

**Debra Bricker Balken**

Curator

with acknowledgments by

**Claudia Gould**

Director

and essays by

**Debra Bricker Balken**

**Ingrid Schaffner**

# **Edna Andrade: Optical Paintings, 1963-1986**

**Institute of Contemporary Art**

University of Pennsylvania, Philadelphia

*'People don't have to be aesthetes in order to understand it':*

## **The Optical Paintings of Edna Andrade**

Debra Bricker Balken

I do not see  
that forced individualism  
or forced exaltation  
are the source  
of convincing formulation  
of lasting meaning.

—Josef Albers, *On My Work*

The poem is a manifesto of the nonvisual, and like Cezanne or Seurat or Rouault, it provides an indispensable approach to understanding TV. The nonvisual mosaic physics and electric-information patterns permit little detachment. The mosaic form of the TV image demands participation and involvement in depth of the whole being, as does the sense of touch. Literacy, in contrast, had by extending the visual power to the uniform organization of time and space, psychically and socially, conferred the power to the detachment and noninvolvement.

—Marshall McLuhan, *Understanding Media*

While the decade of the 1960s spawned multiple aesthetic movements in America — its forms ranging from minimalism, color field painting, pop, performance, conceptual, video art and eventually earthworks — one such vital segment, optical or “op art,” has until recently been passed off as something of an artistic aberration or step-child, its preoccupation with design deemed too close to commerce to be considered a true or legitimate art. To be sure, op art, like its rivalrous counterpart, pop, aspired to a certain democracy. Disaffected of the purity of contemporaneous sculpture and painting, of its remote and cerebral formal investigations, op art was driven by the decidedly non-elitist ideal to produce work that was immediately comprehensible and user-friendly. In the elaborate geometric compositions of Bridget Riley, Richard Anuszkiewicz and Victor Vasarely, for example — three of the movement’s most visible practitioners — the same dizzying sensations, optical effects and afterimages are induced in the viewer, regardless of erudition, art education or experience.

But unlike pop art, where a similar equality prevails through a usage of commonplace imagery drawn from mass culture — which Andy Warhol once stated “anybody walking down Broadway could recognize in a split second”<sup>1</sup> — the abstract patterning in op painting was subject to an instant and widespread commodification, a phenomenon which

augured a new, buoyant market for art in the 1960s. Where pop art had already availed itself of commercial representations, slyly deterring, at least in the beginning, reverse appropriation from industry, op was quickly raided by the design and fashion industries, its vibrant, shifting, sometimes dislocating patterns recast as wallpaper, dresses, textiles, wrapping paper and the like.<sup>2</sup> Clement Greenberg, still the *Nation's* most esteemed art critic and arbiter of taste in the 1960s, who had earlier bemoaned the prevalence of kitsch in mass culture,<sup>3</sup> would dismiss op and pop alike as “novelty art,” a “mannerism”<sup>4</sup> which violated the more heady enterprise of keeping the avant-garde chaste and separate from life. But within the intersections of art and design, an area of visual investigation was emerging that would evade much of the American art press and critics like Greenberg.<sup>5</sup> For all of its populist inclinations, op art was studiously engaged in the examination of visual perception, a trait that underscores its weight and authority while compounding its ingenious sense of hybridity.

When the Philadelphia-based artist Edna Andrade stumbled in 1962-63 upon what was soon to be dubbed “op art,”<sup>6</sup> she was completely unaware she had encountered an international artistic phenomenon. Prior to this date, Andrade had produced a series of abstractions that were alternatively biomorphic and geometric in shape but would now make an abrupt shift to a more resolved, determined and consistent body of paintings that focused on hard-edged geometric patterns producing subtle, quivering sensations. Ironically, this aesthetic shift also resulted from a divorce and a consequent need to find employment. “Every change in my art has to do with a change in my life,” Andrade has stated. “I feel as if I didn’t take charge of my life until I was middle-aged and got a divorce. Prior to that my husband’s career came first.”<sup>7</sup>

At the age of 42, in 1959, Andrade began to teach drawing and design at the Philadelphia College of Art (now University of the Arts). Revisiting the color theories of Josef Albers, an old influence, as well as the notebooks of Paul Klee and generalized Bauhaus ideas relating to the necessity for resolute, precise structure and form in art and design, Andrade was struck by “how little it takes to upset the eye.”<sup>8</sup> Through her assignments to students — which involved “problems of individual perception”<sup>9</sup> and “formal relationships of color and line and shape and ground and figure, and all those things that you think about in two dimensions”<sup>10</sup> — her research and thinking began to focus on the way the eye processes visual information. Her painting began to change along side her instruction. In works such as *Geometric 4-63* (1963) and *Cross* (1963), for example, Andrade began to map the basics of color interaction by varying the size of primary geometric forms. These paintings’ bold contrasts of shape and hue quickly evolved into dynamic, pulsating compositions such as *Color Motion 4-64* (1964), *Turbo 2*, (1965), *Radiant Ellipse 1-65*, (1965) and *Radiant Ellipse 4-65*, (1965), in which the illusion of depth is effected through convex patterns of abruptly shifting squares or rectangular lines. Positioned on an underlying grid structure, these meticulously painted compositions seem, paradoxically, to unsettle the eye, inducing a mild physiological or sensory experience.

Andrade has always claimed that a symbiotic relationship exists between her teaching and her studio practice. But with the ongoing professional demands of an art college, the time left for painting remained limited and constrained. Given the precision of her compositions, with their exact seams of differing colors, she was initially only able to produce a few works a year. While this situation was relieved somewhat by her turn to fast-drying acrylic paint in 1965 — as opposed to the slower-drying oil-based medium she used prior to this period — the patience required to finesse her elaborate designs

was consuming. But in her off-hours from teaching, Andrade would draw on drafting paper, its readymade grid providing a template to link and weave together the intricate network of geometric forms that she would later, when additional time was found, translate into her paintings.

These drawings, like the paintings themselves, have a distinctly mathematical look to them, the products it would seem of computation or an in-depth knowledge of geometry. But Andrade had no specific training in the area of mathematics. Rather, her designs, for all their technical virtuosity, are the outgrowth of deduction and a keenly spatial intelligence. "I really didn't understand algebra in high school," she has explained, "and I never took any mathematics in college, but geometry seemed to me very easy. I mean plane geometry... plane geometry is very logical."<sup>11</sup>

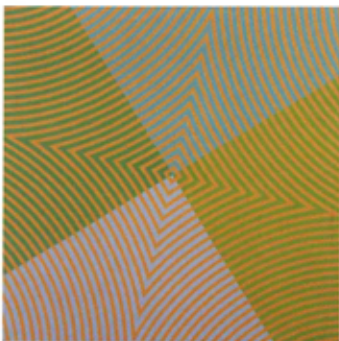
While scouring Albers, Klee and the Bauhaus for models and projects for her classes at the Philadelphia College of Art in the early 1960s, she was also reminded of a repressed childhood memory that would have direct bearing on the aesthetics of her work. At the age of three, Andrade's mother gave her a set of "Montessori block-like tiles... triangles, squares and maybe a hexagon. I remember they were different colors. What pleasure I had in putting those together."<sup>12</sup> The recollection of the impact of this "miscellaneous information,"<sup>13</sup> as she has characterized it, the stray childhood experiences that later congeal into definition and importance, along with her renewed interest in Albers, contributed in part to the geometrical ingredients of her new work.

The early exposure to the Montessori blocks or tiles had further latter-day associations and reverberations. Andrade has likened the complexity of her geometric compositions to tiling patterns produced by the extensive, trans-cultural traditions of the so-called craft based arts, such as quilt-making, basketry, carpet weaving, pottery decoration and mosaic paving. The symmetrical columns of interlocking cubes and hexagons in *Falling Cubes* (1966) and *Hot Blocks* (1966), for instance, are ordered by a certain uniformity and repetition similar to the formal devices used by various artisans. The reiteration of a single geometric shape over the field of the canvas, while in no way the approximation of a drone — the interiors of these forms are varied and skewed to generate dizzying retinal effects — results in a distinctly depersonalized, anonymous art that, like the mosaic tiles on a Middle Eastern mosque, bears no trace of the artist's identity or interior life. "I find myself in the ancient tradition of all those anonymous artisans," she has stated. "Artists have always used the pure and the powerful archetypes, the circle, the triangle, the square, the pentagon, and endowed them with symbolic content."<sup>14</sup>

But what is the "symbolic content" of Andrade's work? Ironically indeterminate and vague — the sum total of each viewer's own idiosyncratic experience — the copious and unpre-scribed meanings or content of the optical paintings issue from a cultural counteraction. Andrade's inquiries into the nature of visual perception, to testing the way in which the eye can be disoriented and thrown off-base through the relatively simple means of combining contrasting color and basic geometric shapes, were in part a reaction to the lingering impact of abstract expressionism. Unlike the New York School's emphasis on the revelation of the artist's subjectivity, metaphorically conveyed through loose skeins or gestures of paint and the dominance of the brush stroke, Andrade became interested, after 1962-63, in a denial of individuality in art and a repression of the cult of personal expression. Unlike her earlier, more moody abstractions, characterized by imprecise rectangles or organic forms filled with muted color, Andrade's paintings after 1962-63 become entirely flat, their surfaces hard-edged, pristine, and completely uninflected by either brushwork

*Color Motion 2-64*, 1964  
Oil on canvas  
36 x 36"  
Courtesy Locks Gallery

Edna Andrade with *Color Motion 4-64*



or pictorial incident. A certain cool, anonymous look, emptied of abstract expressionism's egoistic overtones, typifies a painting such as *Hot Blocks*. Speaking to the context of this work, Andrade noted in 1965, "I think that this generation feels that you don't attempt to solve emotional and sociological problems through your art."<sup>15</sup>

The art of the generation to which she alludes and felt strong affinities with — broadly encompassing both minimalism and pop — exists in distinct opposition to the New York School's outpouring of self. If anything, a cool sensibility unifies the disparate aesthetic trends that surfaced during the early to mid-sixties. Definite stylistic correspondences exist between the radically simplified geometric sculptures of Donald Judd, Carl Andre and Dan Flavin and Andrade's restrained use of primary shapes in a composition such as *Interchange* (1966). While Andrade's op paintings are not as austere in their visual syntax as this minimalist work, they purposefully abide by a formal rigor, draw on repetitive devices and are devoid of narrative content. Moreover, op and minimalism engage the viewer in a generally similar manner, demanding active participation either through circumambulation, in the case of minimalism's often imposing objects, or through the retinal assault of Andrade's vibrating canvases.

But where Andrade's optically oriented paintings depart from minimalism's extreme sculptural reductions is on the issues of illusion and "symbolic content," a term she frequently invoked. Part of minimalism's project was to purge art of illusion through a literalist emphasis on materials. The dictum that "less is more," that no extraneous subject matter or reference interfere with the phenomenological experience of primary structures made of commercial sheet aluminum, copper or fluorescent bulbs runs counter to what Andrade aimed to achieve in her work. While she declined to provide a metaphysical or transcendent experience for the viewer, her painting thrives on the production of sensory responses. Like minimalist and color field painting, her compositions are flat, free of the perspectival systems which manufacture illusion or the suggestion of a third dimension; however, through her compositional wizardry and variation of form and color to create movement, illusionistic afterimages become the contradictory but desired outgrowth of her work. And, as in all op art, this feature is the distinguishing content of her painting.

Unlike the intellectual enterprise of minimalist art, which asserts the role of art as an object unembellished by illusion or metaphor, Andrade has attempted to lift her painting beyond the level of formal investigation to create as wide an audience as possible, regardless of a person's art education. As she has noted of her pulsating compositions, "People don't have to be aesthetes in order to understand it. It has a direct visual-emotional impact."<sup>16</sup> The immediacy of her work, its instant retinal hit, obviated any need for explanation. The same kinesthetic reaction was engendered in every viewer. Andrade realized that what characterized op art, in general, was that "it was a kind of democratic art... [unlike] most art [which] is so elitist, it seems."<sup>17</sup> Of all of the movements that emerged in the 1960s, she believed that "op and pop have a closer relationship... It seems to me that they both are trying to make art more like life and vice-versa. I am not so much interested in the products of pop as I am in their motives."<sup>18</sup>

Although op is generally considered a post-war phenomenon that surfaced simultaneously in Europe and South America in the 1950s — articulated variously by artists such as Vasarely in France and Jesus Raphael Soto in Venezuela as well as collectives such as Group Zero in Germany (Heinz Mack and Otto Piene), Gruppo N and Gruppo T in Italy, and the Groupe de Recherche d'Art Visuel, or GRAV in Paris — it took "The Responsive Eye" (1965), an exhibition at the Museum of Modern Art in New York, to totalize this phenomenon.

A rambling overview of contemporary abstract art that included a mix of painters and sculptors, among them Albers, Ad Reinhardt, Ellsworth Kelly, Piero Dorazio, Frank Stella, Kenneth Noland and Larry Poons, the survey also featured a section on optical painting that highlighted Vasarely, Riley, Anuszkiewicz and Agam among others. Within this vast array of occasionally conflicting aesthetic strategies, William C. Seitz, the curator of the exhibition, nonetheless detected a certain unifying interest in the "reduction of shape-vocabulary to the simplest units and combinations."<sup>19</sup>

Edna Andrade with *Space Frames*  
A, B, C, D, 1965

Of the considerable press that was generated by "The Responsive Eye," most critics focused on the op artists, singling out Riley in particular. Noting the democratizing ideals that informed this new art, its interest in broad as opposed to specialized audiences, and the ideological and visual contrasts it posed to outgoing styles of abstract expressionism, further connections were made by mass media publications such as the *New York Times*, *Time* and the *Nation* to the worlds of fashion, advertising and science.<sup>20</sup> While some art critics such as Thomas B. Hess, editor of *Art News*, believed these connections rendered op a debased form of artistic expression, which, like television, lulled its viewers into passivity and created a generation of "peripatetic zombies," others were not quite so threatened.<sup>21</sup>

In fact, in his catalogue essay for "The Responsive Eye," Seitz underscored op's more scientific foundations with an invocation of Michel-Eugene Chevreul,<sup>22</sup> the nineteenth-century French color theorist, and his early analysis of the way color interacts and plays on the eye. While Seitz's allusion to science was not elaborated beyond Chevreul — it was the press that built on this interpretation — an extensive history of color experimentation buttressed his peremptory claim. Andrade was not included in the MoMA exhibition, but like many of her British and European counterparts who were, she was more than acquainted with the ideas of Chevreul, as well as Hermann von Helmholtz's research on optics and the effect and perception of color. In short, a certain degree of far-reaching, even off-beat reading shaped the production of op art's alliance with science.

Working in relative isolation in Philadelphia, Andrade wrote to her ex-husband shortly after "The Responsive Eye" in 1965, "I think that I am on a good kick with my work. Unfortunately, I wasn't in the Museum of Modern Art's 'Responsive Eye' show because I didn't know that so many other people were working on the same visual problems until it was too late."<sup>23</sup> The show did, however, provide her with a sense of artistic identity and the affirmation that the independent reading and thinking which she had embarked on in the early 1960s was part of a coherent aesthetic direction or trend. Her work did become integrated into a few of the spate of national exhibitions devoted to op art that followed on the wild success of "The Responsive Eye."<sup>24</sup> And in 1967 she had her first one-person New York exhibition of her optical paintings at the Easthampton Gallery, which consolidated her stake in the field.<sup>25</sup>

At first, Andrade responded with reservation to the designation "op art," feeling it glossed over the seriousness of the movement's mission. "This 'optical' label could be the kiss of death," she stated in 1965. "It's too simple. It seems to refer too directly to the physiology of the eye. It fails to suggest that we are exploring the whole process of perception... attempting to evaluate the comparative importance of direct, visual experience, conditioning, cerebration."<sup>26</sup> She has now grown accustomed to and utilizes the tag, primarily because it has stuck since the mid-1960s as a handy description. But like many artistic terms, it is limited and one-sided, missing the range and depth of the movement's intent. Besides her consideration of Chevreul and Helmholtz, Andrade had enlarged the scope of her reading to include more contemporary figures such as the British mathematical physicist



and philosopher, Lancelot Law Whyte, whom she met in the early 1960s through her friends, the architects Anne Tyng and Louis Kahn. Whyte marked and subsequently encouraged her elaboration of geometric patterns, underscoring that a sense of unity and holism should be effected in her painting.<sup>27</sup> While Andrade later read many of the second-generation gestalt theorists, such as Anton Ehrenzweig and R. L. Gregory, writers who focused on the perception and cognition of visual form, it was Whyte (who had been analyzed by Carl Jung) who reinforced her understanding that geometric patterns and shapes are initially grasped as a totality and not for their constituent parts.<sup>28</sup>

From this position, Andrade, like many other op artists, began to reassess the modernist emphasis placed on the picture plane and the fracturing of form and shape into disparate incidents. Op art, she believed, posed an alternative means of configuring and enlivening a flat surface. "As far as the canonization of the picture plane is concerned," she wrote in 1965, "I think the whole thing has been carried to absurd lengths, ever since Cezanne. Maybe it's not what Cezanne had in mind at all! He constantly moved forms back and forth! With the new art, paintings are no longer things to be looked at — or into... they possess positive action."<sup>29</sup> Op art has often been considered a curious, hybrid offshoot of kinetic art, the translation of earlier experimentation with movement in art, rather than a legacy of Cezanne, as Andrade intuited.<sup>30</sup> None of this history or probing was present in "The Responsive Eye," however, which, again, confined its analysis to contemporary developments in abstraction. While op art's not so distant heirs were in fact works that skirted cubism and the rupturing of space into multiple dimensions such as Marcel Duchamp's *Rotoreliefs* (1935), Duchamp and Man Ray's *Anemic Cinema* (1926) and Lazlo Moholy-Nagy's *Light Space Modulator* (1922-30),<sup>31</sup> Albers is generally considered the primary forerunner of op, his Bauhaus experiments with optics the most consistent, sustained and influential work of its kind.

Whatever its illustrious pre-history, the art press remained incessantly fearful that op was too easily aligned with commerce. Like its irreverence towards the picture plane, op's affiliation with marketing and design seemed, to many critics, a violation of the formalist credo that art should be separate from life. Andrade, however, remained unswayed by the sanctimonious overtones of this position. Given the democratic ideal that informed her aesthetic purview, she responded with alacrity to the few commercial projects that came her way. From 1960 to 1963, just as she was reformulating her work, easing into the development of the flickering geometric patterns that would become the mainstay of her painting, she took on a commission to renovate three restaurants (one of them a mobile unit) for a now-defunct Philadelphia chain known as Linton's. Among her primary responsibilities were consulting on the color scheme, upholstery and wall decorations. While this project did not allow as much direct integration of her own compositional schemes as she would have liked, another commission, a series of jigsaw puzzles produced between 1967-70 for Springbok (a division of Hallmark Cards), involved direct reproductions of the geometric patterning established in works like *Color Motion 4-64* (1964). Similarly, her paving design for the Philadelphia Free Library in 1972 abides by the same egalitarian view that good design should be available for public consumption.

Andrade's paintings and few public and commercial works partially reflect the optimism of post-World War II American culture and its giddy but deep-seated belief in the future. This combination of her positivist thinking and populist ethos corresponds not only to a new buoyant economy in the 1960s but to the mass proliferation of another new media: television. Critics have noted the similarity between the overall distribution of geometric forms in most op art and the mosaic patterning or pixelation that transmits color and light

in television.<sup>32</sup> In 1964, two years after Andrade began to pursue her optical paintings and a year before "The Responsive Eye," Marshall McLuhan's highly influential collection of essays, *Understanding Media: The Extensions of Man*, theorized the role and impact of "media" (a term he coined), or television, on mass culture. While Andrade was clearly aware of McLuhan's book, it was one she never read; she was more interested in op's internal histories and corollary investigations by color theorists, psychologists and art historians.

All the same, the comparison to television's abstract and instantaneously engaging mosaic of moving lines is not off-handed. The mix of art, advertising and technological experience generated by electronic mass media is a significant part of the visual culture that spawned op and pop art alike. McLuhan's "Age of Information" yielded multiple cross-over connections. A few early professional experiences shaped Andrade's technological predisposition. Shortly after her graduation from the Pennsylvania Academy of the Arts in 1937 and her marriage to the architect Preston Andrade, she worked during World War II for the Office of Strategic Services (OSS) in the Visual Presentation Division in Washington, DC. Under the direction of Eero Saarinen she devised maps, charts, graphs and exhibitions for use by government officials. She also worked with the filmmaker John Ford producing animated instructional short films. This experience combined with the influence of her architect husband<sup>33</sup> and her renewed interest in the Bauhaus to mark and determine her geometric abstractions of the early 1960s.

Toward the end the decade, Andrade's canvases began to increase in scale, a feature that compounded their optical reverberations. *Emergence II* (1969), for instance, with its symmetrical rows of circles, half filled with color applied in conflicting directions, engulfs the viewer, maximizing its sense of movement and clamor. These cacophonous statements would eventually ease into more lyrical compositions such as *Cool Wave* (1974), *Blue Carpanel* (1975) and *Night Sea* (1977), in which color is muted and harmonious and the intricate geometric webs shimmer rather than vibrate. The enveloping size of these paintings worked to amplify their optical sensations, whatever the retinal pitch or tone. Employing the serial format she had adopted in 1962-63 by reiterating similar patterns in different color schemes, Andrade's work through the early- to mid-1980s continued to reinvent the notion of illusion in art as well as test *a priori* assumptions that relate to the perception of color and form.

Andrade has lived and worked in Philadelphia without interruption from the late 1950s, actively pursuing her work while teaching (until 1988). As an artist whose work emerged in the pre-feminist decade of the 1960s, Andrade claims she was not "aware" of feeling excluded or sitting on the sidelines while other (male) figures made it into the mainstream.<sup>34</sup> Perhaps the democracy of her aesthetic position, or her consuming interest in by-passing Greenbergian ideas of formalist purity, still the big stakes in art in the 1960s, spared her any perceived setback.<sup>35</sup> Intriguingly, the monolithic yet rarified requirements for modernist art receded in the 1970s, collapsing into a fragmented art world where distinctions between the fine arts, design and their commercial application no longer rigidly prevailed. And it seems especially from our own vantage point in the early twenty-first century, now that op art has experienced something of a revival in the past decade, rethought and refashioned by a younger generation of artists,<sup>36</sup> that Andrade's pulsating, optical compositions and her expansive, upbeat artistic view have been endowed with a new currency and situated at the forefront of a now vital history.



## Endnotes:

1. Andy Warhol and Pat Hackett, *POPism: The Warhol '60s* (New York: Harcourt Brace Jovanovich, 1980): 3.
2. Bridget Riley was horrified to find that her painting, *Current*, was transformed into a dress without permission in 1965. Other artists, however, such as Richard Anuszkiewicz, Julian Stanczak and Victor Vasarely worked directly with industry to effect their designs in commercial applications. Pamela M. Lee in "Bridget Riley's Eye/Body Problem," *October*, no. 98 (Fall 2001), 33 is one of the most recent authors to allude to this distinction.
3. Clement Greenberg, "Avant-garde and Kitsch," reprinted in *Clement Greenberg: The Collected Essays and Criticism*, vol. 1, ed. John O'Brian (Chicago: University of Chicago Press, 1986).
4. Clement Greenberg, "Recentness of Sculpture," reprinted in *Clement Greenberg: The Collected Essays and Criticism*, vol. 4, 254.
5. Outside of Greenberg, critics such as Thomas B. Hess, in "You can hang it in the hall," *Art News*, vol.64, no.2 (April 1965), 41-43, 49-50, also decried the commercial properties of op art.
6. The term "op art" is generally assumed to have been coined and first used by John Bozoroski in "Op Art: Pictures that Attack the Eye," *Time*, October 23, 1964, 78-86.
7. Edna Andrade quoted in Anne R. Fabbri, "Edna Andrade: Always embracing the new," *Philadelphia Daily News*, December 3, 1999, 92.
7. Edna Andrade, Interview with the author, March 8, 2002.
8. Edna Andrade quoted in Patricia Likos, Interview with Edna Andrade, Archives of American Art, Smithsonian Institution, April 1, 1987, 29.
9. *Ibid.*, 20.
10. Andrade, Interview with the author.
11. *Ibid.*
12. Andrade, Interview with the author.
13. Edna Andrade, Artist's Statement, exhibition brochure, Philadelphia: Marian Locks Gallery, 1979.
14. Edna Andrade quoted in Ben Wolf, "Edna Andrade," *Jewish Exponent*, March 5, 1965, 11.
15. *Ibid.*
16. Andrade quoted in Likos, *op.cit.*, 28.
17. Edna Andrade, letter to Preston Andrade, October 3, 1965.
18. William C. Seitz, *The Responsive Eye*, ex. cat., (New York: The Museum of Modern Art, 1965), 12.
19. See, among others, John Canaday, "Art That Pulses, Quivers and Fascinates," *New York Times Magazine*, February 21, 1965, 12-13, 55-57, 59. *Time*, *op.cit.* Max Kozloff, "Commotion of the Retina," *The Nation*, March 22, 1965, 316-18.
21. Hess, *op. cit.*, 43.
22. Seitz, *op.cit.*, 30.
23. Andrade quoted in Likos, *op.cit.*
24. Of the many museum exhibitions devoted to op art in 1965, Andrade was included in the following: *Art with Optical Reaction*, ex. cat. (Des Moines, Iowa: Des Moines Art Center); *Optical Painting*, Philadelphia Art Alliance, and *The Deceived Eye*, ex. cat. (Fort Worth, Texas: Fort Worth Art Center).
25. John Canaday, who had enthusiastically reviewed *The Responsive Eye*, *op. cit.*, had a lukewarm reaction to Andrade's work. Cf., his "Edna Andrade," *New York Times*, April 15, 1967, 27, in which he states her "basic patterns and color schemes are over familiar." Perhaps if he had known of her early involvement with op art, he might have responded to her work differently.
26. Andrade quoted in Wolf, *op.cit.*
27. Andrade has read most of Lancelot Law Whyte's numerous books and essays — many of which he gave her on his trips to Philadelphia to lecture at the University of Pennsylvania and subsequently at the Institute for Advance Study, Princeton — the most pertinent being, *Aspects of form: a symposium of form in nature and art* (New York: Pellegrini and Cudahy, 1967); *The Atomic Problem, A Challenge to Physicists and Mathematicians* (London: Allen & Unwin, 1961); *The Unconscious Before Freud* (New York: Basic Books, 1960); *Essay on Atomism, From Democritus to 1960* (London: T. Nelson, 1961); and "Towards a Science of Form," *The Hudson Review* (vol. XXX111, no 4, Winter), 1970-71.
28. Following her general interest in gestalt theory, as well as the ideas of Whyte, she subsequently read Anton Ehrenzweig's *The Hidden Order in Art: A Study in the Psychology of Artistic Imagination* (Berkeley, California: University of California Press, 1967) and R. L. Gregory's *The Intelligent Eye* (London: Weidenfeld and Nicolson, 1970).
29. Andrade, quoted in Wolf, *op.cit.*
30. For a history of the relationship of op art to kinetic art, cf. Stephen Bann, "Unity and Diversity in Kinetic Art," in *Four Essays on Kinetic Art* (St. Albans, England: Motion Books, 1966).
31. For a history and discussion of the features of op art cf., Cyril Barrett, *Op Art* (New York: The Viking Press, 1970).
32. Cf. Hess, *op.cit.*
33. Andrade credited her husband long after her divorce as having "affected my work, both technically and conceptually. He taught me how to draft and how to do architectural renderings. A lot of the precision that came from that sort of drawing has stayed with me." Cf. Andrade quoted in Likos, *op.cit.*, 1.
34. *Ibid.*, 7.
35. Andrade was opposed, moreover, to "sexually segregated" exhibitions, declining an invitation for her future dealer, Marian Locks, to participate in a show of Philadelphia women artists in 1969. Cf. Edna Andrade, letter to Marian Locks, January 10, 1969.
36. On the revival of op art by contemporary artists, cf., for example, Barry Blinderman, *post-hypnotic*, ex. cat. (Normal, Illinois: University Galleries, Illinois State University, 1999).