ABSTRACT

Title of Dissertation:	PLASTIC FANTASTIC: AMERICAN SCULPTURE IN THE AGE OF SYNTHETICS
	Danielle Eileen O'Steen, Doctor of Philosophy, 2018
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This dissertation considers the role of plastics as a sculptural medium in the United States in the 1960s and 1970s. At this time, artists were turning to synthetics in large numbers and with great enthusiasm, in spite of wavering public opinion on plastics in the U.S. I argue for the significance of this "plastics moment" for the arts by looking closely at the work of four artists: Donald Judd (1928–1994), Eva Hesse (1936–1970), De Wain Valentine (b. 1936), and Frederick Eversley (b. 1941). I position their sculptures in the social context of synthetics in twentieth-century America. In their distinctive practices, Judd, Hesse, Valentine, and Eversley each used plastics with a pioneer's zeal: working with local industries, creating new means of production, and even developing formulas for the materials.

Plastic Fantastic is an interdisciplinary text, engaging scientific and cultural histories in conversation with American art scholarship. I focus on the production accounts of the objects to understand how these four artists took on the challenge of synthetics, and

consider the diversity of substances used, looking at sculptures in Plexiglas, Fiberglas, and polyester resin. Using a technical approach to art history, I expand the literature on artworks from this period, which often omits material details and overlooks plastics' place at this crux of sculpture in the U.S. My dissertation illuminates the important innovations of Judd, Hesse, Valentine, and Eversley to understand this juncture in the 1960s and 1970s, when American art found plastics.

PLASTIC FANTASTIC:
AMERICAN SCULPTURE IN THE AGE OF SYNTHETICS

By

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In thanking my family, I cannot help but first acknowledge an important coincidence. My topic on plastics often evokes a recollection of a famous scene in *The Graduate*, which is cited in my introduction. In my text, I do not mention that this film was edited by my late father, Sam O'Steen, at a critical time in his career. While my writing on plastics has no direct relationship to his work on this movie, I am grateful to share this cultural touchstone with him in honor of his memory.

I am thankful for my family who has long supported me, including my in-laws—Nate, Marsha, Allison, and Jason—and especially my sister Molly and my mother Bobbie, who generously acted as my reader and editor in the final stages. Finally, I am endlessly grateful to my husband Mike, who has offered continual support, patience, and feedback throughout this entire process, and my two children Samuel and Rosalie, the beautiful bookends who marked the beginning and end of my dissertation writing and who continue to bring love and light into my life. Mike, Samuel, and Rosalie, I share this text with you.

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Introduction — The Pioneers of Plasticraft

"When an artist tells you he works in plastic—and many do—the next question—if you want any information at all, has to be what kind of plastic. Uvex, acrylic, plexiglas, fiberglas, vinyl, lucite? And then you have to find out how he uses it."

— John Perreault, 1969[1]

For a brief period, starting in the mid-1960s, plastics found rebirth in the hands of American artists, at a time when the materials were at a crossroads in public consciousness. No longer lauded for the utopian promises and wartime values that fueled the industry's beginning, plastics in the 1960s were synonymous with junk, considered mundane, disposable, and cheap. Plastics were "ubiquity made visible," according to a 1957 essay by Roland Barthes.[2] The materials were found in every aspect of daily life, exhausting consumers, as Norman Mailer decried in 1963: "…everywhere we are assaulted by the faceless plastic surfaces of everything which has been built in America since the war."[3] A family of materials already complicated by their propensity towards abstraction, plastics were pariahs, without concrete identities, which had lost their connection to the history of innovation in the United States. In the midst of this cultural reckoning for plastics, many artists brought the materials into their studios, despite their retrograde status.[4] As opposed to the historic triumvirate of sculptural materials—stone,

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[1] John Perreault, "Plastic—Very Present," *Village Voice* (December 4, 1969), 28. Perreault was reviewing the exhibition *A Plastic Presence* at The Jewish Museum in New York, November 1969 to January 1970, organized by the Milwaukee Art Center.

[2] Roland Barthes continued that plastics were in decline, as "the first magical material that consents to be prosaic." Roland Barthes, "Plastic," in *Mythologies*, trans. Richard Howard and Annette Lavers (New York: Hill and Wang, 2012), 191, 195.

[3] Norman Mailer, "The Big Bite," in *The Penguin Book of Contemporary American Essays*, ed. Maureen Howard (New York: Penguin Books, 1984), 70. The essay was originally published in the May 1963 issue of *Esquire*.

[4] Throughout this dissertation, I will use "plastics" and "synthetics" interchangeably, in both referencing plastics as a family of materials but also in the implication of both terms,

wood, and metal—plastics offered new properties for artists, such as transparency, optical play, and a range of new tactile surfaces. In the process of integrating plastics into their practices, these artists became innovators, producing a new lexicon of synthetic objects.

"The new pioneer of plasticraft has invaded a domain," declared critic Palmer French in 1967.[5] He wrote that "…[the artist] is actually experimenting and, in some cases, innovating techniques and potentially useful modifications not hitherto explored in commercial applications."[6] French situated artists working in plastics as collaborators rather than outsiders to the industry. Even the plastics industry saw the value of artists engaging with synthetics. In a 1968 editorial in the trade publication *Modern Plastics*, Joel Frados claimed that artists were finding new directions for plastics, making artwork that was "fast becoming the most exciting expression of our times."[7] Frados continued: "Where's the plastics industry in this revolution? Why hasn't it used plastics to similarly blast through the limitations of shape and form that have too long restricted consumer and industrial product design?"[8] Frados argued that it was the art community that would write the next chapter in America's history of plastics.

Starting in the 1960s, artists began honing their craft with particular types of these synthetic materials. As critic John Perreault noted in 1969: "When an artist tells you he

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as simultaneously and culturally referring to artificiality, imitation, invention, and manmade products, rather than the art historical use of "plastic" as it relates to modeling and three-dimensional artwork made with traditional sculptural materials.

[5] Palmer French, "Plastics West Coast," *Artforum* 6, no. 5 (January 1968): 48. French was reviewing the exhibition *Plastics West Coast* at Hansen-Fuller Gallery in San Francisco in 1967.

[6] Ibid.

[7] Joel Frados, "Plastic for Art's Sake," *Modern Plastics* 45, no. 12 (August 1968): 77. The editorial cites *Plastic as Plastic*, the 1968 exhibition at the Museum of Contemporary Craft in New York, as proof of artists' innovations in plastics.

[8] Ibid.

works in plastic—and many do—the next question—if you want any information at all, has to be what kind of plastic. Uvex, acrylic, plexiglas, fiberglas, vinyl, lucite? And then you have to find out how he uses it."[9] This specialized attention to plastics allowed artists to expand the potential of their materials, creating objects that strayed far from the manufactured, consumer products of plastics' past, bringing a new awareness to an art-going public. Perreault remarked on this phenomenon: "We have finally begun to adapt to plastic…and some of this has to do merely with the presence of plastic all around us, not to mention the fact that artists recently have done a lot to wake us up to it."[10] In essence, the rise of plastics as artistic materials in the 1960s and 1970s created a significant, if short-lived, "plastics moment," binding artists though a new, shared visual vocabulary of chemical colors, transparent structures, and synthetic surfaces.

The materials under discussion, grouped under the family name "plastics," represent a widely divergent set of substances, mostly carrying brand names such as Plexiglas, developed by Röhm & Haas Company, and Nylon, invented by DuPont. This expansive landscape of matter also includes hybrid materials like Fiberglas, created by Owens-Corning Fiberglas Corporation by pairing glass fibers with polyester resin. This dissertation will look to a select corner of the larger plastics family, focusing on the materials Donald Judd, Eva Hesse, De Wain Valentine, and Frederick Eversley chose to bring into their artistic arsenal: Plexiglas, Fiberglas, and polyester resin, respectively. Each artist discussed in this dissertation pushed the boundaries of their plastics in their

[9] Perreault, "Plastic—Very Present," 28.
[10] Ibid.

novel approaches to fabrication (in the case of Judd and Hesse) and their inventive methods of casting and finishing (for Valentine and Eversley).

I contribute to the extensive scholarship on sculpture from this period by looking at works by Judd, Hesse, Valentine, and Eversley through the lens of materiality and artistic practice rather than theoretical frameworks. In closely considering the methods of four artists working with plastics, this text offers an expanded view of their particular uses of Plexiglas, Fiberglas, and polyester resin, and of how the materials drove their artistic innovations. Integral to this dissertation are the odd characteristics of the substances in question, as each chapter addresses how the artists' objects were made and behaved. In order to understand why their work is so important to the history of contemporary art, I recover these details through a close look at the process of making and the finer details of the finished objects.

From Innovation to Proliferation

From the beginning, the American public struggled to understand plastics as a new set of industrial materials with no easily identifiable sources. For instance, plastics could not be attached to one specific natural resource or production process. Rather, synthetics were developed through closed-door, laboratory-based innovations—an engineered, new resource for a modern era. Plastics, as a family of materials, are created by linking small molecules together in a long chain, or a polymer, through a process called polymerization.[11] Polymers occur in natural substances as well, but in plastics the

[11] Polymer comes from the Greek words *poly*, meaning "many," and *meros*, which translates to "parts," referencing the chain-link structure of polymers. See: Science

chemical structure is designed and adapted with different compounds to create a variety of products, often using only hydrocarbons.[12] In essence, synthetic polymers are flexible, adaptable, and diverse—seemingly limitless in their variations. So, why are these materials still considered an all-encompassing entity, with "plastic" as a singular noun standing in for such a range of substances, such as polymethyl methacrylate (acrylic or Plexiglas), polystyrene (Styrofoam), and polyvinyl chloride (PVC)?[13]

This misperception began when modern plastics first emerged in the U.S. in the 1930s, when the conversations surrounding the materials emphasized man's ability to create matter, pitching plastic as an abstract future rather than a particular present.[14] An article in the March 1936 issue of *Fortune* magazine announced that plastics had displaced "the divine monopoly on primary substances," and continued that synthetics

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History Institute, "Science of Plastics," accessed May 14, 2018, https://www.sciencehistory.org/science-of-plastics.

[12] Examples of natural polymers include tar, shellac, amber, and latex, among other materials. While plastics are derived from hydrocarbons such as petroleum and natural gas, synthetic polymers may also include the addition of elements such as oxygen, chlorine, nitrogen, silicon, and sulfur. Ibid.

[13] Even in the 1940s, the use of "plastic" to describe a range of materials created a challenge for the industry. In a report on the Annual Fall Conference of the Society of the Plastics Industry, held in New York in November 1944, Colonel Willard Chevalier, publisher of *Business Week*, wrote that the industry had to educate consumers, as the "biggest difficulties in marketing plastics is the very word 'plastics'" as a generic term. Willard Chevalier, "When Plastics Comes Home from the Wars," *Modern Plastics* 22, no. 4 (December 1944): 129. Two years later, a report on the Society of the Plastics Industry's National Exposition in New York in April 1946, stated: "Unfortunately the word *plastics* means only one material to too many people. They have not yet learned that cellulose acetate, polystyrene, phenolics, ureas and other materials are as different from each other as iron, steel, copper or lead." "The Plastics Industry Has Come of Age," *Modern Plastics* 23, no. 8 (April 1946): 132.

[14] I use the term "modern plastics" to distinguish between earlier iterations of the synthetic materials that appeared before the 1930s, which were more unstable products that are no longer popular today, such as celluloid developed in the mid-19th century.

were "a tribute to the powers of man."[15] In 1940, *Fortune* magazine described the early years of the plastics industry, up until the 1930s, as "something like the world on the first day of creation."[16] Proclaimed the future of U.S. industry, plastics were secular substances imbued with spiritual significance.[17] The early excitement of plastics' potential drove the vast expansion of synthetics, with fervor likened to a material religion. In the 1940 article, the *Fortune* author described the wide reach of the industry, as no one company was capable of cornering the market: "The plastics industry, indeed, is something special in the way of industrial chaos."[18] Citing the 240 trademarks in circulation, representing approximately 14 types of plastics, the article casts the field of plastics—even in 1940—as a runaway train of exponential growth, and fiercely competitively for U.S. companies like Monsanto, DuPont, General Electric, and Union Carbide.[19] And no wonder: the *Fortune* reporter writes that from 1935 to 1939, plastics production grew from 127 million to 247 million pounds of matter, with the finished objects valued at around $500 million.[20]

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[15] "What Man Has Joined Together…", *Fortune* (March 1936): 69.
[16] The same article illustrated the growing field of plastics as a fictional continent called "Synthetica," which included "Rayon Island" and a country of Acrylic, with the capital of Plexiglas. Other synthetic nations—Petrolia, Alkyd, and Petrolia, among them—included a smattering of "cities" representing industrial brands that are no longer extant. "Plastics in 1940," *Fortune* 22 (October 1940): 90, 92–93.
[17] Here I borrow from David Nye and his discussion of sublimity and an almost-religious veneration of technology and infrastructure in the United States. He writes: "The technological sublime is an integral part of contemporary consciousness…In a physical world that is increasingly desacralized, the sublime represents a way to reinvest the landscape and the works of men with transcendent significance." David E. Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1994), xiii.
[18] "Plastics in 1940," 94.
[19] Ibid.
[20] This figure does not include plastics in liquid form, which would bring the 1939 calculation to more than 300 million pounds of material. Ibid., 89.

During World War II, plastics took on an important role, as scientists used synthetics to develop more efficient materials for everything from the largest vehicles to the smallest detail on a soldiers' uniform.[21] The armed forces of the modern age were redesigned to be the carriers of a range of synthetic objects, while the wartime effort fanned the flames of the plastic industry's growth, creating high demand for innovation. In the postwar era, plastics became at once the most accessible technology for Americans to understand, live with, and invest in, while at the same time the most threatening. By the 1940s, plastics were growing in prominence, as one 1942 article claimed the substances were "emerging as *materials in their own right*…[and] may one day become a dominant material, just as steel did in the immediate past."[22] It is with these grand ambitions that plastics entered the national landscape through marketing campaigns and industrial designers, who were tapped to make the presence of plastics in daily life more commonplace.[23] With the end of the war, plastics producers were pressed to find a new, national need for synthetics, to keep their many factories around the U.S.—built for the war effort—active and growing. A report on a conference for the Society of the Plastics Industry in 1944 read that "the peacetime possibilities of plastics are virtually untouched" opening up a "broad field of new markets" to redefine and even solve the problems of the postwar era, at least in the eyes of the industry.[24] To stay afloat, synthetics corporations

[21] For instance, a report on the U.S. Navy and plastics from 1945 claims that a battleship includes "around 50,000 plastic parts." "Plastics at war—Navy," *Modern Plastics* 22, no. 5 (January 1945): 100.
[22] Joseph L. Nicholson and George R. Leighton, "Plastics Come of Age" *Harper's Magazine* 185 (August 1942): 301.
[23] For instance, see: John Gloag, *Plastics and Industrial Design* (London: G. Allen & Unwin Ltd., 1945).
[24] Chevalier, "When Plastics Comes Home," 129.

sold plastics as the future of the American home, manifested in products like Tupperware.[25] With great comfort in plastics came unbridled abundance for inexpensive, convenient, and disposable objects, transforming the materials of domestic life in the U.S. At the same time, artists were finding the value in using synthetics to create their objects. The November 1944 issue of *Modern Plastics*, for instance, included an article on plastics and sculpture, claiming that synthetics can "liberate" artists from traditional materials and that the substances "combine the colorful clarity of glass, the massiveness of stone, the permanence of marble, the mobility of clay, the warm surface of wood, the yielding rigidity of ivory."[26] In this context, plastics were presented as composed of the best qualities of other materials to support their potential for sculptural innovation.

By the 1960s, several guidebooks for artists had even appeared, showing the rising interest in working with plastics. These texts outlined the methods for working with a range of plastic materials, in an effort to close the knowledge gap between plastics and more traditional artistic media.[27] This period also marked a moment when the mention of plastics in popular culture took on a derogatory tone, such as in the 1967

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[25] Jeffrey Meikle argued that the rise of Tupperware in the home in the 1950s marked the beginning of seeing "plastic as plastic," which continues through the 1960s. Jeffrey L. Meikle, *American Plastic: A Cultural History* (New Brunswick, NJ: Rutgers University Press, 1995), 181. An article in the May 1950 issue of *Fortune* also claimed that the "greatest concentration of plastics around the average American is in the kitchen." "A 1950 Guide to Plastics," *Fortune* 41 (May 1950): 110. For further reading: Alison J. Clarke, *Tupperware: The Promise of Plastic in 1950s America* (Washington, DC: Smithsonian Institution Press, 1999).

[26] Jan and Ursula de Swart, "A Medium for Sculpture," *Modern Plastics* 22, no. 3 (November 1944): 103.

[27] See: Thelma Newman, *Plastics as an Art Form* (Philadelphia: Chilton Book Company, 1964); Nicholas Roukes, *Sculpture in Plastics* (New York: Watson-Guptill Publications, 1968); Clarence Bunch, *Acrylic for Sculpture and Design* (New York: Van Nostrand Reinhold Company, 1972); and Newman, *Plastics as Design Form* (Philadelphia: Chilton Book Company, 1972).

movie *The Graduate*, as the reference to plastics in this film marked the divide between an older generation still enthralled with its novelty and a younger generation convinced of its stagnation.[28] With this history of plastics in mind, the widening use of synthetics by artists in the 1960s then seems remarkable. So, why were certain sculptors invested in seeking a new direction for plastics, at a time when the public was weary of the materials? These artists were returning to an early age of technological enthusiasm, and taking the helm from innovators before them.

Historical Precedence in Plastics

Pioneers of a previous generation had been the first artists to work with plastics, notably Russian artists and brothers Naum Gabo and Antoine Pevsner. Starting in the 1920s, they used cellulose nitrate and cellulose acetate to create their Constructivist sculptures, and had turned to the acrylic product Perspex by the late 1930s.[29] The artists chose to work with transparent plastic substances to alleviate their artworks from the burden of mass and activate the space around their objects through the crystal clear

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[28] In the film, the main character Benjamin Braddock, played by actor Dustin Hoffman, is given career advice by a middle-aged family friend at his college graduation party. The man says: "I want to say one word to you. Just one word...Plastics…There's a great future in plastics. Think about it. Will you think about it?" Meikle argued that the term "plastic" entered "the folklore of the baby boom generation" with this film. Meikle, *American Plastic*, 3. Buck Henry, the screenwriter for *The Graduate*, later explained in an interview: "I was trying to find a word that summed up a kind of stultifying, silly, conversation-closing effort of one generation to talk to another. Plastics was the obvious one." Jay Boyar, "When 'Plastics' Became a Bad Word," *Washington Post*, August 30, 1992: G4.

[29] See: Elizabeth Rankin, "A Betrayal of Material: Problems of Conservation in the Constructivist Sculpture of Naum Gabo and Antoine Pevsner," *Leonardo* 21, no. 3 (1988): 287. Hungarian artist László Moholy-Nagy also began painting on plastic in the 1920s and later incorporated Plexiglas into his sculpture. Sibyl Moholy-Nagy, *Moholy-Nagy: Experiment in Totality* (Cambridge, MA: MIT Press, 1969), 198, 201.

materials. Both Gabo and Pevsner sought to create new forms freed from the weight of more traditional sculpture to represent a modern age and its technological culture.[30] Towards these ends, the artists engaged with industrial partners to source and learn about their materials. For instance, Gabo was introduced to Perspex in 1937, only two years after it was first presented to the public, when he met John Sisson in the Plastics Division of the manufacturer Imperial Chemical Industries in England.[31] He began working with the material that same year.

The Constructivist artists were not the only figures to experiment with plastics in the early days of the industry. American artists were also finding the substances through a direct dialogue with plastics manufacturers. For instance, artist Alexander Calder exhibited a work in Plexiglas as the center for the Röhm & Haas Company display at the 1939 New York World's Fair (Figure 1). Calder was the winner of a competition hosted by the Museum of Modern Art in New York and Plexiglas producer Röhm & Haas, of Philadelphia and Darmstadt, Germany.[32] The collaboration between Calder and Röhm & Haas marked an early confluence between the plastics industry and fine arts, and an important part of the agenda at the world's fair.[33]

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[30] Steven A. Nash and Jörn Merkert, *Naum Gabo: Sixty Years of Constructivism* (Munich: Prestel-Verlag, 1985), 59.
[31] Martin Hammer and Christina Lodder, *Constructing Modernity: The Art & Career of Naum Gabo* (New Haven: Yale University Press, 2000), 251.
[32] The contest and subsequent collaboration with Calder was the brainchild of industrial designer Gilbert Rohde, who had been hired by Röhm & Haas as technical advisor. The judges, arts patron Katherine Dreier, sculptor Robert Laurent, and Museum of Modern Art curator James Johnson Sweeney, declared Calder the winner in April 1939. The artist was awarded $800. "Plexiglass Sculpture Prizes are Awarded." *Pencil Points* 20, no. 6 (June 1939): 56–57. Regina Lee Blaszczyk, *Rohm and Haas: A Century of Innovation* (Philadelphia: Rohm and Haas Company, 2009), 62, 64.
[33] Fair organizers played an important role in elevating plastics, as the Department of Feature Publicity circulated a 10-page document on the presence of plastics at the fair,

An abstract bust, Calder's work was larger-than-life, towering over its visitors (Figure 2). Built with three colors of transparent Plexiglas—clear, purple, and red—in flat sheets cut into shapes and round rods in varying diameters, the sculpture introduced fairgoers to the physical and aesthetic presence of this new material. Light also acted as an ancillary medium, as round rods transmitted light from the illuminated circular base, bathing the onlooker in an ethereal glow. With this exhibit, Röhm & Haas created a visual agenda to sell their product that relied on Calder's abstraction in Plexiglas, on view at the center of the corporate showcase. This early collaboration set the stage for the industry's work with cultural institutions, designers, and artists for the decades to come.

Upon first glance, the transparent sculptures by Calder, Gabo, and Pevsner—who were working with plastics at the same time—might appear to be the progenitors of much of the artwork discussed in this dissertation.[34] For instance, the artists working in both the 1930s and the 1960s were interested in the visual and structural possibilities of plastics and in collaborating with industrial partners. However, the similarities end there. When

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which would "offer America its first opportunity to see plastics used on a large scale—in art, in design and in practical applications." "Plastics at the New York World's Fair," Department of Feature Publicity, New York World's Fair 1939 and 1940 Incorporated records, 1935–1945, New York Public Library, New York, NY.

[34] Rosalind Krauss wrote in 1979: "No sooner had minimal sculpture appeared on the horizon of the aesthetic experience of the 1960s, than criticism began to construct a paternity for this work, a set of constructivist fathers who could legitimize and thereby authenticate the strangeness of these objects. Plastic? inert geometries? factory production?—none of this was *really* strange, as the ghosts of Gabo and Tatlin and Lissitzky could be called in to testify. Never mind that the content of the one had nothing to do with, was in fact the exact opposite of, the content of the other. Never mind that Gabo's celluloid was the sign of lucidity and intellection, while Judd's plastic-tinged-with-dayglo spoke the hip patois of California." While Krauss rightly called for a move away from a linear narrative that would connect Gabo and Judd, in her ode to postmodernism, she further argued for a shift from the medium towards a linguistic framework, which did not appropriately address the role of materials in each artist's work. Rosalind Krauss, "Sculpture in the Expanded Field," *October* 8 (Spring 1979): 32.

one looks closely at the specific details of production—the behaviors of the materials, the ways in which the artists worked with their plastics, and the outcomes of their labor—the artists only shared the choice to source and use plastics to accomplish their intended goals. Additionally, in the 1920s and 1930s, plastics were still the new substances of a changing, technological age, rather than materials exhausted by consumerism. In this dissertation, I focus in particular on the "plastics moment" of the 1960s and 1970s to understand what happens when artists find plastics again in this later period.

Outline of the Dissertation

As the first art historical study devoted to the use of plastics in sculpture of the United States in the 1960s and 1970s, this dissertation focuses on the particular innovations of artists working with synthetic substances. Ultimately, I complicate the assumption that "plastic" is a universal substance, rather than a family of disparate materials, by considering how the idiosyncrasies of particular materials drove the practices of four artists and contributed to a longer narrative of 20th-century innovation in America. The four subsequent chapters consist of individual artist case studies and works in plastics by Judd, Hesse, Valentine, and Eversley. This dissertation is not primarily an interpretive act. Rather, I focus on the material and technical aspects of objects, not as *secondary* to art historical interpretation but as *method*. First, I highlight how these artists worked with synthetics in practical terms and then I recover important collaborations and details of labor that allowed the artists to make these artworks.

In the chapter on Judd, I look closely at his use of Plexiglas as a particular substance in his oeuvre, arguing for its unique presence among the many industrial

materials he used. I focus on one series of experimental, floor-bound objects, nicknamed the "Turnbuckles," which were composed primarily of Plexiglas and emphasized the visual prowess of the plastic. I consider the development and construction of these idiosyncratic works to show how Judd adapted his practice to use Plexiglas, as the plastic required a different approach to fabrication than his metal sculptures. I argue that the industrial materials used in Judd's objects, such as Plexiglas and steel, were not interchangeable but rather took on distinct roles in the artist's practice.

For the case study on Hesse, I focus on her first four works in Fiberglas, which were shown at her solo exhibition at the Fischbach Gallery in New York in 1968. Just as the chapter on Judd allows me to expand previous discussions on how the artist worked with fabricators, in this text I recover the very presence of Hesse's collaborators, particularly the workshop that produced her Fiberglas objects: Aegis Reinforced Plastics in New York. I present the history of Hesse's work with Aegis as well as an in-depth discussion of how her plastic sculptures were made and how the artist shifted her methods of making to allow for collaborators and Fiberglas.

The third chapter argues for Valentine's great contribution to the field of plastics, as the artist developed his own formula for polyester resin that allowed him to cast objects on unprecedented scale. I trace the details of Valentine's process of making his sculptures, to show the impact of the material on his studio practice. I also expand the limited scholarship on Valentine, which has primarily focused on his technical achievements, by considering specific works the artist made with his signature material in the context of his first solo exhibition at the Pasadena Art Museum in 1970.

Finally, the case study on Eversley reclaims the artist's unusual history, as he worked as an aerospace engineer before turning to sculpture and creating polyester resin objects. His training informed his studio practice and impacted the development of his centrifugal process of casting, which involved creating his objects by spinning the liquid plastic in a mold. The chapter delves into the Eversley's procedures and laborious methods of casting and finishing, which are often omitted in the literature on the artist. Furthermore, I show how the artist's research on the scientific principles of energy impacted his work, as seen in the optical abilities of his objects.

While the first two chapters disrupt canonical readings in the scholarship of two established artists based in New York—Judd and Hesse—the following two case studies look at two more marginalized figures working in Los Angeles—Valentine and Eversley—in an effort to restore their important legacies and work in plastics. The chapters on Judd and Hesse also address two artists working with fabricators in different ways, to show the different models of industrial collaboration that existed among the artistic community in New York during this period. The case studies on Valentine and Eversley, on the other hand, focus on two figures who cast and finished their polyester resin objects by hand in the comfort of their studios, without the use of outside workshops. Valentine and Eversley each developed a distinct method of working that expanded the boundaries of their materials. By choosing these artists, among the many working in synthetics at this time, I present four different approaches to working with plastics, through fabricators as well as in the studio, while also addressing the different ways artists found synthetic materials through the industrial markets of two cities: New York and Los Angeles.

On Scholarship, Language, and Plastics

Over the last 20 years, several important art historical texts have expanded the scholarship on artists, their studio practices, and their uses of technologies and industrial materials in the 1960s and 1970s.[35] This body of literature has brought more specificity to the methods of artists in this generation, expanding the broad claims made by curators and critics during this time about the impact of scientific models on young artists.[36] However, these texts rarely address the different personalities and processes for particular materials, continuing the misperception that "industrial materials" and "technologies" are interchangeable and demand equal labor and resources from artists. By looking at plastics, I aim to give this family of materials more texture and complexity in the art historical scholarship, and create an opening to talk about substances as individual threads or narratives that run through this period of sculpture in the United States.

In addition to responding to the strong literature on artwork from the 1960s and 1970s, I take to task the imposition of "schools" or "movements" on the objects in

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[35] Notably: Caroline Jones argued that the 1960s marked a shift away from the solitary, mythical artist towards one who injects the "intrusions" of technology into form and practice. Caroline A. Jones, *Machine in the Studio* (Chicago: University of Chicago Press, 1996), 9. Pamela Lee looked at the ways artists used technology in the 1960s, not just as a new artillery of static materials, but as reference points to dialogue with the changing social structures of the 1960s. Pamela M. Lee, *Chronophobia: On Time in the Art of the 1960s* (Cambridge, Massachusetts: MIT Press, 2004), xix–xx. Julia Bryan-Wilson considered how artists from this period modeled their studio practices on forms of labor borrowed from industrial America, arguing that the artists who identified as "art workers" used their practice as a platform to engage with the political and social turbulence of the late 1960s and early 1970s. Julia Bryan-Wilson, *Art Workers: Radical Practice in the Vietnam War Era* (Berkeley: University of California Press, 2009).

[36] For instance, John Coplans wrote in 1967 that "the most dominant pressure upon the younger artist's approach is a keen awareness and appreciation of the potency of science and the scientific mind." John Coplans, "The New Sculpture and Technology," in *American Sculpture of the Sixties*, ed. Maurice Tuchman. (Los Angeles: Los Angeles County Museum of Art, 1967), 21.

question, in the use of terms such as Minimalism, Postminimalism, and Finish Fetish, among others. These designations often remove the works from their production and material histories, for the sake of group unity. Minimalism, in particular, is a misleading term in grouping a range of disparate artistic practice, first established through critical writings from the 1960s.[37] Subsequent literature has then tied such sculpture to modes of rhetoric or displaced the specificity of substance for a discussion of the gendered politics of Minimalism.[38] In order to work outside of the restrictive framework of "Minimalism," I draw from texts that have intervened in the homogenization of geometric, abstract sculpture from this period.[39] I also build from scholarship that considers the complex

[37] Michael Fried's essay "Art and Objecthood," published in the June 1967 issue of *Artforum*, unknowingly established Minimalism's place in art history. In the text, he declared "literalist art," particularly works by Donald Judd and Robert Morris, as reliant on the viewer and theatricality rather than the values of modern art to which Fried and his mentor Clement Greenberg adhered. Fried, "Art and Objecthood," in *Art and Objecthood: Essays and Reviews* (Chicago: University of Chicago, 1998), 153. James Meyer cited Barbara Rose's "ABC Art" article as an example of criticism that "did not so much subvert medium specificity as render it irrelevant." James Meyer, *Minimalism: Art and Polemics in the Sixties* (New Haven: Yale University Press, 2001), 147. See: Barbara Rose, "ABC Art," *Art in America* 53, no. 5 (October/November 1965): 57–69.

[38] Certain texts have further removed materials from the conversation around Minimalism: Krauss, *Passages in Modern Sculpture* (Cambridge, MA: MIT Press, 1977); Hal Foster, "The Crux of Minimalism," in *The Return of the Real: The Avant-Garde at the End of the Century* (Cambridge, MA: MIT Press, 1996), 35–68; and Anna Chave, "Minimalism and the Rhetoric of Power," *Arts Magazine* (January 1990): 44–63.

[39] Meyer has disrupted this canonization, arguing instead for the distinct practices of artists grouped under "Minimalism." Meyer, *Minimalism: Art and Polemics*. Also: Alex Potts distinguished the different ambitions of Minimalist artists' theoretical writings. Alex Potts, *The Sculptural Imagination: Figurative, Modernist, Minimalist* (New Haven: Yale University Press, 2000), 178–310. Martha Buskirk argued that the turn to serial forms and fabrication did not remove authorship but actually strengthened the connection between the artist and their object. Martha Buskirk, *The Contingent Object of Contemporary Art* (Cambridge, MA: MIT Press, 2003), 3. Jo Applin upset Minimalism's exclusionary status at the epicenter of 1960s sculptural practice. Jo Applin, *Eccentric Objects: Rethinking Sculpture in 1960s America* (New Haven: Yale University Press, 2012), 11.

relationships involved in the use of fabrication, particularly with respect to Judd.[40] Similarly, "Postminimalism," as an imposed label coined by critic Robert Pincus-Witten, grouped artists with very different practices, such as Hesse, Richard Serra, Lynda Benglis, and Keith Sonnier, in opposition to the rigidity of Minimalism based on "the eccentricity of the substances they used."[41] Rather than subscribe to these terms, I am interested in the intersections between artists and their materials, and how plastics created connections across art historical designations.

Artists working in Los Angeles in the 1960s and 1970s were also grouped by labels such as Light and Space, Finish Fetish, and L.A. Look, which included artists such as Peter Alexander, Larry Bell, Robert Irwin, Craig Kauffman, John McCracken, Helen Pashgian, and others. While some art historians have rejected the pejorative nature of these terms, the labels persist, as first used by critics and sustained by subsequent scholarship.[42] Coined by John Coplans, Finish Fetish referred to both the atmospheric qualities and sleek, new surfaces of sculptures being made in Los Angeles at this time, without distinguishing variations of production, finish, or composition.[43] L.A. Look was

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[40] Notably, Joshua Shannon argued for the significance of both the artist's labor in his early artworks and the work involved in his fabricated objects, paying particular attention to the history of Judd's primary fabricator: Bernstein Brothers Sheet Metal Specialties. Joshua Shannon, *The Disappearance of Objects: New York Art and the Rise of the Postmodern City* (New Haven: Yale University Press, 2009), 150–186.
[41] Robert Pincus-Witten, *Postminimalism* (New York: Out of London Press, 1977), 16.
[42] Meyer argued that "Finish Fetish" narrowly stereotypes a broad group of work in the way that New York Minimalism was created to market particular artists. Meyer, "Another Minimalism," in *A Minimal Future?: Art as Object 1958–1968*, eds. Ann Goldstein and Lisa Gabrielle Mark (Los Angeles: Museum of Contemporary Art, 2004), 37–38. "Light and Space," for instance, is chronicled and historicized in the following text: Jan Butterfield, *The Art of Light + Space* (New York: Abbeville Press, 1993).
[43] Coplans wrote: "A sense of ambience manifests itself in the handling of subject matter, in the overall treatment (by the incorporation of aspects of the intensely reflective quality of California light) and in the relative newness of all surfaces (Los Angeles proliferated

used by Peter Plagens, referring to "cool, semitechnological, industrially pretty art," where plastics was the "mythical material" in offering properties not possible with more traditional materials and sparking technological intrigue for artists keen to experiment.[44] In my work on Judd, Hesse, Valentine, and Eversley, I work in opposition to the terms Minimalism, Postminimalism, and Finish Fetish, in order to expand the prescribed categories for sculpture made in the 1960s and 1970s, through the frame of plastics.

An Approach to Objects and Materials

In this dissertation, I focus on the process of working with plastics to reinsert the important history of making into the literature on sculpture from the 1960s and 1970s. Plastics commanded a particular presence in the studio. As one example, strong odors were often inescapable for artists who worked with plastics in this period, at a time in which ventilation and containment was rarely involved. Plagens described the visceral, odorous quality of polyester resin present in many studios in Los Angeles: "By 1968–69, the chemical smell of resin and a frozen drop at the nozzle of a 55-gallon drum were as

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within living memory)—for example, by the use of shiny, bright, new materials and clean surfaces." Coplans, "Introduction," *Ten from Los Angeles* (Seattle: Contemporary Art Council of the Seattle Art Museum, 1966), 9.

[44] Peter Plagens wrote: "The patented 'look' was elegance and simplicity, and the mythical material was plastic, including polyester resin, which has several attractions: permanence (indoors), an aura of difficulty and technical expertise, and a preciousness (when polished) rivaling bronze or marble. It has, in short, the aroma of Los Angeles in the sixties—newness, postcard sunset color, and intimations of aerospace profundity." For Plagens, the artists who worked in this manner included Larry Bell, Craig Kauffman, Ed Ruscha, Billy Al Bengston, Kenneth Price, John McCracken, Peter Alexander, Valentine, Robert Irwin, and Joe Goode. He failed to include other important artists associated with this community, including Helen Pashgian and Eversley, among others. Peter Plagens, *Sunshine Muse: Contemporary Art on the West Coast* (New York: Praeger Publishers, 174), 120–121.

familiar Beaux-Arts studio decor as splattered floors and turpentine."[45] Valentine remembered his neighbor and contemporary Larry Bell coming by his Venice Beach studio to complain about the smell.[46] Hesse's fabricator and studio assistant Doug Johns even recalled filling the neighborhood around her Canal Street studio with noxious smells when creating her Fiberglas works.[47] Not all plastics commanded such a visceral presence in the studio, such as in the prefabricated Plexiglas sheets purchased and used by Judd, and yet each of the materials addressed in this dissertation posed different physical challenges for the artists, which are often lost in the gloss of finished works. These details, such as smells, surfaces, and other tactile elements, distinguished plastics from other materials in this period, in the studio and in the exhibition gallery, and are the focus of the following case studies. This dissertation outlines the way these objects were *made* by exploring the dynamics between plastics and the artist as maker, through a technical approach to art history.

The technical study of art history—also called technical art history—finds its roots in museums and exhibition practice, as it often involves the collaborative work between art historians, conservators, scientists, and other scholars to understand the materials and makings of objects in institutional collections. This methodology is attentive to the artist's practice of making, pairing evidence left behind in the object and in the artist's writings and contributions with historical background on the materials used,

[45] Plagens, *Sunshine Muse*, 120–121.
[46] Tom Learner, Rachel Rivenc, and Emma Richardson, *From Start to Finish: De Wain Valentine's Gray Column* (Los Angeles: The Getty Conservation Institute, 2011), 10.
[47] Doug Johns, interview by the author, July 26, 2016, Topanga, CA.

including technical information that could have been unknown to the artist.[48] In using this approach, I draw from the tradition of material culture studies in American art history, as well as recent texts on the role of craft in modern art narratives.[49] Technical art history also shares similar objectives with object-based theory or "new material studies," in considering the complex lives of objects and materials. However, the two methods are distinct. The technical study of art history builds from investigative work on specific objects and materials, privileging evidence left by the artist. "New material studies," on the other hand, considers the larger life and presence of the non-human object within political and social networks, *despite* the role of the maker.[50] "New material studies"

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[48] See: Maryan W. Ainsworth, "From Connoisseurship to Technical Art History: The Evolution of the Interdisciplinary Study of Art," *The Getty Conservation Institute Newsletter* 20, no. 1 (2005): 4–10; and "A Matter of Teamwork: A Discussion about Technical Studies and Art History," *The Getty Conservation Institute Newsletter* 20, no. 1 (2005): 11–16. My introduction to this field came during my participation in 2013 at the Summer Institute for Technical Art History (SITAH), hosted by New York University's Institute of Fine Arts and funded by the Andrew W. Mellon Foundation, which sought to engage Ph.D. Candidates in the methods of object-based and art technical research from 2012 to 2016. The Harvard Art Museums has hosted the program since 2017, under the name Summer Institute for Technical Studies in Art (SITSA).

[49] Jules Prown's foundational essay argued for the relevance in American art history of material culture studies, which considered objects as active in providing evidence rather than passive as illustrations. Jules David Prown, "Mind in Matter: An Introduction to Material Culture Theory and Method," *Winterthur Portfolio* 17, no. 1 (Spring 1982): 1. On craft, Glenn Adamson looked at the role of craft in modern art in order to blur the lines between fine art and craft through the guise of materials and making. Glenn Adamson, *Thinking through Craft* (Oxford: Berg Publishers, 2007).

[50] Jennifer Roberts identified the "new material studies" as encompassing such interdisciplinary scholarship as Thing Theory, New Materialisms, Speculative Realism, Assemblage Theory, and Object-oriented ontology, as working through four keywords: agency, making, exchange, and matter. Jennifer Roberts, "Things: Material Turn, Transnational Turn," *American Art* 31, no. 2 (Summer 2017): 65. For instance, Arjun Appadurai argued for the "social lives" of objects through the political context of their exchange and circulation as commodities. Arjun Appadurai, "Introduction: Commodities and the Politics of Value," in *The Social Life of Things: Commodities in Cultural Perspective*, ed. Arjun Appadurai (Cambridge University Press, 1986), 3. See also: Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC: Duke University

texts emphasize the finished product rather than the implicit process involved in the works.[51] Rather than interpreting artworks outside of the studio or the workshop, this dissertation considers the interactions between the artists and their artworks in order to understand how plastics shaped and informed their practices.

This dissertation brings the physical practice of technical art history to the written page, using plastics as the framework in which to understand the specific contributions of four individual artists working in the United States in the 1960s and 1970s.[52] In each case study, I present the artists and their work through the ballet of making that was specific to the plastic used, in the following ways:

- considering how plastics were used and adapted outside of industrial norms;

Press, 2010); Bill Brown, "Thing Theory," *Critical Inquiry* 28, no. 1 (Autumn 2001): 1–22; Alfred Gell, *Art and Agency: An Anthropological Theory* (New York: Clarendon Press, 1998); and Bruno Latour, "A Collective of Humans and Nonhumans," in *Pandora's Hope: Essays on the Reality of Science Studies* (Harvard University Press, 1999), 174–215. Ann-Sophie Lehmann described this body of scholarship as part of a "material turn." Lehmann, "Good Art Theory Must Smell of the Studio," in *Hiding Making—Showing Creation: The Studio from Turner to Tacita Dean*, eds. Rachel Esner, Sandra Kisters, and Ann-Sophie Lehmann (Amsterdam: Amsterdam University Press, 2013), 250.

[51] Lehmann wrote that these texts often only consider finished objects, ignoring their making or "'prenatal' life." Lehmann, "Showing Making: On Visual Documentation and Creative Practice," *Journal of Modern Craft* 5, no. 1 (2012): 10. Roberts argued for the significance of process, making, and "tacit intelligence," where "making resides not solely in the mind of the craftsperson but somewhere in the kinetic interface between mind, body, tools, and materials." Roberts, "Things, Material Turn," 66.

[52] Several conservation studies on the study of plastics have been helpful as a starting point on a technical approach to these materials: Brenda Keneghan and Louise Egan, eds., *Plastics: Looking at the Future and Learning from the Past* (London: Archetype Publications, 2008); Thea van Oosten, Yvonne Shashoua, and Friederike Waentig, eds., *Plastics in Art: History, Technology, Preservation* (Munich, Germany: Siegl, 2002); Yvonne Shashoua, Conse*rvation of Plastics: Materials science, Degradation and Preservation* (Oxford, UK: Butterworth-Heinemann, 2008); and Friedericke Waentig, *Plastics in Art: A Study from the Conservation Point of View* (Petersberg, Germany: Michael Imhof Verlag, 2008).

- studying how the sculptures were produced, with or without fabricators;
- exploring how an engagement with materials informed the objects' composition;
- following the lives of the objects, from the studio or shop to the exhibition space.

I am interested in the "feedback loop" that occurred between the artists and their materials in creating a series of negotiations, rather than a purely hierarchical relationship between the artists and their subservient substances.[53] In the cases of Judd and Hesse, this approach offers two alternative interpretations of fabrication as practice, lending more complexity to this method of working than has been previously discussed in scholarship from this period. Valentine and Eversley, then, offer two examples of artists adapting the tradition of casting to synthetics that relied directly on the labor of the artist.[54] In addition, for Hesse and Eversley, this approach offers a new way to consider the discussions of identity as present in their works, complicating the "blind spots" of material-based scholarship.[55]

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[53] Thank you to Jennifer Roberts for her discussion of this "feedback loop" at the 2017 Summary Workshop for the Summer Institute for Technical Art History, Institute of Fine Arts, New York University.

[54] I owe thanks to Karen Lemmey for her thoughts on casting plastic sculpture in relation to the history of cast sculpture as well as the direct carving movement in the early 20th century.

[55] Huey Copeland identified the "blind spots" of material-based studies, as risking "the social reproduction of white supremacy" in overlooking the inherent bias towards bodies and objects from a Euro-American academic perspective. Huey Copeland, "Tending-toward-Blackness," *October* 156 (Spring 2016): 141. Copeland's text was written in response to an *October* questionnaire that asked scholars to comment on "a decentering of the human in theoretical and historical writing across the humanities," but was omitted from the special Winter 2016 issue on Materialisms due to an editorial oversight.

Framing Exhibition History

In each chapter, I pair a discussion of process and materials with a look at key museum and gallery shows for the artists in the 1960s and 1970s. This attention to the history of display is an important part of my methodology, as it further recovers the details of the artists' plastic artworks. The exhibition histories, revived through archival photographs and documents, also reclaim the surfaces and colors of the works, often lost in the black and white photography so prevalent for installation photographs from this period.[56] Reclaiming the specificity of color through exhibition images is an essential aspect of this project, as each of the four artists discussed created works with vibrant hues: Judd selected rich and fluorescent colors for his Plexiglas objects; Hesse harnessed the colorful iridescence of raw Fiberglas; Valentine added pigments to polyester resin to cast his solid fields of color; and Eversley used both transparent dyes and opaque pigments to create optical Lenses that were awash with color. In this text, I elevate color as critical to understanding why the artists chose their respective plastics. Color is essential to the history of these objects, which is most evident when considering the color photography that captured the many solo and group exhibitions focused on plastics in the 1960s and 1970s.[57]

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[56] Potts addressed the "complex set of mediations" involved with photographs of sculptures, arguing that installation images from the 1960s and 1970s should be read as more than simply documents. Potts, "The Minimalist Object and the Photographic Image," in *Sculpture and Photography: Envisioning the Third Dimension*, ed. Geraldine A. Johnson (Cambridge, UK: Cambridge University Press, 1998), 181.

[57] David Batchelor wrote of the "extreme prejudice" against color in the history of Western art, as color has traditionally been marginalized in "the realm of the superficial, the supplementary, the inessential or the cosmetic." David Batchelor, *Chromophobia* (London: Reaktion Books, 2000), 22–23.

For instance, from 1965 to 1972, more than a dozen museums and galleries across the U.S. hosted exhibitions focused on plastics in art.[58] These group shows set the stage for how these objects were both shown and received on a national scale. Through the exhibitions, the American public found a different side of plastics, through immersive environments, absurdist architectural forms, and unlikely monuments constructed by artists. Visually, the shows varied, as they each compiled artists working with a wide range of materials and approaches. *A Plastic Presence*, the largest survey of sculpture in plastics by 49 artists working in the U.S. and Canada, organized by the Milwaukee Art Center with stops at The Jewish Museum in New York and the San Francisco Museum of Art from 1969 to 1970, offered one example (Figure 3). While on view in Milwaukee, the exhibition showed many artists who worked with clear and opaque surfaces, which offered a version of plastic sculpture that appeared to privilege the raw states of plastics without commercial intervention. *Plastics and New Art*, an exhibition that also opened in 1969 at the Institute of Contemporary Art at the University of Pennsylvania, presented a

[58] The exhibitions included: *Plastics*, John Daniels Gallery, 1965; *Plastics West Coast*, Hansen-Fuller Gallery, San Francisco, 1967; *Plastic as Plastic*, organized Museum of Contemporary Crafts (now Museum of Arts and Design), New York, 1968, and shown at the Arts and Industries Building, Smithsonian Institution, Washington, DC and Oberlin College in Oberlin, Ohio between 1969 and 1970; *Plastics: Los Angeles*, California State College at Los Angeles, 1968; *Made of Plastic*, Flint Institute of Arts, Michigan, 1968; *Plastics and New Art*, organized by the Institute of Contemporary Art at the University of Pennsylvania, Philadelphia and shown at the Marion Koogler McNay Art Institute in San Antonio, Texas, 1969; *Hard, Soft and Plastic*, 1969, Wilcox Gallery, Swarthmore College, Swarthmore, Pennsylvania; *A Plastic Presence*, organized by the Milwaukee Art Center (now Milwaukee Art Museum) and traveled to The Jewish Museum in New York and the San Francisco Museum of Art (now San Francisco Museum of Modern Art), between 1969 and 1970; *Editions in Plastic*, 1970, University of Maryland Art Gallery, College Park, Maryland; *Works in Plastic*, 1970, Trinity College Art Gallery, Hartford, Connecticut; *Tony Delap/Frank Gallo/Eva Hesse: Trio*, Owens-Corning Fiberglas Center in New York, 1970; and *The Last Plastics Show,* California Institute of Arts in Valencia, California, 1972.

different perspective (Figure 4). Arranged as a sort of absurdist showroom of plastic objects, the sculptures in the show represented a greater spectrum of colors, presenting a wider range of the uses of the materials that did not rely on a seemingly pure state of plastics in white, clear or opaque shades.

The exhibitions also varied in their approach to didactic material, with some shows making an effort to educate the public on plastics. *Plastics West Coast* at Hansen-Fuller Gallery in San Francisco in 1967 offered visitors a glossary of terms, defining resins, acrylics, vinyl, and other types of plastics as well as laminating, fabricating, and vacuum forming as methods in production.[59] For *Plastic as Plastic* at Museum of Contemporary Crafts (now Museum of Arts and Design) in New York in 1968, organizers included the scientific compositions and characteristics of synthetics as well as a historical survey adapted from a document by the Society of the Plastics Industry within the catalogue text.[60] In a foreword for the exhibition *Made of Plastics* at Michigan's Flint Institute of Arts in 1968, director G. Stuart Hodge even cited a select list of inventors and corporations as a short history of plastics.[61] Several exhibitions also partnered directly with industrial companies. *Plastic as Plastic* was sponsored by Hooker Chemical Corporation, a subsidiary of Occidental Petroleum Corporation, later exposed in the late 1970s as responsible for the Love Canal disaster.[62] *A Plastic Presence* paired up with Philip Morris and their plastics subsidiary Milprint for financial support, to the dismay of

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[59] "Plastic Definitions," The Hansen Gallery, Exhibitions Archives, San Francisco Museum of Modern Art, San Francisco, CA.
[60] *Plastic as Plastic* (New York, NY: The Museum of Contemporary Crafts, 1968), 7–8.
[61] *Made of Plastics* (Flint, MI: Flint Institute of Arts, 1968), 2.
[62] Andrew C. Revkin, "Love Canal and Its Mixed Legacy," *New York Times*, November 25, 2013, accessed June 22, 2018, https://www.nytimes.com/2013/11/25/booming/love-canal-and-its-mixed-legacy.html.

critics.[63] Finally, the aptly-titled *The Last Plastics Show* at the California Institute of Arts in Valencia, California in 1972—which presented itself as the finale of these exhibitions—stemmed from a collaboration between the university, Hastings Plastics in Santa Monica, California, and Valentine along with artists Judy Chicago, and Doug Edge, who organized the show of 24 artists. With these sponsorships, the industrial companies neither required that artists be complicit in corporate activities nor insisted that the artists promote their materials. However, the very practice of working with plastics often came with an implied affiliation to the American industry.

Ultimately, the curators of these exhibitions often positioned artists as future pioneers of the plastics industry. Milwaukee Art Center director Tracy Atkinson, who organized *A Plastic Presence* with the institution's Director of Exhibitions, John Lloyd Taylor, stated what was at stake with this show: "Plastics have earned a bad name from all the flimsy toys, all those endless and deadly countertops and lighting fixtures, those boxes and appliance housings which split and shattered under normal use, not to mention the early, less-than-satisfactory 'synthetic' fabrics and leather."[64] According to Atkinson, it was the artists in the exhibition, which included Hesse, Eversley, and Valentine, who were making the greatest strides to correct this situation.

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[63] Grace Glueck of the *New York Times* lambasted exhibition's corporate arrangement with Philip Morris as it attached artists to "image-building for the plastics industry." In this context, she declared a troubling future for museum exhibitions, as corporations were increasingly taking the lead as sponsors. In the article, Glueck quoted Jewish Museum director Karl Katz, who claimed the sponsor did not have any say in planning the $70,000 exhibition: "We don't have to take any corporate shows we don't want. And there are never any strings attached." Grace Glueck, "Building the Plastic Image," *New York Times*, December 7, 1969: D28.

[64] *A Plastic Presence* (Milwaukee: Milwaukee Art Center, 1969), 6.

These exhibitions introduced the public to a new generation of plastic sculpture made through a range of novel methods and techniques. This phenomenon allowed institutions to revel in the spectacle of the works and even capitalize on the commercial potential of plastic products.[65] At the same time, critics struggled to make sense of the artworks, and often scoffed at the very presence of plastics in a museum setting. In a review of *Plastic as Plastic*, Hilton Kramer wrote that artists working in plastics are "primitives" rather than innovators, in comparison to the efforts of industrial designers.[66] He wrote: "Instead of a grand synthesis, they have achieved only a public display of divided loyalties."[67] Lucy Lippard, in a review of *Plastics* at the John Daniels Gallery in 1965, saw the malleability of plastics as problematic, as the works were "made to order for the current idioms: polychrome 'space sculpture,' optical and hard-edge color paintings and constructions, and pop commentaries on commercial items."[68] Rather than a coherent movement, plastic works were troublingly flexible. She wrote: "The combined purity and luxuriance of color and surface, the luminescent, prismatic effects are

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[65] For instance, the opening of *A Plastic Presence* at the Jewish Museum alone brought out more than 5,000 people, filling the three-story museum. Carl Katz, the Jewish Museum director, called it "one of the biggest openings we've ever had. A real maxi-opening." George Weissman, president of Philips Morris echoed this sentiment about the show: "This is all a new sensation for these people. It involves all the senses. They just don't seem to believe this could be done with plastic." John B. Forbes, "Business Flexes Plastic Art," *The New York Times*, November 23, 1969: F14. The Jewish Museum also tapped into the public's eagerness with the accompanying exhibition *Plastic in Editions*, from November 1969 to January 1970. The show offered smaller artworks in plastics that were for sale, with prices ranging from $4.50 to $1,000, by artists such as Claes Oldenburg, Jim Dine, Barnett Newman, and Larry River. Julie Baumgold, "Best Bets," *New York Magazine* 2, no. 48 (December 1, 1969): 57.

[66] Hilton Kramer, "'Plastic as Plastic': Divided Loyalties, Paradoxical Ambitions," *The New York Times*, December 1, 1968: D39.

[67] Ibid.

[68] Lucy Lippard, "New York Letter," *Art International* 9 (May 1965): 53.

frequently too much for those accustomed to less assertive materials. Like light itself—neon, fluorescent or electric—plastic tends to take off on its own."[69] On *A Plastic Presence*, *Chicago Tribune* critic Thomas Willis wrote: "If plasticult belongs to all of us, these works seem to say, let's do the best we can to find its inner poetry and logic."[70]

The critics presented an anxiousness with this "plasticult," which would continue throughout discussions of the works from this period. Synthetics used as artistic materials would continue to baffle critics and bewilder the public. By looking closely at the case studies in the following chapters, I bring more specificity to the artists and objects that fueled this movement. In considering the practices of Judd, Hesse, Valentine, and Eversley, I argue that these figures were integral to a new wave of "plasticraft" in their innovative approaches to making sculpture as well as in the way they challenged the place of plastics in the arena of public opinion.

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[69] Lippard, "New York Letter," 53.
[70] Thomas Willis, "Bringing the Art of Plastics Into Focus," *Chicago Tribune*, February 8, 1970: G10.

Chapter One — Donald Judd

"I have very ambivalent feelings about plexiglass and don't like it too much as a material. In part it's a sort of slippery and slightly disagreeable material."

— Donald Judd, 1971[1]

In a 1971 interview, Donald Judd professed having "very ambivalent feelings" about Plexiglas, calling it "a sort of slippery and slightly disagreeable material."[2] As a figure long attached to the development of minimal art in New York, whose fabricated work is often discussed as stark, cold, and impersonal, Judd's comments here are unexpected and emotive. The quotation illustrates an essential aspect of the artist's work: that in making his objects, he took on industrial materials that were unpredictable, even expressive. With no precedent in the history of sculpture, these substances were challenging for Judd, and his comment revealed the dynamic presence of Plexiglas in particular. At the time, this plastic—generically known as acrylic—was already integral to many of his geometric, fabricated objects, including three groups of floor-bound works, which are the subject of this chapter. Judd worked with pre-colored, prefabricated acrylic sheets, allowing him to introduce a wide range of colors to his objects. As seen in the interview, Judd considered Plexiglas apart from the metals he used, such as iron, brass, and copper, as well as hot-rolled, galvanized, and stainless steel. The plastic possessed a variety of abilities and was capricious, shifting color depending on the environment. Plexiglas has previously been relegated to just another one of Judd's

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[1] John Coplans, "An Interview with Don Judd," *Artforum* 9, no. 10 (June 1971): 50. This interview was concurrently published in John Coplans, *Don Judd* (Los Angeles: Pasadena Art Museum, 1971).

[2] Ibid. "Plexiglas" is a brand of acrylic developed by Röhm & Haas Company in the 1930s. Judd used this particular product, though not exclusively. However, I will apply the term throughout the text, as it is the language Judd used in medium descriptions for the works that are the subject of this chapter.

materials among many in discussions of the artist's work. What I propose is a reconsideration of Judd's materials as *particular* substances with *disparate* properties, parsing out the individual behaviors of Plexiglas, for instance, rather than grouping it under an overall categorization of "industrial materials." I argue that Plexiglas impacted the artist's process of collaborating with fabricators in a way that varied from his work with metals, resulting in early objects that were flexible, tentative, and even fragile in their construction.

Plexiglas created a unique challenge for Judd's primary fabricator, Bernstein Brothers Sheet Metal Specialties, whose expertise was in metalwork.[3] In working with the plastic sheets, Judd and his fabricators designed objects that were experimental in their construction and emphasized the visual properties of the material. Together, they innovated, particularly in making a series of floor-bound objects, nicknamed the "Turnbuckle" works, which were rectangular structures composed of three lateral sides of Plexiglas held together with tension wires—adjustable with turnbuckles—attached to two metal ends and open to the floor.[4] Judd made "Turnbuckle" objects first in opaque pebbled plastic, beginning with *Untitled (DSS 53)* from 1964 (Figure 5), before turning to transparent colors, starting with *Untitled (DSS 58)* from 1965 (Figure 6).[5] In this chapter,

[3] An invoice dated November 3, 1964 in Judd's archives, from the year he began working with Bernstein Brothers, included a list of the shop's specialties, starting with: "Sheet Metal Work/Experimental Work/Of Every Description." Bernstein 1964, Invoice folder, Judd Foundation Archives, Marfa, TX.

[4] "Turnbuckle" is an informal term used by the Judd Foundation and David Zwirner Gallery, which currently represents the artist's work.

[5] Judd made two pebbled Plexiglas "Turnbuckle" objects in 1964: DSS 53 and DSS 54, in orange and turquoise colors respectively. The second series in transparent Plexiglas are as follows, with corresponding colors: DSS 58, Red Fluorescent, three versions (1965, 1968, and circa 1970; DSS 82, Amber, 1966; DSS 83, Yellow Fluorescent, two versions (1966, destroyed, and 1969); DSS 190, Blue, 1969; DSS 234, Grey amber, 1970; and DSS 269,

I focus on the "Turnbuckles" to show the complexity of Judd's fabricated works. Rather than being static, homogenous industrial objects, these floor boxes were idiosyncratic in their design, elastic in their construction, and visually assertive in the cascading color streams that emitted from the plastic. With a close look at the development and technical construction of the "Turnbuckles" and an analysis of their visual prowess, I propose a more nuanced approach to Judd's work with industrial materials, which did not always come with certainty or predictability.

The chapter first addresses previous scholarship on Judd and its limited approach to how he worked with specific objects, followed by a short history of his introduction to Plexiglas and the artist's work with Bernstein Brothers. The following sections look more closely at the construction of the objects and the role of acrylic, particularly in two "Turnbuckle" boxes: starting with the first work, *Untitled (DSS 53)*, which used a pebbled, opaque Plexiglas (Figure 5), and then *Untitled (DSS 58)* that introduced fluorescent, transparent acrylic to the series (Figure 6). The rest of the text outlines how Judd brought plastic and steel together as he created a "network" to order and assemble his materials, which I explore through correspondence and purchase orders in Judd's archives and accounts from conservators and the artist's assistants. Finally, I end the chapter with a short discussion of a related, floor-bound series, starting with *Untitled*

Green, 1972. All of the works use stainless steel end plates, except for one (DSS 58, version three, circa 1970). The works are all formally called *Untitled*. My "DSS" designation follows the catalogue raisonné, compiled by Dudley Del Balso, Roberta Smith, and Brydon Smith: Brydon Smith, *Donald Judd: Catalogue Raisonné of Paintings, Objects, and Woodblocks, 1960–1974* (Ottawa: National Gallery of Canada, 1975). Currently, the Judd Foundation is compiling an updated catalogue raisonné. Provenance of some works mentioned in this chapter are subject to change. I owe thanks to Jana La Brasca and Caitlin Murray of the Judd Foundation for their assistance in confirming these details.

(DSS 128) from 1968 (Figure 7), to offer a subsequent example of how Judd and Bernstein Brothers learned to work with Plexiglas and steel, as first found in the "Turnbuckles."

On Judd Scholarship

Judd remains inextricably tied to the history of Minimalism, despite his insistence in interviews that he did not subscribe to this category of sculpture as a group or movement.[6] Yet critics were eager to make sense of his non-representational, geometric work that used new methods of production and industrial materials. Minimalism, still the chosen label, initially took on a variety of names, such as Object Art, ABC Art, and Cool-Art, with critics situating Judd as a trailblazer.[7] In 1965, Barbara Rose used the phrase "'object' sculpture" to describe work by Judd and Robert Morris, which she deemed "a thoroughly conceptual art," particularly as the work was made by fabricators.[8] The

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[6] In 1990, Judd addressed his distaste for "Minimal Art" as a denomination: "I hate it of course, and I've said that and written that many times. There are lots of reasons for disliking it. One of the least, to begin with, is that it was simply a derogatory publicity label…The main objection is that it makes a group out of something that was not a group, out of several people who were definitely not a group. This is a simplification. It is false art history..." Angeli Janhsen, "Discussion with Donald Judd," in *Donald Judd* (St. Gallen, Switzerland: Kunstverein St. Gallen, 1990), 50.

[7] Notable examples of such criticism: Richard Wollheim, "Minimal Art," *Arts Magazine* 39, no. 4 (January 1965): 26–32; Irving Sandler, "The New Cool-Art," *Art in America* 53, no. 1 (February 1965): 96–101; and Barbara Rose, "ABC Art," *Art in America* 53, no. 5 (October/November 1965): 57–69. James Meyer's scholarship on the distinct practices of artists such as Judd, Robert Morris, Carl Andre, and Sol LeWitt, has advanced a more judicious understanding of this period of sculpture, though the description "minimal art" is still attached to Judd's work. Meyer puts forth a "genealogical approach" that traces the rise and canonization of minimal art, which is a first important step for all literature on Judd to distinguish his practice from colleagues similarly help captive under "Minimalism." James Meyer, *Minimalism: Art and Polemics in the Sixties* (New Haven: Yale University Press, 2001).

[8] Rose, "Donald Judd," *Artforum* 3, no. 9 (June 1965): 34. James Mellow also described

following year, critic Hilton Kramer wrote that Judd's objects marked a move towards "cool, cerebral esthetics," where the artist was a "designer" creating "constructions made to order."[9] Critics writing on Judd struggled to categorize his innovation, and in the process omitted the nuances of his objects.

The first extensive description of Judd's materials came in 1965, on the occasion of the show *7 Sculptors* at the Institute of Contemporary Art, University of Pennsylvania. For the catalogue, artist Robert Smithson wrote an essay on Judd, which began:

> Donald Judd has set up a "company," that extends the technique of abstract art into unheard-of places. He may go to Long Island City and have the Bernstein Brothers, Tinsmiths, put "Pittsburgh" seams into some (Bethcon) iron boxes, or he might go to Allied Plastics in Lower Manhattan and have cut-to-size some Rohm-Haas 'glowing' pink plexiglass. Judd is always on the lookout for new finishes… This new approach to technique has nothing to do with sentimental notions about "labor." There is no subjective craftsmanship, Judd is not a specialist in a certain kind of labor, but a whole artist engaged in a multiplicity of techniques.[10]

Published the year after Judd started working with Bernstein Brothers, this essay described the artist's cottage industry, enumerating a long list of suppliers and fabricators and depicting him on the move, crisscrossing the area, from Long Island City to the Lower East Side, to source his materials. While Judd later discounted Smithson's position, the text is instructive in outlining the radical nature of Judd's practice in 1965.[11]

Judd as "taking a distinctly conceptual approach to the making of art." James R. Mellow, "Hostage to the Gallery," *The New Leader* (March 14, 1966): 33.

[9] Hilton Kramer, "Art: Constructed to Donald Judd's Specifications," *New York Times*, February 19, 1966: 23.

[10] Robert Smithson, "Donald Judd," in *7 Sculptors* (Philadelphia: Institute of Contemporary Art, University of Pennsylvania, 1965), 13. For Caroline Jones, Smithson's tone reflected his approval of Judd's practice, "as if intoxicated by the alien poetry of these proprietary terms." Caroline Jones, *Machine in the Studio* (Chicago: University of Chicago Press, 1996), 269.

[11] Judd commented: "I don't romanticize technology like Robert Smithson and others. I think generally you are forced into more modern technologies, but the technology is

Smithson cited Judd's network of suppliers, including Allied Plastics, to bring specificity to the artist's process and industrial products, mentioning the "'glowing' pink" or Röhm & Haas Company-branded "Red Fluorescent" sheets that were used in the first transparent "Turnbuckle" box, *Untitled (DSS 58)* from 1965, discussed later in this chapter. Smithson also called this work the "pink plexiglass box."[12] However, Smithson's colloquial, even satirical, inventory perpetuated detachment between the artist, his fabricators, and products.

Since this early moment in the literature on Judd, subsequent scholarship has frequently treated the artist's objects as little more than illustrations of his theoretical foundations.[13] These texts often overlook particular materials, with a few exceptions.[14]

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merely to suit one's purpose. It's not something mysterious or something that sanctions the work." Coplans, "Interview with Don Judd," 45. To Lucy Lippard, Judd stated: "Smithson loves to confuse art and science and I'm opposed to such things." Donald Judd Interviewed by Lucy Lippard, 1968, Box 36, Folder 40, p. 101, Lucy R. Lippard papers, 1930s–2010, bulk 1960s–1990, Archives of American Art, Smithsonian Institution, Washington, DC. For more on Judd's comments about Smithson over the years: David Raskin, *Donald Judd* (New Haven: Yale University Press, 2010), 142, n. 30.

[12] Smithson might have seen *Untitled (DSS 58)* at the "Plastics" exhibition at John Daniels Gallery, March 16 to April 3, 1965. Smithson, "Donald Judd," 16.

[13] Raskin, in the first monograph on the artist, advanced an understanding of the objects by using "scale" as a framework, eschewing literalist or phenomenological readings that marooned the artist in a limited Minimalism framework. This approach is applicable across substances, but Raskin did not address the making or abilities of distinct objects. Raskin, *Donald Judd*. In the catalogue for Judd's major retrospective at the Whitney Museum of American Art in 1988, Barbara Haskell's essay traced the artist's theoretical foundations and background in empiricism, with cursory attention to the accompanying images of artworks. Barbara Haskell, *Donald Judd* (New York: Whitney Museum of American Art, 1988). Anna Chave, in her important text on Minimalism as a display of masculine, aggressive, even "brutal" power, did not extend her argument to consider Judd's objects. Anna Chave, "Minimalism and the Rhetoric of Power," *Arts Magazine* 64, no. 5 (January 1990), 44. For an oppositional approach to Chave: Raskin, "Specific Opposition: Judd's art and politics," *Art History* 24, no. 5 (November 2001): 682–706.

[14] Alex Potts distinguished between the visual effects of Judd's materials, situating the "tinted perspex" or colored Plexiglas that charged the interiors of Judd's objects in contrast to the metal surfaces. Alex Potts, *The Sculptural Imagination: Figurative,*

An approach to Judd's substances is further complicated by the artist's own writings, which neither specify differences or hierarchies between materials nor privilege the visual qualities of matter. In his essay "Specific Objects," long labeled, despite his objections, as Judd's manifesto, the artist described the state of three-dimensional art in the mid-1960s, which involved a direct use of industrial substances.[15] He wrote: "Materials vary greatly and are simply materials—formica, aluminum, cold-rolled steel, plexiglas, red and common brass, and so forth. They are specific. If they are used directly, they are more specific. Also, they are usually aggressive. There is an objectivity to the obdurate identity of a material."[16] In this list, Judd did not privilege aluminum over brass, or Plexiglas over steel, stripping the products of their individual abilities. Though in the text, the artist talked broadly about the current trends in artwork, rather than about his objects, the language allowed for a cursory, even superficial reading of industrial materials, as a broad school of substances.

Judd's writings are often central to critical readings, emphasizing his words over his objects.[17] Certain texts contend with this "gap," between Judd's claim that substances are inert—"simply materials," as written in "Specific Objects"—and the visual

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Modernist, Minimalist (New Haven: Yale University Press, 2000), 304. Joshua Shannon also addressed the significance of Judd's early work with materials such as asphalt pipes and galvanized iron. Joshua Shannon, *The Disappearance of Objects: New York Art and the Rise of the Postmodern City* (New Haven: Yale University Press, 2009), 165–169.

[15] Judd explained that "Specific Objects" was not his manifesto, but rather a commissioned report on current artwork. The essay was published in *Arts Yearbook* in 1965, though Judd wrote the text the year before. Coplans, "Interview with Don Judd," 43–44.

[16] Donald Judd, *Donald Judd Writings* (New York: Judd Foundation, 2016), 143.

[17] For instance, Hal Foster considered "Specific Objects" as representative of the artist's work, rather than his objects. Hal Foster, "The Crux of Minimalism," in *The Return of the Real: The Avant-Garde at the End of the Century* (Cambridge, MA: MIT Press, 1996), 59.

experiences of his works, but still struggle to account for the two aspects of Judd's practice.[18] In this chapter, I take another path, one which allows Judd's writings to offer a broader view of the artist's work, instead of treating "Juddist" scripture as sacrosanct.[19] Ultimately, I build from the previous scholarship that consider Judd's objects through the intrusions of technology, fabrication, and collaboration, without being restricted to the artist's written parameters for sculpture.[20]

Additionally, I draw from the literature on Judd and color, which looks closely at the individual behaviors of the artist's objects and has offered productive discussions of the presence of Plexiglas and of different types of metals. Rosalind Krauss's 1966 essay "Allusion and Illusion in Donald Judd" is often cited as the first text to address the visual spectacle of Judd's objects, as she claimed the works allowed for an experience of unexpected "beauty" that was hardly reductive, removed, or polemical, as described by

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[18] Robert Slifkin discussed the schism between Judd's proposed "aesthetics of credibility" and the "illusionistic effects" of his materials, relating that "credibility gap" to 1960s anxiety around technology and conflicting perspectives about the war in Vietnam. Robert Slifkin, "Donald Judd's Credibility Gap," *American Art* 25, no. 2 (Summer 2011): 69–71.

[19] The approach to Judd's writings as scripture is further emphasized by the 2016 edition of the artist's texts, which is a cloth-bound book the size of a personal bible. Judd, *Donald Judd Writings*. Gregoire Muller writes about "orthodox Juddean ideas" and how his writings have been accepted fully without considering the impact and "consequences" of the works. He wrote: "To put it bluntly, it seems that much of the world has been living off of Judd's mental energy while often remaining surprisingly blind to the visual clarity of the works themselves." Gregoire Muller, "Donald Judd: Ten Years," *Arts Magazine* 47, no. 4 (February 1973): 35–36. In 1995, Pepe Karmel described a panel at the Whitney Museum held the year before, entitled "Donald Judd Reconsidered": "Judd's reputation as high priest of Minimalism seemed to have placed an interdiction on discussion of his work: it could be described but not interpreted." Pepe Karmel, "Recalling The Critic Who Was A Sculptor," *New York Times*, February 10, 1995: C25.

[20] Notably: Shannon, *The Disappearance of Objects*, 150–186.

1960s critics.[21] Though Krauss did not address details of materials or colors in Judd's work, she considered the opportunity to talk about the aesthetics of the objects as distinct from Judd's writings, a practice followed by subsequent scholars.[22] Color does not fit comfortably into prescribed notions of Minimalism as gray, monochrome, and cold, with masculine connotations—well suited to the black-and-white photographs that have told much of Judd's story in the 1960s—as color has long been considered secondary, feminine, and superficial in the history of Western art.[23] However, Judd's use of color was emphasized early in his career, as seen in discussions around the artist's solo exhibition at the Whitney Museum of American Art in 1968. For the show's catalogue, William Agee wrote that Judd was unique to his contemporaries for his "rich, vibrant and personal use of color," a reflection of the colorful objects that filled the show.[24] Critics commented widely on the display of color in the exhibition, which took place on an entire, open floor of the museum. Critic Elizabeth Baker described a show "full of color

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[21] Rosalind Krauss wrote that "one is totally unprepared for the extraordinary beauty of the sculptures themselves." Rosalind Krauss, "Allusion and Illusion in Donald Judd," *Artforum* 4, no. 9 (May 1966): 24. On Krauss's shifting position on Judd: Raskin, "Judd's Moral Art," in *Donald Judd*, Nicholas Serota, ed. (London: Tate Publishing, 2004), 79–80.

[22] In a 1991 essay, Yve-Alain Bois reflected on his personal encounters with Judd's work, which included "a kind of gratitude towards the artist for having revealed the aesthetic potential of what are not terribly noble materials: who can deny that, before Judd, galvanized iron bore the stigma of being amongst the ugliest and most drab of industrial materials?" Yve-Alain Bois, "The Inflection," in *Donald Judd: New Sculpture* (New York: Pace Gallery, 1991), n.p.

[23] David Batchelor, "Everything is Color," in *Donald Judd*, ed. Nicholas Serota (London: Tate Publishing, 2004), 65–75. Also: Batchelor, *Chromophobia* (London: Reaktion Books, 2000), 22–23.

[24] William C. Agee, *Don Judd* (New York: Whitney Museum of American Art, 1968), 9. Agee returns to the topic of Judd and color in: Agee, "Donald Judd and the Endless Possibilities of Color," in *Donald Judd: Colorist*, ed. Dietmar Elger (Ostfildern-Ruit, Germany: Hatje Cantz Publishers, 2000), 33–51.

and slithery reflections coming off satiny surfaces," which caused a "dematerialization" in the objects due to "light, reflection, surface thinness or transparency" and the "knife-sharp" edges that "usually reflect or refract or, with certain plastics, fluoresce."[25] In his review, James Mellow wrote that he was unprepared for the emphasis on color in the exhibition, as his "previous assumption—which I now find is incorrect—was that color was a secondary consideration."[26]

The conversation on Judd and color was not revived until some 30 years later, primarily surrounding several exhibitions that addressed this aspect of the artist's work.[27] The focus on color was most likely galvanized by Judd's last essay written before his death: the 1993 text "Some Aspects of Color in General and Red and Black in Particular."[28] In the essay, Judd initially declared: "Material, space, and color are the main aspects of visual art," inextricably connecting color and material as the essential stuff of art objects.[29] The lengthy discussion traced the history of color in painting,

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[25] Elizabeth C. Baker, "Judd the Obscure," *ArtNews* 67, no. 2 (April 1968): 45, 61.
[26] Mellow, "'Everything Sculpture Has, My Work Doesn't: My Work Doesn't,'" *New York Times*, March 10, 1968: D21, D26.
[27] For texts on Judd and color: Dietmar Elger, ed., *Donald Judd: Colorist* (Ostfildern-Ruit, Germany: Hatje Cantz Publishers, 2000); Batchelor, "Everything as Color," in *Donald Judd*, Nicholas Serota, ed. (London: Tate Publishing, 2004), 65–75; and Marianne Stockebrand, ed., *Donald Judd: The Multicolored Works* (New Haven: Yale University Press, 2014). The exhibition "Dan Flavin/Donald Judd: Aspects of Color," at the Menil Collection from November 1998 to January 1999, also addressed color in Judd's work.
[28] This essay by Judd was written on the occasion of the Sikkens Prize awarded to the artist on November 27, 1993. He fell ill and was unable to deliver the lecture, passing away on February 12, 1994 in New York. It was first printed as: Judd, *Some Aspects of Color in General and Red and Black in Particular* (Sassenheim, Netherlands: Sikkens Foundation, 1993). It was also published in the Summer 1994 issue of *Artforum*.
[29] Judd wrote: "Color, like material, is what art is made from. It alone is not art…Other than the spectrum, there is no pure color. It always occurs on a surface which has no texture or which has a texture or which is beneath a transparent surface." Judd, "Some

sculpture, and architecture and included a call to recognize the primary significance of color in artmaking. Judd wrote that color was always essential and the idea of his works as "only white or gray was a notion of the academy," certainly referencing stereotypical readings of Minimalist art.[30]

David Batchelor, in particular, has addressed the relevance of industrial colors in Judd's work, returning color to discussions about minimal art.[31] Batchelor claimed Judd's colors pulled from "painting-in-the-world" as his vibrant, synthetic colors mirrored the surfaces of modern, urban life, which offered the artist an alternative to the traditions of color theory.[32] This literature has expanded the scholarship on Judd, color, and his use of materials, but rarely connects these elements to process and fabrication. My chapter builds from this important scholarship to offer a new, visual approach to Judd's work, paired with a thoughtful discussion of Plexiglas and its presence in particular objects. In

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Aspects of Color in General and Red and Black in Particular," in *Donald Judd Writings* (New York: Judd Foundation, 2016), 833, 855.

[30] Judd, "Some Aspects of Color," 850.

[31] Batchelor likened the colors of minimal art to Pop Art, in that both used "found colours, commercial colours, industrial colours, and often bright, vulgar, modern colours in bright, vulgar, modern collisions with other bright, vulgar, modern colours." Batchelor, *Chromophobia*, 12. In an unpublished text from 1994, Lippard furthered this position, writing: "In both Minimalism and Pop, the commercial fabrication process, the industrial materials, the bright colors, the plastic and metallic glitter were an affirmation of the real world, of life, and of popular culture…" Donald Judd, circa 1956–1976, 1994, Box 10 Folder 39, p. 2, Lucy R. Lippard papers, Archives of American Art.

[32] Batchelor wrote of the phenomenon of color in modern life: "Most of the colours we now see are chemical or electrical; they are plastic or metallic; they are flat, shiny, glowing or flashing (or they are broken, switched off and as if they were never there). These colours are intense but also ephemeral; they are vivid but also contingent. And they are ubiquitous: always everywhere allied to commerce and the street. As such they are always also impure, and largely indifferent to the protocols of traditional colour theory." Batchelor argued that Judd's objects did no depict or evoke specific elements of the city but rather embodied "the colours and surfaces of the city." Batchelor, "Everything is Color," 70–71, 75.

looking at one particular body of work—the "Turnbuckles"—I address how Plexiglas introduced radical, visual displays rich with color at Judd's major exhibitions, how access to acrylics informed the objects, and how Judd establish his own production "company" creating a link between different suppliers and his fabricators to support his unprecedented way of working with the plastic.

When Judd Found Plexiglas

The objective of this chapter is not biographical but rather addresses a material encounter between Judd and Plexiglas, which began in the early 1960s and continued to the end of his career. Plastic was prevalent in the artist's works and was especially important in introducing transparency, reflective surfaces, and a full spectrum of colors, from saturated, dark hues to brilliant, fluorescent tones. Plexiglas was outspoken when used as the primary surface, as in the "Turnbuckle," declaring itself as visual spectacle. Plexiglas first appeared in Judd's early paintings in the form of a found object: a yellow, plastic "O" letter implanted in the middle of *Untitled (DSS 30)* from 1962, the only figure on a field of cadmium red light pigment on Liquitex and sand on Masonite (Figure 8).[33] This work belongs to a group of highly-textured paintings from the early 1960s that married cadmium red light with sand, wax, and objects like the asphalt pipe that protrudes through the center of *Untitled (DSS 29)*.[34]

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[33] Marianne Stockebrand, "Catalogue," in *Donald Judd*, ed. Nicholas Serota (London: London: Tate Publishing, 2004), 169. Judd's records include a receipt dated July 2, 1962 from Commercial Plastics for yellow vinyl measuring 21 by 50 inches. The destination of the material is unknown, but it might represent another attempt to use plastic. DDB Fabrication and Material Files, Box 2, Folder 6, Judd Foundation Archives, Marfa, TX.
[34] For a thoughtful discussion of this object: Shannon, *Disappearance of Objects*, 161.

Plexiglas was then used in an early floor-bound object, *Untitled (DSS 38)*, 1963 (Figure 9), one of the wooden, rectilinear structures painted in the electric hue of cadmium red light that were included in Judd's solo exhibition at the Green Gallery in New York in 1963 installed directly on the floor.[35] *Untitled (DSS 38)* is reminiscent of steps or a scalable structure and includes a custom-cut, violet-colored Plexiglas strip attached to the interior of a diagonal step across the square object. While the plastic gives the illusion of a view into the interior, the darkly colored Plexiglas is rather opaque and reflective, receding as ornamentation in contrast to the charged, red color and diagonal grain of plywood visible beneath the painted surface.

At this early moment in Judd's career, color was primarily expressed in paint, particularly with the artist's preferred hue: cadmium red light. In a 1971 interview, Judd stated that cadmium red light allowed him to emphasize a work's shape, claiming it was "the only color that really makes an object sharp and defines its contours and angles."[36] In this explanation, Judd omitted cadmium's history in the tradition of painting, rather emphasizing a new, specific purpose for the color: to accentuate shape with the utmost clarity.[37] In *Untitled (DSS 38)*, the artist used the precise edges of Plexiglas to further

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[35] Three versions of this work were made in 1963, 1969, and 1975. Judd claimed to have been the first artist to show objects directly on the ground: "The absence of a base, as far as I knew, was completely my idea." Coplans, "Interview with Don Judd," 44. He later expounded: "Nothing had ever been placed directly on the floor…Since now it is common for work to be placed anywhere in a room, it is impossible for people to understand that placement on the floor and the absence of a pedestal were inventions. I invented them. But there is no history." Judd, "Some Aspects of Color," 839.

[36] Judd discussed his choice of cadmium red light: "If you went down to cadmium red, medium or deep, the form would be fuzzy so the only point about the color was its capacity to define the form with clarity." Coplans, "Interview with Don Judd," 43.

[37] Cadmium was a metallic pigment developed in the 19th century, used by modernist painters, such as Henri Matisse. On this history: Inge Fiedler and Michael Bayard, "Cadmium Yellows, Oranges, and Reds," in *Artists' Pigments: A Handbook of*

delineate the object, while also attempting to introduce transparency. In these early objects, Judd was interested in creating opportunities to see a work's interior, by using Plexiglas or even incorporating physical holes, such as the semi-circular cut-outs along the top surface of *Untitled (DSS 41)*.

In March 1964, three months after the Green Gallery show that included the cadmium red objects, Judd turned to fabrication, hiring Bernstein Brothers, located three blocks from his loft on Third Avenue between 17th and 18th Streets.[38] He also turned to metal and plastic as his primary materials, rather than wood, in his search for a "thinner, more shell-like surface," so as to create objects that could be easily read as "hollow," freeing his works from the weight of traditional sculpture.[39] Judd described his decision to work with fabricators as part of his search to find the best "technique" to realize his structures, seeking those who had expertise in using metal and plastic.[40] Early on, Judd

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Their History and Characteristics, Vol. 1, Robert L. Feller, ed. (Washington, DC: National Gallery of Art, 1986), 65–108.

[38] For a history of the shop, see: Shannon, *The Disappearance of Objects*, 170–173.

[39] Judd explained the switch to metal, as wood was too absorbent and had a thick surface, saying he wanted a "thinner, more shell-like surface" that would create interior space. Coplans, "Interview with Don Judd," 44. While participating in a 1966 symposium for the Jewish Museum exhibition "Primary Structures," Judd stated: "I intend my pieces to be hollow. The sheet metal is obviously only so thick, and everyone knows how thick it is so that you are aware of this big space inside." "Primary Structures" Symposium, The Jewish Museum of New York, May 2, 1966, Box 2, Folder 5, p. 17, Lucy R. Lippard papers, Archives of American Art.

[40] In defending himself against Mark Di Suvero, who claimed that "my friend Don Judd can't qualify as an artist because he doesn't do the work," Judd responded: "The point is not whether one makes a work oneself or not. The point is that it's all a case of technique that makes the thing visible, so that I don't see in the long run why one technique is any more essentially art than another technique. And there are presumably an infinite number of techniques. I don't see why someone shouldn't go out and find the one that it suits him…" "Primary Structures" Symposium, p. 5–6, Lucy R. Lippard papers, Archives of American Art. Judd recalled Di Suvero later apologized for his remarks. Donald Judd Interviewed by Lippard, p. 125, Lucy R. Lippard papers, Archives of American Art.

explained that his fabricated objects did not always turn out the way he expected. In 1966, he stated: "Even if you can plan the thing completely ahead of time, you still don't know what it looks like until it's right there. You may turn out to be totally wrong once you have gone to all the trouble of building this thing."[41] There was a learning curve in this relationship, as the craftsmen at Bernstein Brothers became accustomed to Judd's specifications at the same time he was developing a new visual language.[42] In an interview from 1968, Judd defended his use of industrial processes by arguing that mass producing his objects improved the techniques of the craftsman, stating: "It would be the same object. In fact if they had to build say 30 of them, they'd get a lot better at it than they were now. The work would get better, for one thing."[43] Then, in 1971, he described his work with craftsmen as using "an old-fashioned technique—basically a late 19th-century metal-working technique."[44] Over these years, Judd emphasized his investment in the expertise of his fabricators and recognized what was needed to refine and hone a particular work: steady and frequent collaboration.

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[41] Bruce Glaser, "Questions to Stella and Judd," *Art News* 65, no. 5 (September 1966): 60. The article stated that the interview was adapted from a broadcast on WBAI-FM New York in February 1964, on a program "New Nihilism or New Art?" produced by Glaser that originally included Dan Flavin, who was omitted from the printed text.
[42] Judd complained that the first major piece made by Bernstein, *Untitled (DSS 50)* in painted galvanized iron, was not to his specifications: "They made the oval piece. It's not too well-made because they didn't realize how I wanted it. Bernstein made it as he would have made a ventilating duct." Coplans, "Interview with Don Judd," 44.
[43] Donald Judd interview, May 1968, conducted by Margot Willett, Archives of American Art, Smithsonian Institution, Washington, DC.
[44] Coplans, "Interview with Don Judd," 45.

The History of Plexiglas, and Judd

The "Art Studio," a former grocery store in Marfa, Texas, was one of Judd's working spaces later in his career. The studio, which remains preserved from the time of his death in 1994, includes a table covered with Plexiglas samples (Figure 10), visually representing the initial step of choosing colors and materials before fabrication. In this context, Plexiglas is removed from his objects, represented in the small squares arranged on the table, one substance among many in his studio. However, in practice, Judd was not simply incorporating a generic "plastic" surface, but utilizing sheets of acrylic, a synthetic material with *inherently unique* visual abilities, available in a variety of colors, and manufactured with a high, glossy finish.

Plexiglas was first launched in 1936 as a cast acrylic sheet product developed by Röhm & Haas Company of Philadelphia and Darmstadt, Germany. The material, generically known by its chemical name polymethyl methacrylate (PMMA) but more commonly called acrylic, quickly found wide appeal for industrial and military use as a lighter and more durable stand-in for glass.[45] Plexiglas is made by injecting the plastic in a liquid state into a mold of glass sheets on either end, and then immersing it in water for polymerization. The resulting hard plastic possesses a glossy, reflective surface like glass, as the material is a direct, positive impression of the glass mold, but with the durability of a synthetic substance. In short, Plexiglas is the progeny of glass, born from its surface with similar reflective and visual properties. To make tinted sheets, color is added to the initial, liquid substance, making the hue inherent to the plastic, a quality favored by

[45] Sheldon Hochheiser, *Rohm and Haas: History of a Chemical Company* (Philadelphia: University of Pennsylvania Press, 1986), 59.

Judd.[46] Initially developed as Plexiglas from Röhm & Haas, acrylic sheets were also available from a variety of companies by the 1960s, known by trade names such as Perspex from Imperial Chemical Industries and Acrylite from American Cyanamid Company.

Cast acrylic sheets are lightweight and durable and have the unique ability to conduct light from one edge to the other, passing through the lens-like, slick surface. A 1945 corporate text from Röhm & Haas described this effect as "edge-lighting" or "light-piping," where light transmitted from edge to edge and emanated from "any surface that is interrupted by sanding, machining, carving, engraving, or even painting."[47] In Judd's work, this phenomenon often created a physical outline that circumscribed the object, as if a *drawn line of pure matter*, where the edges are brighter than the flat surfaces of the material. Acrylic was not the only material that imposed its visual idiosyncrasies in Judd's work, as certain metals such as brass and galvanized steel also used reflective surfaces and contrasting patterns to bring a variety of effects to the objects. However, acrylic's transparency and wide ranges of colors made it ever-changing in Judd's work, varying greatly depending on the light conditions, the space, and the juxtapositions of other materials.

Judd actively researched Plexiglas, as evidenced by the pamphlets and materials in his archives (Figure 11). He even corresponded with Röhm & Haas, as seen in a letter

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[46] Judd stated: "I think it would be best of all if the material had its own color which was intrinsic and not applied. But there isn't much color of this sort to work with. So far, the only thing that really has a lot of color is plastic." "Primary Structures" Symposium, p. 3, Lucy R. Lippard papers, Archives of American Art. In 1971, when asked why use Plexiglas, Judd stated: "It has a hard, single surface and the color is embedded in the material." Coplans, "Interview with Don Judd," 45.

[47] *Chemicals for Industry* (Philadelphia, PA: Röhm & Haas Company, 1945), 118.

dated February 16, 1965 (Figure 12) from H.W. Gift, a representative in the Plastics Department. Gift responded to Judd's inquiry from that month, writing that Röhm & Haas did not fabricate objects, revealing Judd's initial interest in working directly with a plastic company.[48] The letter lists the standard sizes—96 by 96 and 48 by 96 inches—corresponding to and most likely determining the 48-inch length of the "Turnbuckles" using transparent acrylic, produced the same year of this exchange, in 1965.

Composing the First Turnbuckle

Before making the transparent plastic "Turnbuckles," Judd first created two early floor boxes using pebbled acrylic, or the Röhm & Haas product "Flair Patterned Plexiglas," advertised for its rippled, "stained glass effects" (Figure 13).[49] Judd ordered the plastic sheets for the first of these objects, *Untitled (DSS 53)* (Figure 5), in August 1964, five months after he began working with Bernstein Brothers.[50] Measuring 22 inches off the ground and almost four feet long, the work was fabricated for the artist with three slabs of orange-pebbled Plexiglas on the long sides and top of the rectangular structure, leaving the work open to the floor. The sculpture is designed with an odd scale, as the work sits too low to the ground to evoke furniture or design objects but is sizable enough with large, uninterrupted sheets of Plexiglas to evoke architectural structures. A

[48] DDB Fabrication and Material Files, Box 3, Folder 1, Judd Foundation Archives.
[49] Flair Patterned Plexiglas was listed in a Röhm & Haas Company brochure in Judd's archives. DDB Fabrication and Material Files, Box 2, Folder 4, Judd Foundation Archives.
[50] For the "Turnbuckles," the steel and Plexiglas were often ordered separately. For *Untitled (DSS 53)*, the Plexiglas was purchased on August 22, 1964, and the steel was purchased on October 2, 1964. The steel plates were then refabricated on February 19, 1968. Smith, *Donald Judd: Catalogue Raisonné*, 120.

mechanical construction with no inherent function, the work is held together by tension wires running through the piece and attaching to hot-rolled steel plates on each end, bringing together two materials with widely different properties. Even with the pebbled Plexiglas, the wires are still dimly visible (Figure 14), offering a reified view of the hardware inside without revealing the interior system. In using this textured, opaque plastic sheeting, Judd made the surface distinctive, but was also able to obscure the interior, perhaps to conceal the design in this first, rough stage, as he was working out the "Turnbuckles" with Bernstein Brothers. He made only one other work with the pebbled Plexiglas: *Untitled (DSS 54)*, which used a turquoise-colored material for a slightly smaller box with the same structure, before (and perhaps, more confidently) turning to a fully transparent acrylic for the remainder of the "Turnbuckles."[51]

Untitled (DSS 53), as the first "Turnbuckle," was owned by fellow artist Dan Flavin and remains in the Flavin's family collection. The "Turnbuckle" creates an odd relationship between the two materials used, where the plastic sheets and steel end pieces continue to be two very distinctive substances, united in Judd's composition. The bluish and silver streaked steel plates (Figure 15) retain the marks of their making, including lines from the material being milled and the blue and purple marks of welding—specifically, the visual evidence of heat touching the metal—coming through the outer surface along the edges and in the center where the turnbuckle wires were attached. The steel plates betray their industrial process, particularly in the hot-rolled metal rather than the more uniform stainless steel of later works. In great contrast, the plastic sheets are

[51] *Untitled (DSS 53)* measures 20 by 45-3/8 by 31 inches, while *Untitled (DSS 54)* is 20 by 44-1/4 by 30-1/2 inches. The subsequent transparent "Turnbuckles" correspond more to industry standards, following readymade sizes available in Plexiglas (see page 41).

untouched and consistent, with no seams or interruptions throughout the distinctively rippled, dull surface of the patterned plastic (Figure 16), with a trace of the casting process visible only in the diagonal markings left behind on the milled edges of the Plexiglas.

The "Turnbuckle" offered a physical and visual conversation between two materials that Judd coerced together, not for function or utility but for visual experimentation, creating awkward interactions seen in the gaps that can form between the metal and plastic, even when composed (Figure 17). These disjunctive details are not flaws, I would argue, but rather fragile, important moments that show Judd—at an early stage in his career as a sculptor working with fabricators—struggling to create a union between two substances not designed to come together. The "Turnbuckles" brought complexity to Judd's oeuvre of fabricated objects because of their delicate nature and tentative balance of objects marrying two very different materials. Judd's experimentation in these works is best exhibited in the way the boxes were composed and continue to be installed.

Untitled (DSS 53), like the subsequent "Turnbuckles," is actually a delicate, rather vulnerable object, requiring practiced hands to put it together. Due to the balance of tension between the Plexiglas sheets and the steel end plates, the components are always, and were meant to be, stored separately, so each time a "Turnbuckle" is installed, it requires a team of installers to ensure the integrity of each section and of the object as a whole, as I witnessed when it was placed on view at the David Zwirner gallery in 2018.[52]

[52] Thank you to Tamar Margalit at the Museum of Modern Art and Jaime Schwartz at David Zwirner for generously arranging my visit to see this work, and to the art handlers at Zwirner for sharing their time and knowledge.

The process begins with each of the sections laid out carefully and then slowly brought together, first around the base in a delicate horizontal stacking of plastic beside metal (Figure 18). For each "Turnbuckle," the Plexiglas was suspended without screws or pins but using a series of devices, including welded tabs on the edges of the steel plates that loosely hold the plastic sheets and cables with turnbuckles, which were attached through metal brackets welded to the interior of the steel (Figure 19).[53] In three photographs showing the installation process (Figure 20), the turnbuckle wires are connected before the top piece is laid down, typically by arranging the perimeter of sides pieces on a table with an open hole in the center, allowing an installer to crawl up through the center to access the cables. The wires are connected loosely at first, to allow for the top piece to be slipped in carefully to keep the plastic from flexing through the choreography of art handlers. The installers then continue to slowly fit the pieces together while the wires are more firmly tightened on the inside of the box until the metal components are able to fully hold the plastic sheets in place, as seen in an image of the work's composed interior (Figure 21). The work is then lowered to the ground for final installation, keeping tension on the metal side pieces in the process.

My contemporary account of putting together *Untitled (DSS 53)* is consistent with historic descriptions as well. One of Judd's assistants, Jaime Dearing, recalled the acrobatic skill of installing a "Turnbuckle." He described the process as starting by setting up the metal ends and the two Plexiglas sides to attach the turnbuckle wires, requiring "some moment of pure balance," then cleaning the interior one last time and

[53] The number of turnbuckle cords varied. Bernstein Brothers created some steel plates with four brackets and others with five brackets to attach the wires.

leaving the two, top wires slack before bending the top piece and "snapping it into place."[54] For Dearing as well as contemporary installers, the final step would be reaching into the open bottom to tighten the wires without bending the plastic.[55]

The "Turnbuckle" is a strange example of an industrially fabricated object, as its rudimentary design is engineered to bring together two disparate materials but it is not finite as a closed system of mechanics. Rather, the floor box is a work composed based on careful touch, requiring the labor of practiced hands, keeping it at the mercy of human error each time it is put together as it changes upon every installation. Essentially, the "Turnbuckle" is never exactly the same piece twice, as opposed to other fully fabricated works by the artist that are not adjustable. The "Turnbuckles" could even be considered more ephemeral than other Judd objects as they are contingent on the circumstances, labor, and space for their final appearance and offer a more vulnerable side to the artist's use of industrial fabrication.

Rather than a fixed object, Judd intended the "Turnbuckle" to be a new portable kind of sculpture, at a time when the artist was beginning to exhibit more widely. In an interview, Judd described this function: "The floor boxes with plastic sides and top started out in a practical way. I wanted them to be portable, and shippable—a knock-down piece. Thus they are designed to be taken apart."[56] Their flexible construction made them more delicate, as the Plexiglas sheets bent more easily than the steel end plates. The objects could also be easily manipulated in his studio and on site for an exhibition,

[54] Jaime Dearing, email to the author, May 17, 2017.
[55] Thank you to Jaime Dearing, Mette Carlsen of the Judd Foundation and Eleonora Nagy of the Whitney Museum for sharing their experiences in installing these objects.
[56] Coplans, "Interview with Don Judd," 49–50.

making them more malleable than a fabricated object that emerged fully composed from the workshop. Dearing remembered that the works would even arrive from Bernstein Brothers to Judd's studio in pieces, for his assistants to put together.[57] Judd was particular about all the components, including the appearance of the tension wires, but he was not attached to the specific hardware used. Dearing purchased turnbuckles and wires on Canal Street in New York as well as in other cities, if he needed to find a replacement while installing an exhibition.[58] The "Turnbuckles" were adjustable forms that Judd continually returned to, as evidenced by the spare end pieces still present in Judd's studio in Marfa (Figure 19).

The "Turnbuckle" objects were also represented in Judd's four major solo exhibitions in the 1960s and 1970s, which were all titled "Don Judd": Whitney Museum, 1968; Stedelijk Van Abbemuseum, The Netherlands, 1970 (which traveled to Folkwang Museum in Essen, Germany, and Whitechapel Art Gallery in London); Pasadena Art Museum, 1971; and The National Gallery of Canada, Ottawa, 1975. Yet the objects were often mislabeled in exhibition catalogues.[59] Or the works were represented by the same

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[57] "I don't remember Bernstein ever supplying hardware or putting the pieces together. They just delivered the metal and plexiglass panels. (Usually still with protective material adhered to the panels)." Dearing, email to the author, May 17, 2017.

[58] "Especially in these pieces, he cared a lot about how the wires and turnbuckles looked. Because they represented structural integrity—they loomed large in meaning. Surprisingly, he cared less about the turnbuckle placement and type. Sometimes turnbuckles were in the middle, sometimes non-equidistant, sometimes attached to the metal wall itself. There were 2 or 3 different ways of wrapping the wire ends. The wire varied in size and type as did the turnbuckles. Wire and turnbuckles were sometimes lost or damaged and needed replacement at a new venue—Europe, Briton [sic], USA, etc. yielding differing hardware types and color. Of course, all hardware must match within a single piece." Dearing, email to the author, May 10, 2017.

[59] Color is often listed incorrectly, as seen in a 1966 catalogue that describes *Untitled (DSS 58)* as "pink" instead of Red Fluorescent. *Eight Sculptors: The Ambiguous Image* (Minneapolis: Walker Art Center, 1966), n.p.

two black-and-white images typically used for the whole series, such as a photograph of *Untitled (DSS 58)* (Figure 22), showing the object cropped tightly and floating on a dark background without color, as well as a photograph of *Untitled (DSS 53)* (Figure 23) from Judd's 1964 exhibition at the Green Gallery.[60] Although the "Turnbuckle" works were involved in these major shows, the photographs in the catalogues often diminished the specificity of their visual impact. This phenomenon perpetuated the idea that Judd's works were interchangeable, even with regards to the uniquely colorful and vibrant *Untitled (DSS 58)*, the first transparent "Turnbuckle."[61]

Turnbuckles and Transparency

In 1965, Judd turned to transparent acrylic for the "Turnbuckles," first using a Red Fluorescent Plexiglas in *Untitled (DSS 58)* (Figure 6). As opposed to the pebbled Plexiglas, the transparent sheets opened up the object's interior, revealing the infrastructure of the piece. Judd described the works: "None of the plexiglass boxes have a bottom, so in the clear ones the floor can be seen through the box. This opens the box up. The whole scheme has to do with *defined ends and open body*; this has been a sort of

[60] For instance, an image of *Untitled (DSS 58)* was used in the text for the 1971 Pasadena Art Museum exhibition, though the work included (plate 21) was *Untitled (DSS 83)*, made with Yellow Fluorescent (not "fluorescent orange" as cited). Coplans, *Don Judd*, 43. The catalogue has an inserted "errata and addenda" page at the front with the many amendments, including color corrections. In 1973, Judd wrote that there were "64" mistakes in the Pasadena exhibition catalogue. Judd, "Complaints, Part III," *Arts Magazine* (March 1973): 31.

[61] On the problems and limitations of minimal art and photography: Potts, "The Minimalist Objects and the Photographic Image," in *Sculpture and Photography: Envisioning the Third Dimension*, ed. Geraldine A. Johnson (Cambridge: Cambridge University Press, 1998), 181–196.

steady idea."[62] Like the pebbled version, the transparent object was left open to the floor, with three lateral sides of transparent acrylic attached by two steel ends. The first of the transparent acrylic "Turnbuckles," *Untitled (DSS 58)* was a spectacle of synthetic color. Three versions of this work were made in 1965, 1968, and circa 1970, the first two with stainless steel ends and the last with another form of steel.[63] In the objects, the Red Fluorescent Plexiglas created a show of delectably gaudy, syrupy, saccharine color, where the edge-lighting encircled the work with a glowing outline.[64] As seen in three different photographs of the third version of *Untitled (DSS 58)* in a recent exhibition, the plastic emits a wide range of colors, from hot pink to deep, electric orange to a darker, more magenta hue (Figure 24), depending on the light conditions.[65] The plastic sheets, layered together in space, send streaks of colored light along the gallery floor. The metal plates are merely vehicles, containing the volume of color along with the visible tension wires, to allow for a deep wash of chemical color, unsullied by adhesives or seams. In another image (Figure 6), the 1968 version glows with a rich, opulent light. The effect is unexpected for acrylic, a substance that does not embody life or spirituality in its

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[62] Judd also stated that the pebbled Plexiglas boxes were first used to conceal the interior, while he refined the design. "Once I got the design of the wires better I was able to make the boxes of transparent plexiglass." Coplans, "Interview with Don Judd," 50.
[63] The DSS catalogue raisonné documented two versions of *Untitled (DSS 58)*, but a third object in the series has recently been identified by the Judd Foundation, dated circa 1970 and using either hot or cold rolled steel, which has yet to be confirmed for the foundation's current catalogue raisonné project.
[64] I observed this range of visuals as I placed contemporary sheets of Plexiglas no. 2085 against a window and watched the color change throughout the day, with the edges glowing like brilliant ember at dusk, on September 26, 2017.
[65] The range of color calls to mind a quotation from Josef Albers's 1963 *Interaction of Color*, which Judd includes in his 1993 essay "Some Aspects of Color in General and Red and Black in Particular": "If one says 'Red' (the name of a color) / and there are 50 people listening, / it can be expected that there will be 50 reds in their minds. / And one can be sure that all these reds will be very different." Judd, *Donald Judd Writings*, 842.

industrial veneer. Yet in Judd's work, the object possesses an ethereal presence, giving substance to light, akin to stained glass.

The phenomenon of *Untitled (DSS 58)*, as a modern marvel, was not lost on Judd's contemporaries, who sought to describe the work's spectacle of color and light. Smithson, in writing on the "pink plexiglass box" in 1965, described an artificial, crystalline form, built from tension, where "every surface is within full view, which makes the inside and outside equally important."[66] Lucy Lippard previously owned the 1968 version of *Untitled (DSS 58)*, buying the object after its appearance in the Whitney Museum exhibition with money she received from a Guggenheim Fellowship.[67] She once described the work's color and effects as "Mercurochrome," referring to a popular topical antiseptic in the 1960s, generically known as merbromin, which came in a red solution that stains the skin vibrant colors when used.[68] Lippard's evocation of this medicinal, red

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[66] Smithson, "Donald Judd," 16.

[67] Lippard's archives include a full account of her experience with the artwork. She purchased the work in 1968 and sold it in 1975, as she recalls: "And I bought a Don Judd. The year I got the Guggenheim—I got $7,000 for a Guggenheim, which seemed like an absolute fortune. I was making about three or four [thousand dollars] at the time…But I bought a Don Judd, again, for a thousand bucks or 800 or something, early on… I sold it when I went to Spain." Oral history interview with Lucy Lippard, March 15, 2011, Archives of American Art, Smithsonian Institution, Washington, DC. In December 14, 1975, she wrote Judd a letter to tell him she sold the piece to finance her writing ventures, agreeing to send his 15% artist's rights portion. Lippard sold the work to a collector through art consultant Elaine J. Johnson and gallery owner Paula Cooper. In 1994, Lippard wrote in a draft text for a Judd symposium: **"**I owned pink box for a while; probably liked it for all the wrong reasons. My Kid ran into it with trycicle [sic] so when I sold it so I could take time off to write a novel, the plexi was all replaced." Donald Judd, circa 1956-1976, Lucy R. Lippard papers, Archives of American Art. In 1987, Paula Cooper sold the object to the Centre Pompidou in Paris, where it currently resides.

[68] In conversation with Judd, Lippard connected Plexiglas to cadmium paint: "Because the pink box in a way is a kind of expansion of that whole idea of the cadmium red, isn't it? Because I think light edges do the same sort of thing—merchurochrome [sic]." Donald Judd Interviewed by Lippard, p. 93, Lucy R. Lippard papers, Archives of American Art.

liquid speaks to the electric color and fluid, bodily effects of the fluorescent plastic sheets, as if molten color was suspended in space. In an interview, Lippard described the work: "It was a pink plastic box where the edges of the Plexiglas had sort of a Day-Glo tinge. It was a beautiful thing."[69] Before she acquired the work, Lippard also called attention to the "Turnbuckle" while interviewing Judd on the occasion of his 1968 Whitney Museum exhibition, with Whitney curator William Agee interjecting:[70]

Lippard:	Why were the ends on that steel? Mainly to keep it tighter? Or —?
Judd:	No, because I wanted steel ends, solid ends. I could very well make a plain plastic box. Then it could be all glued together and so forth. This can't be because the ends are too heavy.
Lippard:	And then the ends were the reason for the axis thing rather than you planned on the wires inside?
Judd:	No, I planned on the wires. It was, you know, thought of like it is. Plain plastic boxes seemed too simpleminded.
Lippard:	Yes. You've never done one, have you?
Agee:	They're too pretty almost, some of them.
Lippard:	Well, it would begin to look like a display item too. This made it sculpture.
Agee:	The steel ends, too, seem to give it an anchor, give it more of a definition than an all-plastic box.
Lippard:	Also it makes it harder to define and it does make it more complex the whole thing.
Judd:	It would be too light, too.
Agee:	All plastic would just seem to levitate.[71]

The discussion addressed Judd's choice of materials, as well as the impact of the object in the Whitney's galleries at the time of the interview. Elements of the objects come forth, such as the balance between the physical beauty of the colored plastic and the need to

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[69] Oral history interview with Lucy Lippard, Archives of American Art.
[70] In the interview, Lippard mentioned *Untitled (DSS 58)* on three occasions, first to ask if anyone owned the piece, before she acquired the object. Donald Judd Interviewed by Lippard, p. 82, 83, 93, 102, and 103, Lucy R. Lippard papers, Archives of American Art.
[71] Donald Judd Interviewed by Lippard, p. 103, Lucy R. Lippard papers, Archives of American Art.

emphasize that the object is sculpture (not a "display item," a reference to consumer products), as well as the contrast between heavy steel and light plastic, where the Plexiglas would "levitate" if left alone. These descriptions offered a more thorough visual analysis of the object that is specific to the individual abilities of the two materials.

This assessment of *Untitled (DSS 58)* continued in the photographs from the Whitney exhibition, despite the black-and-white photography. In one image (Figure 25), the "Turnbuckle" gleamed under the spotlight as a prism lit from within, casting light in long, angular streaks on the hard floor. Against the foreboding gallery architecture with a honeycombed Brutalist ceiling and dark, stone floors, the object glowed like a piece of discovered ore, with a halo of light that brightened the interior through the transparency of the side panels, with even the stainless steel ends illuminated.[72] Here, as with other photographs from this period, the images captured the full visual content of the galleries, which asserted themselves as much as the artworks, particular with the juxtaposition of the Plexiglas against the floor.[73] A different image of the same installation (Figure 26) dampened the effect but revealed the edge lighting on the top panel, which gleamed as if demarcated by a bright outline. In the photographs, *Untitled (DSS 58)* was constantly changing, revealing that the work as a "fabricated" object is hardly but static and lifeless.

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[72] In 1984, Judd writes about his problems with gallery installation practices: "Almost all art for thirty years has been shown in white plasterboard galleries, vaguely derived from modern architecture…The lighting is always bad, created by spotlights so that the work will look precious, the saleable jewel." Judd, "A Long Discussion Not About Master-Pieces but Why There Are So Few Of Them: Part II," *Donald Judd Writings*, 393.

[73] Thank you to Karen Lemmey for sharing her observances of these photographs. Dearing also mentioned the particular challenge of flooring when installing the "Turnbuckles" for Judd's exhibitions, along with other environmental factors. He recalled: "They were tricky to get right—many issues arose regarding the needs and place of assembly (level floors, rugs/no rugs, lighting, orientation, stone floors, parquet floors, ugly floors, etc)." Dearing, email to the author, May 10, 2017.

Judd's "Company" and Procedures

Judd's fabrication process was not linear. His practice did not involve one order or one interaction between the artist and the workshop per object. Rather his works were produced through a network of correspondence and an exchange of purchase orders (or "POs"), creating a flurry of handwritten paperwork—often prepared by his assistant Dudley Del Balso—that represented the many hands involved in each artwork.[74] Today, the Judd Foundation retains stacks of these orders, which include small sketches, descriptions of works, or requests for individual parts.[75] The orders for the "Turnbuckles" in particular show how frequent correspondence and a community of vendors was needed to make these objects. These works were often identified by a sketch of the end plate with holes marking the positions for the tension wires (Figure 27), accompanied by shorthand notations that stand for materials, such as "S/S" for stainless steel and "#2085" for Röhm & Haas-branded "Red Fluorescent" Plexiglas. When it came to the "Turnbuckle" objects, the works were not fully assembled by Bernstein Brothers, but rather Judd and his assistants ordered components separately. One purchase order from Judd's studio

[74] Meyer described the "circuit of production" that drove Judd's collaborative making. Meyer, "The Minimal Unconscious," *October* 130 (Fall 2009): 143.

[75] Richard Bernstein, son of Bernstein Brothers proprietor Edward, discussed the process for the purchase orders: the document would first be stamped by a shop technician, often José "Joe" Otero, and then approved by Judd's assistants, such as Dudley Del Balso. The order would be stamped the year and the piece number, so "89-72" would reference 1989 and object no. 72. "Judd Foundation: Oral History Project," September 13, 2005, p. 36, Judd Foundation Archives, Marfa, TX. Two events changed Judd's organization: the artist joined Leo Castelli Gallery after Green Gallery closed in July 1965 and the gallery became involved in some of the purchase orders; and Del Balso was hired by Judd in April 1968 as his office manager, after working with him while assisting Agee on the Whitney Museum retrospective in 1968. Thereafter, she started a system of organizing purchase orders and archiving material. Jeffrey Kopie, "Chronology," in *Donald Judd*, Nicholas Serota, ed. (London: Tate Publishing, 2004), 251, 254.

requests three sets of end plates, while another asks for Plexiglas sheets for two separate "Turnbuckles" in yellow fluorescent (#2086) and blue transparent (#2069) colors (Figure 28), most likely destined for *Untitled (DSS 83)* and *Untitled (DSS 190)*.[76] These documents were important in tracking the sources for Judd's objects, but the purchase orders were more than simply paperwork. The order forms were the bridge between Judd, his fabricator, his suppliers, and his gallery, as the artist and his assistants managed the production of his objects from the studio. His "Turnbuckles," in particular, were not just ordered, processed, and delivered, but required a system to organize the movement and replacement of parts and pieces.

Judd's records include invoices from several plastics suppliers (Figure 29), for materials sold to Bernstein Brothers or directly to the artist. These documents show that Judd sourced plastic from Lower Manhattan: he purchased materials from Allied Plastics Supply Corporation on 75 Cliff Street (which later moved to 895 East 167th Street, Bronx, NY) and Commercial Plastics & Supply Corporation on 630 Broadway. He also worked with companies in Long Island City: he ordered supplies from DBL Plastics Inc. on 43-38 36th Street and Cadillac Plastics Company on 14-51 Broadway.[77] These companies sold acrylic sheets broadly, which included Plexiglas and Acrylite products, as

[76] For instance, there are two purchase orders signed by Del Balso, dated July 10, 1969, ordering two sets of Plexiglas sheets for two Turnbuckles in yellow fluorescent (#2086) and blue transparent (#2069) colors respectively: four sheets measuring 19 ¾ by 48 inches and two sheets measuring 34 x 48 inches. The same day, another purchase order (#69-6) requested three sets (six total) of stainless steel ("S/S") end plates measuring 20 by 34 inches to be sent directly to Castelli Gallery. Donald Judd, Business, 1969–1977, Leo Castelli Gallery records, circa 1880–2000, bulk 1957–1999, Archives of American Art, Smithsonian Institution, Washington, DC.

[77] DDB Fabrication and Material Files, Box 2, Folder 4, Judd Foundation Archives.

enumerated by a written list prepared by Del Balso and amended by Judd with product numbers and colors for the two brands (Figure 30). [78]

Röhm & Haas's Plexiglas colors are identifiable as four digit numbers, while Acrylite, produced by American Cyanamid Company, uses three digits, a dash, and then a final number. For Plexiglas, Judd purchased nos. 2085 (Red Fluorescent), 2086 (Yellow Fluorescent), and 2069 (Blue Transparent) for his works. For Acrylite, Judd bought nos. 539-6 (Green), 420-4 (Amber), and 625-5 (Blue) sheets for his objects.[79] While certain colors are checked in pencil by Judd, it is unclear whether he had a preference between the two acrylic brands, though Dearing recalled that the artist's choices were based on the "color, sheen, density, and thickness" of the different types of acrylic.[80] Whatever the reason, the document reveals the meticulous organization of Judd's studio to differentiate between the qualities of color offered by two American suppliers, as part of a concentrated effort to get to know the plastic substance. Together, the purchase orders from Judd's studio and the checklist of acrylics show what was involved with Judd's process of fabrication: research on and collaborative working with several different industries to manage the circulation of materials.

This paperwork also reveals that components for the artist's works were occasionally replaced, particularly when the materials were damaged or mishandled. As

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[78] DDB Fabrication and Material Files, Box 2, Folder 4, Judd Foundation Archives.
[79] The Plexiglas and Acrylite colors all appear in purchase orders in Castelli's records: Donald Judd, Business, 1969–1977, Leo Castelli Gallery records, Archives of American Art. Conservator Eleonora Nagy warned that Judd's colors for Plexiglas are not consistent with contemporary product numbers as the chemical compositions have changed. "Judd Foundation: Oral History Project," p. 47, Judd Foundation Archives.
[80] On Judd's preference for acrylic brands, Dearing remarked: "Don cared more about the color, sheen, density, and thickness than about the brand, price, scratch resistance, or availability." Dearing, email to the author, May 10, 2017.

such, Judd preferred that familiar hands handled his objects when possible, as correspondence over the artist's 1971 exhibition at the Pasadena Art Museum shows that he insisted the museum pay for Dearing and a representative from Bernstein to oversee installation.[81] Over time, Judd became more inflexible about repairs, as he struggled to maintain the integrity of his works after repeated damage in exhibitions.[82] He drafted a letter in 1969 about the burden of fixing objects, which had created onerous busywork for him, his studio, and his dealer, Leo Castelli, to manage insurance claims and repairs.[83] Even today, the question arises as to whether components of the artist's objects may be simply replaced, with conservators insisting on maintaining the original marks and technologies of his fabricators whenever possible, as representatives of a historic moment in object making.[84] In essence, due to Judd's unusual use of temperamental industrial materials, the activity around an object persisted long after its production, as the artist struggled to keep the integrity of his surfaces.

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[81] Donald Judd exhibition, May 11 to July 4, 1971, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.

[82] Judd enumerated the damage done by shipping companies and institutions in a 1973 essay: Judd, "Complaints, Part III," 31.

[83] In the letter, dated December 18, 1969, Judd wrote: "Due to the tremendous amount of time I have spent on insurance claims I am only willing to lend my works of art to institutions who will be directly liable for any damages incurred during the exhibition or in transportation." Donald Judd, 1965–1973, Box 12, Folder 58, Leo Castelli Gallery records, Archives of American Art.

[84] In 1968, Lippard asked Judd what a collector should do if the Plexiglas in an object "gets scratched up badly," and Judd responds: "Throw it away and get a new set…Replace the Plexiglas." Donald Judd Interviewed by Lippard, p. 127, Lucy R. Lippard papers, Archives of American Art. Today, conservators state that Judd's components should not simply be replaced with contemporary parts, but should be retained when possible to maintain the original technologies of his fabricators, as documents of a moment in object making. On this issue: Eleonora E. Nagy, Bettina Landgrebe, and Shelley M. Smith, "Treatment of Donald Judd's *Untitled 1977*: Retention of the original acrylic sheets," *Objects Specialty Group Postprints* 18 (2011): 113–125.

Tunnels after Turnbuckles, In Conclusion

In this chapter, I have looked closely at the "Turnbuckle" as an object that brought two incongruous industrial materials together in visual and mechanical balance, driven primarily by the parameters of Plexiglas. I conclude by looking at what came next: another series of floor pieces made with Plexiglas and steel that Judd began developing in 1968. This group of objects started with *Untitled (DSS 128)* (Figure 7), constructed with amber-colored Plexiglas and stainless steel, which was followed by five related works made between 1968 and 1969.[85] Designed with Plexiglas sheets wrapped around a steel core, the work represented Judd's next step in finding a way to bring plastic and metal together as structural and visual partners.

The object is constructed with three lateral sides of Plexiglas, open to the floor, which surrounds a steel core that tunnels through the structure. These "tunnel" objects are very different than the "Turnbuckles." They are larger—*Untitled (DSS 128)* is 33 inches high and more than five-and-a-half feet long—and rely on exterior hardware rather than tension wires for the construction. The fabricated metal core includes picture frame steel plates on either end, connected by the narrow, rectangular tunnel that runs horizontally through the object. Instead of using tension, the Plexiglas sheets are attached to one another using stainless steel pins along the lateral, top edges, and connect to the metal core with stainless steel screws at each corner. The hardware is fully visible and hard to ignore, as the pins and screws protrude from the sleek edges of the plastic. The Plexiglas

[85] The full series of the *Untitled* "tunnel" works: DSS 128, Amber, 1968; DSS 134, Green, 1968; DSS 144, Blue, 1968; DSS 145, Yellow, 1968; DSS 155, Red Fluorescent, 1968; and DSS 158, Yellow Fluorescent, 1969. A similar work, dated 1973 in the collection of the Solomon R. Guggenheim Museum, uses the same structure but with brass instead of stainless steel.

is used more as decoration than as structure in these works. As I have already shown, the "Turnbuckles" were temperamental and challenging objects to handle. The "tunnels" are the steady, second act, designed to avoid the complications of the "Turnbuckle" structure.

The "tunnel" objects were also developed as fully fabricated works, as an undated document from Bernstein Brothers described the process of making them at length.[86] Bernstein Brothers had more control over the production of these sculptures, perhaps due to their growing comfort working with Plexiglas. The "tunnels" and the "Turnbuckles" are similar in their design as solitary, floor-bound objects and in their emphasis on color with large, unadulterated swathes of plastic. However, in *Untitled (DSS 128)*, the steel core interrupts the plastic, where the Plexiglas is visually and physically subservient to the metal structure.[87] Though the later works were not collapsible like the "Turnbuckles," the plastic is similarly stored in pieces (Figure 31) to prevent the massive sheets of Plexiglas from sagging under their own weight.[88] When seen separately, the bare plastic used for *Untitled (DSS 128)*, for instance, is bright, vibrant, and uniform. However, when the larger works are assembled, the acrylic is muted in juxtaposition with its metal counterpart, a compromise for the sake of a more intact, fabricated form.

The "tunnels" were primarily collected by museums, as they appeared at a crucial point in Judd's career. *Untitled (DSS 128)* was made in anticipation of the 1968 solo exhibition at the Whitney Museum, which acquired the work that year. Two works made

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[86] According to the document, after the steel core is welded and "electropolished," the plastic is slid into welded brackets and attached using stainless-steel screws and pins. Donald Judd, 1965–1973, Leo Castelli Gallery records, Archives of American Art.
[87] One review of the Whitney Museum exhibition in 1968 described the object as "a silver coffin imbedded in a warm, wet volume of honey." Baker, "Judd the Obscure," 45.
[88] Thank you to Eleonora Nagy for sharing her thorough guidelines for storing and installing *Untitled (DSS 128)* at the Whitney Museum.

in 1969, *Untitled (DSS 144)* in blue Plexiglas and *Untitled (DSS 145)* in yellow Plexiglas, were acquired by the Walker Art Center and the Art Institute of Chicago, respectively, situating these objects as representatives of Judd's legacy. In contrast, the "Turnbuckles" were acquired by private collectors, with only one in a public institution today.[89] As such, these objects have long been overlooked, particularly as they relate to the "tunnel" works.

In discussing these sets of objects together, I offer two important sides of Judd's artistic practice. In the "Turnbuckles," the artist privileged the experimental and idiosyncratic aspects of Plexiglas for delicate, temperamental boxes built through tension. For the "tunnels," Judd emphasized the strength of the structure, using exterior hardware and relegating Plexiglas to the role of visual embellishment rather than the primary building block. Together, the floor boxes present Judd's varying approaches to fabrication. The objects Judd designed were never fixed, especially as he worked out the engineering details, and the artist would often be challenged by the integration of varying materials, such as Plexiglas. Even as he lamented the plastic's pitfalls—as "slippery and slightly disagreeable"—Judd continued to seek out the synthetic substance, creating objects by adapting traditional fabrication methods to his designs.[90] The "Turnbuckles," in particular, shed a light on how Judd worked with Bernstein Brothers, his gallery, his suppliers, and his assistants on these objects, as they collectively took part in his circulation of materials and contributed to the artist's complex process.

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[89] *Untitled (DSS 58)*, 1968, is at the Centre Pompidou, Paris. Another work, *Untitled (DSS 234)*, 1970, is a promised gift to the Los Angeles County Museum of Art.
[90] Coplans, "Interview with Don Judd," 50.

Chapter Two — Eva Hesse

"…if you use reinforced fiberglass clear and thin the light is there by its nature and the light does beautiful things to it. It is there as part of its anatomy."

—Eva Hesse, 1970[1]

On November 15, 1968, Eva Hesse opened her first solo sculpture exhibition—entitled *Chain Polymers*—at the Fischbach Gallery on 57th Street in New York. The show marked her debut in the city and signaled her working relationship with Fischbach Gallery, at a time when she was also included in several major group exhibitions.[2] At the center of *Chain Polymers* were four sculptures in Fiberglas installed in the main space of the gallery*: Repetition Nineteen III*, *Accretion*, *Accession III*, and *Sans II* (Figures 32–34). *Repetition Nineteen III*, *Accretion*, and *Sans II* were composed of multiple cast parts—cylinders, tubes, and boxes—displayed either with irregular spacing or in grid form. The works established contact with different spaces in the gallery, with *Repetition Nineteen III* (Figure 32) arranged sporadically on the floor in 19 units, *Accretion* (Figure 34) propped against the wall in 50 components, and *Sans II* (Figure 33) covering 35 feet of the 39-foot gallery wall, hung in a long horizontal strip.[3] *Accession III* (Figure 32) was

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[1] Cindy Nemser, "Eva Hesse," in *Conversations with 15 Women Artists* (New York: HarperCollins, 1995), 188. This interview was first published in the May 1970 issue of *Artforum*. The 1995 version represents the full, edited transcript, though the text differs in part from the initial draft, which reads: "…if you use [Fiberglas] clear, you use it thin, well light does beautiful things to it…It is part of the anatomy structure…" Typescript of Interviews, Eva Hesse papers, 1914–1970, Archives of American Art, Smithsonian Institution, Washington, DC.

[2] In addition to opening *Chain Polymers*, Hesse was included in major group shows in 1968: *Anti-Form* at John Gibson Gallery in October through November; and *9 at Leo Castelli* curated by Robert Morris at Castelli's 108th Street warehouse in December, where she was the only woman artist represented. Elisabeth Sussman, "Eva Hesse: Sculpture 1968", in *Eva Hesse: Sculpture*, eds. Elisabeth Sussman and Fred Wasserman (New York: The Jewish Museum, 2006), 9.

[3] Bill Barrette, *Eva Hesse Sculpture* (New York: Timken Publishers, Inc., 1989), 184.

the monumental anchor of the exhibition. The thickly cast and open Fiberglas cube was covered from edge to edge with 28,000 hand-drilled holes filled with clear vinyl tubing facing inward. Like a sea anemone, the work filled a minimal structure with a lush interior of plastic. Constructed with unpainted, raw Fiberglas, the objects were delicate, almost vaporous, and iridescent under the gallery lights, blending and receding into the space's pale tiled floors and bare white walls.

These four sculptures—*Repetition Nineteen III*, *Accretion*, *Accession III*, and *Sans II*—represented the artist's first collaboration with fabricator Doug Johns at Aegis Reinforced Plastics in New York. Working with Johns at Aegis was especially important to the history of Hesse's work, beginning with the *Chain Polymers* exhibition, though her work with outside workshops is often relegated to a footnote.[4] Johns at Aegis crafted the four Fiberglas artworks to be the focus of her exhibition, making pieces that strayed from the gloss and polish of Fiberglas commercial objects by relying on the imperfections of the unfinished, rough material—filled with air bubbles, rough ridges, and uneven textures—to create the wide range of visual effects.

The scholarship on Hesse has long overlooked the specific role of Fiberglas in the artist's practice. Instead, the literature on Hesse has emphasized the artist's hand in her work, treating her materials as extensions of her body. This chapter recovers Hesse's working relationship with Johns and Aegis Reinforced Plastics. I look closely at the technical construction of the first four Fiberglas works to underscore the significant role of fabrication in the production of her objects, in order to challenge gendered narratives

[4] For instance: Anne Wagner, "Another Hesse," in *Three Artists (Three Women): Modernism and the Art of Hesse, Krasner and O'Keeffe* (Berkeley: University of California Press, 1996), 323 n.130.

that have privileged male artists engaging with industrial partners in the 1960s. In the text, I do not address Hesse's intention or her specific, personal presence in the works. Rather, I consider the artist's objects as "acts of negotiation" as Hesse learned to adapt her process to the plastic, the results of which were presented at the 1968 Fischbach Gallery exhibition.[5]

This approach allows for an expanded understanding of "fabrication," a term that references the process through which artworks were made for artists by industrial workshops. Just as Judd's involvement with the construction and processing of his objects was varied and complex, as seen in the previous chapter, Hesse's engagement with Aegis evolved to become more and more collaborative, and her presence in the process fluctuated depending on the artwork. In short, both Judd and Hesse offer examples of how fluid and flexible the relationships between artists and fabricators were in this period, and how they shifted depending on the material used and the requirements of the artist.

In recovering this history of Hesse's work with Aegis and Johns, I hope to inform future interpretations of the artist's objects with regards to the varying role of labor in her objects. My research in this area also comes with some urgency, as today Hesse's Fiberglas sculptures are no longer luminous and pearly white, but brittle and yellowing. Museums exhibiting these works can only guard and protect the objects as they degrade.[6]

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[5] I adapt this phrase from Wagner, who discussed Hesse's speech and diaries as "acts of representation" rather than confessional texts. Wagner, "Another Hesse," 203.

[6] In anticipation of the artist's retrospective organized by the San Francisco Museum of Modern Art in 2002, the museum hosted a roundtable in 2000 in New York to discuss conservation issues concerning Hesse's sculptures and whether the artist's aging work should be reenacted. Chad Coerver, ed., "Uncertain Mandate: A Roundtable Discussion

The aging of Hesse's Fiberglas works was recently illustrated when Johns, her fabricator, recreated a section of *Sans II* (Figure 35), on the occasion of the artist's retrospective at the San Francisco Museum of Modern Art in 2002. Hung besides Hesse's aging *Sans II*, the contemporary copy revealed the plastic's original brightness, sheen, and pearly white color, which filled the Fischbach Gallery exhibition in 1968. Sadly, the works are now known more widely in the deteriorated state, while their initial, glowing transparency is largely forgotten.

In this chapter, I reclaim the surfaces of these sculptures to offer a better understanding of why Hesse was drawn to Fiberglas and what impact the works had when they were shown in 1968. In a 1970 interview with Cindy Nemser, Hesse remarked on the optical effects of raw Fiberglas: "Color is whatever comes out of the material and keeps it what it is. The light—I'm not too concerned with it, because if you use reinforced fiberglass clear and thin the light is there by its nature and the light does beautiful things to it. It is there as part of its anatomy."[7] Hesse was interested in exploiting the natural and visual abilities of the plastic by choosing to work with the material in a way that was unexpected, and even outside of the artist's control. She struggled to adapt to Fiberglas. In turn, she created a model of working with the plastic that relied on collaboration and experimentation with Aegis Reinforced Plastics and the use of handmade molds in the fabrication process to bring uncertainty to the finished

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on Conservation Issues," in *Eva Hesse*, ed. Elisabeth Sussman (San Francisco: San Francisco Museum of Modern Art, 2002), 291–311.

[7] Nemser, "Eva Hesse," 188. While "fiberglass" is used in some texts as a generic name for the material, in this chapter I use the term "Fiberglas" exclusively, as it references the proper brand for the material first developed by Owens-Corning Fiberglas Corporation.

product. Her explorations of Fiberglas and its potential would come to inform the rest of her career, until her untimely death in 1970.

The following text first considers the previous literature on Hesse that has focused on the hand of the artist in her practice. As a result, the different ways she worked with her materials have been overlooked in discussions of her sculptures, while her use of fabricators has been disregarded as a mere detail in her process. The next section addresses the history of Fiberglas and Hesse's own research into plastics through classes offered by Experiments in Art and Technology (E.A.T.), found in the organization's archival records. The chapter then looks at the details of Hesse's turn to Fiberglas, her work with Johns, and the history of Aegis Reinforced Plastics. The final sections outline the individual production of the four Fiberglas works shown in 1968—*Repetition Nineteen III*, *Accession III*, *Accretion*, and *Sans II*—building from a recent interview I conducted with Johns as well as Hesse's and the Fischbach Gallery's archival papers and my personal encounters with the artworks. The chapter ends with Hesse's final piece, *Seven Poles*, which was made for Fiberglas producer Owens-Corning Fiberglas Corporation and offers a way to contextualize Hesse's experiments with and the trajectory of her innovation in plastics.

On Hesse Scholarship

In considering the works in Hesse's Fischbach exhibition as fabricated plastic objects, I depart from much of the previous scholarship on the artist. Discussions of Hesse's process have long been wrapped up in identifying the impressions of her hand and the trace of her body, as it relates to the tragedy of her tumultuous life and early

death from a brain tumor.[8] This mythology has created what James Meyer calls a "virtual cottage industry" of writings based on analyzing how Hesse the woman relates to Hesse the artist.[9] These texts often use her diaries as ciphers, claiming that they hold secrets of the artist and her work.[10] Even scholars who argue against a biographical approach to the artist are pressed to address Hesse's personal life.[11] As a result, her story has been repeatedly documented, from her childhood in Hamburg, cut short in 1938 when she fled the Nazis with her family at age two, to her turbulent transition to New York, which led to her parents' divorce and to her mother's suicide, and finally to her brief marriage to artist Tom Doyle.[12] Her story culminated with her nearly two-year struggle with a brain tumor that ended her life on May 29, 1970. I refer to, rather than belabor, these

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[8] This attention to the myth of Hesse began soon after her death, particularly when *Artforum* published her last diaries in November 1972 on the occasion of a major exhibition at the Guggenheim Museum. Robert Pincus-Witten, "Eva Hesse: Last Words," *Artforum* 11, no. 3 (November 1972): 74–76.

[9] James Meyer, "Non, Nothing, Everything: Hesse's 'Abstraction,'" in *Eva Hesse*, ed. Elisabeth Sussman (San Francisco: San Francisco Museum of Modern Art, 2002), 62.

[10] Among the other texts that sustained the myth of Hesse soon after her death: Lucy Lippard, "Eva Hesse: The Circle," *Art in America* 59, no. 3 (May 1971): 68–73; Pincus-Witten, "Eva Hesse: Post-Minimalism into Sublime," *Artforum* 10 (November 1971): 32–44; and Nemser, "My Memories of Eva Hesse," *Feminist Art Journal* 2, no. 1 (Winter 1973): 12–13.

[11] Wagner, for instance, argued for a more complex approach to Hesse's work, but in the process laboriously dictated the explicit details of the artist's life. Wagner, "Another Hesse," 191–282. Even Lippard, who rallied against an emphasis on Hesse's biography over her work in her seminal on the artist, discussed the artist's work as an extension of her body. She wrote: "Because of Hesse's total absorption of herself in her work, one reads the work as one reads the person, not in a gossipy or personally associative so much as in an archetypal manner; in that sense this interpretation could be arrived at by someone who did not know the artist at all." Lippard, *Eva Hesse* (New York: New York University Press, 1976), 17.

[12] For a history of Hesse's youth: Fred Wasserman, "Building a Childhood Memory: The Diaries of Eva Hesse's Early Years," in *Eva Hesse: Sculpture*, eds. Elisabeth Sussman and Fred Wasserman (New York: The Jewish Museum, 2006), 96–131.

biographical touchstones to address how, Hesse, the woman, is often at the center of discussions of her work, overshadowing the role of fabrication in her practice.[13]

Hesse's turn to Fiberglas grew out of her ongoing interest in industrial materials.[14] She was part of a community of artists in New York in the 1960s and 1970s who found promise in unlikely substances, new technologies, and collaborative methods of working. Her involvement with other artists of her generation were fruitful, particularly in her approach to seriality and materials, though she was later deemed a "Post-Minimalist" or "Anti-Form" artist, limiting discussions of her work.[15] For instance, like many of the figures associated with minimal art, Hesse sourced items from the hardware stores on

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[13] Anna Chave argued for an attention to Hesse's biography, claiming it is integral to her work and to understanding the gendered environment that informed the artist: "…she made her art out of her illness, which substantially defined her identity as a woman and (to a lesser degree) as a Jew, as one of the disempowered and despised." Anna Chave, "A 'Girl Being a Sculpture,'" in *Eva Hesse: A Retrospective*, ed. Helen A. Cooper (New Haven: Yale University Art Gallery, 1992), 112. Unsurprisingly, Chave and Wagner have situated themselves on opposing sides of the scholarship on Hesse. See Wagner's response to Chave: Wagner, "Another Hesse," *October* 69 (Summer 1994): 49–84. And Chave's rebuttal to Wagner: Chave, "Response to 'Another Hesse,'" *October* 71 (Winter 1995): 146–148.

[14] Arguably, Hesse's interest in industrial materials began in 1964 when the artist was invited, with then-husband Tom Doyle, for a residency in Germany. The artists were hosted by German industrialist and collector Arnhard Schiedt to work in his empty factory building in Kettwig-am-Ruhr for a year in exchange for artworks. Hesse was immediately drawn to the industrial setting and soon began picking up scraps of wire, rope, and other objects left by the workers. In these initial experiments with such materials, she made reliefs and small sculptures by mixing the leftover machinery with plaster. Hesse later called the arrangement "an unusual kind of 'Renaissance patronage." Nemser, "Eva Hesse," 178.

[15] Pincus-Witten, who coined "Postminimalism," clustered artists such as Hesse, Richard Serra, Lynda Benglis, and Keith Sonnier who could be identified by "the eccentricity of the substances they used." Pincus-Witten, *Postminimalism* (New York: Out of London Press, 1977), 16, 18. In April 1968, Robert Morris wrote "Anti Form," an essay that identified a shift for artists towards substances that spawned "investigations [that] move from the making of things to the making of material itself." Morris, "Anti Form," *Artforum* 6, no. 8 (April 1968): 35.

Canal Street near her studio and worked with, or at least considered, several manufacturers and suppliers, as evidenced by the stacks of business cards in her records (Figure 36).[16] However, despite her interest in engaging industrial culture, Hesse was later set apart from artists who turned to similar sources to produce their sculptures. Artists such as Judd and Robert Smithson were defined by their industrial links, as both men were even captured in a 1967 *Arts Magazine* article in strong, fraternal poses with their fabricators (Figure 37).[17] Despite her relationships with some of the same fabricators, particularly Arko Metals in New York, a shop used by Smithson, no such photographic documentation exists for Hesse, rendering that labor mostly invisible in the literature on her work.[18] The closest equivalent to the *Arts Magazine* story is a 1970 article in *Life* that included Hesse among other artists using industrial materials, such as "ladles and buckets, goggles and gas masks."[19] However, instead of showing her in a confident pose with her fabricators, Hesse's portrait in the article depicted her peeking out from behind an unfinished latex sculpture (Figure 38), as if engulfed by her piece.

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[16] Eva Hesse papers, 1914–1970, Archives of American Art. For instance, Hesse is often discussed as responding to Sol LeWitt, her close friend and colleague, and his serial approach to sculpture, as evidenced by the recent text: Veronica Roberts, ed., *Converging Lines: Eva Hesse and Sol LeWitt* (Austin, TX: Blanton Museum of Art, 2014). Building from his consideration of Minimalism as a series of practices rather than a movement, Meyer argued for Hesse's influence on the artists making minimal art and vice versa. Meyer, "Non, Nothing, Everything," 70.

[17] John Perreault, "A Minimal Future? Union-Made: Report on a Phenomenon," *Arts Magazine* 41, no. 5 (March 1967): 26–31.

[18] Smithson even recalled the importance of Arko Metals in her practice: "She went to the same fabricator that I did, Arko Metals…I had a lot of pieces made there, and the Arko guy used to talk about her all the time." Lippard, "Out of the Past," *Artforum* 46, no. 6 (February 2008): 241.

[19] "Fling, Dribble and Drip: Young Sculptors Pour Their Art all over the Floor." *Life* 68, no. 7 (February 27, 1970): 62–66.

Despite the lack of photographic evidence, Hesse did engage industrial workshops, especially when she decided to bring Fiberglas into her practice.

Hesse's sculptures using Fiberglas have long been misunderstood as handcrafted by the artist rather than fabricated. Marcia Tucker wrote in 1969, in the catalogue for the exhibition "Anti-Illusion: Procedures/Materials" at the Whitney Museum of American Art in New York: "…because [Hesse] is concerned with creating personal forms, she must use only materials that she can make herself."[20] Despite Tucker's claim, Johns, not Hesse, fabricated the artist's sculpture in the show: *Expanded Expansion* from 1969, constructed of rubberized cheesecloth hanging off reinforced Fiberglas poles.[21] Then, in 1971, not long after the artist's death, Robert Pincus-Witten also described her use of Fiberglas as allowing for "the mark of the hand."[22] These accounts obscured the physical role of the plastic in Hesse's process and the different demands of the synthetic material on her practice.

Fiberglas, for instance, behaved very differently than latex, another material important to Hesse that has drawn connections to the artist's hand and body in its evocation of flesh. Two opposing sides of her practice, latex involved painstaking craft

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[20] Marcia Tucker continued: "The plastic, fiberglass, rubberized cheesecloth and gauze from which her pieces are modeled are neither cast nor moulded. They are made by putting the raw material on the floor and shaping it, adding layers until the proper substance is attained." This description fails to address the variant processes for the different materials in Hesse's practice and the role of fabrication. Marcia Tucker and James Monte, *Anti-Illusion: Procedures/Materials* (New York: Whitney Museum of American Art, 1969), 30.

[21] Barrette, *Eva Hesse Sculpture*, 212.

[22] Pincus-Witten, "Hesse: Post-Minimalism," 42.

from the artist while Fiberglas required the expertise of an outside fabricator.[23] This important distinction between Fiberglas and latex has been lost in discussions on Hesse's process, in part because the aging plastic works now match the fleshy tones of the latex objects, leading both materials to be read as relating to the artist's body.[24]

The Fischbach Gallery show not only highlighted her sculptures in Fiberglas but also included four sculptures in latex in a smaller, adjacent room: *Schema*, *Sequel*, *Stratum*, and *Sans I* (Figure 39).[25] The juxtaposition of the two materials in the exhibition showed their equally important but distinct roles in her practice. Fiberglas and latex also appeared in Hesse's objects around the same time: she began working with latex in the fall of 1967 and Fiberglas in 1968.[26] Even the title of her exhibition, *Chain Polymers*, called on the chemical composition of both Fiberglas and latex as polymers made of up large molecules repeating and linked together in a long chain.[27] Beyond the chemical makeup of Hesse's objects at Fischbach, the sculptures themselves acted as oversized representation of polymers, with *Sans II* and *Accretion* in particular collecting in long, flexible chains along the gallery wall. However, Hesse's show demonstrated the

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[23] Conservator Martin Langer discussed Hesse's laborious process of making the latex works, which required building up many layers by hand. Coerver, ed., "Uncertain Mandate," 295–296.

[24] For Chave, the bodies or body parts that Hesse's works evoke read of pain, flayed skins, and dismemberment. I attribute much of this reading and conflation of the works in Fiberglas and latex to Chave's experience of the sculptures after a period of aging and yellowing, as she writes in the early 1990s. I doubt she would have attached such imagery to the Fiberglas sculptures in their original, iridescent condition. Chave, "A 'Girl Being a Sculpture,'" 101–103.

[25] The side gallery also included drawings and test pieces displayed in glass and metal pastry cases. Lippard, *Eva Hesse,* 98.

[26] Sussman, "Letting It Go as It Will: The Art of Eva Hesse," in *Eva Hesse*, ed. Elisabeth Sussman (San Francisco: San Francisco Museum of Modern Art, 2002), 28.

[27] See the Introduction, page 4, footnote 11.

differences between the hard, pearly, translucent Fiberglas works in the main space (Figure 32), and the soft, honey-colored latex sculptures in the adjacent room (Figure 39).

While the scholarship on Hesse has long conflated the latex and Fiberglas works, critics reviewing the Fischbach Gallery show actually addressed the unique visual spectacle of the plastic objects. These reviewers called out Fiberglas as a distinctive presence in the exhibition and Hesse's work as new and groundbreaking, even when they betrayed their uneasiness with the synthetic substance. John Perreault discussed Hesse's plastic works as "displaying an 'accidental' variety of subtle colors and translucencies" from the raw materials: "It's the kind of show that makes one nervous: all that unfinished fiberglass, all that mush."[28] More positively, Anita Feldman wrote that "Hesse's concerns seem to revolve around what objects and materials do—to light, to space, to themselves, and to each other," describing *Repetition Nineteen III* as cylinders made of "delicately gritty, translucent material."[29] James Mellow described *Repetition Nineteen III* as "knee-high vase forms in translucent fiberglass," adding that "the manner in which the forms filled up with light created an additional distinction."[30] Throughout these reviews, critics commented on the odd visual display of Hesse's plastic objects as distinct from the latex works. Emily Wasserman's most explicitly paid attention to the material's details. She discussed *Accretion*, for instance, as the "the not-quite-transparent tubes, in a range of shadowy tints (barely grey, pink, or blueish)," *Sans II* as possessing "light-catching lumpiness," and *Accession III* and its plastic tubing as having "a rippling, even silky look," "a faint purple cast to it," and "a dappling surface which catches and reflects light

[28] Perreault, "The Materiality of Matter," *The Village Voice* (November 28, 1968): 19.
[29] Anita Feldman, "Reviews: Eva Hesse," *Arts Magazine* 43, no. 2 (November 1968): 58.
[30] James Mellow, "New York Letter," *Art International* 13 (January 1969): 53–54.

like some kind of synthetic fur—made from the skin of a plastic anemone!"[31] Remarkable in these accounts is the attention to the Fiberglas objects as iridescent, almost kaleidoscopic structures with ever-changing surfaces. The reviews addressed Hesse's materials in a manner lost in later scholarship. Like chameleons, the raw, unpainted Fiberglas objects reacted to light and space, unsettling the critics' assumptions of what plastic objects could be.

Fiberglas and Hesse's Plastics Research

Fiberglas was still a relatively new product when Hesse began working with Aegis Reinforced Plastics. The producer of the material, Owens-Corning Fiberglas Corporation, was founded as a joint venture between Corning Glass Works and Owens-Illinois Glass Company in 1938. Prior to their merging, both companies had been experimenting with producing glass fibers: Corning Glass was developing new forms of insulation and Owens-Illinois was working on air filters and architectural bricks made from glass.[32] They joined forces to produce glass textiles, initially used for electrical equipment.[33] Fiberglas was finally discovered after a laboratory accident in the early 1940s, when a technician spilled polyester resin on the glass cloth.[34] When the mixture dried overnight, it produced a much stronger substance with exponentially greater

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[31] Emily Wasserman, "New York," *Artforum* 7, no. 5 (January 1969): 60.
[32] Michael Lamm, "The Fiberglass Story," *American Heritage of Invention & Technology* 22, no. 4 (Spring 2007), accessed June 1, 2018, http://www.inventionandtech.com/content/fiberglass-story-0.
[33] Samuel S. Oleesky and J. Gilbert Mohr, *Handbook of Reinforced Plastics of The Society of The Plastics Industry, Inc.* (New York: Reinhold Publishing Corporation, 1964), 119.
[34] Ibid.

capabilities. Subsequently, polyester resin became the key component of Fiberglas, turning the glass material into a plastic product.

The plastic is first made by splitting molten glass into thin filaments and weaving them together to produce different kinds of textiles, including woven cloth and twisted rope. The glass fabric is then dipped in or brushed with liquid polyester resin as reinforcement and cured until rigid. The resulting "alloy" is stronger than its parts and unified in appearance, since the fibers disappear into the resin.[35] The plastic is desirable for its resistance to acids, alkalis, moisture, and mold, as well as the fact that it does not decay, burn, shrink, or expand. Owens-Corning Fiberglas Corporation continued to develop the material, particularly different glass textiles such as chopped strand mat, the foundation for all of Hesse's Fiberglas sculptures.[36] Introduced in 1947, the chopped strand mat fabric (Figure 40) is created by laying fibers on top of one another in a random arrangement, making the material strong in all directions and able to conform to compound curves and complex shapes.[37]

By the 1960s, Fiberglas was easily adaptable for artists, as the glass cloth could be placed in a mold and then brushed with resin to create solid yet lightweight surfaces, akin to papier-mâché in process but with a plastic finish. However, working in Fiberglas typically required the use of fabricators who had been trained by the industry, knew the

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[35] The glass fibers disappear into the resin because the refraction of light is similar for both materials. As the resin ages, the "relationship becomes muddied," accounting for the yellowing color in the works today, according to San Francisco Museum of Modern Art conservator Michelle Barger. Michelle Barger, interview by the author, March 30, 2016, San Francisco, CA. I would like to thank Michelle Barger for sharing with me her important and singular research on Hesse and her materials.
[36] Johns, interview by the author, 2016.
[37] Oleesky and Mohr, *Handbook of Reinforced Plastics*, 119.

chemistry, and could contain the toxic material in their workshops. Still, Fiberglas did not require a particular environment, so Hesse's works could be produced in any space, first at Aegis Reinforced Plastics and later in her studio, under the direction of Doug Johns. Today, the applications for Fiberglas are wide, from commercial furniture and recreation equipment to pipes and large-scale infrastructure, yet the standard process for molding the material is unchanged. Unlike other plastics that rely exclusively on industrial molding and extruding, Fiberglas still often insists on craft, where even manufactured products require a specialized hand to apply the layer of resin to the glass textile.

While artists in the 1960s were primarily turning to fabricators to make their Fiberglas objects, Hesse's interest in plastics did not begin with Aegis. Her notebooks include lists of plastics suppliers and notes from reading texts such as *Modern Plastics Encyclopedia*.[38] She also conducted her own research through classes offered by Experiments in Art and Technology (E.A.T.). Founded in 1966 by Billy Klüver, Rauschenberg, Robert Whitman, and Fred Waldhauer, E.A.T. organized lectures and events to assist artists working with new materials and act as an "intermediary between the artist and the new technology located in industry," as Klüver wrote in 1969.[39] Hesse was especially engaged in E.A.T. lectures on plastics and attended a lecture on polymers conducted in February 1967 by F.H. "Stretch" Winslow of Bell Labs, where Klüver worked as an engineer.[40] This talk occurred more than a year before Hesse began

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[38] Writings and Work Notes, Eva Hesse papers, 1914–1970, Archives of American Art.
[39] Billy Klüver, "Experiments in Art and Technology," *Members Newsletter, The Museum of Modern Art*, no. 3 (January–February 1969): 4. Klüver notes the number of members—artists and engineers—jumped from 300 to 4,000 between 1966 and 1969.
[40] In an E.A.T. response form, Hesse expressed interest in attending the lecture on Polymers by Winslow as well as Casting, Molding and Controls, and Acrylic Materials, all in February 1967. Lecture Series Response Forms, Artists, Experiments in Art and

working with Aegis. In two photographs from the lecture (Figure 41), Hesse is first seen sitting in the crowd, with her hands folded together and tucked under her chin, leaning forward in a concentrated pose, while another image shows Winslow lecturing on polymers and standing in front of technical diagrams projected on the wall.[41] These photographs illustrate Hesse's interest in learning to work with plastics, which would be followed by her hiring Aegis the following spring.

On Doug Johns and Aegis Reinforced Plastics

It is impossible to understand the story of Hesse and Fiberglas without knowing the role of Doug Johns and Aegis Reinforced Plastics in her sculpture. Hesse's work with Johns has been mentioned in monographs and exhibition catalogues on the artist's work, but the details of their partnership is often overlooked.[42] However, the non-teleological, trial-and-error process of Hesse's sculptures required a mixture of both Johns's expertise and Hesse's desire to push the boundaries of Fiberglas production. With Fischbach covering expenses, Hesse began working with Aegis Reinforced Plastics in the spring of 1968, when she traveled to the old Bethlehem Shipyard in Staten Island to meet with

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Technology records, 1966–1993, Special Collections, The Getty Research Institute, Los Angeles, CA. For further reading on Klüver, Bell Labs and E.A.T: Douglas Davis, *Art and the Future: A History/Prophecy of the Collaboration between Science, Technology and Art* (New York: Praeger Publishers, 1973).

[41] I owe thanks to Marcie Begleiter for pointing me in the direction of this photograph at The Getty Research Institute.

[42] For the most thorough accounts of her move to fabrication: Lippard, *Eva Hesse*, 106, 126–128; and Barrette, *Eva Hesse Sculpture*, 172. Sussman also discussed the role of collaboration in Hesse's sculptures and her work with Johns at Aegis: "As Hesse's and Johns's collaboration continued, she convinced him to work outside of the factory and to use fiberglass in ways that he had never envisoned." Sussman, "Letting It Go," 34.

Johns, at the recommendation of fellow artist Robert Morris.[43] It took several months before Johns would start work on Hesse's objects, as Morris insisted Aegis finish his planned sculptures first.[44] Hesse's relationship with Aegis and Johns began with the Fiberglas sculptures in preparation for the Fischbach Gallery show, in order of production: *Repetition Nineteen III*, *Accretion*, *Accession III*, and *Sans II*.[45] In commissioning these four works from Aegis, Hesse entered a world dominated by her male counterparts, with little room for female artists. Lucy Lippard, who later wrote the first major monograph on Hesse's work and career in 1976, recalled that the artist was anxious about the shift towards using fabricators:

> "Moving out of the studio this way was a major step for her, and she went to Aegis with some trepidation; this was a real factory, utterly male-oriented, and she expressed fear of 'all those men with their great big sculptures.' But it was necessary in terms of the professionalism she sought so determinedly and she hoped more professional craftsmanship would keep her pieces from disintegrating."[46]

Hesse wrote in her notebook in September 1966: "I must learn to have my work sent out. Not for work theory, but for permanence."[47] A close confidante of Hesse's, Sol LeWitt recalled: "Eventually she abandoned the latex in favor of fiberglass, because she was

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[43] Doug Johns and Alison Rowley, "The Fourth Dimension," in *Encountering Eva Hesse*, eds. Griselda Pollock and Vanessa Corby (Munich: Prestel, 2006), 89. A ledger from December 31, 1968 listed that the gallery paid Aegis $1,600 in two payments. A memo in the gallery's records on Hesse stated: "Fischbach Gallery paid for the fabrication, including materials and labor, or works made in fiberglass at Aegis." Artist Files, Eva Hesse, Fischbach Gallery records, 1937–2015, Archives of American Art, Smithsonian Institution, Washington, DC. Lippard also cited that Richard Serra was working with Aegis at the same time as Hesse, and the two artists would take the ferry to Staten Island together. Lippard, *Eva Hesse*, 115, 126.

[44] Johns recalls that he made approximately 42 pieces for Morris. Johns, interview by the author, 2016.

[45] Barrette, *Eva Hesse Sculpture*, 172, 174, 182, 184.

[46] Lippard, *Eva Hesse*, 127.

[47] Barrette, *Eva Hesse Sculpture*, 12.

convinced that the fiberglass would last. She wanted it to last. And she certainly didn't have the attitude that she would mutely sit by and watch it disintegrate before her eyes."[48] Despite Hesse's intention, the Fiberglas works had already begun to age by the mid-1970s, like their latex counterparts.[49] Johns claimed that Hesse was aware of the life-expectancy of the raw Fiberglas and said: "She thought about it and I have a very clear memory that it amused her; *the deterioration was part of the concept*. My interpretation of this is that it was her conscious decision to bring the fourth dimension—time—into her sculpture."[50] This variance of opinion might be the result of Hesse's changing relationship with her material, as she may have initially turned to Fiberglas for longevity then accepted the plastic's inevitable decay after gaining experience with the substance. Despite her expectations or objectives, the artist chose to work with fabricators and rely on a skilled hand in her use of plastics.

Unlike many other industrial fabricators at this time, Aegis Reinforced Plastics was founded in order to serve artists in New York. The two principle employees, Doug Johns and Robert Castoire, had previously worked at Orbiform, a company that made commercial plastic products such as globes for Rand McNally.[51] Johns and Castoire had the idea to start Aegis when Robert Morris walked into Orbiform one day and inquired if the company could fabricate his artworks. Orbiform's owner at the time declined to help

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[48] Coerver, ed., "Uncertain Mandate," 297.
[49] Even as early as 1976, Lippard was writing about the varying colors of the separate parts of *Sans II*, as the five sections were living and aging in four different collections, with different conditions. Lippard, *Eva Hesse*, 129.
[50] Johns and Rowley, "Fourth Dimension," 93.
[51] Johns, interview by the author, 2016. Specializing in plastics, Orbiform was a subsidiary of Dyna-Graphic Displays in Brooklyn, which produced exhibits, displays, models and maps, among other items.

the artist, so Johns and Castoire left to start Aegis in order to work with Morris, among other sculptors.

Aegis worked with an array of artists, producing a wide range of Fiberglas works, as seen in the group exhibition *Plastics and New Art* at the Institute of Contemporary Art at the University of Pennsylvania in 1969. The show included three works fabricated at Aegis, for Morris, artist Stylianos Gianakos, and Hesse. First was Morris' *Untitled* from 1967 (Figure 42, right foreground), a gray, square box composed of four pieces with an open top that dropped down into the center along diagonal lines at each corner. The sculpture was larger in scale than many of the sculptures in the show, forcing visitors walking by to squeeze between the wall and the work. Then came Stylianos Gianakos's *Untitled No. 6* (Figure 43, left background), a flattened, vertical dome that flared out to three legs, as if a shell left behind by a massive creature. Smooth and shiny, the object read as plastic but was unmistakably organic—part animal and part architecture—with a tan-colored, skin-like surface pulled taut in a hard shape. Finally, Hesse's *Repetition Nineteen III* (Figure 44, center left)—on view after its appearance at Fischbach Gallery—was crowded together on the concrete floor, as an arrangement of 19 Fiberglas cylinders in cloudy white plastic with irregular surfaces and uneven bottoms, organic in shape with the utmost rigid surface. Arranged as part of some absurdist showroom of plastic objects, these Fiberglas works were united only by material and fabricator, representing the expansive landscape of objects and oddities possible in the fibrous plastic.

In addition to their range of production, Aegis was also a company that adapted to the changing city by taking residence in a variety of industrial spaces: first, in an old shipyard on Staten Island, then a car dealer's basement, and finally an abandoned

brewery.[52] While Aegis emerged at a moment of great urgency for plastics in the arts, the firm was short-lived. The company folded in 1969, at which point Johns moved in with Hesse to work full time in her studio, making or assisting in the fabrication of 17 works until the artist's death in 1970.[53]

Repetition Nineteen III

Hesse's relationship with Aegis and Johns began with *Repetition Nineteen III*, which was the result of several stumbling blocks. The Fiberglas work was part of a series that started with *Repetition Nineteen I*, a group of 19 cylinders made of aluminum wire, papier-mâché, Elmer's glue, Dutch Boy white diamond gloss paint, and polyester resin. Squat and smaller than the vessels in *Repetition Nineteen III*, the objects looked like dented or squashed cylinders in varying shapes and sizes with opaque white surfaces that were arranged with no particular orientation. This serial disorder is seen in a series of photographs of the sculpture in four different configurations in Hesse's studio (Figure 45). This work was important to Hesse, as it was depicted on the promotional card for her Fischbach Gallery show, even though it was not included in the exhibition. After *Repetition Nineteen I*, she looked to expand the series into different materials, processes, and textures. First, she considered fabricating the vessels in metal at Arko Metals and covering the objects in Sculp-metal, according to a sketch (Figure 46), which would have resulted in an usual combination of fabricated objects and hand-worked surfaces. She

[52] Johns, interview by the author, 2016. Their business card from their time in Staten Island described Aegis as "manufacturers" and "consultants," with Robert Castoire as the company president. Eva Hesse papers, 1914–1970, Archives of American Art.
[53] Barrette wrote that Johns and Hesse were also romantically involved. Barrette, *Eva Hesse Sculpture*, 13, 172.

instead made test pieces in latex for a possible *Repetition Nineteen II*, which included cords protruding from the center of false bottoms. Finally, Hesse turned to Fiberglas and Aegis to fabricate what would become *Repetition Nineteen III*.[54] The shapes and surfaces that emerged from this first collaboration created striking, iridescent forms with no precedent in Hesse's practice at this point. *Repetition Nineteen III* marked an important moment in which the artist begin to allow the material—Fiberglas—to inform the structure of the work, as seen in her unique process of making at Aegis.

Initially, Hesse gave Johns a sketch of 19 "buckets" to be made in Fiberglas.[55] After about a month, he presented her with 19 cylinders with straight walls and uniform surfaces. According to one account, Hesse was "very disappointed," as she confided in a friend that they looked like "garbage pails" and that she felt conflicted about relinquishing control of her production process.[56] In preparing the next version—what would become *Repetition Nineteen III*—Hesse discovered the solution. Instead of simply supplying instructions, she brought Johns papier-mâché structures to use as molds. With

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[54] Lippard, *Eva Hesse*, 106.
[55] Johns and Rowley, "Fourth Dimension," 89.
[56] Gioia Timpanelli, a writer and friend, recounted she was with Hesse the day she arrived home to find the "industrially perfect buckets" outside her loft: "…[Hesse] was very disappointed, saying that they looked like 'garbage pails' and that they had to be remade. She turned and said to me that was why she had to be there when the work was being done… She wanted to be able to give instructions and to be able to come back and find them done." Coerver, ed., "Uncertain Mandate," 298. This work, entitled *Small 'Repetition Nineteen II' (regular set)*, did end up at Fischbach, but was described as rejected by Hesse and not for sale in the gallery's records in a document was compiled on March 24, 1970. Eva Hesse, Fischbach Gallery List of Unsold Work, Fischbach Gallery records, 1937–2015, Archives of American Art.

the molds, Johns produced the final pieces: oddly-shaped, translucent cylinders with imperfect surfaces, completed in July 1968.[57]

Johns began the process of making the cylinders by draping Fiberglas sheets over the molds while they were hung upside down and then brushing on the liquid resin to conform to the shape. He then tucked the excess material in a series of folds, creating the bottom of the vessel, and hand-trimmed the thinner material left at the top. The resulting circular structures had thin and transparent walls with a thicker base, composed of the folded sheets of Fiberglas that created hollow pockets capturing the light (Figure 47).[58] While Johns covered the molds in wax and parting compound to keep them from sticking, the newspaper in the papier-mâché still attached to the Fiberglas. Hesse and Johns spent a full day pulling off pieces of paper, which left behind a network of bumps and bubbles.[59] Finally, Johns applied a layer of resin after the works were cleaned, which made the cylinders iridescent, with a bluish color that responded to light. He recalled: "You put it under a light and the light just glowed."[60]

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[57] Hesse reused the aluminum wire mesh molds from *Repetition Nineteen III* in the sculpture *Area*. Ten of the sections were covered with latex, sewn together with wire, and hung off the wall to trail along the floor. Barger, "A Delicate Balance: Packing, Handling, and Installation of Ephemeral Works by Eva Hesse," *Journal of the American Institute for Conservation* 47, no. 1 (Spring 2008): 33. Hesse intended for *Area* to be parallel to *Repetition Nineteen III*, but she only used ten sections because of a deadline for an exhibition. Robin Clark, "*Repetition Nineteen*, *Area*, and *Tori*," in *Eva Hesse*, ed. Elisabeth Sussman (San Francisco: San Francisco Museum of Modern Art, 2002), 230.
[58] Thank you to Museum of Modern Art conservator Roger Griffith for sharing this point and the photographs of the bases.
[59] Johns recalled: "I had my workers clean out all the little chips and stuff like that but there was a lot left over, so she and I went through and cleaned them and cleaned them." Johns, interview by the author, 2016.
[60] Johns continued: "It was this gorgeous thing, not a hint of yellow, like it is now." Johns, interview by the author, 2016.

Hesse was ambivalent about the cylinders' striking appearance. According to Johns: "…she thought they were too beautiful, they were just gorgeous. She was so excited that they were so beautiful but so disappointed that they were so beautiful."[61] The objects' original effect is lost in documentation from the Fischbach Gallery exhibition (Figure 32), as the vessels are shown dissipating into the pale gallery surroundings. Subsequent photographs commonly circulated of the work by the Museum of Modern Art, which purchased the sculpture soon after the Fischbach exhibition in 1969, show the work yellowed and set on a warm, wooden floor (Figure 48), emphasizing the aging Fiberglas's ability to mimic puckering skin. This photograph is misleading because, when installed at the museum today, the work actually continues to engage with light, emitting a bluish color.

Johns' fabrication process, using Hesse's molds, resulted in a range of orientations for the vessels. The cylinders in *Repetition Nineteen III* took on individual personalities, as if short creatures haphazardly arranged in a crowd and seated unevenly on the ground.[62] One vessel, for instance, bends slightly in an S-curve, while another is wrapped with ripples running in vertical bands along the surface. One contorts in the middle as if holding a larger object, and some have large air bubbles, like craters poking space inside the plastic. While the shapes of *Repetition Nineteen III* vary, the forms are unyieldingly rigid, fixed in place with the cured resin. I emphasize the differences between the cylinders to show the narrative of experimentation that played out between

[61] Johns, interview by the author, 2016.
[62] Lippard wrote, about *Repetition Nineteen III*: "Like schoolchildren in uniforms, or prisoners, or young trees in a nursery, they carry within them their exuberant individuality." Lippard, *Eva Hesse*, 109.

the forms, as if representing Hesse's exchange with Fiberglas. Each variant object arose from the production process set forth by Hesse and Johns, who allowed the material to change as the work was put together.

In acknowledging the details of its making, *Repetition Nineteen III* can now be seen as the result of an unusually fluid fabrication process that married the marks of Hesse's molds with Johns' plastic handicraft. The two materials involved—papier-mâché and Fiberglas—even merged, further blurring the distinction between where the artist's hand ended and Johns' began. In this relationship, the plastic was allowed to find a purpose it was never invented for—one that celebrated raw, uncontrolled surfaces and imperfect results. Johns recalled: "That's the real appeal to what Eva had because we used the properties of the material rather than looking for a shape that's molded. We looked for the properties and took advantage of the flaws, the disadvantages."[63] With Johns's help, Fiberglas became her collaborator. Hesse's statement for *Chain Polymers* referenced her interest in letting the material evolve beyond her control:

> I would like the work to be non-work. This means that it would find its way beyond my preconceptions. What I want of my art I can eventually find. The work must go beyond this. It is my main concern to go beyond what I know and what I can know. The formal principles are understandable and understood. It is the unknown quantity from which and where I want to go. As a thing, an object, it accedes to its non-logical self. In its simplistic stand it achieves its own identity. It is something, it is nothing.[64]

Here Hesse suggested releasing control of the finished product of her work, submitting to both the fabrication process and unexpected outcomes possible with her materials. Using phrasing such as "find its way beyond" and "go beyond what I know," the artist

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[63] Johns, interview by the author, 2016.
[64] Statement, Eva Hesse, June 1968, Artist Files, Eva Hesse, Fischbach Gallery records, 1937–2015, Archives of American Art.

challenged her sculpture to realize "its own identity," taking it out of the realm of traditional studio work, as "non-work," "thing," and "object." While the importance of materials is not specifically addressed in this statement, Hesse's process with Johns revealed that working with Fiberglas was what gave her variability in surface, effect, and outcome. The sculptures made for the Fischbach Gallery show became Hesse's statement for Fiberglas: that the plastic would not conform to her expectations but was rather *complicit* in informing the works.

Accretion and *Accession III*

Accretion and *Accession III* were the next two Fiberglas works produced by Johns, and were fabricated quite differently and with more regularity than *Repetition Nineteen III*. *Accretion* (Figure 49), for instance, was composed of 50 hollow tubes, each measuring 58 inches each and two-and-a-half inches in diameter, which were remarkably identical. The units were made by wrapping a tube first with parting paper and then with a uniformly cut piece of Fiberglas cloth.[65] Then the cloth was coated in resin and cured, at which point the mold was removed and another coat of resin was applied to create the iridescent surface akin to *Repetition Nineteen III*. The major difference in this work was the mold, as Aegis used a readymade object for the shape rather than papier-mâché forms crafted by Hesse. While the components of *Repetition Nineteen III* were unique in shape and texture, the pieces of *Accretion* were uniform and fabricated, as if Hesse was becoming accustomed to a more conventional form of plastics fabrication. For *Accretion*,

[65] Barrette described that the pieces in *Accretion* were "regular" and could be made quickly, so the "workmen at Aegis" were involved in the sculpture's fabrication, rather than just Johns. Barrette, *Eva Hesse Sculpture*, 182.

the artist also introduced unpredictability in a different way: she leaned the units against the wall in varying intervals, which could be expanded for the space.

As the third piece Hesse made with Aegis, *Accession III* was similarly produced to be more consistent and identifiably fabricated. The idea for the Fiberglas work came when Johns saw *Accession II* from 1968 (Figure 50) in Hesse's studio and proposed a plastic version. *Accession II* was made in collaboration with Arko Metals in New York, the first fabricator Hesse employed. A galvanized steel cube pierced by holes that were then filled with black vinyl tubing, *Accession II* had an interior that was dark and alluring.[66] The sculpture invited the viewer's touch and was even damaged when shown in the exhibition *Directions I: Options* at the Milwaukee Art Center in 1968 when a museum visitor tried to climb inside.[67] In constructing the piece, Arko fabricated the cube and Hesse filled the 30,670 holes by hand with tubing in January 1968.[68] In Hesse's notes, she defined the term "accession" with regards to her work as "increased by something added," such as bringing two materials together through a combination of fabrication and craft.[69] *Accession III* (Figure 51), made of Fiberglas with clear, vinyl tubing, was constructed in a similar fashion, pairing a manufactured object with exhaustive labor.[70]

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[66] The first of the "Accession" series, *Accession I*, 1967, used a rectangular, aluminum box that was perhaps a found object, already filled with holes. Barrette, *Eva Hesse Sculpture*, 138.
[67] Lippard, *Eva Hesse*, 103.
[68] Ibid.
[69] Writings and Work Notes, Eva Hesse papers, 1914–1970, Archives of American Art.
[70] It is unknown where Hesse sourced the tubing, but a ledger from Fischbach shows that the gallery paid World Plastic Extruders based in Moonachie, New Jersey on two occasions, perhaps for the tubing for both *Accession II* and *Accession III*. Artist Files, Eva Hesse, Fischbach Gallery records, 1937–2015, Archives of American Art. The

First, Johns made two test pieces to give Hesse a sense of what was possible in the Fiberglas and vinyl pairing (Figure 52). He then built the structure using a collapsible wooden cube as a mold on which to layer sheets of Fiberglas until it was a half-inch thick and very solid.[71] It would take Aegis several months to complete the piece, as they had to bore 28,000 holes into the plastic with a hand drill using a perforated radiator cover as a guide.[72] The holes were made in rows to the very edge of the structure and then filled with tubing, creating a tight and compulsive network of exterior ridges from the vinyl stitched through the cube. Whereas the interior of *Accession II* was soft and supple, *Accession III*'s clear vinyl inside was stiff and more jewel-like. The two plastics—the Fiberglas and the clear vinyl—were also more integrated in appearance than the steel-and-black-vinyl *Accession II*, allowing *Accession III* to glow under the gallery lights as evidenced by installation images from the Fischbach Gallery show (Figure 32).[73] Hesse grappled with the aesthetics of *Accession III*: "…it becomes a little too precious, at least from where I stand now, and too right and too beautiful. It's like a gem, like a diamond…I'd like to do a little more wrong at this point."[74] In this statement, the artist reflected on the object evolving beyond her expectations, as she had to come to terms

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business card for World Plastic Extruders also appears in Hesse's archives. Eva Hesse papers, 1914–1970, Archives of American Art.

[71] Barrette, *Eva Hesse Sculpture*, 174.

[72] Barrette wrote: "Hesse helped with the threading but was not otherwise involved with the fabrication." Barrette, *Eva Hesse Sculpture*, 174. Johns still retains the hand drill in his collection. Johns, interview by the author, 2016.

[73] Barrette observed that *Accession III* produced a very different effect than the other "Accession" works with "dark, dense interiors." The Fiberglas box "holds light instead of absorbing it." Barrette, *Eva Hesse Sculpture*, 174.

[74] Nemser, "Eva Hesse," 184. This quotation is different in the *Artforum* version of the interview. In *Artforum*, Hesse stated: "…it is a little too precious from where I stand now. It's too beautiful, like a gem, and too right. I'd like to do a little more wrong at this point." Nemser, "An Interview with Eva Hesse," *Artforum* 7, no. 6 (May 1970): 60.

with the aesthetics that could emerge from fabricating an object in Fiberglas and vinyl. In *Sans II*, the next work made by Aegis, Hesse sought to return to a more unpredictable form of plastics production, as seen in *Repetition Nineteen III*.

Sans II

Sans II, the final Fiberglas work in the show, moved away from the rigid fabrication of *Accretion* and *Accession III* by returning to Hesse's handmade molds as the basis for construction. If *Repetition Nineteen III* marked the beginning of Hesse's collaboration with Johns, *Sans II* represented the apex of their work together for the Fischbach exhibition, as the later work is a marvel of collaborative production.[75] More than 35 feet long and over three feet tall, *Sans II* is composed of a long string of open-air boxes or windows, in two registers (Figure 53). A massive undertaking, the sculpture was made in smaller distinct units that were then joined by Fiberglas strips on the back. The work's foundation was plaster casts made by Hesse of two rectangles stacked together, delineated by a raised seam down the middle. Johns used the casts to create two polyurethane molds, which he covered with Fiberglas sheets and brushed with resin. After curing the plastic, he pulled the piece out of the mold and trimmed the excess fibers by hand. What was left was an undulating landscape of uneven edges that were highly expressive, as the result of both Hesse's molds and Johns' Fiberglas casting process. When *Sans II* appeared after its Fischbach Gallery debut in the "Annual Exhibition" at the Whitney Museum of American Art later in December 1968, after the museum had

[75] Barrette and Lippard both discussed *Sans II* as the work in which Johns and Hesse collaborated seamlessly. Barrette, *Eva Hesse Sculpture*, 184. Lippard, *Eva Hesse*, 128.

purchased two sections, a *Time* review described the work as "a row of 30 glistening clear fiberglass half-box forms, whose intentionally sloppy casting endows them with a bubbly effervescence."[76]

The work created a series of interiors, like windows looking into solid masses of plastic, which caught light through corrugated surfaces and air bubbles and errant fibers of glass that were left visible through thinner sections (Figure 54). The luminescent effects of *Sans II* would have been apparent at the Fischbach Gallery show, as Johns' recent reenactment revealed the translucent effect of the original forms (Figure 35). Unlike the other serial pieces in this group, *Sans II* was initially shown with all of its units attached, dominating the wall of the gallery. The monumentality of this work has since been lost, as *Sans II* is no longer a complete work. The sculpture was separated into five sections and sold to four collections after the Fischbach Gallery exhibition, and have each aged and yellowed differently in response to their particular surroundings.[77]

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[76] "Floating Wit," *Time* 93, no. 1 (January 3, 1969), 44.

[77] The Whitney Museum of American Art was the first to purchase two sections in December 1969. Two other sections went to Museum Wiesbaden in Germany and Daros Collection in Switzerland. The last section was given to Hesse's dentist, Norman Messite, to pay off a bill. After changing hands again, the piece was gifted to the San Francisco Museum of Modern Art in 1999. Hesse had planned to make a sixth section for the Whitney but could not because of health reasons. Scott Rothkopf, "Sans," in *Eva Hesse*, ed. Elisabeth Sussman (San Francisco: San Francisco Museum of Modern Art, 2002), 239. All five sections have reunited for three exhibitions since the 1968 Fischbach show: "Eva Hesse: A Retrospective" organized by the Yale University Art Gallery in 1992; "Eva Hesse" organized by the San Francisco Museum of Modern Art in 2002; and "Eva Hesse: Sculpture" organized by the Jewish Museum in New York in 2006.

Hesse's Last Work, In Conclusion

Fiberglas afforded Hesse a new form of physical independence that became important at the onset of her illness, as her increasing reliance on fabrication also paralleled her physical deterioration. The initial signs of her sickness appeared in September 1968, but by October she had finished the Fiberglas pieces for the Fischbach Gallery show, just before Aegis shut down. By early 1969, Johns moved into her studio and on April 18, Hesse was admitted to New York Hospital for an operation on her brain tumor. However, she did not stop working, relying more and more on Johns and student studio assistants to realize her sculptures, as seen in her final work *Seven Poles* from 1970 (Figure 55).[78]

The sculpture marked Hesse's first official collaboration with the plastics industry, as it was created for "Trio," an exhibition hosted by Owens-Corning Fiberglas Corporation at their Fiberglas Center on Fifth Avenue from May through September 1970. Organized by James F. Fulton and his industrial design firm Fulton & Partners Inc., the show included Hesse along with highly-polished geometric sculptures by Tony Delap and realist, painted figures by Frank Gallo. Hesse's sculpture, in stark comparison, was more haphazard and odd as a series of fabricated objects. In the work, seven oversized "L" shapes stood together in a jumbled arrangement as if absurdist limbs, lifted up by nylon threads hung from the ceiling. Composed of aluminum wire wrapped around sheets of polyethylene, the structures were covered with pieces of Fiberglas and made entirely

[78] As Hesse recounted in the Nemser interview, she found having other constructing her sculptures "a little difficult at first" but as she became sick and more comfortable working with others, she would "let more happen and let myself be used in a freer way." Nemser, "Eva Hesse," 184–185. Her student assistants at this time included Bill Barrette, Martha Schieve, and Jonathan Singer.

by her assistants based on a model by the artist.[79] Although a third brain operation kept her from installing the work, she approved the result through photographs while in the hospital, before her death on May 29, 1970. A commission from Owens-Corning, *Seven Poles* was supposed to travel to the corporate headquarters after the exhibition, though the company reneged the deal when they were not satisfied with the installation.[80]

Seven Poles came after Hesse's period of great discovery with Fiberglas, at a point when she had already relinquished control of her production due to her illness. The work, as such, is awkward, as a strange combination of hand-worked surfaces, rendered by her assistants, and rigid plastic. Fiberglas, in *Seven Poles*, was not allowed to shine on its own, but was rather constricted by the wrapped aluminum wire visible through the plastic surfaces. In contrast, Hesse's early works in Fiberglas, discussed in this chapter, represented a breakthrough moment in her career, marking the moment she first turned to the plastic material as a way to expand the visual and structural abilities of her forms. The four works shown at Fischbach Gallery emerged from this period of important experimentation for Hesse, as she learned to collaborate with Johns and negotiate Fiberglas as a new substance in her arsenal. Most importantly, *Repetition Nineteen III*, *Accession III*, *Accretion*, and *Sans II* offered Hesse the opportunity to find her own approach to fabrication through the use of molds and the intrusion of her own labor in the process. For the Fischbach Gallery exhibition, Hesse placed Fiberglas and all of its

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[79] Lippard, *Eva Hesse*, 178–179. Barrette recounted that Johns consulted with Hesse on planning the sculpture, but then was not able to continue working on the piece after the artist's health further declined. Barrette and Singer finished the artwork. Barrette, *Eva Hesse Sculpture*, 238.

[80] After seeing a model of *Seven Poles*, Owens-Corning offered Hesse $4,000 for the sculpture, but rescinded the offer when they saw the work in the exhibition. Coerver, ed., "Uncertain Mandate," 307.

idiosyncrasies squarely at the center of her practice, putting forth a new narrative for plastics, told through the sculptures she left behind.

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Chapter Three — De Wain Valentine

"I think my sculpture grew out of the availability of polyester resin as a material."

"I'm really interested in them much more as fields of transparency and as fields of transparent color than sculptural shapes."

—De Wain Valentine, 1970[1]

In the early 1970s, De Wain Valentine became known for his large-scale, highly polished, cast polyester resin sculptures in large walls, slim columns, and freestanding discs. These works were often dense yet transparent, plastic yet painterly, and marvels of engineering while at the same time delicate, hand-made objects. Of the many artists in New York and Los Angeles working with polyester resin in the 1960s and 1970s, Valentine also had the strongest impact on the development of the plastic industry. He remains a self-taught innovator and an active member of the artist community in Los Angeles, starting with his arrival in 1965 and continuing to this day.[2] In the late 1960s, he took on a challenge that would come to define his career. He sought to cast sculptures in monumental sizes using polyester resin, a casting plastic that changes from a liquid to a solid state without outside heat or apparatus using a catalyst to spark a chemical reaction to harden the material.[3] Polyester resin could be molded into any shape or composition, but was initially designed to be used only for small items. Before Valentine, in the mid-1960s, the industry standard only allowed for single pours of resin up to 50 pounds at a

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[1] John Coplans, "An Interview with DeWain Valentine," in *DeWain Valentine: Recent Sculpture* (Pasadena, CA: Pasadena Art Museum, 1970), n.p. Valentine's name varies among different publications, but I use the spelling according to the artist—De Wain Valentine—and retain the other variations throughout his literature.

[2] Valentine worked in his studio in Venice, California from 1967 to 1991, and is now based in Torrance, California.

[3] This process is called polymerization. See the Introduction, page 4, footnote 11.

time for objects, using small, shallow molds.[4] Any larger and the polyester resin would crack due to the heat produced while curing the plastic.[5] To combat these limitations, Valentine worked directly with the industry and developed a formula that allowed him to cast massive objects with large, continuous pours of the plastic, what he later called his "single-pour casting technique."[6] Through his tireless, trial-and-error experiments over two years, he developed a new product: "Valentine MasKast Resin No. 1300-17." Soon, he was creating 5,000-pound casts, such as *Large Wall* from 1968 (Figure 56).

While previous writing about Valentine has primarily focused on the artist's technical achievements, this chapter argues that his contribution to sculpture is not solely based on his practical role in the development of polyester resin. Rather, I underscore what drove Valentine to concoct his own formula for the plastic: his aspiration to create plastic objects that were monumental in scale but could still act as vessels for colorful, dynamic, and even ephemeral visual effects. To this end, I discuss both Valentine's working process and the impact of these large-scale works. This text looks more closely at the physical presence of his sculptures and the labor involved from the studio to gallery floor, particularly with regards to the artist's first major solo exhibition in Los Angeles at the Pasadena Art Museum in May 1970.[7]

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[4] *Spectacular DeWain Valentine Mass Casting Resin for the Modern Artist* (Santa Monica, CA: Hastings Plastics, 1970), 10.
[5] Tom Learner, Rachel Rivenc, and Emma Richardson, *From Start to Finish: De Wain Valentine's Gray Column* (Los Angeles: The Getty Conservation Institute, 2011), 8.
[6] Henry Hopkins, *Fifty West Coast Artists* (San Francisco, CA: Chronicle Books, 1981), 118.
[7] Peter Alexander was originally scheduled to show alongside Valentine, a change noted by curator John Coplans in a memo. Memorandum, John Coplans, April 6, 1970, Folder, DeWain Valentine, May 12 – July 5, 1970, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.

At the time, the Pasadena Art Museum (now the Norton Simon Museum) was an important venue for area artists, and had reopened with a new building just the year before.[8] Valentine's show was a visual, spectacular declaration of the artist's pioneering casting process and included four large-scale objects made with Valentine MasKast Resin. In one space, the artist installed three polyester resin circles in a staggered arrangement. All named *Untitled (Concave Circle)* (Figure 57), the works had concave surfaces on the side and were seven and a half feet in diameter, twelve inches thick at the bottom, and tapered to six inches on top.[9] The circles ranged in visibility from dense plastic at the edge to thin and transparent at the center. Freestanding and monolithic, the objects seemed delicate as they teetered on their edges with no outside support, but were incredibly heavy at 1,700 pounds each. The circles were accompanied by a blue-tinted, curved wall, or *Untitled (Curved Slab)* (Figure 58), measuring approximately seven feet tall by seven feet wide.[10]

The sculptures were heavy and large as they weighed thousands of pounds, and yet the artist intended the artworks to harness "transparent space," producing effects that

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[8] Valentine exhibited work at the museum during a brief and vibrant period for the institution. In 1969, the year before the artist's exhibition, the Pasadena Art Museum reopened with a new building and major gifts by artists, including Valentine, but fell into financial difficulty in 1974 and was acquired by collector Norton Simon who changed the name to the Norton Simon Museum in 1975. The new direction of the Norton Simon Museum was no longer indebted to Los Angeles artists. Hunter Drohojowska-Philp, *Rebels in Paradise: The Los Angeles Art Scene and the 1960s* (New York: A John Macrae Book/Henry Holt and Company, 2011), 228–229.

[9] *DeWain Valentine: Recent Sculpture* (Pasadena, CA: Pasadena Art Museum), 1970, n.p. In a later interview, Valentine mentioned that the discs tapered to six inches at the top so they would not roll. Dorothy Newmark, "An Interview with DeWain Valentine, Sculptor of Plastic," *Leonardo* 4, no. 4 (Autumn 1971): 377.

[10] The exhibition also included four drawings made with chart tape on mylar. *DeWain Valentine: Recent Sculpture*, n.p.

were spatial and fleeting for the viewer.[11] In the catalogue for the exhibition, Valentine explained: "I'm really interested in them much more as fields of transparency and as fields of transparent color than sculptural shapes."[12] Valentine meant for his objects to transcend the weight and structure of large-scale sculpture. However, the visual effects of the works were only possible *because* of the solid, cast polyester resin and its unique abilities of transparency.

This chapter offers a more expansive portrait of Valentine's path to polyester resin and his creative output from the late 1960s to the early 1970s than has previously been published, building from a recent interview I conducted with Valentine. The first section addresses the limited, previous scholarship on the artist, which has primarily consisted of exhibition-related texts. The chapter continues by looking at the artist's unusually early exposure to plastics as a child, followed by details of his move to Los Angeles from Colorado and his early, large-scale Fiberglas works. The text then lays out Valentine's turn to polyester resin, which allowed him to explore the interior space of sculpture using a translucent material, as he moved away from Fiberglas. In the next section, I outline Valentine's development of a casting process for monumental objects and how the material affected his studio practice. The remainder of the chapter considers the effect of the works outside the studio and reconstructs the artist's solo exhibition at the Pasadena Art Museum in 1970, using material from the museum's archives as well as important color images by photographer Harry Drinkwater. The text concludes with Valentine's hiatus from polyester resin in the mid-1970s and the ephemeral,

[11] Coplans, "Interview with DeWain Valentine," n.p.
[12] *DeWain Valentine: Recent Sculpture*, n.p.

environmental pieces that followed, underscoring the significance of his work in plastics in the early 1970s.

On Valentine Scholarship

When critics were first confronted with the phenomenon of Valentine's massive plastic works, they quickly singled out the artist as a "master" of polyester resin. Fidel Danieli wrote in 1969 that the artist was "the world's most advanced master in this medium."[13] Peter Plagens, an early champion of Valentine's work, remarked in 1971: "De Wain Valentine gives the most muscle and spectacle of all the many area artists casting resin; he does what obviously *ought* to be done with the material, exploiting its capacities for purity, color, transparency, and mystique."[14] Plagens then wrote in 1974 that Valentine's turn to polyester resin on a large scale "established him as the technician *par excellence* in the material, casting two-ton jewels of weight and light."[15] This perception of Valentine as a master of the craft of polyester resin focused on the impact of scale: namely, what happened when the plastic was used to create such large objects. Another reviewer described the artist's work as craft: "It is not surprising that DeWain Valentine continues to win wide acclaim as a sculpture-craftsman, working in difficult materials and extending the medium ever beyond the material's limits." As a result of this repeated attention to Valentine's technical achievements, the artist eventually became

[13] Fidel Danieli, "DeWain Valentine," *Art International* 13, no. 9 (November 1969): 38.
[14] Peter Plagens, "Five Artists, Ace Gallery," *Artforum* 10, no. 2 (October 1971): 87.
[15] Plagens, *Sunshine Muse: Contemporary Art on the West Coast* (New York: Praeger Publishers, 174), 122.

"relegated to a kind of period curiosity," as critic Randy Kennedy wrote in 2011.[16] In 2012, Plagens wrote again on Valentine that his sculptures had fallen into "a kind of art-critical crack" that created "a gauze of technological curiosity" obscuring the art historical relevance of the work.[17] This gap has also been impacted by the limited scholarship, as the only sources on the artist until recently amounted to a few exhibition catalogues.[18]

In 2011, Valentine's contributions to this period of American sculpture were reexamined through *Pacific Standard Time: Art in L.A. 1945–1980*. This initiative comprised a large group of exhibitions in 2011 on the history of Los Angeles artists, which highlighted important figures such as Valentine who have garnered less scholarly attention than their contemporaries.[19] The Getty Conservation Institute presented the most in-depth look at the artist's practice and use of polyester resin, with the exhibition *From Start to Finish: De Wain Valentine's Gray Column*.[20] The Getty exhibition catalogue remains the most substantial text thus far on the artist, his background and his

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[16] Randy Kennedy, "Reputation and Monolith, Both Stand Tall," *New York Times,* September 18, 2011: AR74.
[17] Plagens, "De Wain Valentine and the Profundity of Pleasure," in *Colorado's Valentine* (Fort Collins, CO: University Art Museum, Colorado State University, 2012), 6.
[18] Notably: Thomas H. Garver, *DeWain Valentine: Recent Sculpture* (Vancouver: Fine Arts Gallery, University of British Columbia, 1969); and *DeWain Valentine: Recent Sculpture* (Pasadena, CA: Pasadena Art Museum, 1970).
[19] Spearheaded by the Getty Foundation and the Getty Research Institute, *Pacific Standard Time: Art in L.A. 1945–1980* included participation from more than 60 institutions across Southern California. Among the exhibitions: *Pacific Standard Time: Crosscurrents in L.A. Painting and Sculpture, 1950-1970*, at the J. Paul Getty Museum at the Getty Center; *Phenomenal: California Light, Space, Surface*, at The Museum of Contemporary Art San Diego; and *Now Dig This! Art and Black Los Angeles, 1960–1980*, at the Hammer Museum.
[20] This exhibition and its accompanying publication have been instrumental to my understanding of Valentine's work in plastics.

technical approach, with a particular emphasis on conservation issues around his works. Other recent shows have also contributed to the limited texts on Valentine, in the wake of *Pacific Standard Time*, with a focus more on the artist's biography and exhibition history.[21] This chapter builds from these recent texts but offers a more comprehensive approach to Valentine's work than has previously been published, in both expanding upon the artist's use of polyester resin and considering the visual impact of the works outside the studio.

Valentine's Origin Story

Valentine's knowledge of polyester resin started long before his sculptural work. The artist experienced an unusually early exposure to plastics as a child, allowing him to start experimenting with the materials at a remarkably young age.[22] Valentine first encountered synthetics while growing up in Fort Collins, Colorado, thanks to surplus from a nearby military plant. During World War II, Colorado was the site of many aircraft and shipbuilding factories, as the land-locked state was deemed to be a safe distance from the coastal cities and possible enemy attacks.[23] Valentine recalled that around 1945, the military lifted supply restrictions on Plexiglas and a nearby factory gave

[21] The exhibitions include: *From Start to Finish: De Wain Valentine's* Gray Column, J. Paul Getty Museum at the Getty Center, Los Angeles, 2011–2012; *Colorado's Valentine*, 2012; *De Wain Valentine: Works from the 1960s and 1970s*, David Zwirner, New York, 2015; and De*Wain Valentine*, Almine Rech Gallery, London, 2015.
[22] While in previous chapters I am wary about drawing direct connections between biographical details and artistic practice, such as in the case of Eva Hesse, my reliance on Valentine's background here looks particularly at his exposure to plastics as a child, rather than at links between his work and his personal life and relationships.
[23] Thomas J. Noel, *Colorado: A Historical Atlas* (Norman, OK: University of Oklahoma Press, 2015), 201.

extra materials to his junior high school's industrial arts teacher for students to use in class.[24] The following year, Fiberglas and polyester resin appeared at his school as well, as scraps from the Navy, which had begun using the materials to build ships in Denver.[25] He first used acrylic and resin to make synthetic jewels at school and in his home oven, as an extension of his childhood pastime collecting gemstones throughout the American West.[26]

During the war years, from 1941 to 1945, Valentine lived in 41 different states with his family, as his father pursued construction work with military contractors.[27] In 1945, he spent time in Lander, Wyoming, where his father was working on an Air Force bombing range. After bombing sessions, Valentine would hunt for agates and jades native to the area, collecting and polishing them.[28] Retrospectively, he attributed this early interest in gemstones to his attraction to "transparent colored space."[29] When his family moved back to Fort Collins in 1945, Valentine assisted his parents at his family's car

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[24] De Wain Valentine, interview by the author, July 28, 2016, Torrance, CA.
[25] He explained the surplus was sent to the nearby schools because resin "didn't keep." Valentine, interview by the author, 2016. He attributed two teachers for introducing him to plastics: John Warner, industrial arts teacher at Lincoln Junior High School, and Perry Knight, shop teacher at Lincoln and Fort Collins High School. Linny Frickman, "Colorado's Valentine: A Journey from Fort Collins to Venice Beach," in *Colorado's Valentine* (Fort Collins, CO: University Art Museum, Colorado State University, 2012), 13.
[26] Valentine baked polyester resin in ceramic molds to make jewelry in his family's oven, upsetting his mother by filling the house with toxic fumes. Frickman, "Colorado's Valentine," 13. Ace Gallery Beverly Hills, "De Wain Valentine: Early Resins, 1968–1971," Press release, 2010, accessed March 17, 2017, http://acegallery.art/wp-content/uploads/2015/06/VALENTINE_BHPR.pdf.
[27] Frickman, "Colorado's Valentine," 10. Robin Clark, "Fields of Transparency," in *De Wain Valentine: Works from the 1960s and 1970s* (New York: David Zwirner, 2015), 12.
[28] Learner, Rivenc, and Richardson, *From Start to Finish*, 6.
[29] Valentine remarked: "I guess I was always interested in that kind of transparent colored space. The outside surface of a jewel is stunning, of course, but I was always mesmerized by the inside, the light come from beyond." Ibid.

dealership, Valentine Motor Mart, painting and finishing cars, and worked with Fiberglas again when the company began selling boats.[30] He later spoke of having an "immediate affinity" for the material.[31]

Valentine's direct connection to the military-industrial complex, as his first supplier of plastics, gave the artist important exposure to the range of materials being developed for the war and to the government as a major source of synthetics in the U.S.[32] Where most Americans encountered plastics for the first time through consumer products and advertisements, Valentine began tinkering with the materials left behind from military factories near his hometown. Thus for the artist, plastics were always substances meant for innovating on a large scale, rather than for trivial domestic items.

The Move to Los Angeles and the Fiberglas Works

Plastics ultimately motivated Valentine to move to the West Coast. After receiving his MFA at University of Colorado, Boulder, where he studied briefly with Richard Diebenkorn and Clyfford Still, both visiting artists in his department, Valentine taught drawing, design, and introductory art courses and created sculptures in Fiberglas.[33] He recounted mixing the noxious plastic with more traditional artistic materials: "I was

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[30] Frickman, "Colorado's Valentine," 11–12.
[31] Learner, Rivenc, and Richardson, *From Start to Finish*, 7.
[32] I first discovered this connection while attending a conversation between Valentine and Tom Learner, head of modern and contemporary art research, Getty Conservation Institute, at the National Gallery of Art, Washington, DC on July 16, 2013. I attribute my interest in the links between plastics, the arts, and the military to this discussion.
[33] Valentine, interview by the author, 2016. The artist received his BFA at the University of Colorado, Boulder in 1958 and his MFA at the school in 1960. Valentine remarked that Diebenkorn "turned me on to color" during his studies. Clark, "Fields of Transparency," 13.

always the one who was stinking up the place, covering plaster of Paris with polyester or casting polyester into a void in a piece of ceramic."[34] In 1965, his works attracted the attention of Jack Hooper, a visiting artist from UCLA, who invited Valentine to come to Los Angeles and teach students how to work with plastics.[35] Moving to California with his wife and three children, Valentine taught a class on plastics at the UCLA Extension Program for two years until beginning to pursue sculpture full-time in 1967.[36]

When Valentine arrived in Los Angeles in 1965, plastics were part of the local culture thanks to the nearby military and aerospace industries. Though the city had shifted away from wartime industrial production, the region's economy still relied on contracts from the military-industrial complex, driving the development of technologies and materials.[37] In particular, Southern California was a hotbed of aerospace activity, which not only affected the automotive and surfing cultures in Los Angeles but spurred the growth of suppliers of industrial materials like synthetics.[38] In an interview, Valentine

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[34] Interview with DeWain Valentine, October 1979, Jan Butterfield papers, 1950–1997, Archives of American Art, Smithsonian Institution, Washington, DC.
[35] Valentine, interview by the author, 2016. Learner, Rivenc, and Richardson, *From Start to Finish*, 7.
[36] He held other related jobs during this time, which included teaching at a private girl's school in the area and instructing art collectors' wives how to use plastics and weld metal. Valentine, interview by the author, 2016.
[37] Wesley Marx, a California-based conservationist writer, wrote in 1968 during Valentine's early years in Los Angeles: "Postwar California is, to a great degree, a creature of the national security economy. An amalgam of defense and space contracts supports an extensive aerospace establishment, and this establishment dominates the state's activities in manufacturing, employment, and university research." Wesley Marx, "One-Eyed Technology," in *The California Revolution*, ed. Carey McWilliams (New York: Grossman Publishers, 1968), 37.
[38] For instance, aerospace engineers were involved with developing hot-rod cars, as well as surfboards. This confluence, in addition to the growth of the local industries, is mentioned in: Peter J. Westwick, "Introduction," in *Blue Sky Metropolis: The Aerospace Century in Southern California*, ed. Peter J. Westwick (Berkeley, CA: University of California Press, 2012), 8.

claimed that his work was influenced by "the sophistication of the technical industry here—the space industry, the aircraft industry and maybe even the initial growth of art" in the city, and his practice as "growing out of crafts specifically, rather than out of a European tradition."[39] The artist was pursuing his work at a time when plastics production still relied heavily on commercial craft standards, with little precedent in fine art studio practice.

Local shops supported the artist's growing interest in plastics, such as Hastings Plastics Company that opened in 1957 in Santa Monica. Owned by Norry Hastings, a World War II veteran and one of the founders of the Southern California Society of Plastics Engineers, the company became a major supplier for artists in the 1960s, working with Valentine as well as his contemporaries such as Peter Alexander, Judy Chicago, Fred Eversley, and Craig Kauffman.[40] The community of artists working with plastics learned about the materials from their suppliers as well as from each other, particular in Venice Beach where so many artists lived and worked, as the area offered inexpensive studio space and acted as an incubator for artists interested in sharing ideas and techniques.[41] Valentine moved into his studio in Venice in 1967, where he remained

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[39] This comment was not included in the published interview in the artist's Pasadena Art Museum exhibition catalogue. Transcript of Valentine interview with John Coplans, June 26, 1970, Folder, DeWain Valentine Catalog Copy, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.

[40] Ed Schad, "Noble in Resin: Hastings Plastics, Legendary Maker of Sculptures for L.A. Artists, Closes After 55 Years," *L.A. Weekly*, January 5, 2012, accessed June 26, 2018, http://www.laweekly.com/arts/hastings-plastics-legendary-maker-of-sculptures-for-la-artists-closes-after-55-years-2173530. The shop operated for 55 years until it moved in 2011 and was renamed Santa Monica Plastics, run by former Hastings employees Eric and Claudia Warren.

[41] Venice was originally developed between 1892 and 1904 by Abbott Kinney, who built Italian villas and man-made canals that he filled with gondolas from Italy to be a destination for the wealthy and a cultural center for both the arts and sciences. By the

until 1991.[42] With Larry Bell as his next-door neighbor, Robert Irwin across the street, and Doug Wheeler and John McCracken nearby, among many others, Valentine worked amid a vibrant community of artists who shared material knowledge and support in a studio that gave him the space to expand the scale and size of his objects.

For Valentine, there was also more opportunity for an artist working in plastics in Los Angeles than in New York. He commented in a 1976 interview: "I used to go to New York, and I'd take slides around to the galleries, they'd hear "plastic" and— *pshew*!—it was all over! In 1962, 63, talking to Leo [Castelli] about plastic was like spitting in his eye!"[43] At first, Valentine worked with Fiberglas, making sculptures that were painted and lacquered with bright, industrial colors like candied red, such as *Triple Disk Red Metal Flake—Black Edge*, 1966 (Figure 59). The artist made the work by attaching individual cone shapes at their bases to create "flying saucer" forms and then linking the forms together in an accordion-like chain. Teetering on their edges, the sculptures evoked abstract motors or generators with sleek finishes. These Fiberglas works were exhibited widely in group shows in Los Angeles and New York, notably: "A Summer Show" at Dwan Gallery, Los Angeles in 1966; the survey "Sculpture of the 60's" at the Los Angeles County Museum of Art in 1967; and the Annual Sculpture Exhibition in 1966

1950s, the area was considered a "slum" and offered artists inexpensive studios and residences. Franklin Walker, "Abbot Kinney's Venice," in *Los Angeles: Biography of a City*, eds. John & Laree Caughey (Berkeley, CA: University of California Press, 1977), 235–239.

[42] Jan Butterfield, *The Art of Light + Space* (New York: Abbeville Press, 1993), 193.

[43] Marietta Warner Siegel, "Aesthestic Uses of Transparency in Sculpture: A Theoretical and Creative Investigation (Volumes I and II)" (PhD diss., New York University, 1980), 142–143. Valentine also mentioned that artists such as Larry Bell and Craig Kauffman contributed to his move to California, remaking that "these guys think more like I think rather than New Yorkers." Valentine, interview by the author, 2016.

and 1968 at the Whitney Museum of American Art, which acquired the related 1967 Fiberglas work *Five Red Discs* in 1968.[44] The Fiberglas sculptures introduced Valentine to the public and the art community. At the same time, he began to cast polyester resin objects on a small scale, such as spinning top shapes, prism forms, and tabletop circles (Figure 60), before turning exclusively to polyester resin starting in 1968.

The Turn to Polyester Resin

In 1970, Valentine stated: "I think my sculpture grew out of the availability of polyester resin as a material. Another aspect is that it was possible for me to work the material in my studio without going to an industrial situation to have it fabricated, thus I could work at any scale."[45] Polyester resin allowed Valentine to retain control of his production in the comfort of his Venice studio. As a result, his process was reliant on his own labor and the help of his assistants from the careful measuring of substances to the hours of tending the curing objects and, finally, to the finish.

Valentine described his move from Fiberglas to polyester resin as a shift from emphasizing the exterior orientation of sculpture to accessing the unseen interior of objects. In interviews, he referred to the Fiberglas works as "shells" or "skins" that obscured the inner space of sculpture. In 1971, he remarked on the Fiberglas works: "The most important thing that struck me about these pieces was the fact that they were shells. I became very conscious of their interior space. The next logical step was to reveal

[44] Additionally, the Whitney Museum of American Art acquired, *Top*, 1968, a small cast resin object in the shape of a spinning top. The 1968 exhibition included *Large Wall*, which the artist later gave to the Pasadena Art Museum in 1969.
[45] Coplans, "Interview with DeWain Valentine," n.p.

this space by using a transparent material."[46] The same year, he explained that the Fiberglas works caused him to become "very much aware that most sculpture previously was dealing in terms of shell, whether it was cast bronze, carved wood, or carved stone…Sculpture for the most part really relied on being a shell."[47] He reiterated in a 2011 text that "most sculpture is a skin; your eyes stop at its surface and you only see the outside."[48] Valentine's continual comments on the surface qualities of Fiberglas sculpture, and his use of terms such as "shell" and "skin," illustrate what was at stake for Valentine in turning to polyester resin. With this material, Valentine could create mass to represent the *very effect of being interior space* while continuing to work with plastics, rather than turning to more traditional, and more costly, substances such as glass.

While Valentine cites materials such as bronze, wood and stone in his observations, his realization of the "shell" or "skin" of sculpture comes from his work in Fiberglas. As explained in the previous chapter on Eva Hesse (see Chapter Two), Fiberglas is strong and durable as well as thin and lightweight, which made it very popular among artists. In short, Fiberglas was attractive *because* of its shell-like qualities, the very characteristics that moved Valentine to seek a new material. Landing on polyester resin, which would become his signature substance, Valentine found a plastic—a close cousin to Fiberglas, which uses polyester resin to hold together glass fibers—that

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[46] Newmark, "Interview with DeWain Valentine," 379–380.
[47] *An Exhibition of Five Recent Works by Larry Bell, John McCracken, DeWain Valentine, Ron Cooper, Peter Alexander*, (Edmonton, Canada: The Edmonton Art Gallery, 1971), 37.
[48] Learner, Rivenc, and Richardson, *From Start to Finish*, 12.

allowed the artist to focus on interior space through cast matter, in stark contrast to the shiny surfaces of his Fiberglas works.[49]

Valentine's Casting Process

Unlike Fiberglas which had almost limitless potential with regards to scale—*Triple Disk Red Metal Flake–Black Edge* is more than five feet high and seven feet long, for instance—polyester resin was subject to industrial restrictions when Valentine first started casting objects. As mentioned above, before Valentine's innovations, the use of more than 50 pounds of the substance in a single object was impossible as the material would overheat and crack. In his search for a method to cast larger objects, he turned to plastics professionals, starting with his polyester resin supplier Hastings Plastics. In 1966, Valentine had a chance encounter at Hastings with Ed Revay, a resins representative from Pittsburgh Plate Glass, who agreed to work with the artist to develop a new product.[50] Revay provided polyester resin samples to Valentine before they were available on the market, either by bringing them to the artist's studio or leaving materials for Valentine to pick up at the Pittsburgh Plate Glass plant in Torrance, California.[51] Then Valentine completed research and development on the materials through trial and error in his studio, measuring out gram-by-gram the amount of catalyst needed for different quantities of resin, anywhere from one gallon to a 55-gallon drum.[52]

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[49] Valentine first tried making discs out of vacuum-formed Plexiglas, a material used by colleagues such as Craig Kauffman, but the material was too costly. Newmark, "Interview with DeWain Valentine," 379.
[50] Valentine, interview by the author, 2016.
[51] Learner, Rivenc, and Richardson, *From Start to Finish*, 3, 8.
[52] Valentine, interview by the author, 2016.

By 1968, Valentine had developed "Valentine MasKast Resin No. 1300-17," a product he then chose to distribute in collaboration with Hastings Plastics, along with the accompanying "Valentine 1300-17 Catalyst."[53] The 1970 brochure published by Hastings Plastics used the artist's name as a brand, claiming on one page that the reader can "Cast Valentine Sculptures Weighing 500 to 10,000 Pounds," as if Valentine's works were trademarked objects to be replicated. Described as "a low viscosity, low exotherm, clear liquid resin with a very slight bluish tint which disappears on hardening," this plastic product enabled users to create objects weighing up to 10,500 pounds in single pours, though an enclosed table in the pamphlet only gave details for casting up to 1,480 pounds.[54]

With "Valentine MasKast Resin No. 1300-17" in hand, Valentine began casting massive objects, such as large, tapered "Slabs," curved walls, and five varieties of freestanding circles. A 1973 article outlined the five different types of circles Valentine produced between 1969 and 1973, starting with casts using a single color: the double concave circles; the circles with one side flat and the other concave; and the circles with one side flat and the other convex.[55] Then, Valentine made circles using two different color resins in the same mold: two-toned works with one side concave and the other

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[53] Hastings Plastics president N.M. Hastings explained the process of developing this product in a company brochure: "To achieve this significant break-through, DeWain Valentine had to spend many hours experimenting and many dollars, because, a success of this type is always built on early failures, and failures in use of this resin in large masses is irretrievable and costly. Now that he has worked out most of the product and use problems, DeWain Valentine, in collaboration with Hastings Plastics Company, is releasing his special resin and techniques to other artists and industry." *Spectacular DeWain Valentine Mass Casting Resin*, 10.
[54] Ibid., 10, 11.
[55] John Lloyd Taylor, "De Wain Valentine," *Art International* 17 (September 1973): 22–24.

convex; and finally the flowing color circles, where the two colors are separated by a wavy line.[56] In these works, Valentine experimented with polyester resin's visual abilities through different thicknesses, structures, and colors, all enclosed in massive, freestanding circles. The sculptures Valentine produced in this period were complex in their balance of incredible bulk with lightness of expression, creating what the artist called "fields of transparent color" that were spatial and fleeting for the viewer.[57]

When the artist began using his Valentine MasKast Resin, he adapted his studio practice to accommodate this new scale of working. For instance, the material came in barrels that could only be moved by forklift and required Valentine and his assistants to wear white safety suits and masks against its toxicity (Figure 61). Polyester resin essentially turned Valentine's Venice studio into an industrial laboratory, though one in which each piece was hand-cast and polished to a pristine finish. First, he began with the mold, typically made from particleboard secured with wooden beams and clamps, among other materials.[58] More complex forms, such as curvilinear shapes, were created using Fiberglas molds built from polyurethane foam models, thereby relying entirely on synthetic materials to generate his forms.[59] To keep the objects from attaching to the molds, Valentine would cover the interior of the structures with a polyvinyl alcohol

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[56] Taylor, "De Wain Valentine," 24.
[57] Coplans, "Interview with DeWain Valentine," n.p.
[58] Learner, Rivenc, and Richardson, *From Start to Finish*, 27. In 1971, he discussed commissioning a company to made molds for him, some out of steel plate and some in Fiberglas. Newmark, "Interview with DeWain Valentine," 378. Another text described Valentine using boxes built of wood and Masonite for mold making. Garver, *Valentine: Recent Sculpture*, 6.
[59] Kurt Von Meier, "Interview with DeWain Valentine," *Artforum* 7, no. 9 (May 1969): 56.

separating agent as the first step before introducing the liquid resin.[60] These molds, in particleboard or Fiberglas, would be reused for multiple pieces. The casts would each produce a series of related objects, all using Valentine's signature resin formula.

The artist described the process of casting polyester resin as "sort of like jello—self-cooking art" as the liquid plastic mixed with a catalyst hardens at room temperature through an exothermic reaction, once poured in the mold.[61] This feature of polyester resin meant that casting was time sensitive, so the artist would have to keep a consistent pace between each step. For Valentine, the process began by pouring the catalyst and color—using a paper cup, as shown in one photograph (Figure 62)—directly in the resin drum and then mixing the liquid by inserting a propeller blade attached to a motor and running the propeller for about an hour.[62] The resin would then be lifted by forklift and filtered through a stainless steel strainer—one previously used to remove impurities in airplane fuel—into the mold (Figure 61), taking another hour.[63] A work such as *Large Wall*, weighing 5,000 pounds, would require 10 barrels of resin, each holding 55 gallons or 500 pounds.[64] After the final barrel was poured into the mold, Valentine and his assistants would babysit the work for 18 hours as it cured, releasing the clamps a little at a time until the mold was removed and the raw material was ready for finishing.[65] Due to the

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[60] Von Meier, "Interview with DeWain Valentine," 56.
[61] Ibid., 55.
[62] Learner, Rivenc, and Richardson, *From Start to Finish*, 26.
[63] To regulate the flow of resin, Valentine would use compressed air inserted in the upper valve of the drum, creating pressure to force the resin out. Ibid., 9, 24, 26.
[64] A memo from 2005 on *Large Wall* confirms its weight at 5,000 pounds. Memorandum, Michelle Deziel, Assistant Curator, Norton Simon Museum, June 24, 2005, Object file, De Wain Valentine, Large Wall, 1968. P. 1969.121, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.
[65] This time estimate is based on documentation of *Gray Column*, 1975, which is of comparable size to *Large Wall.* Valentine typically had two or three assistants working in

heat that would be generated by the chemical reaction between the resin and the catalyst, Valentine placed the molds on a forklift near the back door of his studio: if pieces overheated, burned or smoked, he could then push them into the alley.[66] Throughout the curing process, the plastic would make cracking noises—"like pine logs burning in a fireplace," according to Valentine—keeping the artist attentive to the risk of combustion.[67]

This blind casting process led to some tense moments for Valentine, particularly when producing *Large Wall* (Figure 56), his largest pour at the time of its making in 1968. The wide, monumental plinth, around eight-feet-high and cast with a tapering top, weighed 5,000 pounds and almost broke its mold.[68] Valentine remembered that after he had poured in nine barrels, the mold, made of two-by-fours and heavy particle board, began to crack under the hydraulic pressure of the liquid resin. He recalled: "I thought, 'Oh boy, I've got a polyester skating rink in my studio if this breaks!'"[69] As his story goes, Larry Bell, his studio neighbor in Venice, appeared at this very moment to complain about the smell emanating from Valentine's studio and was enlisted, along with several other men, to help stabilize the mold. Bell had some large, solid wooden beams that they used, along with pipe clamps, to squeeze the structure together and reseal the

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his studio, including Chris D'Arcangelo, Rob Janiger, and Keith Anderson. Learner, Rivenc, and Richardson, *From Start to Finish*, 9, 10, 24.

[66] Learner, Rivenc, and Richardson, *From Start to Finish*, 9. Valentine, interview by the author, 2016.

[67] Learner, Rivenc, and Richardson, *From Start to Finish*, 9.

[68] Originally called *Untitled (Large Slab)*, *Large Wall* has had its current title as of December 21, 1998. Art File Report, October 28, 2011, Object file, De Wain Valentine, Large Wall, 1968. P. 1969.121, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.

[69] Valentine, interview by the author, 2016.

mold.[70] Valentine soon learned how to steady the works in spite of the hydraulic pressure, using other materials such as steel and Fiberglas and bracing his particleboard molds with "hundreds and hundreds of C-clamps."[71]

The heavy labor came after the molds were released, which revealed the rough, matte surface of the raw polyester resin. Valentine and two or three assistants spent days and sometimes weeks sanding and finishing the pieces using an automobile body fender grinder and sandpaper (Figure 63) and then classic car wax.[72] The objects were polished to remove any explicit marks of making. However, the imperfect, human labor of the artist and his assistants left behind subtle undulations on the surface like wide water ripples, as the polyester resin retained its "liquid origins" when hand-polished in this way.[73] This effect can be seen in one of the large circles from 1970 on view in Valentine's studio (Figure 64). Even a minor warbling of the plastic would distort the visitor's view through the objects, but without marring the clear optics of the works. Scratches or scuffs, on the other hand, were not tolerated. Valentine spoke of the

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[70] Valentine, interview by the author, 2016.

[71] He used reverse-roof, triangulated frames to brace the large wooden and particleboard mold. Regarding C-clamps, he described his process: "Every place there was a leak I'd put a new C-clamp. It was all empiric, all trial and error." Ibid.

[72] Learner, Rivenc, and Richardson, *From Start to Finish*, 10. Valentine explains that the finer grit of the sandpaper today no longer requires the use of car wax. Valentine, interview by the author, 2016. Reportedly, "a few hundred pounds of resin came off" during the sanding and polishing process. Kennedy, "Reputation and Monolith," AR74.

[73] On the occasion of a 1969 exhibition at the Fine Arts Gallery, University of British Columbia, Thomas Garver described the "liquid origins": "Thus unlike plastic or glass that is polished by machines that produce a perfectly flat surface, the Valentine slabs tend to bulge or wave in a manner that suggests the liquid origins of the work. Further, this gently undulating surface, while in contrast to the precision of shape, is in precise agreement with the content or interior of the piece, for the resin is never entirely transparent or colorless and is frequently filled with a curious colloidal glow, like unfiltered water, a result of reaction between catalyst and resin." Garver, *Valentine: Recent Sculpture*, 10.

sculptures' "ultimate surface," where any abrasions in the plastic would obscure their visual effects.[74] The artist explained: "It has to be as perfect as possible, because if there are scratches or ripples, all you see are the ripples or scratches. I don't want you to just look at the surface. I want you to ignore the surface as much as possible. So you look at it and through it and in it and beyond it."[75] The final stage of finishing, therefore, was imperative and onerous, as Valentine sought to completely eliminate the marks of his casting process entirely by hand.

Despite their weight, the completed objects were unexpectedly fragile: Valentine once likened polyester resin to marble in delicacy.[76] The works' fragility came from the material's tendency to scratch or chip easily. The artist remarked: "I have a strange, perhaps romantic, feeling that this is part of their poetry—you know, something that is large in scale and highly refined yet extremely delicate and easily subject to destruction."[77] In some cases, minor damage to a work required Valentine to refinish the surface, which meant an irreversible loss of material, thereby slightly changing the shape of the object.[78] The emphasis on visibility was so important to Valentine that he would repeatedly treat and polish his works even when they were on view. For the show at the

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[74] *Exhibition of Five Recent Works*, 38.
[75] Valentine, interview by the author, 2016.
[76] Newmark, "Interview with DeWain Valentine," 379.
[77] Coplans, "Interview with DeWain Valentine," n.p.
[78] With regards to refinishing, the artist remarked that sustaining the surface was more important than retaining mass: "You can just resand the surface if it gets scratched up, and then repolish—almost infinitely, until the material is finally worn away." Von Meier, "Interview with DeWain Valentine," 56. This opinion is not, however, held by museums that intend to maintain the original surfaces, despite the aging of the polyester resin. The issue is addressed in the Getty Conservation Institute publication, particular with regards to "orange peel" patterning or "grow-outs," which are the characteristics of polyester resin aging, due to the material's slow movements over time, like glass. Learner, Rivenc, and Richardson, *From Start to Finish*, 4.

Pasadena Art Museum, for instance, Valentine came to the galleries each week to tend to the sculptures to ensure they were in their ideal condition, extending the artist's work outside the studio.[79]

On Color and Polyester Resin

Despite the laborious process of casting and finishing, polyester resin gave Valentine the opportunity to create his monolithic fields of colored space without compromising the visible interior of the object. Valentine introduced color to the sculptures early in the process, mixing different artist pigments into the resin with the catalyst, while the liquid plastic was still in its steel drum.[80] He adjusted each batch depending on the color, as some pigments slowed down the catalyst.[81] At this point the color became inherent to each batch of resin, making the different hues continuous throughout the objects. Valentine used multiple colors for certain works, such as *Circle Blue Smoke Flow*, from 1970 (Figure 65). These circles included two colors divided by a wavy line made by titling the mold after pouring in the two colors. Typically, though, Valentine used solid hues. In every instance, the color was not applied, as in his Fiberglas sculptures, but integrated into the material. The artist's use of pigments in casting plastic tested the traditional place of color in sculpture as secondary to substance. In the 1970 catalogue, he explained:

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[79] For the exhibition at the Pasadena Art Museum, Valentine agreed to return to the galleries every week with his assistants to polish the works throughout the run of the show. Memorandum, Registrar, May 12, 1970, Folder, DeWain Valentine, May 12 – July 5, 1970, Pasadena Art Museum Archives, Norton Simon Museum, Pasadena, California.
[80] He also added ultraviolet filters to stabilize the color. Valentine, interview by the author, 2016.
[81] Ibid.

> "I keep finding direct relationships in the new pieces to painting: they are not really painting nor really totally sculptural—they are some kind of marriage of the two. The color to me is ultimately important, especially the way the transparency and the color work together. That somehow isn't what I think of as a specific interest of classical sculpture. My sculptures are physical things, with physical color imbedded within the sculptural process rather than color painted on the surface."[82]

Valentine sought to blur the boundaries between painted surface and object, as well as painting and sculpture.[83] *Large Wall*, when included in the 1968 Annual Exhibition at the Whitney Museum of American Art, was even described by one critic as "a polyester slab in translucent mauve that seems to emulsify a Jules Olitski painting, or make of it a precious window."[84] Valentine also chose different colors for different effects, as he stated in 1969 that red and yellow pigments were not as effective in diffracting light—rather, they absorbed light—whereas blue and purple pigments allowed for more "prismatic" effects.[85] These sculptures became color studies on a large scale, interrupted only by the occasional air bubble suspended in the plastic, as seen in one detail of *Large Wall* (Figure 66).[86]

The color effects of these works are often lost in the photographs from the period, even when the images are in color. Documentation of *Untitled (Concave Circle)* from

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[82] Coplans, "Interview with DeWain Valentine," n.p.
[83] In a 1971 exhibition text, John Lloyd Taylor argued this point: "The illusionistic qualities of Valentine's sculpture are not dissimilar to the illusionism of color in painting, and in this regard it is conceivable to think of his work in terms of both painting and sculpture. Yet the work maintains a definite physicality with real color; they are indeed solid volumes, but volumes of colored air into, through and beyond which one is visually drawn." Taylor, *Directions 3: Eight Artists* (Milwaukee, WI: Milwaukee Art Center, 1971), n.p.
[84] Max Kosloff, "New York: Whitney Annual: Sculpture, Whitney Museum," *Artforum* 7, no. 6 (February 1969): 64.
[85] Von Meier, "Interview with DeWain Valentine," 56.
[86] Valentine explained that bubbles are the result of "local overheating." Newmark, "Interview with DeWain Valentine," 379.

1970, for instance, shows great variation in the color of the plastic. A large example of the double-concave circles, the work measures six feet in diameter and two feet thick at its base, tapering to a narrow center before widening again to 21 inches at its top, and weighs 3,500 pounds. *Untitled (Concave Circle)* is forbidding in its mass and creates arresting optical illusions through its violet, transparent interior. In photographs from the exhibition *A Plastic Presence* (Figure 67), *Untitled (Concave Circle)* acted as a wide-angle lens, distorting and shrinking visitors to the show in side reflections, flipping the images of other figures standing close to the object, and showing the room awash in red jewel-like colors. In contrast, a recent photograph (Figure 68) reveals the work's sleek, sharp surface and rich violet color with neon pink hotspots where spotlights hit the plastic.[87] Neither of the photographs accurately documents the work's vibrant display of colors, as one contemporary account describes "tonalities of deep and pale violets, blues, reds, pinks, and at its most transparent conditions, subtle rose-greys."[88] *Untitled (Concave Circle)* exhibits ever-changing color, which is inherent to the experiential qualities of Valentine's large-scale polyester resin sculptures that has so often eluded photographs of the works.

Pasadena Art Museum Exhibition

The role of color was especially prominent in the documentation of Valentine's works shown at the Pasadena Art Museum exhibition in 1970. As seen in the Los

[87] The sculpture was included in two stops of *A Plastic Presence*: Jewish Museum, New York, November 19, 1969 through January 4, 1970; and Milwaukee Art Center, January 30 through March 8, 1970. The work was acquired in 1970 by the Milwaukee Art Center (now the Milwaukee Art Museum).
[88] Taylor, "De Wain Valentine," 23.

Angeles-based photographer Harry Drinkwater's images of the show (Figure 57), the artist's three circles—thick and transparent—displayed energetic and even prismatic effects in their staggered arrangement. Individually and in close proximity to one another, the circles appeared layered, as if overlapping washes of color constantly shifted for the viewer. A critic later described the circles as exhibiting "complete objectlessness—pure physical color volumetrically suspended in space—when viewed from within several inches of the surface."[89] Each work was made of translucent polyester resin with distinct, solid colors, described by the artist as "deep violet-red," "light lavender," and "deep red at the periphery varying to a peach color at the center."[90] All cast from the same mold and using the same polyester resin, the circles differed in their colors but shared in their impact on the exhibition space.

Fresh from the studio and balancing on their edges without support, the objects appeared like artificial boulders or megaliths arranged ritualistically for the public, as if part of a silent ceremony, while introducing thousands of pounds of plastic into the museum. However, the translucency of the material also gave the circles the illusion of being portals through which to reencounter the exhibition space. This unusual dynamic created an awe-inspiring installation where the impact of the sculptures was not limited to the sheer size and mass of the cast matter. The hand-worked surfaces, for instance, created warbled and rippling views of the gallery, while the reflections on the polished floor gave the heavy objects the appearance of floating (Figure 57). Based on other photographs showing visitors interacting with the objects, the sculptures were most

[89] Taylor, "De Wain Valentine," 23.
[90] He also described *Curved Wall*, shown in an adjacent space, as "clear blue-violet" in color. Newmark, "Interview with DeWain Valentine," 377.

groundbreaking in their dynamic interiors that created elaborate visual play. Images of children intermingling with the sculptures on view showed the effects of the works on the space (Figure 69), with layers of reflections, ghostly likenesses, and an almost cinematic interweaving of visual echoes. In Valentine's exhibition, the sculptures encroached on the visitors' space in a new way, creating an experiential encounter with plastics.

Other photographs of the exhibition give further evidence of the visual spectacle, particularly when visitors moved around the objects. In one image (Figure 70), an older visitor, clutching her purse, peered into a circle, while her companion loomed large behind the object, captured in the distortion of the plastic surface, warping any sense of distance, scale, and space. These effects were not lost on critics, one of whom wrote that the sculptures "become shifting, never ending patterns inhabiting the plastic dimensions in almost hypnotic intensity."[91] Another reviewer described the works as offering the "visual illusion of huge orbs," encouraging viewers "to take turns standing behind them where they seem to float in a fortune-teller's crystal," as if they were mystic objects with enchanted abilities.[92] In a different image (Figure 71), a visitor, beset with bags and standing very still, is framed at the center of one large circle with her hand slightly extended. The woman inhabited the circle as if suspended in a sphere—one effect of the double concave shape, to appear volumetric rather than reductive. She reappeared in a fuzzy, disembodied reflection through the lens of another circle closer to the photographer. As seen in the images by Drinkwater (Figure 57), the circles not only

[91] Betje Howell, "Andy Warhol Art in Pasadena Display," *Los Angeles Herald-Examiner*, May 17, 1970: F8.
[92] William Wilson, "Other Exhibits of Pasadena Museum," *Los Angeles Times,* June 1, 1970: E8.

warped the space around the public, but also immersed them in the rich colors of the works. This chromatic effect was recently displayed in an arrangement of circles at David Zwirner in New York in 2015 (Figure 65) that called to mind the Pasadena Art Museum installation, where the visitors standing behind the works appeared suspended in the plastic substance, as if submerged in an oversized fishbowl.

As evinced by the photographs and accounts of the Pasadena Art Museum exhibition, Valentine's polyester resin circles were not simply feats of engineering. They were human-made phenomena that appeared like giant gemstones excavated from the earth and polished to their potential, akin to the stones Valentine collected as a child. However, rather than geological, the objects were synthetic, creating prismatic experiences only possible when polyester resin was cast on a human scale. Valentine's work with polyester resin aimed to transcend the physical weight and encumbrance of the plastic, to emphasize its *qualities*—transparency, visual effects—rather than its *mass*. Yet it was the thickness, density, and shape of the plastic that made Valentine's "transparent color fields" compelling, unlikely, and engaging. In fact, Plagens wrote in 1975 that the objects "moved *away from physicality via physicality itself*."[93]

The heft of the objects might have gone undetected by visitors, as the weights of the works were not mentioned in the exhibition catalogue. However, photographs of the installation process (Figure 72) offer a reminder of the objects' sheer mass and scale. As these images show, the human interaction with the works was not limited to the exhibition. Upon leaving the studio, the sculptures required continued labor, as seen in

[93] Plagens, *De Wain Valentine* (La Jolla, CA: La Jolla Museum of Contemporary Art, 1975), 3.

the efforts of the large group of art handlers placing the objects. These photographs assert that, despite their visual effects, the circles were not ephemeral or fleeting objects but works of solid, cast matter.

A Polyester Resin Hiatus, In Conclusion

By 1975, Valentine had turned his attention elsewhere and stopped casting polyester resin objects. Previously, he had spoken about the burden of working with resin on such a large scale. In the catalogue for the Pasadena Art Museum exhibition, he stated: "Rather than the medium being plastic, it is really transparency. Polyester at this time just so happens to suit my interests. I would almost be relieved if I found another means to go about pursuing my involvement with transparent color fields."[94] The works that followed similarly engaged light and transparency, first with his immersive installations that grew out of his prior work in plastics.

As early as 1969, Valentine shared plans to create a polyester resin structure one could enter through a ladder or trapdoor, to be fully immersed in the plastic.[95] He was interested in further expanding the boundaries of the material. Valentine even redesigned his studio to be a "laboratory" for experimentation with white walls, white tile floors, white furniture, and skylights, as well as a separate space to install environmental pieces.[96] His exhibition at La Jolla Museum Of Contemporary Art in La Jolla, California

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[94] Coplans, "Interview with DeWain Valentine," n.p.
[95] Garver wrote in 1969: "Valentine now has plans to construct resin monoliths, either as circles or cubes, into which one will enter (possibly by ladder or trapdoor) to experience the plastic euphoria from all sides." Garver, *Valentine: Recent Sculpture*, 12.
[96] Butterfield discussed the transformation of his studio into a "laboratory." Butterfield, *Art of Light + Space*, 193. In the 1970s, he also constructed a separate room in his studio

in 1975, for instance, was devoid of the polyester resin works, but rather showed his *Cantilevered Planes*, 1975 (Figure 73). The work was composed of acrylic sheets installed in vertical succession and edge-lit to give the appearance of floating lines of light drawn in space. This installation still relied on plastic as the medium, but obscured the acrylic components to highlight the visual abilities of the substance, rather than its mass. Unlike in the large-scale cast polyester resin objects, the material of this later work was no longer the visual focus but merely the vehicle for an experience.

Valentine's works that came after the mid-1970s similarly engaged light and transparency, first with his room-based installations, followed by large-scale constructions in layered picture frame glass, among other works. The artist did not return to casting polyester resin until 2014, after a renewed interest in his work following *Pacific Standard Time*. He has exhibited new circles in recent years, such as *Circle Blue Green*, reaching more than six feet high and cast in 2016 from a 1972 design (Figure 74). Now working out of his studio in Torrance, California, Valentine has returned to the shapes and substances that declared him the "the technician *par excellence*" of polyester resin.[97] The new works have also joined the series of recent shows that have reintroduced audiences to the artist's plastic objects and have reestablished the timelessness of his sculptures. His monoliths still read today as extraordinary explorations of light, transparency, and color made possible through Valentine's development and use of his own formula. Only in taking control of the production and the chemistry of polyester resin was the artist able to free his materials from the confines of industry standards, and

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to experiment with environmental work. Cara Montgomery, "Los Angeles Report," *Arts Magazine* 47, no. 7 (May/June 1973): 53.

[97] Plagens, *Sunshine Muse*, 122.

allow plastics to fulfill a new potential: one of complex, rich aesthetic experience rather than merely surface, shell and skin.

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Chapter Four — Frederick Eversley

"I am involved with using art as a phenomenon as opposed to using art as a language, and as such I am dealing with real energies, forces, space, time, and matter."
— Frederick Eversley, 1976[1]

As an artist working with polyester resin in Los Angeles, Frederick Eversley was unique in his centrifugal process of casting. Eversley created his objects by spinning liquid plastic in a circular mold until it cured, thereby expanding the tradition of cast sculpture. The artist has, since 1968, been known for his geometric forms that emerged from this process. An engineer by training, Eversley stood apart from artists of his generation for his unusual background. From 1963 to 1967, he worked as an engineer for Wyle Laboratories in El Segundo, California, testing equipment for NASA missions at the height of the Space Race. In 1967, he left his position to become a full-time artist, working in Venice, California, and developing methods of casting polyester resin that he continues to use to this day.

Eversley's signature and most innovative series of works, the "Lenses," which he began in 1970, have loomed large in his practice. The artist made the Lenses using a range of colors in variations of the same form: a circular work with one flat side and one curved, parabolic side.[2] All of the Lenses were made by casting the liquid substance using circular motion. A portrait of Eversley from the 1970s (Figure 75) showed the artist posed casually, leaning against the wall of his Venice studio beside one of the translucent Lenses. The color of the sculpture was lost in the black-and-white photography, but the

[1] Frederick Eversley, *Frederick Eversley* (Santa Barbara, CA: Santa Barbara Museum of Art, 1976), n.p.
[2] Eversley described this series as "transparent, three-color plano-concave cylindrical paraboloidal lenses." Ibid.

image spoke to the vibrancy of the work. As shown, the parabolic center of the Lens made the object highly interactive with the space around it, condensing Eversley's reflection and distorting the architecture of the studio through the highly-finished transparent plastic. The Lens picked up streaming sunlight as if conducting energy, while it sat on a tall pedestal of clear acrylic plastic, giving the work the appearance of floating in space, despite the heft of cast polyester resin. In fact, for Eversley, his objects were intended to harness energy. In 1976, he claimed he was "using art as a phenomenon" in his work with "real energies, forces, space, time, and matter," where his transparent Lenses, in particular, had the appearance of "possessing their own internal source of energy."[3] When displayed, the Lenses were conductors of light, at once like optical implements and precious gems as well as finely crafted, hand-cast sculptures.

This text will closely consider Eversley's techniques and approach to casting polyester resin, particularly as seen in the Lenses, as the objects are rarely addressed in the limited art historical scholarship on the artist. By focusing on the process and materials used in Eversley's practice, I provide a more textured history of the artist's innovations, showing that his objects are the result of meticulous planning and labor, which is often forgotten in the works' finished, polished state. I underscore what was so groundbreaking about Eversley's method of working, as he discovered how to transform plastic by casting through motion, creating objects with no precedent in the history of plastics.

I begin the chapter with a summary of the previous scholarship on Eversley's work, which has privileged his role as an African American artist coming of age in the

[3] Eversley, *Frederick Eversley*, n.p.

1970s, at a time that fueled important discussions around the history and the future of Black art in the United States. Previous literature has focused on Eversley's inclusion in particular exhibitions, as well as his first solo exhibition, which opened at the Whitney Museum of American Art in 1970. I propose an approach to Eversley's work that looks beyond the artist's mere presence in certain shows by concentrating on what made his work in plastics so innovative. I start by closely examining the artist's Whitney Museum show, using the institution's archives. I expand the scholarship on this exhibition by showing how it first presented the public with Eversley's unique approach to plastics in both his construction of the objects and his intention set forth in the catalogue.

The subsequent text considers what happened after 1970: notably, the development of his Lenses. I offer an in-depth discussion of Eversley's process of making these works through recent interviews I conducted with the artist. This section is followed by an overview of the installation and reception of Eversley's first major survey organized by the Santa Barbara Museum of Art in 1976, where he presented a large body of the Lenses. Finally, the chapter concludes with Eversley's return to the aerospace community in 1977, as he became the first artist-in-residence at the newly opened National Air and Space Museum at the Smithsonian Institution in Washington, DC. Building from the Smithsonian's records, I delve into the history of this residency during which Eversley struggled within an institution that, from the beginning, underestimated his requirements for creating plastic objects outside his studio. This chapter brings to light these moments in the early years of Eversley's career to understand why his works are so often removed from the context of their labor and specialized plastics craft.

On Eversley Scholarship

Much of the literature on Eversley has considered his identity as an African American artist in the 1970s, as he is frequently discussed within the boundaries of important exhibitions representing Black artists during this period.[4] His works, in these contexts, are often represented as symbols rather than as specific objects. In 2006, art historian Kellie Jones wrote: "Eversley's presence begs a question: does his multiple positions as black person, engineer and artist, whose work represented the intersection of aesthetics and scientific properties, modulate our thinking about the place and importance of this work?"[5] In her discussion on the strong current of abstract art by African American artists in the 1960s and 1970s, Jones situated Eversley by claiming his significance in creating "a certain type of visibility" in exhibitions for Black artists.[6] Jones included Eversley in an important chapter in African American art history without dictating that his objects needed to engage with more explicitly figurative or narrative

[4] See: Kellie Jones, "'It's not enough to say "black is beautiful"': Abstraction at the Whitney, 1969–1974," in *Discrepant Abstraction*, ed. Kobena Mercer (London: Institute of International Visual Arts, 2006), 162–164; Jones, "To the Max: Energy and Experimentation," in *Energy/Experimentation: Black Artists and Abstraction, 1964–1980* (New York: The Studio Museum in Harlem, 2006), 14–34; and Darby English, *1971: A Year in the Life of Color* (Chicago: University of Chicago Press, 2017). Throughout this text I will use the capitalized terms "Black" and "White," following Bridget Cooks, whose choice of terminology reflects the "social realities" around language that have informed the history of African American art. Bridget R. Cooks, *Exhibiting Blackness: African Americans and the American Art Museum* (Amherst: University of Massachusetts Press, 2011), xv.

[5] Jones, "To the Max," 32.

[6] Jones wrote: "Some types of activism were more situational and pressed the point about black creativity and the existence of black abstractionists through a certain type of visibility, through participation in group exhibitions of black artists and at the level of content. Activism by Al Loving, Fred Eversley and Daniel LaRue Johnson can be viewed in this light." Ibid., 26–27.

motifs on race. Her approach to Eversley engaged with other important writings that also addressed the role of Black artists and abstraction at this time in American art.[7]

Prior to Jones, the literature on Eversley consisted primarily of exhibition-related texts, with little emphasis for the art historical significance of the artist's work.[8] Darby English more recently expanded the discussion on Eversley as a Black artist whose practice of working in abstraction in the 1970s was a challenge both to a White, mainstream modernism and more representational, African American narratives.[9] English offered a rare but brief analysis of the artist's plastic objects, lending specificity to Eversley's sculptures.[10] My text benefits from the important scholarship by Jones and English that has brought Eversley's work to light, even though the artist is primarily considered through the framework of historic exhibitions, with little attention to the details of his studio practice and approach to materials.

In particular, Eversley is often discussed in the context of his solo show at the Whitney Museum in 1970, which opened amid the political tensions between the institution and the Black Emergency Cultural Coalition (BECC).[11] In 1969, the BECC

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[7] On the challenges faced by African American artists making nonobjective artworks, particularly from the 1960s to the 1980s: Dawoud Bey, "The Black Artist as Invisible (Wo)Man," in *High Times, Hard Times: New York Painting 1967–1975*, ed. Katy Siegel (New York: Independent Curators International, 2006), 97–99, 102–104, 106–109.
[8] Most notably: Eversley, *Frederick Eversley* (Santa Barbara, CA: Santa Barbara Museum of Art, 1976).
[9] "Through their modernist work on canvas, in plastic, and on the cultural field more generally, these artists opened a field of differentiation within a cultural territory otherwise captured by the political formalisms of 'blackness.'" English, *1971*, 11.
[10] Ibid., 119, 177–178.
[11] Jones discussed exhibitions by African American artists at the Whitney Museum during this time as the result of a political push applied at the end of the 1960s to demand more presence of Black artists and workers by the Black Emergency Cultural Coalition (BECC), in part as a reaction to the *Harlem on My Mind* exhibition at the Metropolitan Museum of Art in 1969. Jones, "It's not enough," 155–180. On April 24, 1969, the

challenged the Whitney Museum to better represent African American artists and the institution responded: between 1969 and 1975, the museum put on 12 shows with Black artists, which included 11 solo shows and one group exhibition, *Contemporary Black Artists in America* in 1971.[12] Eversley's exhibition was the third show included in this important roster of African American artists, though reviews from this period often linger on the visual display of the objects, with only scant mention of his race.[13]

This literature on Eversley has recovered important background on the artist's exhibition, but has not addressed his major body of sculpture that came right after 1970 and marked an important development in his studio practice: the Lenses. Recent exhibitions have brought more attention to Eversley's approach to polyester resin and to the radical, visual effects of his objects, including the Lenses, yet without addressing his

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BECC met with Whitney Museum staff, who agreed to the following points: "1. Stage a major exhibition of 'Black Art Works.' / 2. Establish a fund to buy more works by black artists. / 3. Show at least five annual one man exhibitions, in the small gallery off the lobby, of black artists. / 4. Have more black artists represented in the 'Whitney Annual.' / 5. Consult with black art experts." Benny Andrews, "The B.E.C.C. Black Emergency Cultural Coalition," *Arts Magazine* 44, no. 8 (Summer 1970): 19.

[12] The solo exhibitions at the Whitney Museum were as follows: Al Loving (December 19–January 25, 1970); Melvin Edwards (March 2–29, 1970); Fred Eversley (May 18–June 7, 1970); Marvin Harden (January 5–February 4, 1971); Malcolm Bailey (March 16–April 25, 1971); Frank Bowling (November 4–December 6, 1971); Alma Thomas (April 25–May 28, 1972); Jacob Lawrence (May 16–July 7, 1974); Jack Whitten (August 20–September 22, 1974); Betye Saar (March 20–April 20, 1975); and Minnie Evans (July 3–August 3, 1975). The museum opened the group show "Contemporary Black Artists in America," from April 6 to May 16, 1971. Also part of the group exhibition, Eversley was the only artist to exhibit artworks in plastic, according to the checklist. Robert Doty, *Contemporary Black Artists in America* (New York: Whitney Museum of American Art, 1971), 56. For a full account, see: Susan E. Cahan, *Mounting Frustration: The Art Museum in the Age of Black Power* (Durham, NC: Duke University Press, 2016).

[13] Henry Seldis described the show as a "sensual experience," further claiming, problematically, that the artist's identity is not present in the work: "Like other black artists in America, Eversley knows anger and frustration. But he has not chosen to make it the theme of his art." Henry J. Seldis, "Eversley Show in New York," *Los Angeles Times*, June 8, 1970: E10.

"multiple positions" outlined by Jones.[14] While this chapter focuses in particular on the artist's practice and the role of polyester resin in Eversley's process, I argue for the significance of the artist's innovations while also acknowledging that there is still further work to be done on the racial politics that affected his involvement with exhibitions and the larger artistic community. I hope that my close analysis of Eversley's studio practice and work in plastics will inform future scholarship that sees the artist's technical contributions to sculpture as relevant to the political and cultural histories of African American art and art in general in this period.

Eversley's Beginning and Background

More than any of his contemporaries, Eversley was uniquely positioned at the intersection of the aerospace industry and the artist community in Los Angeles. Born in Brooklyn, New York in 1941, Eversley had a penchant for science that was supported at an early age. His father, Barbadian by birth, was also an engineer, and his mother, a teacher, came from a historically prominent African American family.[15] Attending

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[14] Jones, "To the Max," 32. Eversley's work has recently found new attention, in part due to exhibitions involved with "Pacific Standard Time" in 2011, such as *Now Dig This! Art & Black Los Angeles, 1960–1980* at the Hammer Museum. In the catalogue, Jones singles out Eversley as the most "visible" Black artist working in a Minimalist style in the exhibition. Jones, *Now Dig This! Art & Black Los Angeles, 1960–1980* (Los Angeles: Hammer Museum, 2011), 21. Two solo exhibitions in 2017 also looked closely at Eversley's practice, with a particular focus on the Lenses: *Fred Eversley: Black, White, Gray*, Art + Practice, Los Angeles, CA, and Rose Art Museum, Waltham, MA, 2017; and *Fred Eversley: 50 Years an Artist, Light & Space & Energy*, Muscarelle Museum of Art, Williamsburg, VA, 2017.

[15] His father, Frederick W. Eversley Jr., worked as an engineer for Republic Aviation for more than 20 years before becoming one of the most prominent Black contractors in New York. Ronald Smothers, "F.W. Eversley Jr., Contractor, Dead: Head of Large Corporation With Minority-Group Ownership in the 60's and 70's," *New York Times*, January 4, 1983: D18. The artist's mother, Beatrice, descended from the Syphax family

Brooklyn Tech High School, Eversley went on to study electrical engineering at Carnegie Institute of Technology (now the Carnegie Mellon University), completing his degree in 1963. He initially planned to study bio-medical engineering at the University of Pennsylvania School of Medicine, but instead took a job at Wyle Laboratories, best known for its aerospace research for NASA and the Department of Defense.[16] Eversley worked at the company until 1967 as a senior projects engineer, testing instrumentation systems for NASA and its Gemini and Apollo programs by exposing equipment to extreme conditions that might occur in space, using "high intensity energy."[17] Landing at

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that traced its lineage back to slaves working at Mount Vernon, including Maria Carter, the child of Martha Washington's son, George Washington Parke Custis. Rebecca Sheir, "Family Tree: From George Washington to the Black Heritage Museum of Arlington," *WAMU*, October 10, 2014, accessed March 6, 2018, https://wamu.org/story/14/10/10/exploring_the_deep_roots_of_an_influential_slave_family/.

[16] Eversley ended up at Wyle through unusual circumstances. After graduating college, he planned a trip to Mexico to study mural painting and, to fund his travels, he contacted Frank Wyle, the president of Wyle Laboratories, whose son was Eversley's fraternity brother. He offered to work at Wyle for six months to a year in exchange for an advance for his trip to Mexico. Wyle agreed and Eversley arrived in California to start his new job in 1963. Greg Cook, "How Fred Eversley Went From NASA Engineer to Cosmic Artist in '60s LA," *The ARTery*, March 8, 2017, accessed March 6, 2018, http://www.wbur.org/artery/2017/03/08/fred-eversley.

[17] Eversley described his job description: "Employed as Senior Project Engineer—Instrumentation Systems at Wyle Laboratories, El Segundo, California. Supervised the design and construction of high intensity acoustic and vibration test laboratories at NASA facilities in Huntsville, Alabama, and Houston, Texas; Wyle Laboratory facilities in El Segundo and Norco, California and Huntsville Alabama and facilities for the German and French government aerospace agencies. Also instrumentation systems for the control and monitoring of speed rail (metroliner) and nuclear blast simulation facilities." Eversley, *Frederick Eversley*, n.p. He explained: "I was designing test facilities to simulate the environments that the components would be encountering in space, primarily in the field of high intensity acoustics. The most important aspect of all of these projects was that they all involved high intensity energy (acoustic, shock, vibration, heat, light, radiation, etc.), and how to generate it, control it, and measure it and its physical effects." Linda DeBerry, "Harmonic Convergence: An Interview with Fred Eversley," *Crystal Bridges Member Magazine* 6, no. 2 (August 2017): 7.

Wyle at the height of the Space Race, the stakes were high, as he recounted: "I spent four years working crazy hours beating the Russians to the moon."[18]

Arriving in Los Angeles in 1964, Eversley initially faced racial prejudice from landlords while looking for a place to live. He finally settled in Venice Beach, which he described as "the only beach community where Blacks were accepted."[19] Eversley became friendly with the artists working in the area, including Valentine, Larry Bell, James Turrell, Robert Irwin, and John McCracken, among others, and often helped them with technical challenges.[20] Then in January 1967, Eversley was in a major car accident, severely breaking his leg, leaving him on crutches for 13 months. Friend and artist Charles Mattox offered to let Eversley stay in his studio in exchange for help with his kinetic sculptures. During this time, Eversley left Wyle and never returned to engineering, instead pursuing a new path as an artist. Soon after Eversley moved into the studio, Mattox left for a teaching job at the University of New Mexico, Albuquerque, and Eversley took over the space. In 1969, his neighbor, artist John Altoon, died, and Eversley was given his studio by Altoon's widow. The studio, a former laundromat redesigned by architect and local resident Frank Gehry, had a workshop in front and an exhibition area in the rear (Figure 76). It became the epicenter of Eversley's experiments throughout the 1970s, and he continues to work in this space today.

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[18] Marilyn Holstein, "Meet the Master of the Lens," *SoHo Life* (November 2012): 14. In July 1969, the Apollo 11 crew became the first to land on the moon. On the Space Race: Martin Collins, *Space Race: The U.S.-U.S.S.R. Competition to Reach the Moon*, (San Francisco: Pomegranate Communications, Inc., 1999).
[19] Holstein, "Meet the Master," 14.
[20] Eversley recalled: "In spare time that I had and on weekends, I'd hang out with my neighbors, including [artists] Larry Bell, Jim Turrell, Ed Moses, Bob Irwin, as well as John McCracken, John Altoon and Charles Mattox. And as an engineer, I would help them do little things, technical things." Cook, "Fred Eversley Went From NASA."

The Exhibitions of 1970

Between 1969 and 1970, Eversley began to garner attention for his sculptures, which found a range of audiences in different contexts. For instance, during this time he participated in three significant and distinct group exhibitions: one that addressed the collision of artists and new technologies; another that attempted a comprehensive survey of "Black art"; and a third that considered the rise of plastics in American sculpture. First, he was included in the *Art and Technology* program at the Los Angeles County Museum of Art, implemented between 1966 and 1971, in which curator Maurice Tuchman paired artists with scientific organizations and industrial corporations in the Los Angeles area for collaborative projects.[21] In the catalogue, companies and artists are equally represented. The book's cover image is a patchwork of portraits of artists and corporate CEOs. All those represented appear to be White men, except for Eversley (Figure 77), with women artists completely excluded.[22] In light of this bias, Eversley's involvement in the exhibition is noteworthy, as well as the fact that he was uniquely positioned to participate because of his engineering background. However, his proposed project with Ampex Corporation was left unrealized, as it was still in the "research stage" when the catalogue was published.[23]

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[21] See: Anne Collins Goodyear, "The Relationship of Art to Science and Technology in the United States, 1957–1971: Five Case Studies," (PhD diss., University of Texas at Austin, 2002," 334–402.

[22] Women were omitted from this program despite female artists' involvement with scientific communities and Tuchman's admission that he received proposals from women for the exhibition. Maurice Tuchman, *Art and Technology: A Report on the Art & Technology Program of the Los Angeles County Museum of Art, 1967-1971* (Los Angeles: Los Angeles County Museum of Art, 1971), 19.

[23] Eversley was paired with Ampex Corporation, which specialized in audio/visual recording and data systems. His proposal, for a "matrix of translucent liquid crystal

Around the same time, Eversley was included in the important group exhibition *Dimensions of Black* in 1970 at La Jolla Museum of Art, in La Jolla, California. Growing out of a class project at University of California, San Diego, the show proposed a history of Black art, from African roots and slave art to European modernist appropriation and the Harlem Renaissance, with a small section on "Contemporary Black Art" that included Eversley.[24] In the context of this show, Eversley's abstract works were compared to process-oriented objects from the African continent, a connection that omitted any specific discussion of his use of plastics.[25]

In yet another context, Eversley's work with synthetics was championed. He participated in the major traveling exhibition "A Plastic Presence," which debuted at the Jewish Museum in November 1969 and marked Eversley's first exposure in New York.[26] In February 1970, he returned to New York and, as he recalled, had a stream of

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imagery" to be sprayed on plastic or silk, was unrealized at the time of the exhibition. Tuchman, *Art and Technology*, 101.

[24] Affiliated with the University of California, San Diego, the show began with an "Afro-American Cultural Traditions" class that proposed an exhibition as a class project. More than 100 students worked on this show and curator Jehanne Teilhet, along with three Black and three White students, traveled through 30 states as well as Haiti and Jamaica in planning the show. Jehanne Teilhet, "Introduction," in *Dimensions of Black*, ed. Jehanne Teilhet (La Jolla, CA: La Jolla Museum of Art, 1970), iv-vi. Dates of the exhibition were February 15 to March 29, 1970.

[25] In the text: "Eversley's pieces in cast resin reveal total involvement in the media and in the process of creation. The precision of the concentric color rings and the clarity of casting seen in his finished pieces are the result of lengthy controlled process and technical orientation. The processes are removed from the piece itself because you can't tell what it will look like until it is completely done. The creation is almost an act of faith reminiscent of the bronze-casting processes of Ife and Benin." Deborah Butterfield, "Contemporary Black Art," in *Dimensions of Black*, ed. Jehanne Teilhet (La Jolla, CA: La Jolla Museum of Art, 1970), 132, 134.

[26] Organized by the Milwaukee Art Center, the show traveled to The Jewish Museum, New York and the San Francisco Museum of Art, from 1969 to 1970.

encounters with dealers and curators that would change the course of his career.[27] Most notably, Eversley visited the Whitney Museum and asked to meet with curator Marcia Tucker, who showed great enthusiasm for his work and offered to curate his first solo exhibition later that spring.[28]

Eversley at the Whitney Museum

Eversley's show at the Whitney Museum, from May 18 to June 7, 1970, featured 12 cast polyester resin objects displayed on pedestals in the small lobby gallery on the first floor of the building.[29] These works represented Eversley's first major series: three-layer, three-color cast resin cylinders, cut and sliced in a variety of arrangements, including *Untitled*, 1970, later acquired by the museum.[30] This sculpture offered a sense of the other objects' visual display in the exhibition, as they were all made with the same three colors that were signature to this series: "an outer layer of violet, a middle layer of amber and an inner layer of blue."[31] Appearing like thick stained glass, the work's shape

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[27] In one day, he recounted meeting several important New York art dealers: first, Betty Parsons, who purchased two works for her private collection; and then, Leo Castelli as well as Ivan Karp, of O.K. Harris, who would later give Eversley a show at his satellite space Hundred Acres. Holstein, "Meet the Master," 16.

[28] Ibid.

[29] Jones discussed the optics of the museum using such a paltry space to show the work of African American artists. Jones, "It's not enough," 172. The space, now part of the Met Breuer under the auspices of the Metropolitan Museum of Art, is currently a gift shop.

[30] According to the Whitney Museum's records, the institution brokered sales of Eversley's works, selling seven pieces to outside buyers by June 1970 and acquiring one sculpture for their collection while also taking commission. *Fred Eversley: Recent Sculpture*, 1970 May 18–June 7, Exhibition Records, Whitney Museum of American Art Archives, New York, NY.

[31] Eversley, *Fred Eversley: Recent Sculpture* (New York: Whitney Museum of American Art, 1970), n.p.

bends reflections in the cut sections, warping space through layered color, with crystal-clear visibility throughout the perimeter of plastic. Two photographs of the sculpture (Figure 78)—one with a violet background and bright spotlights and another with a white background and diffuse lighting—reveal the wide range of color effects in the work. Whereas the first image depicts the sculpture streaked with lines of colored light, giving way to a deep purple base, the second image shows the object's three layers of color as suspended entities, with the center, turquoise hue glowing brightest, as if the center of a gemstone. In this early group of objects, Eversley used the three colors and casting process as the control in his experiments, and created variables between the structures by sawing away pieces of the cylinders, consistently and scientifically working through the objects—a process he would continue with his Lenses.

In creating his cut cylinders, Eversley cast the polyester resin by spinning the plastic inside a large pipe on a horizontal axis, using a lathe in Mattox's studio.[32] For *Untitled*, in the Whitney Museum's collection, Eversley began with the cast cylinder, which he then sawed diagonally to create a deep cut in the front and a shallow slice in the back, leaving a U-shaped divot and a knife's edge at the top. Small in scale, at less than two feet high, the three-colored polyester resin object created a range of views, visible through the fine, hand-worked finish that appears machine-rendered, with all traces of process removed through sanding. In these sculptures, the labor needed to manipulate polyester resin in this manner was invisible. It comes as no surprise then that previous discussions of this exhibition have rarely addressed the specificity of Eversley's objects,

[32] Cook, "Fred Eversley Went From NASA."

particularly since the artist himself described these artworks as "visual phenomena" and "fascinating toys."[33]

In the statement Eversley included in the catalogue that accompanied the Whitney Museum show, the artist set forth his intention for the shifting visual qualities of his objects, with this opening line: "The crux of the problem of writing a statement about my work is that I am dealing strictly with visual phenomena."[34] Rather than representing fixed imagery, Eversley explained that his objects and their "internal space and colors constantly change in relationship to ambient light, viewing angle, environment and the spectator's frame of mind."[35] Eversley not only relied heavily on the viewer and shifting perspectives, but also encouraged a tactile experience with his sculptures: "The intent of my work is to create beautiful and fascinating toys with which one can amuse oneself for hours."[36] This expectation for the objects is surprising, especially in the context of a museum exhibition where the visitors were certainly not asked to handle or play with the delicate, plastic objects. In his approach, Eversley sought to create more accessibility to his objects, offering a form of abstraction that did not shun social context but rather situated the sculptures as a focal point for human interaction.[37] While his objects were

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[33] Eversley, *Fred Eversley: Recent Sculpture*, n.p.
[34] Ibid.
[35] Ibid.
[36] He expanded this point further: "My pieces should be lived with for a long time, and hopefully played with, picked up, moved around, combined with other objects, viewed under all kinds of light and from every possible perspective angle." Ibid.
[37] Eversley explained in 1976: "I am attempting to use phenomenon as a means of focusing the spectator into perceiving the complex nature of reality, both physical and social, and through these perceptions of forming new kinds of subjective meaning and higher awareness…To my way of thinking this is the primary goal of the marriage of art and technology." Eversley, *Frederick Eversley*, n.p.

reliant on the handiwork and expertise of the artist, Eversley also intended the works to thrive beyond the artist's own presence.

The Whitney Museum's installation seems to have been at odds with Eversley's intentions. While no photographs of the show remain, a floor plan (Figure 79) in the institution's archives reveal that the works were arranged in tight clusters in the small gallery, creating a claustrophobic environment.[38] In this layout, the sculptures were crowded together in a small, windowless space and in fixed grids. The works would have felt further removed from visitors as they sat on tall Plexiglas pedestals, which would have conducted light and brightened the installation.[39] One critic, reviewing the show, wrote that the works "seem to float on their transparent stands," as if beyond this world.[40]

Another reviewer also wrote of the striking presence of the works, that "the play of light gives them a certain translucent beauty," but then criticized the objects, claiming they were overtly commercial rather than fine art: "With it all, there is something 'interior decorator' about them, some 'store-bought' quality that robs them of the true weight of art. Some of the pieces resemble expensive vases or ashtrays. There is no question but that Eversley has talent, but the plastic medium seems to interfere with it."[41] As was true for many of his contemporaries, Eversley's plastic sculptures often confounded critics, who did not see the works as handcrafted objects but rather described them as commercial items, as was also seen in the chapters on Judd and Valentine. The

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[38] Floor plan, *Fred Eversley: Recent Sculpture*, 1970 May 18–June 7, Exhibition Records, Whitney Museum of American Art Archives, New York, NY.
[39] Exhibition records cited the use of Plexiglas pedestals, measuring four feet high. *Fred Eversley: Recent Sculpture*, 1970 May 18–June 7, Exhibition Records, Whitney Museum of American Art Archives, New York, NY.
[40] Seldis, "Eversley Show in New York," E10.
[41] John Gruen, "All That Smoke," *New York* 3, no. 23 (June 8, 1970): 69.

public was similarly flummoxed by these works. In 1971, when Eversley showed sculptures at Hundred Acres, a "minigallery" run by Ivan Karp of O.K. Harris, the gallery encountered visitors who mishandled Eversley's works, operating beyond the artist's stated intentions for his audience to have tactile experiences with his objects.[42] One letter explained that a sculpture was damaged when an employee found "an elderly European man rolling the piece from side to side," adding: "He was most apologetic."[43] Despite such misunderstandings, Eversley's great debut at the Whitney Museum in 1970 would be followed by a productive period of experimentation with plastic casting, as the artist began studying parabolic shapes for what would be his next and most important body of work: the Lenses.

The Lenses and the Parabola

Like many of his contemporaries in Los Angeles, Eversley was initially drawn to polyester resin as a material that allowed him to cast and finish transparent objects in the comfort of his Venice studio, without the need for specialized equipment.[44] For the Lenses, he shifted the casting to a vertical axis—as opposed to the horizontal orientation

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[42] Grace Glueck, in a review of Eversley's show at Hundred Acres, on 456 West Broadway, described the aim of the "minigallery" that opened May 1969: "Its aim is to show the oeuvre of contemporary artists who work in intimate or table-top scale, a dimension for which most avant-garde galleries are not adjusted." Grace Glueck, "Art: Highlights of Downtown Scene," *New York Times*, December 11, 1970: 56.

[43] Letter to Fred Eversley, July 10, 1972, Hundred Acres gallery records, 1970–1977, Archives of American Art, Washington, DC.

[44] Eversley cited glass and acrylic as the only other transparent materials available to him, both of which required particular equipment: "Polyester is virtually the only material that gives you both transparency, and the ability to do the whole thing without pressure chambers or kneeling ovens. So you have much more freedom." Frederick Eversley, interview by the author, December 11, 2017, New York, NY.

used in the cut cylinders—by attaching a mold to a potter's wheel (Figure 80). He then spun the liquid plastic until the material hardened, creating circular objects with thick walls that were flat on one side and concave and parabolic on the other.[45]

The parabola is a mathematical figure that, for practical purposes, appears as a bowl shape with walls almost parallel to one another that slope to meet at a center point; it occurs both in nature and in manmade objects. Eversley explained that "the parabola is the ideal physical shape for concentrating and reflecting energy," with past applications found in devices such as satellite dishes and radar antennae.[46] For his 1976 exhibition, organized by the Santa Barbara Museum of Art, Eversley wrote a statement—a four-page declaration of purpose addressing his perspective on the function of his artwork, the trajectory of his objects, and the role of energy in his forms—that also explained his fascination with the parabola. The shape appealed to him as a source of exploration for the following reasons:

1. The purity and elegance of the form,
2. Its widespread, multi-disciplined applications,
3. Its inherent ability to concentrate in both lens and reflector modes, all forms of electromagnetic and acoustic energy to a single focus,
4. The fact that I could find little evidence of artistic study and use of this primary geometric shape.[47]

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[45] Eversley described the process in technical terms: "I discovered that I could generate a concave cylindral [sic] paraboloidal shape naturally by centrifically casting the liquid plastic around a vertical axis, thus employing the resulting centrifugal and gravitational accelerations to form the concave surface." Eversley, *Frederick Eversley*, n.p.
[46] Susan Price, "Behind the Studio Doors: The Venice Art Walk Offers a Glimpse at Where the Artists Work," *Los Angeles Times Magazine*, May 24, 1987: 34.
[47] He further cited past applications: "The parabolic shape is found to exist in a wide range of natural forms and physical phenomena: trajectory of projectiles; cables carrying a uniformly distributed load along the horizontal—such as in suspension bridges; parallel beam light, acoustical and microwave reflectors; parabolic sand dunes created by wind action; the parabolic shape of graphical representation of many physical phenomenon in the fields of fluid and aerodynamics." Eversley, *Frederick Eversley*, n.p.

Following this interest, Eversley launched a study of the parabola by casting his polyester resin objects. As two sources, he cited a 1687 theory by Isaac Newton, called "Newton's Bucket," which entailed rotating liquid on a vertical axis to create a parabola, as well as a 19th-century and early 20th-century method of spinning liquid mercury to create telescopic mirrors.[48]

While the artist drew from his knowledge of scientific history in his exploration of how to create a parabola, he also found inspiration in his engineering experience: specifically, a particular instrument he encountered while working for Wyle Laboratories. He recalled: "The first time I saw the effect of the parabola was on the handmade lens for the Hasselblad they took on the early space flights."[49] Starting in 1962 with the Sigma 7 mission, Swedish-made Hasselblad cameras were continually used by NASA, as well as throughout the U.S. Space Shuttle Program until its conclusion in 2011.[50] Eversley recalled that one aspect of his job at Wyle was to test all the equipment, including what he described as "that very expensive piece of glass": "I had seen this, actually held it in my hand, and it was incredibly beautiful…it was a perfect parabola."[51] Like the

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[48] DeBerry, "Harmonic Convergence," 9. On Newton's Bucket: Jens M. Knudsen, Poul G. Hjorth, *Elements of Newtonian Mechanics: Including Nonlinear Dynamics* (Berlin: Springer Science & Business Media, 2002), 142–145. On liquid mirror telescopes: David Leverington, *Observatories and Telescopes of Modern Times* (Cambridge, UK: Cambridge University Press, 2016), 90–95.
[49] Eversley, interview by the author, January 12, 2017, Los Angeles, CA.
[50] Astronaut Wally Schirra purchased a Hasselblad camera from a store in Houston to bring on the Sigma 7 mission in October 1962, introducing the space program to the cameras. See: Jennifer Levasseur, "Pictures by Proxy: Images of Exploration and the First Decade of Astronaut Photography at NASA," (PhD diss., George Mason University, 2014), 110–135. Also: Adam Mann, "The Best Space Images Ever Taken By Apollo Astronauts with Hasselblad Cameras," *Wired* (July 20, 2013), accessed March 5, 2018, https://www.wired.com/2013/07/apollo-hasselblad/.
[51] Eversley, interview by the author, January 12, 2017, Los Angeles, CA.

Hasselblad lens, Eversley's objects were also visual devices, generating images and reflections through the depth of the polyester resin. In all, the artist built his Lenses to evoke a rich and ongoing history of scientific principles and instrumentation, through the language of plastics.

Casting the Lenses

The first group of Lenses, made between 1970 and 1974, were cast using multiple layers of color, such as *Untitled*, 1970 (Figure 81). Here Eversley developed the method of working that he would continue to hone throughout his career. The artist began by adding colored, synthetic dye to the clear polyester resin and catalyst and then pouring it into the circular mold made with a found cylinder sealed to the top of the mechanized potter's wheel (Figure 80), which spun the entire time the plastic cured.[52] Eversley adjusted the speed to determine the height of the walls: the faster the speed, the more curvature he could create in the center.[53]

Just as Eversley varied the shapes of his cut cylinders, in the Lenses he created an assortment of forms based on the same circular molds. The different orientations are seen in a 1970s portrait of the artist posed with five objects using similar pigments but slightly different shapes: either closed in the center or with apertures (Figure 82). For instance, some objects had a circle cutout in the center, such as *Untitled*, 1970 (Figure 83) made by limiting the amount of resin in the mold to create the opening when spinning the material.

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[52] Eversley, interview by the author, December 11, 2017, New York, NY.
[53] Eversley explained: "The speed creates the curvature, which creates the depth. So, the faster the speed, the higher the curvature. Depending on how much material you pour in, you end up with either a parabola, or you keep spinning it fast enough, and you get a hole in the middle." Ibid.

In casting, the turntable spun for an extended period of time, from four hours for smaller works to three days for the largest objects, and continued until the object had completely hardened and shrunk away from the mold.[54] When introducing layers of color, Eversley created a control for each hue by pouring a small amount of the tinted liquid plastic into a paper cup to monitor the resin. He knew to add the next color when the control material "start[ed] to gel," to get distinctive layers.[55] Introduced too early, the second color would swirl together with the first.

A multimedia educational kit on "Contemporary Artists at Work" from 1978 featured Eversley and showed staged photographs of his process.[56] In the series of images (Figure 84), the artist is first depicted calculating the ratio of catalyst to resin, then pouring the mixed substance into the mold, and finally removing the hardened plastic object with a vacuum cup. The finished work, emerging rough and opaque, was then ready for polishing. In creating the Lenses, Eversley used a range of implements to navigate and hand-polish the flat and parabolic surfaces (Figure 85).[57] The significance of this process of sanding and finishing cannot be overstated. In working with the parabolic shape, Eversley chose a form that necessitated the artist to sand and polish everything by hand, in a series of acrobatic moves as he worked around the shape over the course of

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[54] Eversley, interview by the author, December 11, 2017, New York, NY.
[55] Ibid.
[56] Dan Tooker, *Contemporary Artists at Work, Sculptors* (New York: Harcourt Brace Jovanovich Films, 1978), Cassette recording, Filmstrip, Visual material. Henry Hopkins, director of the San Francisco Museum of Modern Art, and Los Angeles critic Peter Plagens were consultants to this published and circulated educational project.
[57] "A parabolic surface, by definition, has to be completely hand polished…it would be much more difficult to get successful outcome if it was done commercially, or in some sort of a factory…A parabolic surface is the most difficult surface to polish." Eversley, interview by the author, December 11, 2017, New York, NY.

weeks of intensive labor. Through this process, Eversley obscured his own efforts to ensure the visual effects of the works would not be marred through the marks of making.

Two Lenses in Eversley's studio (Figure 86) show the transformation of the objects, from rough and untreated to transparent and fully polished. One particular challenge of this process was the sticky, top surface of newly cast plastic, as material left open to the air was full of air bubbles and tacky, like molasses, making it especially difficult for Eversley to maintain the parabolic shape.[58] Since this process required such meticulous care, the artist never turned to outside workshops or factories to finish his works. The polyester resin, when cast and finished in this manner, was still delicate and easily prone to damage. On Eversley's behalf, Hundred Acres gallery even drafted a document in the early 1970s for the artist's collectors to understand how best to care for the objects, which included applying polishing wax by hand, rather than with a cloth.[59]

The Lenses were made in two sizes: 20 and 40 inches in diameter. For the 20-inch works, he used the potter's wheel to spin the plastic. For the 40-inch Lenses, he worked with two large-scale turntables he purchased at auction for 50 dollars apiece. He later discovered that these very turntables were used to cast some of the first generation of

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[58] Called "oxygen inhibition," the top layer is exposed to oxygen that inhibits the resin from hardening. Eversley explained: "That means that the first eighth of an inch of the resin, at least, is like thick molasses. It's horrible." Eversley, interview by the author, December 11, 2017, New York, NY.

[59] The document reads: "1. Polish out slight scratches with Classic Car Wax Plexiglass Polish using a soft, clean flannel cloth. 2. Wax with Classic Car Wax (wax) using clean fingers for application and removal of wax. 3. Both Classic Car Wax Plexiglass Polish and Classic Car Wax can be obtained by any large automotive supply store. 4. It is important that the sculpture be lifted directly up when moving location. The sculpture should not be slid around. Simple cleaning should be done by <u>hand</u>, not cloth!" "Cleaning Instructions for Fred Eversley Sculpture," Hundred Acres gallery records, 1970–1977, Archives of American Art.

atomic bombs in the United States, creating a reencounter for Eversley with the industrial-military culture of Los Angeles.[60]

Transparent Dyes and Opaque Pigments in the Lenses

Eversley presented his objects as a continuation of his knowledge of engineering. His letterhead and business cards (Figure 87) even included "Engineered Aesthetics" as his company line, a clever nod to his approach to artmaking. As engineered objects, the first group of multicolored Lenses glowed with bright, layered hues through large, distorting, transparent surfaces rendered with incredible clarity. The Lenses are slippery in their reflections, but are also visually striking, with dewy, deep colors that evoke transparent candies. As evidenced in one work, *Untitled* circa 1971 to 1972 (Figure 88) the object is composed of a series of layered, colored rings, from rose at the periphery to deep orange, a subtle blue, and a hint of pale yellow at the very center. The sculpture is receptive to its surroundings as the parabolic curves in the center create echoes of reflections. At the same time, the physical perimeter of the object is unclear.

Critics from this period remarked on the curious experience of visiting the objects, as solid pieces of plastic with extraordinary abilities. One reviewer wrote: "…the pieces have curious light-gathering qualities that in one astonishing case produce an illusion of a sphere that simply isn't there. One reaches to touch it, and it disappears: a form defined completely by light."[61] Another reviewer echoed this account of the Lenses'

[60] Eversley, interview by the author, January 12, 2017, Los Angeles, CA. Also: DeBerry, "Harmonic Convergence," 10.
[61] Benjamin Forgey, "Polished Spheres Catch and Hurl Light," *The Washington Star* January 9, 1976: C3.

transformative effects: "Some create the mirage of containing eclipses, others seem to become big weightless orbs of color. All act as a wide-angle camera lens, distorting the surrounding world into imagery out of fantasy painting."[62] Hand-polished to a fine finish, the transparent Lenses were fantastical, even futuristic. In a 1970 letter to critic Barbara Rose, Eversley wrote that another artist, Paul Brach, had likened his cast polyester resin objects to "moonrocks," claiming his works are "what everyone wishes the moonrocks to look like, instead of the dull, grey, dust they are."[63] The Lenses were chromatic phenomena, yet made of inert matter.

Around the middle of the decade, Eversley began using opaque pigments with his Lenses, rather than transparent dyes, as for example in *Untitled* of 1974 (Figure 89).[64] The objects were cast in the same molds as their predecessors, but were tinted with black, white, grey, and peach pigments rather than with vibrant colors. Eversley found opaque pigments through an encounter with artist John McCracken, his studio neighbor. He recalled that McCracken, who had been using black pigment in his own Fiberglas works, gave Eversley a spare can of the material, which remains in the artist's studio today. As Eversley recounted, McCracken offered him the pigment after they had discussed the criticism Eversley received for not making "Black art."[65] After a year of the can sitting in his studio, he finally used it to fix a Lens with muddied color. Then, after making several

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[62] William Wilson, "Art: The LAICA Growing Up with Illusions of Grandeur," *Los Angeles Times*, October 3, 1976: R68.
[63] Letter from Eversley to Barbara Rose, April 23, 1970, *Fred Eversley: Recent Sculpture*, 1970 May 18–June 7, Exhibition Records, Whitney Museum of American Art Archives, New York, NY.
[64] In a 1976 catalogue, he stated that he began using opaque pigments in 1975 but the text's chronology listed 1974 as the start date. Eversley, *Frederick Eversley*, n.p.
[65] Cook, "Fred Eversley Went From NASA."

black Lenses, he turned to white pigment—apparently after a White studio assistant joked that the artist should make works for White people—and finally to gray colors to bring the two together for a seemingly "biracial" object.[66] In first turning to black and then white and gray pigments, Eversley responded to critics who faulted him for not representing the African American experience in his abstract work. Although a tongue-in-cheek retort, the black Lenses, as Eversley insists to this day, were not made to explicitly comment on issues of race.[67] Rather the opaque Lenses allowed him to engage with the topic of race and representation on his own terms, even while he looked to scientific and celestial inspirations.

For instance, in 1976, Eversley described the opaque works as representations of cosmic principles: "Concepts such as stars expanding their energy and becoming black holes, white dwarfs, and neutron stars are important components of modern cosmological studies."[68] As opposed to the transparent Lenses, the opaque works paired reflective surfaces with limited visibility through the plastic, acting as a mirror for the viewer rather than a transparent frame through which to see the space around. For example, in *Untitled*, 1974 (Figure 90), the Lens is jet black and dense with an incredibly thin center—rendered and sanded by hand with the utmost care—which shows the movement of the casting process through a galaxy-like swirl of pigment frozen in the center of the plastic.[69] The work balances solid mass with delicate transparency, with a reflective,

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[66] Cook, "Fred Eversley Went From NASA." For another source on this story, see: Frederick Eversley, interview by L. H. Shockey Jr., 2012, Conservation Records, Smithsonian American Art Museum, Washington, DC.
[67] Eversley, interview by the author, December 11, 2017, New York, NY.
[68] Eversley, *Frederick Eversley*, n.p.
[69] Thank you to Ariel O'Connor, Objects Conservator, Smithsonian American Art Museum, for sharing her knowledge and observations of this artwork.

polished surface that creates cascading reflections into the concave interior of the piece and an outer ring that thins, appearing like liquid mineral at the edge.

The effects of the opaque, cast polyester resin objects varied greatly, as Eversley continued to experiment with the form. Another black Lens (Figure 91), thick in color at the perimeter, for instance, softens to a cloudy layer of pigment and then opens to even greater transparency at the center, offering a clear view of the space around. In contrast, a peach-hued Lens (Figure 92), saccharine in color, is thick with pigment until the open hole at the center, made by spinning the polyester resin to expose the core. The color is also varied, with a tan outer edge and a yellow inner ring with an iridescence at the very center, at the thinnest part of the sanded plastic.

The relationships between Eversley's Lenses became clear in 1976, when he showed 45 works dating from 1968 to 1976 at his first survey exhibition at the Santa Barbara Museum of Art, offering the most in-depth look at his polyester resin objects to date.[70] In a checklist for the exhibition, the Lenses and other objects are described in shorthand, as a cast of characters for Eversley's artistic output over eight years. This list included descriptions for Lenses, such as "Full lens," "Small hole," and "Rear slice," accompanied by colors, such as "transparent black," "opaque black," "pearlescent," and "3 color."[71] The document gives a sense of how Eversley had been working out particular shapes and techniques in his continued work on the parabolic form.

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[70] Seldis, "Art: Optical Magic Turns Us Inward as We Look Out," *Los Angeles Times*, May 23, 1976: 76. In January 1976, Eversley also exhibited 12 Lenses, made between 1971 and 1976, at the National Academy of Sciences in Washington, DC. "Frederick Eversley," catalogue, The National Academy of Sciences, Eversley Artist File, B.C. Holland Gallery records, 1942–1991, Archives of American Art, Washington, DC.

[71] The checklist for the Santa Barbara Museum of Art exhibition includes descriptions for objects, from 1968 to 1976: "Flat rim," "Full lens," "Small hole," "Front slice," "Rear

While there are no extant photographs of the exhibition in Santa Barbara, there are images from its installation at the Oakland Museum (now the Oakland Museum of California) that show both the transparent and opaque Lenses, in 20-inch and 40-inch sizes, arranged in staggered rows on transparent Plexiglas pedestals (Figure 93).[72] Situated in a brightly-lit room with pale wall panels, the transparent Lenses in the show interacted with the opaque works, picking up echoes or floating apparitions. Critics responding to the show focused on the opaque black, white, and gray works and their dizzying effects, as Henry Seldis wrote: "Approaching one of these, you will suddenly see your reflection flip from an upside-down position to a regular mirror image. Such effects and the psychological properties of their colors make these latest pieces even more subtle and mystical than the earlier transparent work."[73] Critic Laurie Glass commented: "Standing directly in front, one sees oneself inside a larger self inside a room—inside the world, inside the galaxy, inside the universe, or so one begins to sense."[74] She concentrated on one black pigment Lens, an object that was "visually impenetrable at the thick edges, but which thins to the barest of gray haze towards the center," making "a stellar pronouncement in its own section of the night."[75] These evocations of celestial bodies and galactic forces were clearly a reflection of Eversley's

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slice," "Round back," "Double parabolic wall," "Round parabolic wall," "Parabolic wedge," "Curved wall," "Full cath.", "Thin cath.", "Crown," "Concave cath.", "Double parabolic cath.", "3 sided circular wedge," "Long circular wedge," and "3 color, 3 layer." Release of Objects, *Frederick Eversley*, Exhibition File, Santa Barbara Museum of Art Archives, Santa Barbara, CA.

[72] Organized by the Santa Barbara Museum of Art, the survey also traveled to the Newport Harbor Art Museum, December 1976 to January 1977, and the Oakland Museum, February to March 1977.

[73] Seldis, "Art: Optical Magic," 76.

[74] Laurie H. Glass, "Fred Eversley Retrospective," *Artweek* (March 26, 1977): 16.

[75] Glass, "Fred Eversley Retrospective," 16.

catalogue statement, which described the opaque lenses as "black holes, white dwarfs, and neutron stars."[76] One work in the exhibition (Figure 94) even showed the swirling patterns of the centrifugal process, further emphasizing the heavenly, otherworldly qualities of the sculptures.

In the Oakland display, the sculptures were presented as rare gems, examples of an unknown natural history, or earthbound, celestial bodies. The objects on their clear pedestals appear to hover off the ground as if harnessing sources of energy, seemingly weightless despite their mass. Eversley used these transparent pedestals throughout his career, as seen in a photograph of the artist posed with a series of Lenses (Figure 95).[77] Eversley's use of clear stands also emphasized the high finish of the objects, where the details of the artist's craft—in all its messiness—were completely hidden from the public eye, and from critics.

National Air and Space Museum Residency, In Conclusion

Throughout this chapter, I have outlined Eversley's process of casting polyester resin objects to show how his objects were made through meticulous craft honed by the artist, which is often omitted in interpretations of his sculpture. I have also situated Eversley's studio as the center of his experimentation, which shifted in 1977. That year,

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[76] Eversley, *Frederick Eversley*, n.p.

[77] This attention to a transparent support evokes the work of his contemporary Larry Bell, whom Eversley has cited as an influence. In 1970, Eversley attributed his "fascination with pristine surface, internal space and reflections" to Bell. Eversley, *Fred Eversley: Recent Sculpture*, n.p. In 1980, he cited being influenced by Bell and Robert Irwin "who were employing the elements of light, transparency, reflection, pristine surface, color and internal space to create beautifully seductive objects." Peggy Loar, "Interview: Frederick Eversley," *Ocular* 5, no. 2 (Summer 1980): 43.

the artist left his workspace to become the first artist-in-residence at the Smithsonian National Air and Space Museum (NASM) in Washington, DC, which ultimately posed the greatest challenge to his methods of making. While he intended to use the opportunity to expand his research on the opaque Lenses, the residency instead shifted the course of his practice.[78] No longer in the comfort of his studio, Eversley was faced with the limitations of working with polyester resin in the context of an institution that was not prepared to support the artist's specialized process of plastics casting.

The museum, which had opened the previous year on the National Mall, initiated the residency program to connect artists with the museum's collection and its history, as well as the public. The selection committee consisted of NASM director Michael Collins and curator of art James Dean, as well as representatives from the National Endowment for the Arts and directors Joshua Taylor of the National Collection of Fine Arts and Al Lerner of the Hirshhorn Museum and Sculpture Garden. As Eversley recalled, Lerner nominated him, though two other artists were approached first: Robert Rauschenberg and Richard Diebenkorn.[79] Dean, who had spearheaded the NASA art program from 1963 to 1974, was Eversley's Smithsonian representative for the project.[80] Dean explained the

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[78] Eversley, interview by the author, December 11, 2017, New York, NY.

[79] Before accepting the position, Eversley contacted both artists, who each encouraged Eversley to take the residency. Eversley recalled that Rauschenberg was leaving for India to work on a print series and Diebenkorn was retiring and chose to remain in his studio instead. Eversley, interview by the author, January 12, 2017, Los Angeles, CA.

[80] While the Director of Educational Media at NASA, Dean was chosen to create a new program inviting artists to respond to particular events, working with Hereward Lester Cooke, curator of paintings at the National Gallery of Art, as an advisor. Dean and Cooke selected the first group of artists in 1963, and in 1974 Dean transferred the collection of artwork to the new National Air and Space Museum and became the museum's first art curator. James Dean and Bertram Ulrich, *NASA/Art: 50 Years of Exploration* (New York: Harry N. Abrams, 2008), 8, 12. Also: Goodyear, "NASA and the Political Economy of Art, 1962–1974," in *The Political Economy of Art: Making the Nation of Culture*, ed.

position, in an article in *The Washington Post*, announcing the appointment: "We want his presence in the building. We want him to talk to people, do his work, and consider flight and space craft. We want him to consider what they have done to man."[81] As Eversley recalled, he was originally asked to work in a glass-walled room in the museum fully visible to the public, but negotiated instead for a studio in the basement—a space called "Room P710."[82]

Eversley's original contract for the position stated that the artist would use the opportunity "to study the permanent collection of the NASM, to visit other centers of flight and space activity, and to respond to this experience, while at the NASM, by creating original works of art in whatever medium and technique Artist chooses."[83] From the beginning, complications arose, as Eversley's given residence was being renovated during his time in Washington, disrupting the artist's schedule, and NASM did not have a proper workspace for Eversley at the start of the position.[84] By December, Dean had

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Julie F. Codell (Cranbury, NJ: Rosemont Publishing & Printing Corp., 2008), 191–206; and Goodyear, "Art, Technology, and the American Space Program, 1962–1972," *Intertexts* 3, no. 2 (Fall 1999): 124–146.

[81] Paul Richard, "The Space Museum's Latest Craft: It's Art, by Sculptor Frederick Eversley," *The Washington Post*, December 8, 1977: E9.

[82] Eversley, interview by the author, January 12, 2017, Los Angeles, CA.

[83] In the first contract, the residency, originally set for November 1, 1977 to June 30, 1978, stipulated that a Smithsonian representative would ultimately select one sculpture made during the residency to bring into the museum's collection, and that Eversley would have the opportunity to exhibit work at the museum, neither of which would come to fruition. Agreement, dated October 27, 1977, Artist-in-Residence, Frederick Eversley, Dean, NASM, Smithsonian Institution, Contracts Office, Records, 1953–1990, Smithsonian Institution Archives, Washington, DC.

[84] During the position, Eversley resided at the Barney House Studio, 2306 Massachusetts Avenue, NW, a mansion on Embassy Row owned by the National Collection of Fine Arts at the time. The building now houses the Embassy of Latvia.

canceled the artist's contract and new dates were set for Eversley to start in July 1978.[85] However, problems persisted. In May 1979, Eversley wrote a memo to the deputy director of the museum, Melvin Zisfein, outlining in detail the challenges of his residency, which at that point had lasted for 19 months.[86] In the letter, Eversley claimed that a proper workshop was never provided, as he had spent much of his time setting up the studio from scratch in Room P710.[87] When the artist had finally finished building his studio in the museum, his work was further delayed when he discovered that his ventilation ducts were connected to the museum's central system, potentially exposing the public to Eversley's fumes, making casting plastic impossible.[88] After meeting with the staff at NASM about this dilemma, Eversley decided to switch gears completely and work with precast acrylic to create an entirely new body of work.[89] The new objects that

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[85] The new dates were set from July 1, 1978 to June 30, 1979, with the same terms of his previous contract. Agreement, September 12, 1978, Artist-in-Residence, Frederick Eversley, Dean, NASM, Smithsonian Institution, Contracts Office, Records, 1953–1990, Smithsonian Institution Archives.

[86] The document includes a four-page letter, as well as a three-page addendum on the history of his residency and a two-page proposal for an extension of his time at the museum. Letter to Melvin Zisfein, May 25, 1979, Artist-in-Residence, Frederick Eversley, Dean, NASM, Smithsonian Institution, Contracts Office, Records, 1953–1990, Smithsonian Institution Archives.

[87] He elaborated: "Thirteen (out of the last 19) months of my time (figured on a full-time basis) have also been spent on the project. Essentially, all there is to show for this major expenditure of time and money is a well-planned, well-executed, well-stocked workshop studio." Ibid. A handwritten memo by Dean confirms Eversley's points, as he wrote: "Studio really never was setup. Oven not hooked up until April and air compressors in May." James Dean, Memo, June 18, 1979, Artist-in-Residence, Frederick Eversley, Dean, NASM, Smithsonian Institution, Contracts Office, Records, 1953–1990, Smithsonian Institution Archives.

[88] Eversley, interview by the author, January 12, 2017, Los Angeles, CA.

[89] Ibid. A final contract outlined the comprise, wherein Eversley would remain an artist-in-residence until April 1, 1980 and the museum would purchase two artworks for their collection for $5,000 each. Letter from Elbridge O. Hurlburt to Frederick Eversley, August 25, 1979, Artist-in-Residence, Frederick Eversley, Dean, NASM, Smithsonian Institution, Contracts Office, Records, 1953–1990, Smithsonian Institution Archives.

emerged from his initial acrylic experiments at NASM were stacked, laminated pieces, made by attaching individual cut sections of the prefabricated plastic, using glue or screws, in a staggered arrangement that cascaded in arches and spirals on a gallery wall (Figure 96). The new pieces evoked the structure and movement of aircraft and reacted to the light like their polyester predecessors, but did not possess the visibility or dynamics of the Lenses, nor did they rely on Eversley's craft of casting. He worked on this series until 1982 when he returned to polyester and continued to work in both materials.[90]

The Smithsonian residency, in its failures, was a testament to the significance of Eversley's studio, where he established a process that required specialized labor. As a result, his casting experiments ceased until he was able to return to Los Angeles.[91] The schism that grew between NASM and Eversley during his time in Washington, regarding practical requirements for the artist, could be explained by a fundamental misunderstanding by the institution of the nature of his plastics production. At this juncture in Eversley's career, his sculptures were misinterpreted as plastic baubles or fetishes rather than the products of hard labor, an interpretation that would continue in the subsequent literature on his objects. It is for this reason that I have sought to bring more specificity to the details of his craft and the optical abilities of his Lenses, honed through his treatment of polyester resin.

Eversley's work in plastics began after an unusual trajectory, as his turn to sculpture came after his time as an aerospace engineer. Yet his training allowed him to

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Ultimately, Eversley would sell two Lenses to the museum in April 1980, ending Eversley's commitments to NASM.

[90] Eversley, interview by the author, January 12, 2017, Los Angeles, CA.

[91] Eversley maintains studios in Los Angeles and New York, but he still creates his sculptures exclusively in California.

tap into a history of scientific principles in order to develop his centrifugal process of casting and his polyester resin objects, thereby expanding the tradition of cast sculpture. By emphasizing Eversley's technical and artistic achievements, I contribute to the limited scholarship on the artist with a more comprehensive understanding of his impact on the development of American sculpture in creating nonrepresentational, geometric work on his own terms. His works were not tokens of abstraction but were the vehicles for a new form of plastics innovation, driven by the particular labor of the artist.

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Conclusion

"It is somewhat ironic that my principle sculptural medium polyester resin, is a petrochemical product (derived from gas and oil), the energy source in shortest supply."
— Frederick Eversley, 1976[1]

The focus of this dissertation is timely, as the news media today is teeming with information about the specificities of synthetics: in particular, the urgent need for conservation efforts to remedy the growing epidemic of plastics pollution in the oceans and around the world.[2] While the current conversations around these materials are specific to 21st-century developments, the roots of these issues can be found in the 1970s, where this text ends. At this time, the U.S. consumer was already weary of the constant and inescapable presence of synthetics in domestic life, but a changing political climate further accelerated plastics' decline in the realm of public opinion.[3] In short, the period of plastics innovation that spurred the practices of Judd, Hesse, Valentine, and Eversley starting in the 1960s, with its optimism of embracing "new materials," gave way to an era of pessimism that began around the 1970s.

This decade brought a series of events that greatly impacted the perception of synthetic materials. First, a growing environmental movement raised awareness of the world's limited natural resources and the impact of petrochemical products, like plastics.[4]

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[1] Frederick Eversley, *Frederick Eversley* (Santa Barbara, CA: Santa Barbara Museum of Art, 1976), n.p.
[2] For instance: Livia Albeck-Ripka, "87,000 Tons of Plastic And Counting in Pacific," *New York Times*, March 23, 2018: A8.
[3] On the shifting opinions of plastics in this period: Jeffrey L. Meikle, *American Plastic: A Cultural History* (New Brunswick, NJ: Rutgers University Press, 1995), 242–276.
[4] On the federal level, this movement included the founding of the Environmental Protection Agency in 1970 as well as the passage of important legislature, including the Clean Air Act in 1970, the Clean Water Act in 1972, and the Endangered Species Act in 1973.

Then 1973 brought the oil embargo against the United States led by the Organization of Arab Petroleum Exporting Countries (OPEC) in response to American support of Israel in the immediate aftermath of the Yom Kippur War.[5] In the wake of the embargo, between October and December 1973, the price of crude oil rose by about 130 percent by the barrel, doubling prices for consumers.[6] While the embargo ended by March 1974, the crisis that ensued became a nationwide, cultural phenomenon, which had long-lasting effects on the public perception of oil and foreign resources, as well as plastics.

In 1976, Eversley even contributed his own perspective on this shifting climate. In the catalogue that accompanied his 1976 survey organized by the Santa Barbara Museum of Art, the artist used part of his four-page statement to address the need to reassess the nation's energy resources, from his own perspective and research on the issue with regards to his artistic production. As befits this period, Eversley was concerned that the world's supply of petrochemicals would run out, which stands in contrast to today's focus on the environmental impacts of such materials. He wrote:

> "The most disturbing impression gained from any study of energy phenomena, in both a social and physical sense, is the present and ever growing energy shortage. We are witnessing an end of an era of cheap and abundant energy and all the social mores that this implied…Since it is projected that the world energy demand will triple in the next 25 years, it is obvious that major attention must be focused onto this problem.[7]

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[5] On October 6, 1973, Egypt and Syria attacked Israel on the eve of Yom Kippur, the holiest holiday in the Jewish tradition. By October 19, President Richard Nixon had approved sending $2.2 billion in weapons to Israel and that same day OPEC announced a boycott on shipments of oil to the U.S. in retaliation. For further details on these events: Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (New York: Touchstone, 1991), 600–608.

[6] Ruth Schwartz Cowan, *A Social History of American Technology* (New York: Oxford University Press, 1997), 246.

[7] Eversley, *Frederick Eversley*, n.p.

He continued this discussion with a surprisingly candid confession about his role in this political situation. While he deemed solar energy "the most likely long range solution to the energy crisis" and the most direct influence on his sculpture, he acknowledged the impact of his own use of polyester resin: "It is somewhat ironic that my principle sculptural medium polyester resin, is a petrochemical product (derived from gas and oil), the energy source in shortest supply."[8] In this text, Eversley brought a necessary self-awareness to the realities of artists working with plastics. While Eversley was among the artists who continued working with plastics in the decades that followed, he also inadvertently offered one of several potential explanations for why the larger surge of artists working in plastics waned after the 1970s.

There are two possible reasons for this declining interest in plastics from institutions and artists as it relates to the overall focus of this dissertation. First, one source for the shift in opinion is the energy crisis of 1973, which was followed by another shortage in 1979 due to events around the Iranian Revolution that again sent shockwaves through the U.S., greatly impacting the American consumer.[9] An opinion piece in the *New York Times* in 1979, for instance, made the direct connection between oil and plastics, eerily anticipating today's crisis of synthetic materials amassing in the sea: "In America today, an 'ocean' of petroleum byproducts is being gulped by plants manufacturing millions of disposable plastic knives, forks, plates, and scores of other products which once were made from replaceable resources such as wood."[10] The article

[8] Eversley, *Frederick Eversley*, n.p.
[9] Yergin, *The Prize*, 678–687.
[10] The article continued: "In 1978, some 733,000 tons of disposable plastics were used and discarded. That's more than 1.5 billion pounds, or the equivalent total weight of 10

continued to link the wave of disposable items to the 1970s oil crises, as a call for consumers to become more aware of the impact of their use of plastics.[11]

Secondly, another source for this change stemmed from the growing realization, by artists and the industry, of the dangers of working with plastics, in relation to the increasing awareness for safety issues in light of the environmental movement.[12] I do not claim with certainty that the shifting conversations about plastics in the 1970s had a direct impact on the four artists who are the subject of this dissertation, especially since at least two of them—Judd and Eversley—continued to work with their plastic substances through this period, even in light of Eversley's statement. Rather, I briefly outline this history to suggest the possible impact of such political events on the artistic community.

In addition, by the early 1970s, artists began to voice their weariness with the prevalence of plastics. The presciently titled exhibition *The Last Plastics Show* at the California Institute of Arts in Valencia, California in 1972, for instance, ultimately marked the beginning of declining interest in synthetic sculpture. The show began as a collaboration between Norry Hastings, proprietor of Hastings Plastics in Santa Monica, and Paul Brach, the Dean of Fine Arts at the California Institute of Arts, who together

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million average human beings—in one year!" Robert C. Lohnes, "Back to Wood. Back to Paper," *New York Times*, June 6, 1979: A27.

[11] Lohnes posited: "…most of our disposable plastics find a market because they are convenient. Is it more convenient to eat off a plastic plate, or to make a significant contribution to ending the gasoline shortage?" Lohnes, "Back to Wood," A27.

[12] In a review of the exhibition *Finish Fetish: LA's Cool School* at the Fischer Gallery at the University of Southern California in 1991, William Wilson wrote about the decline of artists using plastics because of the materials' toxicity: "By the '70s the material was proven seriously toxic. Artists stopped using it but not before it provided a mordant metaphor of a pretty environment that is pure poison." William Wilson, "A Study in Plastic in 'Finish Fetish'," *Los Angeles Times*, March 22, 1991: F19. The exhibition included works by Valentine and Eversley.

chose three artists—Valentine, Judy Chicago, and Doug Edge—to organize the show of 24 artists, which also included Eversley.[13] Valentine recalled: "Paul Brach, who was the head of Cal Arts at that time, asked me if I would curate a plastic show. I was very sick of being in shows about plastic because it was art that I was interested in, not just plastic. That was just a means, so I said okay, but I'm going to call it the last plastic show."[14] Here Valentine revealed his own exhaustion with the focus on plastics in exhibitions and in Los Angeles, even at a time when he was still casting his own work. I touch on this exhibition in order to emphasize the significance of what came before: the period of optimism for synthetics that has been at the center of this text.

Throughout this dissertation, I have looked closely at the production of sculptures in the 1960s and 1970s as a way to understand this moment of plastics enthusiasm, which drove artists to develop novel approaches to these materials. Through the lens of plastics, I have also offered a new way to consider artwork from this period, as emerging from distinct movements of innovation where artists created their own models for fabrication, collaboration, and craft that were driven by the requirements and capabilities of synthetics substances. In my approach, I do not presume the political "innocence" of plastics or take on a positivism perspective towards this family of materials, as Eversley's comments anticipate the necessary, shifting climate for petrochemical materials in 1976. Rather, I undertake this study of synthetics to bring more specificity to the presence of plastics in the studios of artists and their exhibitions in this period. Ultimately, I argue that art historical discourse should be more mindful of the many lives of the art object,

[13] *The Last Plastic Show* (Valencia, CA: California Institute of Arts, 1972), n.p.
[14] De Wain Valentine, interview by the author, July 28, 2016, Torrance, CA.

the idiosyncrasies of materials, and the labor involved in the studio or in the fabricator's workshop. These details can provide a more holistic understanding of the art object.

My approach has important implications for subsequent scholarship:

- First, the material idiosyncracies of the artworks in question can now be the building blocks with which to construct future interpretations, as essential rather than peripheral details.

For instance, considerations of Eversley's work must take into account the significance of his process, as his long history of working with polyester resin was guided by his interest in casting through motion with a liquid substance.[15]

- Second, a close look at the particular methods of making can free the artist from the confines of established narratives.

By looking at Hesse's work with Fiberglas, for example, I offer an alternative path for interpretation, which asserts the significance of both handicraft and fabrication processes in her sculpture. This approach upends prior and long-held claims that Hesse "must use only materials that she can make herself," as written by curator Marcia Tucker in 1969.[16]

- Finally, this method can be applied retrospectively and outside the boundaries of this dissertation.

My treatment of the work of Judd, Hesse, Valentine and Eversley can be used with regards to figures such as Naum Gabo, as a close look at the artist's methods of making would allow for a materials-based interpretation of his work, liberated from the burden of ideological and theoretical approaches.

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[15] See Chapter Four, page 142, footnote 44.
[16] Marcia Tucker and James Monte, *Anti-Illusion: Procedures/Materials* (New York: Whitney Museum of American Art, 1969), 30.

As a first step towards these larger objectives, this dissertation has brought more material specificity and complexity to artworks by Judd, Hesse, Valentine, and Eversley, whose studio practices and methods of making have been explored in detail throughout this dissertation. The first two chapters opened up new ways of considering the role of fabricators and collaborators in the work of Judd and Hesse, whose sculptures have been written about at length, though without much attention to the construction of their works. Then, the case studies on Valentine and Eversley brought more attention and specificity to the innovations of two lesser-known artists, whose distinctive works in polyester resin expanded the traditions of cast sculpture and transformed the artists' studios into sites for plastics experimentation. This focus has allowed me to elevate the role of plastics as a group of substances that challenged artists in ways that were distinct from the other industrial materials being used in this era, in both New York and in Los Angeles. These four figures emerged from a generation of artists whose work, I hope, can now be explored past the boundaries of this text, in order to understand their impact as pioneers of plasticraft from coast to coast.

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