as Art," *New Yorker*, March 4, 1972, p. 30; "Seeing Things," *Print* 26, no. 2 (March 1, 1972): 62-

enclosure was a small wooden frame, meant to serve as the ants' home base. Each day Sonfist rearranged four separate food sources within the enclosure and drew and videotaped the patterns of movement that resulted as the ants sought them out. As one newspaper article explained, "[The ants] make the designs according to the conditions which he sets up."[3]

Sonfist later explained that he saw *Army Ants* as "an environment of army ants paralleling human civilization."[4] As part of the installation, he displayed his drawings of food locations and ant movements along with a video of humans moving en masse within the city. In the following pages I argue that *Army Ants* was one manifestation of what might be called the "environmentism" of the era: an interest in the relationships between individuals (or groups) and their environments that was not necessarily committed either to environmental determinism or to a political program for saving the environment — the two senses in which the term "environmentalism" has conventionally been used.

This "environmentism" embodied a tension between two understandings of environment that were common at the time. One of them was the understanding that was then being institutionalized by the environmental movement in the United States and elsewhere, particularly in governmental agencies and ministries of the environment but also in many environmental activist organizations. This was an understanding of the environment as the set of physical factors influencing human wellbeing, with the "natural" environment often being identified as an ideal away from which humanity had fallen and to which it should, so far as possible, return. This was, in other words, *the* environment. The other was an understanding of the environment as a system; that is, a set of interrelated objects and processes defined in relationship to a focal individual, community, or population. This was the environment *of* something or someone.

Whereas the first understanding tended to reduce a singular environment to nature, the second tended to expand multiple environments without limits.

66; Barbara Ford, "Army Ants: Fiends from Hell or Man's Best Friend?" *Saturday Review*, April 15, 1972, pp. 54-59; Lewis Thomas, "Notes of a Biology-Watcher: Antaeus in Manhattan," *New England Journal of Medicine* 286 (May 11, 1972): 1046-1047. It is discussed briefly in Marga Bivjoet, *Art As Inquiry: Toward New Collaborations Between Art, Science, and Technology* (New York: Peter Lang, 1997), p. 127; Barbara C. Matilsky, *Fragile Ecologies: Contemporary Artists' Interpretations and Solutions* (New York: Rizzoli International, 1992), p. 33.

3 Norman Nadel, "Artist 'Draws' Army Ants into Design," *Pittsburgh Press*, March 13, 1972, p. 6.

4 Carol Siri Johnson, "Interview with Alan Sonfist, Environmental Sculpture," *Essays in Arts and Sciences* 20 (1991): 85-95, on p. 93. The Whitney drawing can be seen in Alan Sonfist, *Nature, the End of Art* (Florence, Italy: Gli Ori, 2004), p. 154.

Conceptually, the environmental movement emerged at the meeting-point of these two tendencies, incorporating older concerns with nature conservation with newer, more expansive concerns about humanity's "total environment" and the environments of nonhuman forms of life. *Army Ants* illustrates the productive tension between these two understandings and the limits of systems thinking in the environmental art of the era.[5]

"Nature's Boy" Meets Systems Theory

I have chosen to focus on *Army Ants* because it illustrates these themes with particular clarity, but it does not represent a major discontinuity in Sonfist's œuvre. On the contrary, it is consistent with his efforts to bring found objects and processes into the gallery beginning with his earliest publicly exhibited works from the mid-1960s. These works include the *Crystal Monuments* series (1966-1972), in which crystals within glass enclosures changed phase in response to the ambient temperature.[6]

Like some of the work of his contemporaries, notably Hans Haacke, Sonfist's pieces from this period were often about interactions between objects and their gallery environments and the changes that those interactions led to over time. These included living things, such as bacteria growing and changing in response to heat, light, and moisture on the window of a gallery or snails leaving tracks in a plastic enclosure.[7]

This kind of art was environmentist in the sense I have described above; it was not necessarily a contribution to a political campaign to save nature (the most common meaning of "environmentalism" in English after the 1960s), nor did it assume that the environmental factors had a larger influence on behavior or biology than hereditary factors (the typical meaning of "environmentalism"

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[5] For related intersections of art, systems, and environment in the work of Dan Graham and Robert Smithson, respectively, see William Kaizen, "Steps to an Ecology of Communication: *Radical Software*, Dan Graham, and the Legacy of Gregory Bateson," *Art Journal* 67, no. 3 (2008): 86-107; Reinhold Martin, "Organicism's Other," *Grey Room*, no. 4 (Summer 2001): 34-51. On the emergence of a similar set of questions around environment in Japan during this period, see Midori Yoshimoto, "From Space to Environment: The Origins of Kankyō and the Emergence of Intermedia Art in Japan," *Art Journal* 67, no. 3 (2008): 24-45.

[6] Glueck, "Auction Where the Action Is," p. D26.

[7] Described in Sonfist, *Nature, the End of Art*.

before the 1960s).[8] Nonetheless, it was centrally focused on the relationship between individuals and their environments.

In later works, Sonfist continued to experiment with processes that unfolded in time and with framing devices that called attention to the relation between objects and their environments. These works were often staged in settings outside the gallery, and they increasingly blurred the lines between land art and landscape design. His best-known work, *Time Landscape* (1965-1978), restored some of the pre-colonial vegetation of Manhattan on a small plot of land on the Lower East Side framed by fencing and pavement. Sonfist presented this as the first of a series of public monuments to nature. By the late 1970s, he had effectively positioned himself at the border between land art and landscape architecture, where he continues to work today.[9]

One of the first profiles of Sonfist to appear in the popular press, by art critic Grace Glueck for the *New York Times*, took pains to emphasize the artist's concern with nature while also situating him within a trajectory of twentieth-century modern art. Identified in the article as "Nature's Boy," Sonfist was quoted as identifying Marcel Duchamp as an important influence. Whereas Duchamp had "claimed man-made objects as works of art," however, Sonfirst argued that he was claiming "natural phenomena." Glueck stressed the activist nature of Sonfist's art, noting that two of his recent pieces had involved mobilizing viewers to mail "pieces of pollution" to their Congressional representatives and sending tin cans back to their manufacturers with notes asking for them to be recycled.

In Sonfist's work — at least as seen through the eyes of one art critic — a Duchampian questioning of the conventional boundaries of art and its conditions of exhibition was thus linked to a political commitment to the preservation of nature. Sonfist's idea of nature was, however, not the pristine nonhuman space of some of his contemporaries. Beginning with his earliest public statements, Sonfist consistently emphasized that he had little interest in uninhabited landscapes or in pristine nature, in contrast to certain other practitioners of what was coming to be called "land art" and "earth art." His experience growing up in New York had focused his attention instead on the nature to be found within densely settled landscapes, including both the woods of Bronx Park that he explored as a child and the dioramas on display at the American Museum of Natural History.[10]

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[8] These are the two definitions of "environmentalism" given in the current edition of the *Oxford English Dictionary*.

[9] Jonathan Carpenter, "Alan Sonfist's Public Sculptures," in *Art in the Land*, ed. Sonfist, pp. 142-154; Bijvoet, *Art as Inquiry*, 132-134; Tufnell, *Land Art*, pp. 99-101.

[10] Christine Terp, "The Primeval Forest Returns to Manhattan," *Christian Science Monitor*, Dec. 18, 1979, p. B4; Carol Hall, "Environmental Artists: Sources and

Nonetheless, even as he rejected some of the frontier theatrics of contemporaries such as Robert Smithson, Nancy Holt, and Michael Heizer, Sonfist's understanding of the category of "nature" remained largely untroubled: "I always get violently upset when I see people destroying nature," he told Glueck. To preserve "the environment" was, among other things, to preserve the kinds of urban woods and natural scenes that had inspired him as a child — that is, to preserve "nature" in the midst of the city.

The usage of the term "environment" as a near-synonym for "nature" was not unusual. Historians of the U.S. environmental movement have emphasized the importance of this new word for activists in the 1960s and 1970s who sought to differentiate themselves from an older generation of "nature conservationists".[11] (In German, the replacement of *Natur* by *Umwelt* tracks a similar shift.[12]) As Adam Rome notes, the phrase "environmental movement" only began to be used widely in the United States around the time of the first Earth Day.[13] However, this new word often obscured significant continuities. The environmental movement that emerged from Earth Day — "a national Environmental Teach-In" held in 1970 — and from similar demonstrations and protests in other countries typically saw the environment as effectively equivalent to "nature."[14] More precisely, the

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Directions," in *Art in the Land: A Critical Anthology of Environmental Art*, ed. Alan Sonfist (New York: Dutton, 1983), pp. 8-59, on p. 52; Robert Rosenblum and Alan Sonfist, "Introduction: Interview with the Artist," in Alan Sonfist, *Nature, the End of Art* (Florence, Italy: Gli Ori, 2004), pp. 8-16, on p. 9.

[11] Christopher Sellers, "Body, Place and the State: The Makings of an 'Environmentalist' Imaginary in the Post-World War II U.S.," *Radical History Review* 74 (1999): 31-64.

[12] On the German conservation and environmental movements, see Thomas M. Lekan, *Imagining the Nation in Nature: Landscape Preservation and German Identity, 1885-1945* (Cambridge, Mass.: Harvard University Press, 2004); Frank Ueko□tter, *The Age of Smoke: Environmental Policy in Germany and the United States, 1880-1970* (Pittsburgh: University of Pittsburgh Press, 2009); Christoph Mauch, ed., *Nature in German History* (New York: Berghahn, 2004).

[13] Adam Rome, *The Genius of Earth Day: How a 1970 Teach-in Unexpectedly Made the First Green Generation* (New York: Hill and Wang, 2013).

[14] Gaylord Nelson, "National Teach-In on the Crisis of the Environment," *American Libraries* 1, no. 2 (1970): 140-141. The origins and impact of Earth Day are discussed in depth in Adam Rome, *The Genius of Earth Day: How a 1970 Teach-in Unexpectedly Made the First Green Generation* (New York: Hill and Wang, 2013). On the history of the U.S. environmental movement, see Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987); Robert Gottlieb, *Environmentalism Unbound: Exploring New Pathways for Change* (Cambridge, Mass.: MIT Press, 2001); Hal K. Rothman, *The Greening of a Nation? Environmentalism in the United*

environment of the environmental movement was nature damaged, contaminated, or threatened by humanity. A similar understanding of environment as nature was central to Sonfist's work and persona.

At the same time, an alternative understanding of environment as system was also part of his work, and the two understandings both complemented each other and came into conflict, as they did in environmental art and activism of the era more broadly. In the same article by Glueck cited above that described him as "Nature's Boy," Sonfist was quoted as describing his artworks as "ecological systems."[15] The phrasing is important: Sonfist was not saying that the artworks were about ecological systems, but that they were themselves such systems.

Sonfist's use of systems language here was imprecise, as much systems talk of the time was, whether it was being generated by scientists, artists, or activists. When the art critic Jack Burnham wrote about the rise of a new "systems esthetics" in *Artforum* in 1968, for example, he did not mean to claim allegiance to the sociological theories of Talcott Parsons or Niklas Luhmann, to the ecosystem theory of Howard and Eugene Odum, or to any other particular theory or theorist. On the contrary, he drew eclectically on sources as varied as Ludwig von Bertalanffy's general systems theory and the systems analysis of E.S. Quade, a theorist at the U.S. military think tank RAND.[16]

In the postwar United States, one did not have to be a self-identified systems theorist — someone like Parsons, Luhmann, Quade, Bertalanffy, the Odums, or the management theorist Herbert Simons, all of whom developed ambitious theoretical frameworks and conducted research aimed at determining the basic principles governing systems in the abstract — or even to know precisely what systems theory was to its academic practitioners to embrace the language of systems. It was precisely the vagueness of systems talk and its capacity to be applied to a wide variety of domains and to mean different things to different people that made it so widespread.[17]

States since 1945 (Fort Worth: Harcourt Brace College Publishers, 1998); James Morton Turner, *The Promise of Wilderness: American Environmental Politics since 1964* (Seattle: University of Washington Press, 2012); Christopher C. Sellers, *Crabgrass Crucible: Suburban Nature and the Rise of Environmentalism in Twentieth-Century America* (Chapel Hill: University of North Carolina Press, 2012).

[15] Grace Glueck, "Auction Where the Action Is," *New York Times*, Nov. 15, 1970, p. D26.

[16] Jack Burnham, "Systems Esthetics," *Artforum* (September 1968): 30-32.

[17] On the multiple intellectual origins and ideological debts of mid-twentieth-century systems theory, see Robert Lilienfeld, *The Rise of Systems Theory: An Ideological Analysis* (New York: Wiley, 1978). On the adoption of systems talk by the American counterculture, see Fred Turner, *From Counterculture to Cyberculture: Stewart*

Nonetheless, systems talk was not totally unconstrained, and Sonfist's use of the term "ecological systems" to describe his artworks provides a clue to a tension around environment that was built into *Army Ants*. Sonfist's public persona was and remains that of a committed environmentalist in the now-conventional sense of the term, but his artwork from the 1960s and 1970s reveals an interest in environments that links him to contemporaries whose environmental art was not necessarily founded on opposition to the human destruction of nature, and could even sometimes be seen as contributing to it. For these environmental artists, the key concern was not "nature" per se but rather "environment" as an object of human control and as a determinant of human nature.

For "environmentists" in this sense, the main issue that needed to be addressed both in politics and in art was humanity's power to shape the environment that shaped humanity itself. This perspective often, but not always,

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Brand, the Whole Earth Network, and the Rise of Digital Utopianism (Chicago: University of Chicago Press, 2006). On systems theory in postwar art, architecture, and design, see Pamela M. Lee, *Chronophobia: On Time in the Art of the 1960s* (Cambridge, Mass.: MIT Press, 2004); Marga Bijvoet, *Art as Inquiry: Toward New Collaborations between Art, Science, and Technology* (New York: Peter Lang, 1997); Peder Anker, *From Bauhaus to Ecohouse: A History of Ecological Design* (Baton Rouge: Louisiana State University Press, 2010); Caroline Jones, "System Symptoms," *Artforum*, Sept. 2012, http://www.artforum.com/inprint/issue=201207&id=32014; Felicity Scott, "Limits of Control," *Artforum*, Sept. 2013, http://www.artforum.com/inprint/issue=201307&id=42636; Felicity Dale Elliston Scott, *Architecture or Techno-Utopia: Politics after Modernism* (Cambridge, Mass.: MIT Press, 2007); Luke Skrebowski, "After Hans Haacke: Tue Greenfort and Eco-Institutional Critique," *Third Text* 27, no. 1 (2013): 115-130; Edward A. Shanken, "Art in the Information Age: Technology and Conceptual Art," *Leonardo* 35, no. 4 (2002): 433-438. On the history of cybernetics in particular, see Geof Bowker, "How to Be Universal: Some Cybernetic Strategies, 1943-70," *Social Studies of Science* 23, no. 1 (1993): 107-127; N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999); Lily E. Kay, *Who Wrote the Book of Life? A History of the Genetic Code* (Stanford, California: Stanford University Press, 2000), especially pp. 73-127; Ronald Kline, "Where are the Cyborgs in Cybernetics?" *Social Studies of Science* 39, no. 3 (2009): 331-362; Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: University of Chicago Press, 2010). On the emergence of ecosystem ecology, see Chunglin Kwa, "Representations of Nature Mediating between Ecology and Science Policy: The Case of the International Biological Programme," *Social Studies of Science* 17, no. 3 (1987): 413-442; Joel B. Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology* (New Brunswick, NJ: Rutgers University Press, 1992); Stephen Bocking, *Ecologists and Environmental Politics: A History of Contemporary Ecology* (New Haven: Yale University Press, 1997).

led to interests that overlapped with those of the emerging environmental movement. It was possible to care deeply about humanity's changing environment without thinking that pollution, wilderness, or endangered species were the most important issues to address. For many environmentists both inside and outside the environmental movement, systems talk offered a seemingly rigorous way of understanding interactions among the diverse processes and objects that constituted humanity and its surroundings.[18] It was also a useful tool for contemporary efforts to bring aesthetics, technology, and civic activism together into a single, politically informed artistic practice.

Art's Technological Environments

By the time *Army Ants* opened in the spring of 1972, the language of systems was already circulating widely in the U.S. environmental movement. It had multiple sources and pathways of dissemination, including Buckminster Fuller's and Kenneth Boulding's imagery of Spaceship Earth, Stewart Brand's systems-infused *Whole Earth Catalog* (1968-1972), and the increasing public visibility of ecosystem ecologists such as the Odum brothers, who described ecological relationships in terms of circuits, signals, and feedback. Systems talk was also becoming increasingly present in the art world. *Army Ants* brought these two domains together, placing ecosystem science and what Burnham had called "systems esthetics" into a single frame.[19]

Sonfist had had an opportunity to become immersed in systems talk during his time as a fellow of the Center for Advanced Visual Studies (CAVS) at the Massachusetts Institute of Technology in the late 1960s and early 1970s, where he encountered a vision of civic art that was sensitive to environmental problems and conceived in terms of systems. Sonfist arrived as a fellow at the center in 1969 and remained affiliated through 1974. His interest in human-nature interactions in urban settings resonated with the vision of CAVS founder and director Gyorgy Kepes, a painter and art theorist who had followed the former Bauhaus master László Moholy-Nagy from Berlin to London and then to Chicago in 1937. In

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[18] Fred Turner, *The Democratic Surround: Multimedia and American Liberalism from World War II to the Psychedelic Sixties* (Chicago: University of Chicago Press, 2013).

[19] Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006). On Fuller and Boulding, see Peder Anker, "Buckminster Fuller as Captain of Spaceship Earth," *Minerva* 45 (2007): 417-434; Peder Anker, "The Ecological Colonization of Space," *Environmental History* 10, No. 2 (2005): 239-268; Sabine Höhler, "The Environment as a Life Support System: The Case of Biosphere 2," *History and Technology* 26, no. 1 (2010): 39-58.

1947 Kepes had taken a position at MIT, where he founded a new program in the visual arts.

Two decades later, Kepes established CAVS to encourage the collaboration of technologists and artists and to advance his vision of "civic art": a technologically sophisticated, publicly engaged form of artistic practice that was, in Kepes's words, "prophetic of a new world outlook pervaded by a sense of continuity with the natural environment and oneness with our social world."[20] As Kepes used it, the term "environment" referred both to the natural environment, as in the quote above, and to artificial environments, including those constructed by artists.[21] The form of art practice that Kepes envisioned was "civic" because the artist, by creating or calling attention to environments, acted as an interpreter and critic of changes in the total human environment. It was systems-oriented because it focused on relationships and processes rather than on objects and drew on Kepes's engagement with cybernetics dating back to the 1950s.[22]

This political-esthetic vision was similar to that of Burnham, who was one of the first fellows that Kepes invited to CAVS. It was immediately before and during his time at MIT that Burnham published his major book *Beyond Modern Sculpture* (1968) and wrote his essays on "Systems Esthetics" and "Real Time Systems" for the contemporary art magazine *Artforum*. Like Kepes, Burnham argued that the "systems approach to environmental situations" was the most promising way forward for art and for modern society.[23]

More narrowly, systems talk provided a way for Burnham to capture what he saw as a shift from static forms to dynamic processes in the practice of many contemporary sculptors. The object as such, Burnham thought, was becoming increasingly unimportant; it was the system in which the object participated as a whole that mattered. Perhaps not surprisingly given his interest in moving beyond the static object, Burnham coupled his discussion of "systems" with the idea of "environments." If the idea of system implied the tightly coupled, dynamic

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[20] Gyorgy Kepes, "Towards Civic Art," *Leonardo* 4, no. 1 (1971): 69-73, quote on p. 72. The title of a collection of essays that Kepes edited in 1972 suggests how central the environment was to his vision: Gyorgy Kepes, ed., *Arts of the Environment* (New York: G. Braziller, 1972).

[21] Reinhold Martin, "Environment, c. 1973," *Grey Room* 14 (2004): 78-101.

[22] Reinhold Martin, "The Organizational Complex: Cybernetics, Space, Discourse," *Assemblage* 37 (1998): 102-127.

[23] Burnham, "Systems Esthetics," p. 35; see also the discussion of the environment and information processing in Jack Burnham, "Real Time Systems," *Artforum*, no. 8 (1968): 49-55; Jack Burnham, *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century* (New York: G. Braziller, 1968). On systems thinking in Kepes, Burnham, and Haacke, see Jones, "System Symptoms."

relationships between objects, artists, and audiences, environment implied the general context within which those relationships were formed.

Barbara Mitalsky has argued that the movement called "environmental art" emerged in the late 1960s as artists "turned to nature and began interpreting its life-generating forces to create radically new kinds of art."[24] However, this interpretation of the environmental in environmental art focuses on only one half of a two-part development that simultaneously figured environment as nature and as "system," in Burnham's sense of the word.

As Fluxus artist and theorist Kenneth S. Friedman would argue in a contribution to an anthology on land art and environmental art edited by Sonfist in 1980: "Only false romanticism or thin analysis can imagine environmental art to be related exclusively to 'the natural.'"[25] The concerns of Sonfist, Kepes, and others working in environmental art, even those who were deeply concerned about environmental problems, cannot be reduced to the kinds of concerns that would become the near-exclusive focus of environmental agencies and activist organizations in the following years: air and water pollution, open space, wilderness areas and national parks, endangered species and biodiversity, and so forth. They did often share these concerns, but only as part of a broader understanding of the environment as an all-encompassing system.

The venue in which *Army Ants* was exhibited, Automation House, illustrates the potential of systems talk to bridge the worlds of science, art, and politics. The project of labor lawyer Theodore W. Kheel, Automation House was described upon its opening in 1970 as "a symbol and demonstration of man's wish to shape his future in a world of bewildering change," specifically technological change. As in Kepes's vision for civic art, "environment" was a key term: "While machine age tools may give him [i.e., man] more control over his environment than ever before, they sometimes leave him powerless to control his fate." At its opening, Automation House served as the headquarters for three organizations: the American Foundation on Automation and Employment, the Institute of Collective Bargaining and Group Relations, and Experiments in Art and Technology, the last of which was headed by Robert Rauschenberg and Billy Klüver.[26] These organizations each represented a different strategy for addressing

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[24] Matilsky, *Fragile Ecologies*, p. 36.

[25] Kenneth S Friedman, "Words on the Environment," in Alan Sonfist, ed., *Art in the Land: A Critical Anthology of Environmental Art* (New York: Dutton, 1983), pp. 253-256, quote on p. 256.

[26] Automation House announced its opening in 1970 in a special advertising section in the *New York Times* funded by its corporate sponsors; see "Automation House: A Philosophy for Living in a World of Change," *New York Times*, Feb. 1, 1970, p. AS2.

the challenges posed by technology: the first focused on the individual worker, the second on unions and corporations, and the third on art and culture.

The centrality of systems thinking and of "environmentism" to the projects based at Automation House is evident in the building itself. Its promotional materials described it as a multimedia environment equipped with "the technology of tomorrow," particularly the latest in communications devices and automated environmental systems.[27] The artworks displayed in Automation House's first-floor gallery space made visible the principles already embodied in the operation of the building: they were environments within an environment that sought to make humanity's relationship to its environment visible. On the artistic front, Experiments in Art and Technology was not merely about artists using technology but also about the transformative effects of new technologies on humanity's relationship to its environment. As Klüver explained to one journalist in 1968: "We are, in all respects, responsible for the technology that will form our environment tomorrow."[28]

The art that took place under the umbrella of EAT did not always or even usually transcend the fascination with gadgetry of which it was often accused, nor was it able to escape the limits imposed by its heavy reliance on corporate sponsorship. Institutional critique it was not. Even in its most superficial and unreflectively technophilic moments, however, EAT conveyed a consistent message: that technological advancement had made humanity capable of reshaping the environments that in turn shaped humanity, and that art could help humanity understand its new responsibilities.[29] The projects conducted under its

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The initial plans for Automation House are described in "Art & Technology Make It Official," *Wall Street Journal*, Oct. 11, 1967, p. 16.

[27] "Automation House: A Philosophy for Living in a World of Change," *New York Times*, Feb. 1, 1970, p. AS2. A special advertising section announced the opening of Automation House in the *New York Times* in 1970 with support from its corporate sponsors.

[28] Roderick Nordell, "'We're Not Interested in Art,' the Man Said," *Christian Science Monitor*, May 13, 1968, p. 4.

[29] The first exhibit in Automation House's gallery space was *The Magic Theater* (1970), a show of environmental art previously exhibited in Missouri and Ohio; see George Ehrlich, "'The Magic Theater' Exhibition: An Appraisal," *Art Journal* 29, no. 1 (1969): 40-44; Nancy Moran, "Art and Technology Merge at Exhibit," *New York Times*, Mar. 3, 1970, p. 43; Heidi Sinick, "'The Magic Theater' Takes You on a Trip to Mystery Land," *Washington Post, Times Herald*, Mar. 15, 1970, p. H3. In 1970 Automation House was also host to Projects Outside Art, described in one article as consisting of projects "concerned with the environment (e.g., education, health, housing, natural environment, transportation, communication, etc.)"; John H. Holloway, "International Science-Art News," *Leonardo* 3, no. 4 (1970): 481-488,

umbrella were rarely environmentalist in tone, and even when they did address environmental problems, they tended to focus implicitly or explicitly on technological solutions. Nonetheless, whatever their stance on such issues, they were clearly "environmentist."

The Army Ants of *Army Ants*

Like the history of the venue in which *Army Ants* was exhibited, the background of Sonfist's choice of army ants as the living organisms whose "patterns and structures" would become the subject of his installation provides some context for understanding how systems talk infused understandings of the environment and of environmental art at the time.

Drawing as it did on a tradition stretching back to antiquity, the choice of social insects such as ants, bees, or termites as analogs for human society was hardly original.[30] Beyond the general appeal of the insect metaphor, however, Sonfist turned to army ants because of particular characteristics that distinguish them among the thousands of species of social insects. Rather than constructing permanent nests out of found materials, colonies of *Eciton hamatum* use the living bodies of their members as building blocks for nests, bivouacs, bridges, and other infrastructural elements. Shirley Strum and Bruno Latour have argued that baboons are constantly testing the nature and boundaries of their society because they have only themselves and their bodies to rely on rather than the complicated institutions, expectations, and artifacts that stabilize human society.[31] Army ants have far more rigid social roles than baboons, but in the realm of material

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quote on p. 482. The very range of subjects considered to be part of the environment suggests the broad meaning of the term as used here.

[30] On the use of social insects as metaphors for human society, see Charlotte Sleigh, *Ant* (London: Reaktion Books, 2003) and *Six Legs Better: A Cultural History of Myrmecology* (Baltimore: Johns Hopkins University Press, 2007); Janine Rogers and Charlotte Sleigh, "'Here Is My Honey-Machine": Sylvia Plath and the Mereology of the Beehive," *Review of English Studies* 63, no. 259 (2011): 293-310; Jussi Parikka, *Insect Media: An Archaeology of Animals and Technology* (Minneapolis: University of Minnesota Press, 2010).

[31] S.S. Strum and Bruno Latour, "Redefining the Social Link: From Baboons to Humans," *Social Science Information* 26, no. 4 (1987): 783-802. See also Bruno Latour, "A Well-Articulated Primatology: Reflections of a Fellow Traveler," in *Primate Encounters: Models of Science, Gender, and Society*, eds. Shirley C. Strum and Linda Marie Fedigan (Chicago: University of Chicago Press, 2000): 358-381. For an earlier expression of a relate idea about the purity of nonhuman sociality, Gregory Bateson, "Problems in Cetacean and Other Mammalian Communication," in *Steps to an Ecology of Mind* (Chicago: University of Chicago Press, 2000), pp. 364-378.

construction they are similarly flexible, constantly adapting and reforming their structures in response to internal and external factors.[32] It is not hard to see why an artist as interested as Sonfist was in how form emerges from biological processes would have found them an appealing subject.

There was another reason that army ants were particularly good choices for bringing together environmental art and activism through the language of systems. As Charlotte Sleigh has shown, army ants played a surprisingly important role in the development of postwar cybernetics; she argues that in the immediate postwar years, "ants in their then-favored forms of representation helped to create cybernetic science."[33] Among other things, they were key examples in mathematician Norbert Wiener's *Cybernetics: Or Control and Communication in the Animal and the Machine* in 1948, and they were a recurring subject of discussion at the Macy conferences on cybernetics in the 1940s and 1950s, which had served as an inspiration not only for many scientists but also for artists and designers, including Kepes.[34]

For cyberneticians, ants, and specifically army ants, provided a seemingly clear biological model of the emergence of complex behaviors from the interactions of simple agents. They also provided a powerful metaphor. The organization theorist and artificial intelligence researcher Herbert Simon, for example, used the ant in his 1969 book *The Sciences of the Artificial* to suggest that the internal structure of an agent was largely irrelevant to understanding its macroscopic behavior, inasmuch as the latter reflected its adaptation to a

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[32] For a recent study of army ant architecture, see Simon Garnier, Tucker Murphy, Matthew Lutz, Edward Hurme, Simon Leblanc, and Iain D. Couzin, "Stability and Responsiveness in a Self-Organized Living Architecture," *PLoS Computational Biology* 9, no. 3 (2013).

[33] Sleigh, *Six Legs Better*, p. 163.

[34] On Kepes's understanding of cybernetics and his communications with Wiener and others involved in its development, see Orit Halpern, "Perceptual Machines: Communication, Archiving, and Vision in Post-War American Design," *Journal of Visual Culture* 11, no. 3 (2012): 328-351; Martin, "Organizational Complex." On the role of ants in cybernetics, see Sleigh, *Six Legs Better*, p. 157; Norbert Wiener, *Cybernetics; Or, Control and Communication in the Animal and the Machine* (New York: J. Wiley, 1948). Wiener also discusses ant colonies as analogies for fascist human societies in *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1950), pp. 51-52, 58.

particular environment. For Simon, as for many cyberneticians, the relevance of such models for understanding human behaviors and societies was clear.[35]

The cyberneticians' adoption of the ant as model ironically entailed a rejection of the theoretical position of the scientist upon whose empirical work they drew most heavily: T.C. Schneirla, an animal psychologist at the American Museum of Natural History in New York. Although Schneirla's studies of army ants were central to the cyberneticians' discussions, and although he and his students actively participated in the Macy conferences, Schneirla was skeptical of attempts to build universal models on the backs of ants. In an article in *Scientific American* in 1948, he and his coauthor argued that the effect of one ant's behavior on another's "resembles the action of a row of dominoes more than it does the communication of information from man to man."[36]

For Schneirla, the human capacity for flexible symbolic communication placed human society in a different realm than rigid, mechanical ant societies. By the early 1970s, however, despite Schneirla's opposition and a backlash against the term "cybernetics" itself, the cyberneticians' focus on communication and information had come to dominate ant biology and evolutionary biology more broadly.[37]

It was a former graduate student and collaborator of Schneirla's at the American Museum of Natural History named Howard Topoff who provided Sonfist with expert advice and the opportunity to collect army ants for *Army Ants*. Topoff shared many of his mentor's research interests as well as his skepticism toward cybernetic universalism. In February 1972, Sonfist accompanied Topoff and his team to the Smithsonian Institution's research station on Barro Colorado Island in the Panama Canal Zone. After three weeks of sweat and struggle, including a fall that knocked Sonfist unconscious and required several days of hospitalization, they succeeded in collecting the colony of *Eciton hamatum* that would soon become the centerpiece of an art installation in Automation House.[38]

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[35] Herbert A. Simon, *The Sciences of the Artificial* (Cambridge, Mass.: MIT Press, 1969), p. 23-25. Simon also noted that "almost every element in our environment shows man's artifice" (p. 3).

[36] T.C. Schneirla and Gerard Piel, "The Army Ant," *Scientific American* 178 (June 1948): 16-23, quote on p. 22.

[37] On Schneirla, see Sleigh, *Six Legs Better*; Tania Munz, "The Bee Battles: Karl von Frisch, Adrian Wenner and the Honey Bee Dance Language Controversy," *Journal of the History of Biology* 38, no. 3 (2005): 535-570; Marga Vicedo, *The Nature and Nurture of Love: From Imprinting to Attachment in Cold War America* (Chicago: University of Chicago Press, 2013), p. 97.

[38] Sonfist, *Nature, the End of Art*, p. 155.

The significance of the connection between artist and scientist in this case is not that Topoff transmitted a cybernetic or systems-theoretic understanding of ant behavior to Sonfist, who then designed an art installation around those principles. On the contrary, Topoff had learned from Schneirla to be skeptical of the cyberneticians' attempt to turn communication into a master concept with universal reach. To the extent that *Army Ants* manifested certain cybernetic or systems-theoretic understandings of the organism-environment relationship, it was despite Topoff and Schneirla rather than because of them.

Even Sonfist's idea of using food sources to redirect the ants' movements was a departure from Schneirla's and Topoff's core research interests. In fact, much of Schneirla's career had been devoted to demonstrating that the social organization of army ant colonies had more to do with the internal physiological dynamics of the colony than it did with the availability of food or other external factors.[39] In any case, it does not seem that Topoff and Sonfist's conversations were of a particularly intellectual nature. Sonfist relied on Topoff and his team for practical advice about where to find army ants and how to get them to Manhattan and keep them alive.[40]

Nonetheless, there is more than an accidental connection here between art and science. Sonfist's choice of army ants was informed by his understanding of the environment as both nature and system, which in turn had been influenced by cybernetics and systems theory, which in turn had been influenced by the studies of ants carried out by Schneirla and his students. *Army Ants* represented the fruition in artistic form of a cybernetic vision of ant and human society in which simple agents behaved in complex ways in response to changing conditions. It was a system, moreover, in which the bodies and behaviors of ants and humans became constituent parts of the relevant environment. Just as army ants made bivouacs and bridges out of their own bodies, so did the human visitors to Automation House serve as living components of the installation.

Not all observers were impressed by this kind of art or its ability to contribute to an environmental awakening. In 1971, Sonfist had had a show at London's Institute of Contemporary Art that included pieces featuring living worms, locusts, and snails within enclosures. The ICA was an important node in the art and technology network, having organized the groundbreaking Cybernetic Serendipity exhibition in 1968.[41] A scathing review of Sonfist's show in *New*

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[39] T.C. Schneirla, *Army Ants: A Study in Social Organization*, ed. Howard Topoff (San Francisco: W. H. Freeman, 1971).

[40] Personal communication, Howard Topoff, 12 Dec. 2012.

[41] Rainer Usselmann, "The Dilemma of Media Art: Cybernetic Serendipity at the ICA London," *Leonardo* 36, no. 5 (2003), pp. 389-396.

Scientist described him as a "propagandist for the new technological ideology of environmentalism" who was unwittingly contributing to "the coming ecocatastrophe" by implicitly celebrating human mastery over nature, despite his claims to the contrary.[42]

While overdrawn, this criticism was not entirely unfounded. If one considers the relevant "environment" of *Army Ants* to be the enclosure in which they were kept, the implicit message does seem to be one of human technological mastery, whatever Sonfist's consciousness-raising ambitions may have been. The process of rearranging food sources and observing the resulting movements can be interpreted as inviting the ants to participate as co-authors of the artwork, but it is an invitation that the ants cannot refuse. They may "make the design," but the privilege to set up the conditions remains that of the artist, who stands outside the system. Meanwhile visitors to the installation enjoy the opportunity to observe the system without participating in it. Sonfist's decision in the following years to focus on site-specific works outside of the gallery suggests that he may have recognized the limits and contradictions involved in bringing natural objects and processes into the gallery in order to heighten viewers' awareness of environmental interconnectedness.

However reasonable such a critique may be, I think it gives Sonfist and *Army Ants* too little credit. As with the *Crystal Monuments* series, the environment inside the ants' enclosure mattered mainly because it participated in processes that linked it to the environment outside of the enclosure — that is, to the larger environment that also contained the artist, the drawings and videos, and the visitors to the exhibit. Rather than being imposed from the outside, changes in this larger environment took place through rearrangement of materials, energy, and information within the system. The artist was still the designer, but one subject to the feedback (including criticism and misunderstanding) of the other participants.

It was in this sense that Army Ants was an environment *of* ants rather than simply an environment *for* ants. It may still have been an unfortunate development for the ants concerned, but it did not place them on the other side of an abyss separating them from the artist or from humanity. Visitors who entered the exhibit did not merely view an adaptive system on display; they became part of one. Like the ants they came to see, they were provoked into generating new "patterns and structures" as they moved through the exhibit.

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[42] Francis Arnold, "Alan Sonfist," *New Scientist*, 5 Aug. 1971, pp. 336-37; see also the rebuttal from the Institute for Contemporary Art: Jonathan Benthall, "Sonfist's Art," *New Scientist*, 12 Aug. 1971, p. 389.

Army Ants thus illustrates one of the contradictions of environmental art of the time. Inasmuch as it understood environment as nature, it tended to implicitly celebrate human mastery of and separation from the natural world in the very process of transforming natural objects and processes into works of art. Inasmuch as it understood environment as system, in contrast — a seemingly far more technocratic and potentially anti-environmental idiom, with roots not only in the biological thought of Bertalanffy or the Odums but also in military and economic decision theory — it tended to emphasize interdependence. The political environmentalism that emerged in the 1960s oscillated between these two understandings, attempting to save nature from humanity even while assuming that humanity was part of nature.

An Untimely Ending

After all of the careful planning and great expense that had gone into mounting *Army Ants*, it was an environmental system of a very pedestrian sort that turned out to play a decisive role in the fate of the installation. *Army Ants* had been scheduled to run for two weeks, but all of the ants died only a few days after it opened. The apparent cause of the catastrophe was the much-touted temperature control system of Automation House, which automatically lowered the temperature within the building over the weekend — unfortunately, in this case, to a level below that which the tropical ants could survive. For the remainder of the two-week exhibit, the "environment" of *Army Ants* was reduced to videos, drawings, and an empty enclosure.[43]

However disappointing it may have been, and however much it may have reflected a lack of care or foresight, the death of the colony should not have come as a great surprise. Even the ant experts at the American Museum of Natural History had trouble keeping tropical ant colonies alive for long, and in any case the ants' fate had been sealed the moment they were removed from their native forest on Barro Colarado Island. Perhaps understandably, however, Sonfist did not appreciate this demonstration of the importance of the environment, instead threatening to sue Automation House for negligence. The leadership of Automation House eventually apologized, and Sonfist did not follow through on his threat.[44]

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[43] On the ants' death, see Richard F. Shepard, "Going Out Guide," *New York Times*, March 3, 1972, p. 28.

[44] The American Museum of Natural History lost most of a colony on exhibit due to low temperatures a few years later; "Museums Army Ants Succumb to the Cold," *New York Times*, October 24, 1974, p. 38. On Automation House's response and Sonfist's

It is tempting to read the ants' early demise as a parable about the risks of trying to isolate one component of an ecosystem from the others upon which it depends, as the writer and physician Lewis Thomas did in one of his regular columns for the *New England Journal of Medicine*, punningly titled "Antaeus in Manhattan." Despite having not seen the installation himself, Thomas felt he could imagine the scene: "The ants were, together with the New Yorkers, an abstraction, a live mobile, an action painting, a piece of found art, a happening, a parody, depending on the light."[45] Skeptical of the claim that Automation House's heating system was to blame, Thomas thought there was a deeper reason: separated from the sustaining earth, the ants had simply lost their strength, like Antaeus in the grip of Hercules. For Thomas, the problem with the "environment" of *Army Ants* was that it was not natural enough.

It would be equally reasonable, though, to argue that the problem with *Army Ants* was not that it was not natural enough but that it was not systemic enough. As the operation of the heating system had demonstrated, the system of *Army Ants* had been too narrowly imagined to encompass all of the factors that were vital to its success. The exhibit was an attempt to bring nature ("the environment") into the gallery and then to construct a system ("an environment") around it, which failed when the system that had been constructed proved to be fatally dependent on another system whose complexities had not been included in the original design. Caught halfway between "nature" and "system," between privileging nonhuman actors and establishing a system that included both humans and nonhumans, the environment of *Army Ants* proved to be not quite environmental enough. At the crucial moment, when the system generated something truly unexpected (if also unfortunate, within the parameters of the installation), its borders were closed and the surprise was declared a failure.

It was not an accident that the term "environmental art" was used during this period to describe both art that created environments and art that was environmentalist in its politics or subject matter. Environmentalism in its political sense was a subset of the broader perspective that I have been inelegantly calling "environmentism": that is, a concern with humanity's environment and its power to shape it and perhaps even destroy it. Nor was it an accident that both aspects of environmental art as they emerged in the 1960s and 1970s, nature-saving and environment-creating, were often conceived and described in terms of systems. The language of systems provided a way to speak with apparent rigor about inherently open-ended subjects, in part by making it possible to establish

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eventual decision not to pursue legal action, see Grace Glueck, "Out Is In on Columbus Circle," *New York Times*, May 28, 1972, p. D18.

[45] Lewis Thomas, "Antaeus in Manhattan," *New England Journal of Medicine* 286 (1972): 1046-1047, quote on p. 1046.

boundaries between systems and their environments that always nonetheless remained subject to revision. As in the case of *Army Ants*, the language of systems left the door — or the air-conditioning vent — open to the recognition of new factors and new actors. Environmentalists' commitment to the category of nature, in contrast, often closed the door to a further expansion of whatever system was under examination.

Environmentalist thinking of the era was distinguished by this tension between nature and system. The belief that humanity's power had grown to the point that it threatened the existence of nonhuman nature was put in dialog with the belief that all things, human and nonhuman alike, were interconnected and mutually constituted. In response, some artists tried to bring natural objects and forces into the gallery in order to call attention to the agency, complexity, and vulnerability of the nonhuman world, while others tried to transform the gallery into an environment in order to call attention to the importance of the relationships between individuals and their surroundings.

Army Ants is worth considering because it tried to do both. It brought army ants captured in a Central American forest into a Manhattan gallery space and made them into components of an artistic system that included various material artifacts, the artist, and the visitors to the gallery. Its failure — by which I mean both the premature death of the ants and the failure to understand the cause of that death as part of the artwork itself — suggests the difficulty of thinking in terms of systems while holding onto nature. Not unlike preserving wilderness or saving endangered species, putting "natural" objects or processes on display in the gallery could manifest an interest in (and, often, a deep concern for) nature while also disavowing the nature that humans and their artifacts, too, were made of.

After all, if the aim had been to put a product or process of nature in the gallery, then a traditional painting — a composite of wood, fiber, oil, minerals, and animal and plant products changing slowly over time in response to heat and moisture — might have served just as well. The understanding of "environment" that tempted Sonfist and visitors to Automation House to see the army ants of *Army Ants* as more natural than a Jackson Pollock painting or than the gallery space itself, I would argue, ultimately limited not only the impact of Sonfist's piece but also of much of the environmental art and activism of the time. As unwilling to follow the expansive idea of systems to its logical conclusion as they were to fully embrace nature in all of its nonhuman excess and emptiness, its practitioners all too often remained stuck somewhere in the middle, worrying about the air-conditioning.[46]

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[46] Luke Skrebowski, "All Systems Go: Recovering Hans Haacke's Systems Art," *Grey Room* 30 (Winter 2008): 54-83; Luke Skrebowski, "After Hans Haacke: Tue

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