

# Naum Gabo's *Kinetic Construction* and Kinetic Art

Naoki MITSUI

## ナウム・ガボの *Kinetic Construction* とキネティックアート

三井 直樹

現代のメディアアートの源流ともいえる1910年代以降のキネティックアートは、動きや時間を造形要素として取り入れた作品ナウム・ガボに代表されるだろう。動きがメディアとなったキネティックアートは現代美術における環境、インターフェース、インタラクティビティへの萌芽となる。当時の科学技術や理論の影響を受けたキネティックアートのコンセプトは、構成主義からバウハウスへ、そして戦後の美術運動の史実を俯瞰するうえでも意義深い。彫刻家である兄、アントニー・ペヴスナーとともに確立していった構成主義の理論と造形表現について、20世紀以降のアート&デザインにおける意義を考察する。

キーワード：Naum Gabo ナウム・ガボ, Moholy-Nagy モホイ＝ナジ,  
kinetic art キネティックアート, Constructivism 構成主義,  
space and time 時間と空間

### I. Introduction

The idea of Kinetic art began in Russia after the First World War.<sup>1)</sup> In 1919 Naum Gabo began to design an experimental sculpture, *Kinetic Construction*<sup>2)</sup>. (fig. 1). This work is sometimes titled Kinetic Sculpture, and less frequently kinetic Model. *Standing Wave* seems to have been adopted as a subtitle when a replica of *Kinetic Construction* which was acquired by the Tate Gallery in 1966<sup>3)</sup>. This work is made of a vertical metal rod with a weight carefully positioned near either end. The bottom of the vertical rod is connected to a motor that makes it vibrate and form an illusion of movement. This work has changed our view of sculptural space and has influenced other artists. *Kinetic Construction* creates a form or image in space by movement. This is the essential feature of sculpture which Gabo expected. Here I will

examine the historical role and reputation of Gabo's *Kinetic Construction*.

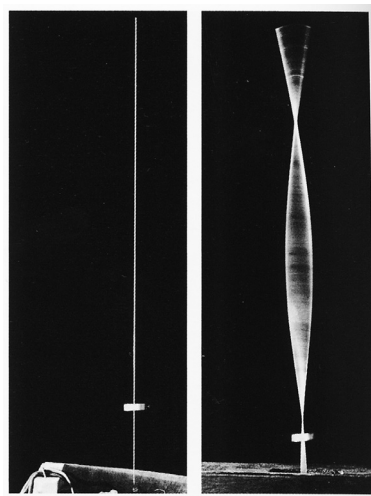


fig.1 Naum Gabo *Kinetic Construction* (1920)

## II. The Concept of Kinetic art

Kinetic art <sup>4)</sup> indicates art which involves movement. <sup>5)</sup> But art which involves movement is not always kinetic in the precise sense of Kinetic art. From the earliest times artists have been concerned with depicting movement. In other words, they have been concerned with the representation of movement, or to be more accurate, of moving objects. The Kinetic artist is not concerned with representing movement, but concerned with movement itself, with movement as an integral part of the work.

Before exploring Gabo's work and Kinetic art, I will begin by considering his background and the genesis of Kinetic art.

The Futurist praised speed (for example, Marinetti) and their Manifestos showed the indication of the idea of Kinetic art as follows:

We can not forget... the fury of a flywheel or the turbine of a propeller, are all plastic and pictorial elements of which a Futurist in sculpture must take account. <sup>6)</sup> That movement and light destroy the materiality of bodies. <sup>7)</sup>

These manifestos suggest Futurists' interest. At this time, they celebrated the delights of speed, energy, and machine aesthetic in the world of technological evolution.

The Futurists illustrated the beauty of movement and speed in their written Manifestos, but in their works, they just represented movement pictorially. For example, some of Giacomo Balla's paintings, such as *Dynamism of a Dog on a Leash* (fig. 2) 1912, are "virtually straight renderings of multiple-exposure photographs." <sup>8)</sup> On the other hand, some other Futurists described an object in movement as it

would appear to a moving observer instead of painting moving objects. One way or the other, Futurists further developed the underlying ideas of the Cubists. However, this is still only an illustration of movement. Movement itself was not depicted in their compositions directly, but rather expressed as the movement of an object. Therefore, Futurist art is not Kinetic art in the sense that I defined above.

In 1920 Naum Gabo and his elder brother, Antoine Pevsner, wrote the *Realistic Manifesto* to accompany their exhibition in Moscow. <sup>9)</sup> In their Manifesto they strongly expressed the limitations of Futurism:

Futurism has not gone further than the effort to fix on canvas a purely optical reflex... It is obvious now to every one of us that by the simple graphic registration of a row of momentarily arrested movements one cannot recreate movement itself. <sup>10)</sup>

In the *Realistic Manifesto*, Gabo also described a new art using the term, "kinetic rhythms" <sup>11)</sup> as follows:



fig.2 Giacomo Balla *Dynamism of a Dog on a Leash* (1912)

The realization of our perceptions of the world in the forms of space and time is the only aim of our pictorial and plastic art... We affirm... a new element, the kinetic rhythms of our perception of real time.<sup>12)</sup>

From the above, he chose Kinetic art as the basic form of our perception of real time. Thus, Gabo explored motion as an aesthetic element and in 1920 made *Realistic Manifesto* which stands as a landmark in modern sculpture.

At this time, other artists also became interested in movement. For example, Marcel Duchamp made a motorized optical device, *Rotary Glass Plate* (fig. 3) in 1920, which demonstrates the illusion of transparency.<sup>13)</sup> Vladimir Tatlin proclaimed a new way of using materials, such as wood, iron, glass and concrete, by constructing *Monument for the Third International* (fig. 4) of 1919-1920. I do not consider Tatlin's *Monument for the Third International* as a work of Kinetic art, because the movement of each level in the monument is too slow to see. Each level requires a day, a month or a year to rotate itself.<sup>14)</sup>

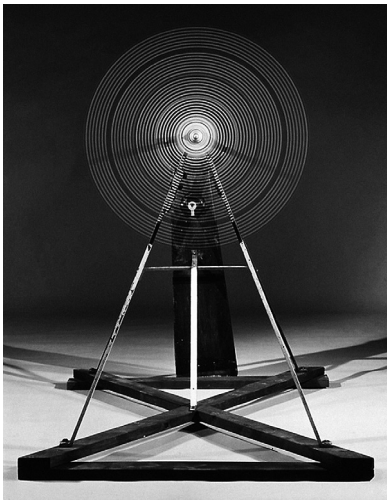


fig.3 Marcel Duchamp *Rotary Glass Plate* (1920)

Laszlo Moholy-Nagy started to work with his *Light-Space Modulator* (fig. 5) in 1922 about two years after *Realistic Manifesto*. This work demonstrated the powerful play of light and shadow, space and time in his three-dimensional construction, and became one of the most important works of Kinetic art. Moholy-Nagy's *Light-Space Modulator* is "derived from his experimentations with light and its transmission

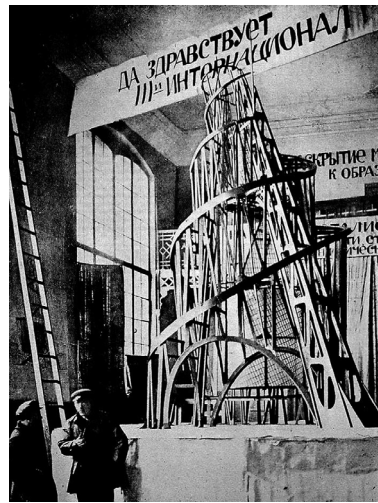


fig.4 Vladimir Tatlin *Monument for the Third International* (1919-1920)

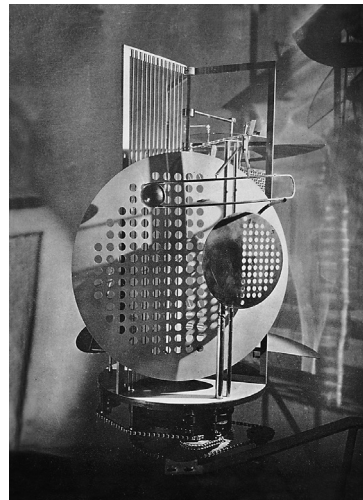


fig.5 Laszlo Moholy-Nagy *Light-Space Modulator* (1922)

through plastic sheets and kineticism.”<sup>15)</sup> Moholy-Nagy knew that the light adds a new sculptural element in his works.<sup>16)</sup> The light reflects the space surrounding this work. In other word, the light encompasses the environment. Moholy-Nagy’s idea of the sculptural and environmental use of light became popular techniques and effects in the Kinetic art after the Second World War. Like Gabo, Moholy-Nagy believed that “the machine is... a very efficient ‘tool’ which will serve the creative intention as well as the traditional hand tool.”<sup>17)</sup>

Through *Realistic Manifesto*, Gabo thought that movement is equally as important as structure, space and image, but it should not be a dominant place.<sup>18)</sup> He did not intend to substitute for his sculpture some sort of mechanical toy. Herbert Read pointed out these Gabo’s ideas, quoting from the *Realistic Manifesto* as follows:

1. To communicate the reality of life, art should be based on the two fundamental elements: space and time.
2. Volume is not the only spatial concept.
3. Kinetic and dynamic elements must be used to express the real nature of time; static rhythms are not sufficient.
4. Art should stop being imitative and try instead to discover new forms.<sup>19)</sup>

### III. Kinetic art and the Idea of Science

It seems to me that Gabo had been exploring how to work out his own ideas of art since 1910, and these interests had accompanied him when he was sent to Munich to study engineering.<sup>20)</sup> In new engineering products, like the T beam, they demonstrated that the strength of bodies does not depend on mass. Gabo abandoned mass in his sculptures. He had attended Wolfflin’s lectures on art history between 1912-1913.<sup>21)</sup>

While studying natural science and mathematics in Munich, Gabo met the crystallographer, Wilhelm Conrad Rontgen who invented the X-ray in 1895. John E. Bowlit stated the influence of X-ray as follows:

X-ray was of much greater importance to Gabo (and maybe to other artists in Munich at that time such as Kandinsky) than the formal theories of Wolfflin. He must have been amazed to see those early lantern slides of the interior of insects, fish, animal, birds and the human body. No doubt Gabo discussed these data with scientific colleague...<sup>22)</sup>

Thanks to Rontgen’s X-ray, many Russian avant-garde artists including Gabo could get “proof of the existence of a ‘more real’ reality behind the facade of physical objects.”<sup>23)</sup> They saw beyond the world of appearances at that time. Apparently, Gabo’s works of Construction series, such as *Construction in Space: Crystal* (fig. 6), 1937, have artistic metaphors from Rontgen’s X-ray photography. Gabo expresses “the conjunction in space of twisting and curving transparent planes”<sup>24)</sup> with X-ray like view.

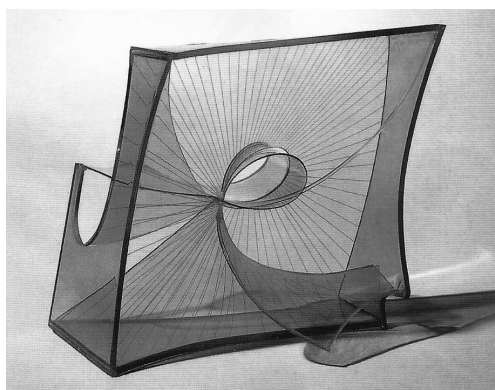


fig.6 Naum Gabo *Construction in Space: Crystal* (1937)



While studying at the University in Munich, Gabo became familiar with Cubism and Futurism and thought that neither could be the style of the future. Gabo said, "Older sculpture was created in terms of solids; the new departure was to create in terms of space."<sup>25</sup> And He dissatisfied with "the use of space in Cubism which be found unsystematic, accidental, in a sense anarchistic."<sup>26</sup>

Gabo had made contact in 1913 with the Blaue Reiter in Munich, such as Franz Marc, Mikhail Larionov, Natalia Goncharova, and Malevich had exhibited with this group in 1911 and 1912, but Gabo did not meet Kandinsky until his return to Russia in 1917.<sup>27</sup> Gabo read Concerning the Spiritual in Art in 1913, and was interested in the artistic theories being debated in Munich. He recalled later, as "artistic life in Munich was preoccupied with a new idea of art, on a deeper, more philosophical level. The idea of non-objective (abstract) art was very seriously discussed."<sup>28</sup>

In 1915 Gabo made his first space-revealing study of a head, *Constructed Head No. 1* (fig. 7). During his trip to Italy, Italian Renaissance

sculpture had repelled him because the interior space was buried in the mass.<sup>29</sup> Gabo said, "visiting Italy was like a great shock, seeing Michelangelo and all those works of the Renaissance masters. 'Something has to be done in sculpture,' I felt. What it was I did not know."<sup>30</sup> He rejected also the showing of form by a series of profiles as Picasso and the Futurists had undertaken to do.<sup>31</sup> The series of Gabo's Head between 1915 and 1916 looks like Cubist sculptures such as Picasso's *Head of a Woman* (1909) because of their geometry, but Gabo was seeking to reveal interior space, not to create a stylized exterior form.<sup>32</sup> Now we can compare this idea of Gabo's *Constructed Head No. 1* and his later writing, *Sculpture: Carving and Construction in Space* (fig. 8):

...two cubes which illustrate the main distinction between the two kinds of representation of the same object, one corresponding to carving and the other to construction... The first represents a volume of mass; the second represents the space in which the mass exists made visible. Volume of mass and volume of space are sculpturally not the same thing. Indeed, they are two different materials... both concrete and



fig.7 Naum Gabo *Constructed Head No.1* (1915)

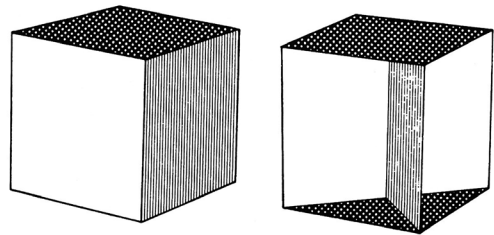


fig.8 Naum Gabo Diagram of geometric cube and a cube constructed according to the stereometric system, 1937. From "Two Cubes," *Gabo*, (Cambridge, Mass., Harvard Uni. Press, 1957), p. 168.

measurable. Up to now, the sculptors have preferred the mass and neglected or paid very little attention to such an important component of mass as space.... We consider it space as an absolute sculptural element, released from any closed volume, and we represent it from inside with its own specific properties.<sup>33)</sup>

In the above, we can find Gabo's interests in science. Gabo was familiar with Bergson's theories on the relationship time and consciousness, and by 1920, Einstein's notions of time as the fourth dimension and the inseparability of time and space were becoming popular.<sup>34)</sup> The discussions of time and space in this scientific interpretation were commonplace within the Russian avant-garde. Gabo recalled Einstein's theory as follows:

There was a feeling of time and space, a movement in men's minds. For instance, I will never forget when I was present at a gathering of scientists and students, in well, about 1911 or 1912 -one of the professors was talking of Einstein's theory, I myself was then studying physics.<sup>35)</sup>

#### IV. Conclusion

At that time, it was difficult to conceptualize the as a space-time continuum.<sup>36)</sup> Stephen Kern explained Einstein's theory as "the theory broke down the distinction between age-old categories that lay at foundation of Western thought."<sup>37)</sup> I can also see the influence of these scientific theories, especially the fourth dimension. Gabo's writing as follows:

Constructive sculpture is not only three dimensional; it is fourth dimensional, insofar as

we are trying to bring the element of time into it. By time I mean movement, rhythm: the actual movement as well as the illusory one which is perceived through the flow of lines and shapes in the sculpture or the painting. In my opinion, rhythm in a work of art is as important as space and structure and image.<sup>38)</sup>

This is just his own idea for *Realistic Manifesto*. After making this kinetic sculpture, Gabo wanted to progress from this simple construction to more complex kinetic forms, but he was disappointed with the clumsy electronic motor as a source of power. In 1922 he made a drawing, *Design for a Kinetic Construction* (fig. 9), which was never realized. This is "a scheme for a more involved play of kinetic rhythms."<sup>39)</sup>

Gabo recalled *Kinetic Construction* as follows:

... standing wave had attracted my attention since my student days, in particular the fact that when you look at a standing wave, the image becomes three-dimensional. In order to show what I meant by calling for the

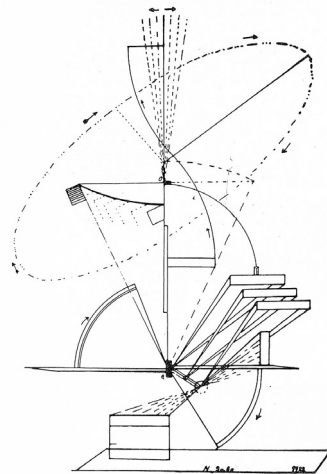


fig.9 Naum Gabo *Design for a Kinetic Construction* (1922)

introduction of kinetic rhythms into a constructed sculpture, I chose that standing wave as a good illusion...<sup>40)</sup>

In this essay, I try to define Kinetic Art through Gabo's works. The term kinetic has never been defined clearly so far. But Gabo provided new meanings to time and space as sculptural elements. He worked with many sculptures not only by his own scientific insight but also through his inner perception. He always sought the boundaries of art and science.<sup>41)</sup> And I can say that the idea of Kinetic art has not changed since the idea was first formulated by Naum Gabo.

## Notes

- 1) "Duchamp's Bicycle Wheel (1913), an inverted bicycle placed on a stool, was not Kinetic art in the technical sense, although it could be moved. The Futurists, Balla and Depero, made moving objects, *Complessi Plastici Mobili and Complessi Motorumoristi*. The latter involved perhaps the first use of a motor. These are at least forerunners of Kinetic art if not Kinetic art in the more precise sense. Much research has been done, but it is impossible to categorize the prehistory of Kinetic art." Nikos Stangos, *Concept of Modern Art: From Fauvism to Postmodernism*, (New York: Thames and Hudson, 1994), p. 224.
- 2) Steven A. Nash and Jorn Merkert, Naum Gabo: *Sixty Years of Constructivism*, (Munich: Prestel-Verlag, 1985), p. 205.
- 3) Nash and Merkert, pp. 205-206.
- 4) The word, "Kinetic" comes from the Greek, kinesis, movement, *kinetikos*, mobile.
- 5) Robert Atkins defines Kinetic sculpture as sculpture that contains moving parts, powered by hand, air or motor. He states as "its originator was the Dada artist Marcel Duchamp, who mounted a spinnable bicycle wheel on a wooden stool in 1913." Robert Atkins, *Art Spoke: A Guide to Modern Idea, Movements, and Buzzwords 1848-1944*, (New York: Abbeville Press, 1993), p. 127.
- 6) This is Boccioni's Technical Manifesto of Futurist Sculpture in 1912. Joshua C. Taylor, *Futurism*, (New York, 1961), p. 134; quoted in Nikos Stangos, *Concept of Modern Art: From Fauvism to Postmodernism*, (New York: Thames and Hudson, 1994), p. 213.
- 7) This is Boccioni's Futurist Painting: Technical Manifesto in 1910. Charles Harrison and Paul Wood, ed. *Art in Theory 1900-1990: An Anthology of Changing Ideas*, (Cambridge, Mass.: Blackwell, 1994), p. 152.
- 8) Robert Hughes, "Futurism," *Nothing If Not Critical: Selected Essays on Art and Artists*, (New York: Penguin, 1990), p. 175.  
"The photographs of sequential movement taken by Eadweard Muybridge and Etienne-Jules Marey can be seen as a precursor of futurist sculpture."
- 9) Ruth Olson and Abraham Chanin, "Antonie Pevsner," *Gabo-Pevsner*, (New York: The Museum of Modern Art, 1948), p. 54.
- 10) Naum Gabo, "Realist Manifesto," *Gabo*, (Cambridge, Mass.: Harvard Univ. Press, 1957), p. 151; quoted in George Rickey, *Constructivism: Origins and Evolution*, (New York: George Braziller, 1967), p. 191.
- 11) Nash and Merkert, p. 205.
- 12) Nash and Merkert, p. 205.
- 13) H. H. Arnason, *History of Modern Art: Painting, Sculpture, Architecture, Photography*, Third ed. (New York: Harry N. Abrams, 1986), p. 229.
- 14) Arnason, p. 190.
- 15) Mark Foley, Forward to *Structure and Ornament: American Modernist Jewelry 1940-60*, (New York:

- Fifty-50, 1984), pp.2-3; quoted in Marcia Yockey Manhart, "Charting a New Educational Vision," *Craft in the Machine Age: the History of Twentieth-Century American Craft 1920-1945*, (New York: Harry N. Abrams, 1996), p. 70.
- 16) Arnason, pp. 324-325.
- 17) Laszlo Moholy-Nagy, *Vision in Motion*, (Chicago: Paul Theobald, 1947), p. 66; quoted in Manhart, p. 69.
- 18) Nash and Merkert, p. 25.
- 19) Herbert Read, "Constructivism: The Art of Naum Gabo and Antoine Pevsner," *Gabo-Pevsner*, (New York: The Museum of Modern Art, 1948), p. 10.
- 20) At first Naum went to the medical school, because Gabo's father decided Naum should become a doctor. Naum transferred to study of natural science in 1911. Nash and Merkert, p. 12. Naum Gabo, exhibition catalog., (Buffalo, NY.: Albright-Knox Art Gallery, 1968), p. 10
- 21) In *Fundamental Concepts of Art history* (1915), Wofflin developed dealing with the art history of style: the linear vs. the painterly, vision of surface vs. vision of depth, open vs. closed forms, multiplicity vs. unity, absolute vs. relative clarity. W. Eugene Kleinbauer, "Principles of Art History," *Modern Perspectives in Western Art History*, (Toronto: Univ. of Toronto Press, 1989), pp. 154-157.
- 22) John E. Bowl, "The Presence of Absence: The Aesthetic of Transparency in Russian Modernism," *The Structurist*, 27/28, 1987-1988, p. 19.
- 23) Bowl, p. 19.
- 24) Nash and Merkert, p. 35.
- 25) Ruth Olson and Abraham Chanin, "Naum Gabo," *Gabo-Pevsner*, (New York: The Museum of Modern Art, 1948), p. 17.
- 26) Olson and Chanin, p. 17.
- 27) Nash and Merkert, p. 50.
- Arnason, p. 192.
- 28) Nash and Merkert, p. 50.
- 29) Nash and Merkert, p. 49.
- 30) Nash and Merkert, p. 49.
- 31) Gabo wrote about Cubism and Futurism in 1971 as "My task was to study mainly the classics. Of course, I knew about Cubism and Futurism but at that time they did not attract my interest..." Nash and Merkert, p. 49.
- 32) Nash and Merkert, pp. 15-16.
- 33) Naum Gabo, Ben Nicholson and J. L. Martin, eds., *Circle: International Survey of Constructive Art*, (London: Faber & Faber, 1937). quoted in George Rickey, pp. 26-27. Nash and Merkert, p. 34.
- 34) Nash and Merkert, p. 25.
- 35) Nash and Merkert, p. 50.
- 36) Stephen Kem, *The Culture of Time and Space 1880-1918*, (Cambridge, Mass.: Harvard Uni. Press, 1983), p. 206.
- 37) Kern, p. 206.
- 38) Stangos, p. 214.
- 39) Olson and Chanin, p. 18.
- 40) Nash and Merkert, p.21.
- 41) Gabo discusses the relationship between art and science in the following book. Naum Gabo, *Of Divers Arts*, (Princeton, NJ.: Princeton Uni. Press, 1962).

## Bibliography

- Arnason, H. H., *History of Modern Art: Painting, Sculpture, Architecture, Photography*. Third ed. New York: Harry N. Abrams, 1986.
- Atkins, Robert. *Art Spoke: A Guide to Modern Idea, Movements, and Buzzwords 1848-1944*. New York: Abbeville Press, 1993.
- Bowl, John E., "The Presence of Absence: The Aesthetic of Transparency in Russian Modernism," *The Structurist*. 27/28, 1987-1988.
- Foley, Mark. *Forward to Structure and Ornament:*



- American Modernist Jewelry 1940-60*. New York: Fifty-50, 1984.
- Gabo, Naum. *Of Divers Arts*. Princeton, NJ.: Princeton Uni. Press, 1962.
- Gabo, Naum. "Realist Manifesto," *Gabo*. Cambridge, Mass.: Harvard Univ. Press, 1957.
- Gabo, Naum. Ben Nicholson and J. L. Martin, eds., *Circle: International Survey of Constructive Art*. London: Faber & Faber, 1937.
- Harrison, Charles and Paul Wood, ed. *Art in Theory 1900-1990: An Anthology of Changing Idea*. Cambridge, Mass.: Blackwell, 1994.
- Hughes, Robert. "Futurism," *Nothing If Not Critical: Selected Essays on Art and Artists*. New York: Penguin, 1990.
- Kem, Stephen. *The Culture of Time and Space 1880-1918*. Cambridge, Mass.: Harvard Uni. Press, 1983.
- Kleinbauer, W. Eugene. "Principles of Art History," *Modern Perspectives in Western Art History*. Toronto: Univ. of Toronto Press, 1989.
- Manhart, Marcia Yockey. "Charting a New Educational Vision," *Craft in the Machine Age: The History of Twentieth -Century American Craft 1920-1945*. New York: Harry N. Abrams, 1996.
- Moholy-Nagy, Laszlo. *Vision in Motion*. Chicago: Pau; Theobald, 1947.
- Nash, Steven A. and Jorn Merkert. *Naum Gabo: Sixty Years of Constructivism*. Munich: Prestel-Verlag, 1985.
- Naum Gabo. exhibition catalog. Buffalo, NY.: Albright-Knox Art Gallery, 1968.
- Olson, Ruth and Abraham Chanin. "Antonie Pevsner," *Gabo-Pevsner*. New York: The Museum of Modern Art, 1948.
- Rickey, George. *Constructivism: Origins and Evolution*. New York: George Braziller, 1967.
- Stangos, Nikos. *Concept of Modern Art: From Fauvism to Postmodernism*. New York: Thames and Hudson, 1994.
- Taylor, Joshua C., *Futurism*. New York, 1961.
- ## Illustrations
- (fig. 1) George Rickey, *Constructivism: Origins and Evolution*, (NewYork: George Braziller, 1967), p. 192.  
<http://monhistoiredelart.blogspot.com/2012/10/naum-gabo-lart-cinetique.html>
- (fig. 2) Robert Hughes, *The Shock of the New*, (New York: Alfred A. Knopf, 1991), p. 25.  
[https://en.wikipedia.org/wiki/Dynamism\\_of\\_a\\_Dog\\_on\\_a\\_Leash](https://en.wikipedia.org/wiki/Dynamism_of_a_Dog_on_a_Leash)
- (fig. 3) Anne D'Harnoncourt and Kynaston McShine, ed. *Marcel Duchamp*, (Munich: Prestel-Verlag, 1989), p. 292.  
<https://i.pinimg.com/iginals/53/7c/0c/537c0cf08e47ebb57edc996e880c6932.jpg>
- (fig. 4) Margot Lovejoy, *Postmodern Currents: Art and Artists in the Age of Electronic Media*, (Ann Arbor: UMI Research Press, 1989), p. 54.  
[https://en.wikipedia.org/wiki/Tatlin%27s\\_Tower](https://en.wikipedia.org/wiki/Tatlin%27s_Tower)
- (fig. 5) Lovejoy, p. 56.  
[https://monoskop.org/L%C3%A1szl%C3%B3\\_Moholy-Nagy](https://monoskop.org/L%C3%A1szl%C3%B3_Moholy-Nagy)
- (fig. 6) Steven A. Nash and Jorn Merkert, Naum Gabo: *Sixty Years of Constructivism*, (Munich: Prestel-Verlag, 1985), p. 115.  
<https://i.pinimg.com/originals/43/7c/bf/437cbffd07b697e96be123ca371146f0.jpg>
- (fig. 7) Nash and Merkert, p. 91.  
<https://i.pinimg.com/originals/0f/5e/50/0f5e509a908c132e4e29300b89a37864.jpg>
- (fig. 8) "Two Cubes," *Gabo*, (Cambridge, Mass., Harvard Uni. Press, 1957), p. 168.
- (fig. 9) Ruth Olson and Abraham Chanin, *Gabo-Pevsner*, (NewYork: The Museum of Modern Art, 1948), p. 18.